## DCC3260M - December 09, 2019

Item # DCC3260M was discontinued on December 09, 2019. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

## CMOS CAMERAS: USB 2.0 AND USB 3.0

► **Color, Monochrome, or NIR Sensors**
► **Versions with Global Shutter and Trigger Available**
► **1.3 Megapixels or 2.3 Megapixels**
► **USB 2.0 or USB 3.0 for Fast Data Acquisition**
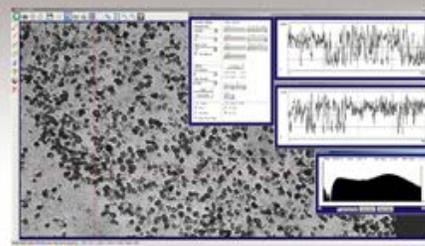
GUI and Software Package Included

**DCC1645C**
Powered via USB 2.0 Cable

**DCC1240C**
USB 2.0 with Trigger Input

**CS235CU**
USB 3.0 with Trigger Input

**DCC3260M**
High-Resolution
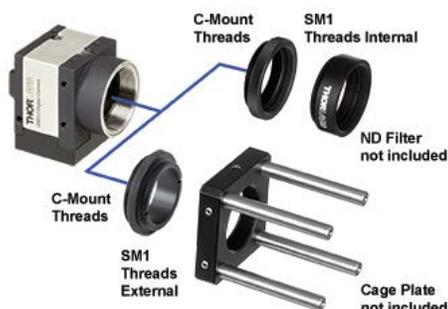USB 3.0 with Trigger

## OVERVIEW

### Features

- Easy to Use in a Wide Range of Applications from Microscopy to Monitoring
- Two Sensor Resolutions Available:
    - 1.3 Megapixel (1280 x 1024 Pixels) Monochrome, Color, and NIR CMOS Sensors
    - 2.3 Megapixel (1920 x 1200 Pixels or 1936 x 1216 Pixels) Monochrome and Color CMOS Sensors
- Available with Global Shutter and External Trigger
- ThorCam™ Software for Windows® 7 and 10 Operating Systems
- SDK and Programming Interfaces Provide Support for:
    - C, C++, C#, and Visual Basic .NET APIs
    - Python API for CS235MU and CS235CU Cameras
    - LabVIEW, MATLAB, and µManager Third-Party Software

**SM1 Thread Compatibility**

C-Mount Threads
SM1 Threads Internal
ND Filter not included
C-Mount Threads
SM1 Threads External
Cage Plate not included

Compatibility of the C-Mount CMOS Cameras with Thorlabs' SM1 internal or external threadings. Our CS-Mount Cameras feature the same compatibility.

These compact, lightweight CMOS cameras are available with either a monochrome (M models), color (C models), or NIR (N model) sensor. They can be used in a wide range of applications from microscopy to monitoring. Our CMOS cameras offer a full-frame resolution of 1280 x 1024 pixels, 1920 x 1200 pixels, or 1936 x 1216 pixels. All camera series are controlled and powered via a standard 5 V USB 2.0 or 3.0 port.

The DCC1545M and DCC1645C compact CMOS cameras have an electronic rolling shutter and their small footprints make them ideal for applications where space is a premium. The DCC1240 and DCC3240 high-sensitivity CMOS cameras include CMOS sensors that allow for switching between rolling and global shutter mode, offer a considerably higher dynamic range, and include an input for an external trigger. Finally, the CS235xU and DCC3260 CMOS cameras have a 2.3 megapixel resolution sensor, very low read noise of <7 e⁻ and also include an input for external triggering. The CS235xU CMOS cameras offer improved thermal management, reduced dark current, lower trigger latency, and added optomechanical compatibility compared to the DCC2360 cameras.

A brief comparison of the features available in each model is presented in the table below. For a detailed list of specifications, see the *Specs* tab.

For quantitative applications requiring low noise, high quantum efficiency cameras, consider our Quantalux® sCMOS and Kiralux™ CMOS Cameras.

**USB and Trigger Cables**
For the DCC1240 cameras, optional CAB-DCU-T1 and CAB-DCU-T2 USB and trigger cables allow one to use the additional trigger input and output ports (T1 and T2) of these cameras together with the USB 2.0 connection. The exposure and readout/transfer events of the camera can be initiated via the input trigger, and external events like strobe lights can be triggered by the camera using the output trigger. The CAB-DCU-T3 GPIO cable can be used with the USB 3.0 cameras as an additional means of connecting and triggering peripheral devices. The trigger configuration (i.e., the source of the input trigger and the timing for the output trigger) can be set via the provided software or the LabVIEW drivers.

**Software**
Each camera also comes with ThorCam, our Windows-compatible GUI software package. Standard drivers like Direct Show (WDM) and .NET are provided and offer support for LabVIEW. An extensive SDK is available. The C/C++ drivers can additionally be imported to Matlab using MEX files.

| Item # | DCC1545M | DCC1645C | DCC1240M | DCC1240C | DCC3240M | DCC3240C | DCC3240N | CS235MU | CS235CU | DCC3260M | DCC3260C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Resolution** | 1.3 Megapixels (1280 x 1024) | | | | | | | 2.3 Megapixels (1920 x 1200) | | 2.3 Megapixels (1936 x 1216) | |
| **Sensor** | Monochrome | Color | Monochrome | Color | Monochrome | Color | NIR | Monochrome | Color | Monochrome | Color |
| **Exposure Mode** | Rolling Shutter | | Global and Rolling Shutter | | | | | Global Shutter | | | |
| **Interface and Included Cable** | USB 2.0 | | | | USB 3.0 | | | | | | |
| **Input/Output Trigger** | No | | Yes | | Yes | | | | | | |

## SPECS

| Item #[a] | DCC1545M | DCC1645C | DCC1240M | DCC1240C | DCC3240M | DCC3240N | DCC3240C | CS235MU | CS235CU | DCC3260M | DCC3260C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sensor Type** | Monochrome | Color | Monochrome | Color | Monochrome | NIR Monochrome | Color | Monochrome | Color | Monochrome | Color |
| **Effective Number of Pixels (Horizontal x Vertical)** | 1280 x 1024 | | | | | | | 1920 x 1200 | | 1936 x 1216 Pixels | |
| **Imaging Area (Horizontal x Vertical)** | 6.66 mm x 5.32 mm | 4.61 mm x 3.69 mm | 6.78 mm x 5.43 mm | | 6.78 mm x 5.43 mm | | | 11.251 mm x 7.032 mm | | 11.340 mm x 7.130 mm | |
| **Pixel Size** | 5.2 µm, Square | 3.6 µm, Square | 5.3 µm, Square | | 5.3 µm, Square | | | 5.86 µm, Square | | | |
| **Optical Format** | 1/2" | 1/3" | 1/1.8" | | 1/1.8" | | | 1/1.2" | | | |
| **Max Frame Rate** | 25 fps | 24.9 fps | 25.8 fps (Freerun Mode) 24.7 fps (Trigger Mode) | | 60.0 fps (Freerun Mode) 56.9 fps (Trigger Mode) | | | 39.7 fps | | 41.0 fps | |
| **ADC[b] Resolution** | 8 Bits | | 8 Bits | | 10 Bits (8 Bits if Connected to USB 2.0) | | | 12 Bits | | 12 Bits (8 Bits if Connected to USB 2.0) | |
| **Sensor Shutter Type** | Rolling Shutter | | Global and Rolling Shutter | | Global and Rolling Shutter | | | Global Shutter | | | |
| **Peak Quantum Efficiency[c]** | 55% | N/A | 62% | 45% | 62% | 65% | 45% | 78% | N/A | 78% | 70% |
| **Read Noise** | <25 e⁻ RMS | | <30 e⁻ RMS | | <30 e⁻ RMS | | | <7 e⁻ RMS | | | |
| **Exposure Time** | 0.037 ms[d] - 983 ms[e] | 0.037 ms[d] - 10.122 s[e] | 0.009 ms[d] - 2 s[e] | | 0.009 ms[d] - 2 s[e] | | | 0.034 ms to 15167 ms in ~0.020 ms Increments | | 0.033 ms[d] - 30 s[e] | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Pixel Clock Speed** | 5 - 43 MHz | 5 - 40 MHz | 7 - 35 MHz | 5 - 85 MHz | 99 MHz | 30 - 118 MHz |
| **Vertical and Horizontal Hardware Binning** | Not Available | | Horizontal, Vertical | Horizontal, Vertical | 1 x 1 to 16 x 16 / 1 x 1 | Not Available |
| **Region of Interest (ROI)** | 4 x 32 Pixels to 1024 x 1280 Pixels, Rectangular | | 4 x 16 Pixels to 1024 x 1280 Pixels, Rectangular | 4 x 16 Pixels to 1024 x 1280 Pixels, Rectangular | 92 x 4 Pixels to 1920 x 1200 Pixels, Rectangular | 2 x 96 Pixels to 1216 x 1936 Pixels, Rectangular |
| **Lens Mount** | CS-Mount[f] | | C-Mount | C-Mount | C-Mount | |
| **Mounting Features** | 1/4"-20 Tap, 6 mm Deep[g] 8-32 (M4) Tap, 6.5 mm Deep w/ Included Adapters | | 8-32 Tap, 5 mm Deep[g] M4 Tap, 5 mm Deep[g] | 1/4"-20 Tap, 6 mm Deep[g] 8-32 (M4) Tap, 6.5 mm Deep w/ Included Adapters | Two 1/4"-20 Taps for Post Mounting, 30 mm Cage Compatible | 1/4"-20 Tap, 6 mm Deep[g] 8-32 (M4) Tap, 6.5 mm Deep w/ Included Adapters |
| **Removable Optic** | Uncoated Glass Filter (D263) / IR Filter D263 w/ HQ Coating | Uncoated Glass (D263) / IR Filter D263 w/ HQ Coating | Uncoated Glass (D263) | Uncoated Glass (D263) / IR Filter D263 w/ HQ Coating | Window, R$_{avg}$ < 0.5% per Surface (400 - 700 nm) / IR Blocking Filter | Uncoated Glass (D263) / IR Filter D263 w/ HQ Coating |
| **Interface** | USB 2.0 | | | USB 3.0[h] | USB 3.0 | USB 3.0[h] |
| **Power Consumption** | 0.5 - 1.0 W / 0.3 - 0.8 W | | 0.3 - 0.7 W | 1.3 W[i] | 3.25 W @ 39.7 fps (Full Sensor ROI) | 1.4 - 2.4 W |
| **Ambient Operating Temperature** | 23 to 122 °F (-5 to 50 °C) | | | | 50 to 104 °F (10 °C to 40 °C) (Non-Condensing) | 23 to 122 °F (-5 to 50 °C) |
| **Storage Temperature** | -4 to 140 °F (-20 to 60 °C) | | | | 32 to 131 °F (0 to 55 °C) | -4 to 140 °F (-20 to 60 °C) |

- a. The specified performance is valid when using a computer with the recommended specifications listed on the *Software* tab.
- b. ADC = Analog-to-Digital Converter
- c. Please see the *Graphs* tab for more information.
- d. Requires maximum pixel clock frequency.
- ^. Requires minimum pixel clock frequency.
- f. Please note that CS-Mount and C-Mount lens mounts both use 1.00"-32 threads but feature different flange-to-sensor distances.
- *. Be careful not to thread a screw longer than the depth of the tap into the camera housing, as this could lead to damage.
- @. A USB 2.0 connection can be used, but will significantly decrease the frame rate and will be limited to 8-bit depth operation.
- i. The power consumption depends on the sensor model and the pixel clock setting.

## GRAPHS

Graphs of the camera response as a function of wavelength are presented here as a comparison between the different camera lines available on this page. Individual sensitivity curves are provided in the tables below.
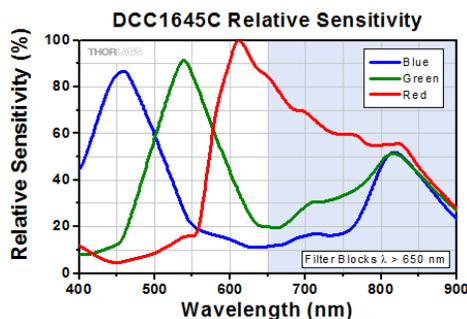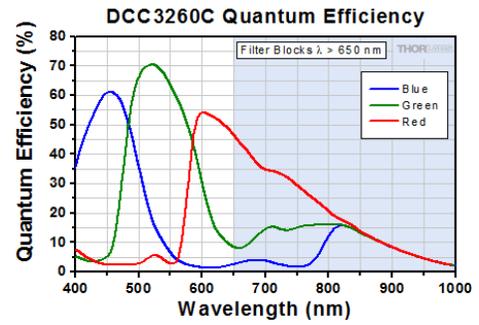


**DCC1645C Relative Sensitivity**

Click to Enlarge
The shaded blue region above 650 nm represents wavelengths blocked by a built-in IR shortpass filter.



**DCC1240C and DCC3240C Quantum Efficiency**

Click to Enlarge
The shaded blue region above 650 nm represents wavelengths blocked by a built-in IR shortpass filter.

**CS235CU Quantum Efficiency**



Click to Enlarge

The shaded blue region above 650 nm represents wavelengths blocked by a built-in IR shortpass filter.
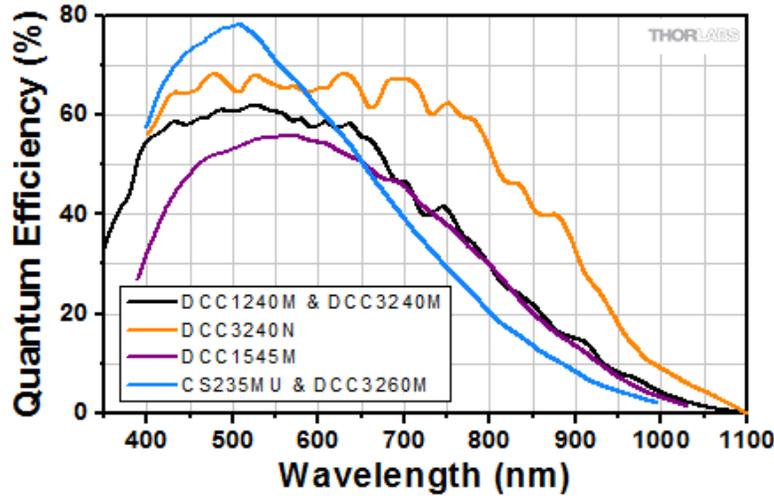
**DCC3260C Quantum Efficiency**
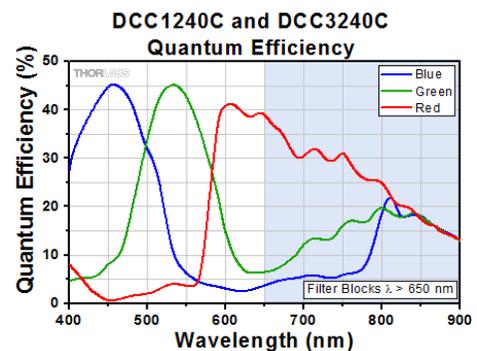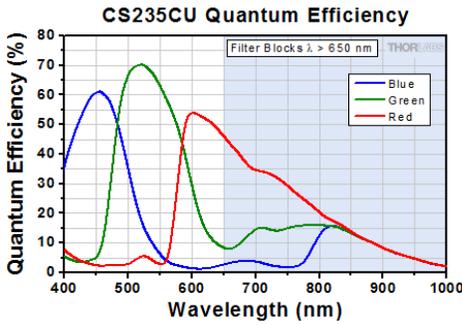


Click to Enlarge

The shaded blue region above 650 nm represents wavelengths blocked by a built-in IR shortpass filter.

**Quantum Efficiency of Monochrome Cameras**
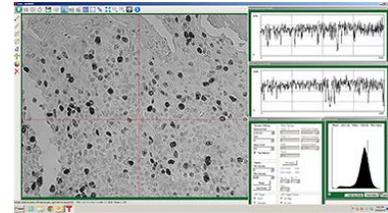


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## SHIPPING LIST

| | | Components Included with CMOS Cameras | | |
|---|---|---|---|---|
| Item # | Cable | Lens Mounting Adapters | Post Mounting Adapters | Other Accessories |
| DCC1545M | USB 2.0 | CS-Mount to External SM1 CS-Mount to Internal SM1 CS-Mount to C-Mount (Unanodized) | 8-32 and M4 Thread Adapters | Software CD with Manual Quick Start Guide |
| DCC1645C | | | | |
| DCC1240M | USB 2.0 | C-Mount to External SM1 C-Mount to Internal SM1 | - | |
| DCC1240C | | | | |
| DCC3240M | USB 3.0 | - | 8-32 and M4 Thread Adapters | |
| DCC3240C | | | | |
| DCC3240N | | | | |
| CS235MU | USB 3.0 | - | - | Software CD with Manual Quick Start Guide Wrench to Loosen Optical Assembly (Item # SPW502) Manual Download Information Card Lens Mount Dust Cap |
| CS235CU | | | | |
| DCC3260M | USB 3.0 | - | 8-32 and M4 Thread Adapters | Software CD with Manual Quick Start Guide |
| DCC3260C | | | | |

## ThorCam™

### Software
#### Version 3.3.1

Click the button below to visit the ThorCam software page.

Click to Enlarge
ThorCam Graphical User Interface (GUI)

Software

ThorCam is a powerful image acquisition software package that is designed for use with our cameras on 32- and 64-bit Windows® 7 or 10 systems. This intuitive, easy-to-use graphical interface provides camera control as well as the ability to acquire and play back images. Single image capture and image sequences are supported. Application programming interfaces (APIs) and a software development kit (SDK) are included for the development of custom applications by OEMs and developers. The SDK provides easy integration with a wide variety of programming languages, such as C, C++, C#, and Visual Basic .NET. Support for third-party software packages, such as LabVIEW, MATLAB, and µManager is available.

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## Compact USB 2.0 CMOS Cameras

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- ▶ Color and Monochrome Versions Available
- ▶ Electronic Rolling Shutter
- ▶ USB 2.0 Connection in an Ultra-Compact Housing
- ▶ 25 fps in Freerun Mode and over 200 fps with Limited Area of Interest
- ▶ Ships with USB 2.0 Cable

| Item # | DCC1545M | DCC1645C |
|---|---|---|
| CMOS Sensor Type | Monochrome | Color |
| Sensitivity Graph | | |
| Exposure Mode | Rolling Shutter | |
| Read Out Mode | Progressive Scan | |
| Resolution | 1280 x 1024 Pixels | |
| Optical Sensor Format | 1/2" | 1/3" |
| Pixel Clock Range[a] | 5 - 43 MHz | 5 - 40 MHz |
| Frame Rate, Freerun Mode[b] | 25 fps | |
| Trigger Input | None | |
| Lens Mounting Thread | CS-Mount (1.00"-32, 6.3 mm Deep)[c] | |
| Post Mounting Thread | 1/4"-20 Tap, 7 mm Deep[d] | |
| Dimensions (H x W x D) | 48.6 mm x 44 mm x 25.7 mm (1.91" x 1.73" x 1.01") | |
| Weight | 0.07 lbs (32 g) | |
| Included Adapters | CS-Mount to External SM1, CS-Mount to Internal SM1, CS-Mount to C-Mount[e], 1/4"-20 to 8-32, and 1/4"-20 to M4 | |

The DCC1545M and DCC1645C CMOS cameras operate with only a rolling shutter and feature an ultra-compact dustproof housing. Frame rates up to 250 fps are possible with a limited area of interest and sufficient light conditions. The small footprint and mini USB 2.0 connector at the side of the housing allow usage in setups where space is at a premium.

These cameras feature a CS-mount lens mounting thread. To equip any of our C-mount camera lenses, the included CML05 CS-mount to C-mount extension adapter is required to ensure that the sensor is in the focal plane of the camera lens.

In addition, the DCC1545M and DCC1645C cameras are also shipped with CS-mount to SM1 internal and CS-mount to SM1 external thread adapters. Additional compatible adapters are available at the bottom of the page. Two 1/4"-20 screw adapters are also included to allow the camera housing to be post mounted using 8-32 or M4 standard screws. Please note that larger lenses may need to be supported independently of the camera.

Our color CMOS cameras have an IR shortpass filter that cuts off transmission above 650 nm. Removing the filter will expose the CMOS sensor to the environment, which could result in dust entering the camera and causing the performance to deteriorate. For those who are very familiar with cameras and sensors, it is possible to change the filter yourself in a cleanroom environment. If you are not comfortable performing this procedure, please send the camera to Thorlabs where our skilled technicians have the tools to safely remove the filter without damaging the camera. Contact technical support for assistance.

- a. Depends on the PC hardware used.
- b. Requires maximum pixel clock frequency.
- c. Please note that CS-Mount and C-Mount lens mounts both use 1.00"-32 threads but feature different flange-to-sensor distances.
- d. Be careful not to thread a screw longer than the depth of the tap into the camera housing, as this could lead to damage.
- ^. The included CS to C-Mount adapter is not anodized. The black anodized CML05 adapter is available as a replacement or substitute.

These cameras are compatible with our C-Mount Camera Lenses and High-Magnification Zoom Lenses using the included CS to C-mount adapter. Our standard lenses include fixed focal lengths from 3.5 mm to 75 mm with maximum apertures of up to f/0.95, as well as an 18 - 108 mm focal length, f/2.5 zoom lens. Our high-magnification zoom lenses are a modular system that features magnifications from 0.07 to 28.

| Part Number | Description | Price | Availability |
|---|---|---|---|
| DCC1545M | USB 2.0 CMOS Camera, 1280 x 1024, Monochrome Sensor | $387.92 | Today |
| DCC1645C | USB 2.0 CMOS Camera, 1280 x 1024, Color Sensor | $387.92 | Today |

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## High-Sensitivity CMOS USB 2.0 Cameras with Global Shutter



Click to Enlarge
Back of Camera with
Input for External
Trigger

- Color and Monochrome Versions Available
- Global and Rolling Shutter Mode
- USB 2.0 Port Provides Power and Computer Interface
- 25.8 fps in Freerun Mode and up to 98 fps with Limited Area of Interest
- Trigger Input
- Ships with USB 2.0 Cable

| Item # | DCC1240M | DCC1240C |
|---|---|---|
| CMOS Sensor Type | Monochrome | Color |
| Sensitivity Graph |  |  |
| Exposure Mode | Global and Rolling Shutter | |
| Read Out Mode | Progressive Scan | |
| Resolution | 1280 x 1024 Pixels | |
| Optical Sensor Format | 1/1.8" | |
| Pixel Clock Range[a] | 7 - 35 MHz | |
| Frame Rate, Freerun Mode[b] | 25.8 fps | |
| Trigger Input | 9-Pin, D-Sub Connector | |
| Lens Mounting Thread | C-Mount (1.00"-32)[c] | |
| Post Mounting Threads | 8-32 and M4 Taps, 5 mm Deep[d] | |
| Dimensions (H x W x D) | 40.4 mm x 32.0 mm x 41.5 mm (1.59" x 1.26" x 1.63") | |
| Weight | 0.16 lbs (74 g) | |
| Included Adapters | C-Mount to External SM1 and C-Mount to Internal SM1 | |

The DCC1240M monochrome and DCC1240C color high-sensitivity USB 2.0 CMOS cameras include CMOS sensors that allow for switching between rolling and global shutter mode, offer a high dynamic range and include an input for an external trigger. The cameras are controlled and powered via a USB 2.0 connection. These cameras can achieve frame rates up to 98 fps (reduced ROI).

Each camera is shipped with C-mount to internal SM1 and C-mount to external SM1 adapters (also sold separately below). Taps in the bottom of the camera allow for post mounting with 8-32 or M4 screws.

Our color CMOS cameras have an IR shortpass filter that cuts off transmission above 650 nm. Removing the filter will expose the CMOS sensor to the environment, which could result in dust entering the camera and causing the performance to deteriorate. For those who are very familiar with cameras and sensors, it is possible to change the filter yourself in a cleanroom environment. If you are not comfortable performing this procedure, please send the camera to Thorlabs where our skilled technicians have the tools to safely remove the filter without damaging the camera. Contact technical support for assistance.

- [a] Depends on the PC hardware used.
- [b] Requires maximum pixel clock frequency.
- [c] Please note that CS-Mount and C-Mount lens mounts both use 1.00"-32 threads but feature different flange-to-sensor distances.
- [d] Be careful not to thread a screw longer than the depth of the tap into the camera housing, as this could lead to damage.

These cameras are fully compatible with our C-Mount Camera Lenses and High-Magnification Zoom Lenses that are sold separately. Our standard lenses include fixed focal lengths from 3.5 mm to 75 mm with maximum apertures of up to f/0.95, as well as an 18 - 108 mm focal length, f/2.5 zoom lens. Our high-magnification zoom lenses are a modular system that features magnifications from 0.07 to 28.

| Part Number | Description | Price | Availability |
|---|---|---|---|
| DCC1240M | Customer Inspired!&nbspHigh-Sensitivity USB 2.0 CMOS Camera, 1280 x 1024, Global Shutter, Monochrome Sensor | $1,267.56 | Today |
| DCC1240C | High-Sensitivity USB 2.0 CMOS Camera, 1280 x 1024, Global Shutter, Color Sensor | $1,267.56 | Today |

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## High-Sensitivity USB 3.0 CMOS Cameras with Global Shutter



Click to Enlarge

- Color, Monochrome, and NIR Versions Available
- Global and Rolling Shutter Modes
- USB 3.0 and GPIO Ports
- 60 fps in Freerun Mode and Capable of 229 fps with Limited Area of Interest
- Trigger Input

| Item # | DCC3240M | DCC3240C | DCC3240N |
|---|---|---|---|
| CMOS Sensor Type | Monochrome | Color | NIR Monochrome |
| Sensitivity Graph |  |  |  |
| Exposure Mode | Global and Rolling Shutter | | |
| Read Out Mode | Progressive Scan | | |

Ships with USB 3.0 Cable

The DCC3240M monochrome, DCC3240C color, and DCC3240N NIR cameras have a USB 3.0 connection for improved performance. Compared to the DCC1240, the DCC3240 cameras are capable of faster frame rates (25.8 fps vs. 60.0 fps in Free Run Mode) and lower trigger delays (as low as 3 µs vs 20 µs). Each camera is powered via the USB port and also has two GPIOs (General Purpose I/O) that allow the camera to serve as a trigger for peripheral devices. Faster than the DCC1240 cameras, they can achieve a maximum frame rate of 229 fps (limited ROI).

The front apertures of these cameras feature an internal C-mount thread. The bottom of the housing has a 6 mm deep 1/4"-20 tap, so adapters are included for easy post mounting using either the 8-32 or M4 standard. These cameras can also be connected to SM1-Threaded Lens Tubes using the adapters sold at the bottom of this page.

Our color CMOS cameras have an IR shortpass filter that cuts off transmission above 650 nm. Removing the filter will expose the CMOS sensor to the environment, which could result in dust entering the camera and causing the performance to deteriorate. For those who are very familiar with cameras and sensors, it is possible to change the filter yourself in a cleanroom environment. If you are not comfortable performing this procedure, please send the camera to Thorlabs where our skilled technicians have the tools to safely remove the filter without damaging the camera. Contact technical support for assistance.

These cameras are fully compatible with our C-Mount Camera Lenses and High-Magnification Zoom Lenses that are sold separately. Our standard lenses include fixed focal lengths from 3.5 mm to 75 mm with maximum apertures of up to f/0.95, as well as an 18 - 108 mm focal length, f/2.5 zoom lens. Our high-magnification zoom lenses are a modular system that features magnifications from 0.07 to 28.

| Resolution | 1280 x 1024 Pixels |
|---|---|
| Optical Sensor Format | 1/1.8" |
| Pixel Clock Range[a] | 5 - 85 MHz |
| Frame Rate, Freerun Mode[b] | 60.0 fps |
| Trigger Input | 8-Pin, Hirose Connector |
| Lens Mounting Thread | C-Mount (1.00"-32)[c] |
| Post Mounting Thread | 1/4"-20 Tap, 6 mm Deep[d] |
| Dimensions w/ Adapter Plate (H x W x D) | 35.0 mm x 29.0 mm x 46.4 mm (1.38" x 1.14" x 1.83") |
| Weight | 60 g (0.13 lbs) w/ Adapter Plate 43 g (0.09 lbs) w/o Adapter Plate |
| Included Adapters | 1/4"-20 to 8-32 and 1/4"-20 to M4 |

- a. Depends on the PC hardware used.
- b. Requires maximum pixel clock frequency.
- c. Please note that CS-Mount and C-Mount lens mounts both use 1.00"-32 threads but feature different flange-to-sensor distances.
- d. Be careful not to thread a screw longer than the depth of the tap into the camera housing, as this could lead to damage.

| Part Number | Description | Price | Availability |
|---|---|---|---|
| DCC3240M | High-Sensitivity USB 3.0 CMOS Camera, 1280 x 1024, Global Shutter, Monochrome Sensor | $1,376.83 | Today |
| DCC3240C | High-Sensitivity USB 3.0 CMOS Camera, 1280 x 1024, Global Shutter, Color Sensor | $1,376.83 | Today |
| DCC3240N | High-Sensitivity USB 3.0 CMOS Camera, 1280 x 1024, Global Shutter, NIR Sensor | $1,715.58 | Today |

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## Kiralux™ USB 3.0 CMOS Cameras with Global Shutter

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Four 4-40 tapped holes allow 30 mm Cage System components to be attached to the camera. Pictured is our CP13 Cage Plate with C-Mount threading.

- Monochrome or Color CMOS 1920 x 1200 Pixel (2.3 Megapixel) Sensor
- Global Shutter
- <7.0 e⁻ RMS Read Noise
- USB 3.0 Interface
- 39.7 fps Max Frame Rate (Full Sensor)
- Triggered and Bulb Exposure Modes
- Ships with USB 3.0 Cable

The CS235MU monochrome and CS235CU color cameras have a USB 3.0 connection for improved performance. Compared to the DCC3260M and DCC3260C cameras (sold below), these cameras are equipped with improved thermal management, reduced dark current, lower trigger latency, and added optomechanical compatibility. Included with each camera is our ThorCam software for use with Windows® 7 and 10 operating systems. We offer support for LabVIEW, MATLAB, Python, µManager, and .NET. Developers can leverage our fully featured API and SDK.

Each camera's aperture has SM1 (1.035"-40) threading for compatibility with Ø1" Lens Tubes; an adjustable C-Mount (1.000"-32) adapter is factory installed for out-of-the-box compatibility with many microscopes, machine vision camera lenses, and C-Mount extension

| Item #[a] | CS235MU | CS235CU |
|---|---|---|
| CMOS Sensor Type | Monochrome | Color |
| Sensitivity Graph | | |
| Exposure Mode | Global Shutter | |
| Read Noise | <7.0 e⁻ RMS | |
| Resolution | 1920 x 1200 Pixels | |
| Optical Sensor Format | 1/1.2" (13.4 mm Diagonal) | |
| Pixel Clock Speed | 99 MHz | |
| Max Frame Rate | 39.7 fps (Full Sensor) | |
| Trigger Input | 12-Pin, Hirose Connector | |
| Lens Mounting Thread | C-Mount (1.00"-32)[b] | |
| Mounting Features | Two 1/4"-20 Taps for Post Mounting 30 mm Cage Compatible | |
| Dimensions (H x W x D) | 47.6 mm x 60.3 mm x 76.7 mm (1.88" x 2.38" x 3.02") | |
| Weight | 260 g (0.57 lbs) | |

- a. Please see the complete specifications at the full web presentation. The specified performance is valid when using a computer with the recommended specifications

tubes. The monochrome camera features a clear window, while the color camera features an IR blocking filter. Each optic can be removed and replaced with another Ø25 mm or Ø1" optic up to 1.27 mm thick when using the camera's C-mount adapter. Without this adapter, the maximum filter thickness is 4.4 mm.

Four 4-40 tapped holes provide compatibility with our 30 mm cage system. Two 1/4"-20 tapped holes on opposite sides of the housing are compatible with imperial Ø1" pedestal or pillar posts. The combination of flexible mounting options and compact size makes these cameras the ideal choice for integrating into home-built imaging systems as well as those based on commercial microscopes.

- listed on the *Software* tab on the full web presentation page.
- à Please note that CS-Mount and C-Mount lens mounts both use 1.00"-32 threads but feature different flange-to-sensor distances.

| Part Number | Description | Price | Availability |
|---|---|---|---|
| CS235MU | Kiralux™ 2.3 Megapixel Monochrome CMOS Camera, USB 3.0 Interface | $1,749.97 | Today |
| CS235CU | Kiralux™ 2.3 Megapixel Color CMOS Camera, USB 3.0 Interface | $1,749.97 | Today |

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# HD-Resolution, Low-Noise USB 3.0 CMOS Cameras with Global Shutter


Click to Enlarge

- Color and Monochrome Versions Available
- Global Shutter Exposure Mode
- Very Low Read Noise: <7 e⁻
- USB 3.0 and GPIO Ports
- 41.0 fps in Freerun Mode
- Trigger Input
- Ships with USB 3.0 Cable

| Item # | DCC3260M | DCC3260C |
|---|---|---|
| Sensor Type | Monochrome | Color |
| Sensitivity Graph |  |  |
| Exposure Mode | Global Shutter | |
| Read Out Mode | Progressive Scan | |
| Resolution | 1936 x 1216 Pixels | |
| Optical Sensor Format | 1/1.2" | |
| Pixel Clock Range[a] | 30 - 118 MHz | |
| Frame Rate, Freerun Mode[b] | 41.0 fps | |
| Trigger Input | 8-Pin, Hirose Connector | |
| Lens Mounting Thread | C-Mount (1.00"-32)[c] | |
| Post Mounting Thread | 1/4"-20 Tap, 6 mm Deep[d] | |
| Dimensions w/ Adapter Plate (H x W x D) | 35.0 mm x 29.0 mm x 42.6 mm (1.38" x 1.14" x 1.67") | |
| Weight | 60 g (0.13 lbs) w/ Adapter Plate 52 g (0.11 lbs) w/o Adapter Plate | |
| Included Adapters | 1/4"-20 to 8-32 and 1/4"-20 to M4 | |

The DCC3260M monochrome and DCC3260C color cameras have a USB 3.0 connection for improved performance. Compared to the DCC1240 and DCC3240 cameras, these cameras are equipped with a high-resolution 2.3 megapixel Sony IMX249 CMOS sensor (1936 x 1216 pixels resolution) with an 11.340 mm x 7.130 mm active sensor area. Each camera is powered via the USB port and also has two GPIOs (General Purpose I/O) that allow the camera to serve as a trigger for peripheral devices. At the highest resolution, these cameras operate at 41 fps, faster than video-rate cameras.

The front aperture of each camera features an internal C-mount thread. The bottom of the housing has a 6 mm deep 1/4"-20 tap, so adapters are included for easy post mounting using either the 8-32 or M4 standard. These cameras can also be connected to SM1-Threaded Lens Tubes using the adapters sold at the bottom of this page.

Our color CMOS cameras have an IR shortpass filter that cuts off transmission above 650 nm. Removing the filter will expose the CMOS sensor to the environment, which could result in dust entering the camera and causing the performance to deteriorate. For those who are very familiar with cameras and sensors, it is possible to change the filter yourself in a cleanroom environment. If you are not comfortable performing this procedure, please send the camera to Thorlabs where our skilled technicians have the tools to safely remove the filter without damaging the camera. Contact technical support for assistance.

These cameras are fully compatible with most of our C-Mount Camera Lenses and High-Magnification Zoom Lenses that are sold separately. Prior to purchasing the desired camera lens, please contact Tech Support to verify compatibility with your camera. Our standard lenses include fixed focal lengths from 3.5 mm to 75 mm with maximum apertures of up to f/0.95, as well as an 18 - 108 mm focal length, f/2.5 zoom lens. Our high-magnification zoom lenses are a modular system that features magnifications from 0.07 - 28.

Thorlabs also offers Kiralux™ 2.3 MP CMOS Cameras with improved thermal management, reduced dark current, lower trigger latency, and added optomechanical compatibility.

- a Depends on the PC hardware used.
- à Requires maximum pixel clock frequency.
- & Please note that CS-Mount and C-Mount lens mounts both use 1.00"-32 threads but feature different flange-to-sensor distances.
- à Be careful not to thread a screw longer than the depth of the tap into the camera housing, as this could lead to damage.

The DCC3260M and DCC3260C cameras will be retired when stock is depleted. If you require these parts for line production, please contact our OEM Team. As potential replacements, please see our CS235MU and CS235CU cameras.
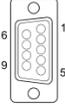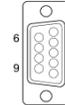
Limited STOCK

| Part Number | Description | Price | Availability |
|---|---|---|---|

| DCC3260M | High-Resolution USB 3.0 CMOS Camera, 1936 x 1216, Global Shutter, Monochrome Sensor | $1,830.05 | 5-8 Days |
|---|---|---|---|
| DCC3260C | High-Resolution USB 3.0 CMOS Camera, 1936 x 1216, Global Shutter, Color Sensor | $1,830.05 | 5-8 Days |

## USB and Trigger Cables for DCC Series Cameras

| Item # | CAB-DCU-T1 | | Pin | Assignment |
|---|---|---|---|---|
| | Connector Device Side | Micro Sub-D, 90° Angled | 2 | Trigger Input + |
| | Connector PC Side | USB 2.0 A Male | 3 | Shield |
| | USB Standard | Hi-Speed USB2.0 | 4 | USB +5 V |
| | Trigger In (Bare Wire) | x | 5 | USB GND |
| Click to Enlarge | Flash & Digital Out (Bare Wire) | x | 6 | Flash Strobe Output + |
| | Wire Gauge USB | 24AWG/2C and 28AWG/1PR | 7 | Trigger Input - |
| | Shielding | Double Shielded 80 °C 30 V | 8 | USB D+ |
| | Length | 3 m | 9 | USB D- |

| Item # | CAB-DCU-T2 | | Pin | Assignment |
|---|---|---|---|---|
| | Connector Device Side | Micro Sub-D, Straight | 2 | Trigger Input + |
| | Connector PC Side | USB 2.0 A Male | 3 | Shield |
| | USB Standard | Hi-Speed USB2.0 | 4 | USB +5 V |
| | Trigger In (Bare Wire) | x | 5 | USB GND |
| Click to Enlarge | Flash & Digital Out (Bare Wire) | - | 6 | Not Connected |
| | Wire Gauge USB | 24AWG/2C and 28AWG/1PR | 7 | Trigger Input - |
| | Shielding | Double Shielded 80 °C 30 V | 8 | USB D+ |
| | Length | 3 m | 9 | USB D- |

| Item # | CAB-DCU-T3 | | Pin | Assignment |
|---|---|---|---|---|
| | Connector Device Side | Hirose HR25-7TP-8S | 2 | Flash Output[a] |
| | End Opposite Connectors | Tinned End of Wires | 3 | GPIO 1, 3.3 V LVCMOS |
| | Function | GPIO | 4 | Trigger Input[a] - |
| | Trigger In (Bare Wire) | yes | 5 | Flash Output[a] + |
| Click to Enlarge | Flash & Digital Out (Bare Wire) | yes | 6 | GPIO 2, 3.3 V LVCMOS |
| | Cable Type | Shielded High-Flexible Control Cable 8 x 0.1 mm, Ø4.9 mm | 7 | Trigger Input[a] + |
| | Shielding | Single Shielded | 8 | Output Supply Voltage, 5 V (100 mA) |
| | Length | 2 m | 9 | N/A |

- a. These pins are opto-decoupled inside the camera to protect against high or incorrect voltages.

| Part Number | Description | Price | Availability |
|---|---|---|---|
| CAB-DCU-T1 | Customer Inspired!&nbspUSB and Trigger Cable (In/Out) for DCU Series and DCC1240 Cameras, 3 m | $145.33 | Today |
| CAB-DCU-T2 | Customer Inspired!&nbspUSB and Trigger Cable (In Only) for DCU Series and DCC1240 Cameras, 3 m | $85.23 | Today |
| CAB-DCU-T3 | Trigger and I/O Cable, Hirose 25, for DCC3240, DCC3260, WFS30 and WFS40, 2 m | $103.81 | Today |

## Optional Accessories for Kiralux™ USB 3.0 CMOS Cameras

Click to Enlarge

Click to Enlarge

These optional accessories allow for easy use of the auxiliary port of our compact scientific (Quantalux® sCMOS & Kiralux™ CMOS) or scientific CCD cameras. These items should be considered when it is necessary to externally trigger the camera, to monitor camera performance with an oscilloscope, or for simultaneous control of the camera with other instruments.

For our USB 3.0 cameras, we also offer a PCIe USB 3.0 card and extra cables for facilitating the connection to the computer.

Click for Details
A schematic showing a TSI-IOBOB2 connected to an Arduino to trigger a compact scientific camera.

**Auxiliary I/O Cable (8050-CAB1)**
The 8050-CAB1 is a 10' (3 m) long cable that mates with the auxiliary connector on our scientific cameras* and provides the ability to externally trigger the camera as well as monitor status output signals. One end of the cable features a male 12-pin connector for connecting to the camera, while the other end has a male 6-pin Mini Din connector for connecting to external devices. This cable is ideal for use with our interconnect break-out boards described below. For information on the pin layout, please see the *Pin Diagrams* tab above.

*The 8050-CAB1 cable is not compatible with our former-generation 1500M series cameras.

**Interconnect Break-Out Board (TSI-IOBOB)**
The TSI-IOBOB is designed to "break out" the 6-pin Mini Din connector found on our scientific camera auxiliary cables into five SMA connectors. The SMA connectors can then be connected using SMA cables to other devices to provide a trigger input to the camera or to monitor camera performance. The pin configurations are listed on the *Pin Diagrams* tab above.

**Interconnect Break-Out Board / Shield for Arduino (TSI-IOBOB2)**
The TSI-IOBOB2 offers the same breakout functionality of the camera signals as the TSI-IOBOB. Additionally, it functions as a shield for Arduino, by placing the TSI-IOBOB2 shield on a Arduino board supporting the Arduino Uno Rev. 3 form factor. While the camera inputs and outputs are 5 V TTL, the TSI-IOBOB2 features bi-directional logic level converters to enable compatibility with Arduino boards operating on either 5 V or 3.3 V logic. Sample programs for controlling the scientific camera are available for download from our software page, and are also described in the manual (found by clicking on the red Docs icon below). For more information on Arduino, or for information on purchasing an Arduino board, please see www.arduino.cc.

The image to the right shows a schematic of a configuration with the TSI-IOBOB2 with an Arduino board integrated into a camera imaging system. The camera is connected to the break-out board using a 8050-CAB1 cable that must be purchased separately. The pins on the shield can be used to deliver signals to simultaneously control other peripheral devices, such as light sources, shutters, or motion control devices. Once the control program is written to the Arduino board, the USB connection to the host PC can be removed, allowing for a stand-alone system control platform; alternately, the USB connection can be left in place to allow for two-way communication between the Arduino and the PC. The compact size of 2.70" x 2.10" (68.6 mm x 53.3 mm) also aids in keeping systems based on the TSI-IOBOB2 compact.

**USB 3.0 Camera Accessories (USB3-MBA-118 and USB3-PCIE)**
We also offer a USB 3.0 A to Micro B cable for connecting our cameras to a PC (please note that one cable is included with each USB 3.0 camera). The cable measures 118" long and features screws on either side of the Micro B connector that mate with tapped holes on the camera for securing the USB cable to the camera housing. When operating USB 3.0 cameras it is strongly recommended that the Thorlabs-supplied USB 3.0 cable be used, with the retention screws securely fastened. Due to the high data rates involved, users may experience problems when using generic USB 3.0 cables.

Cameras with USB 3.0 connectivity may be connected directly to the USB 3.0 port on a laptop or desktop computer. USB 3.0 cameras are not compatible with USB 2.0 ports. Host-side USB 3.0 ports are often blue in color, although they may also be black in color, and typically marked "SS" for SuperSpeed. A USB 3.0 PCIe card is sold separately for computers without an integrated Intel USB 3.0 controller. Note that the use of a USB hub may impact performance. A dedicated connection to the PC is preferred.

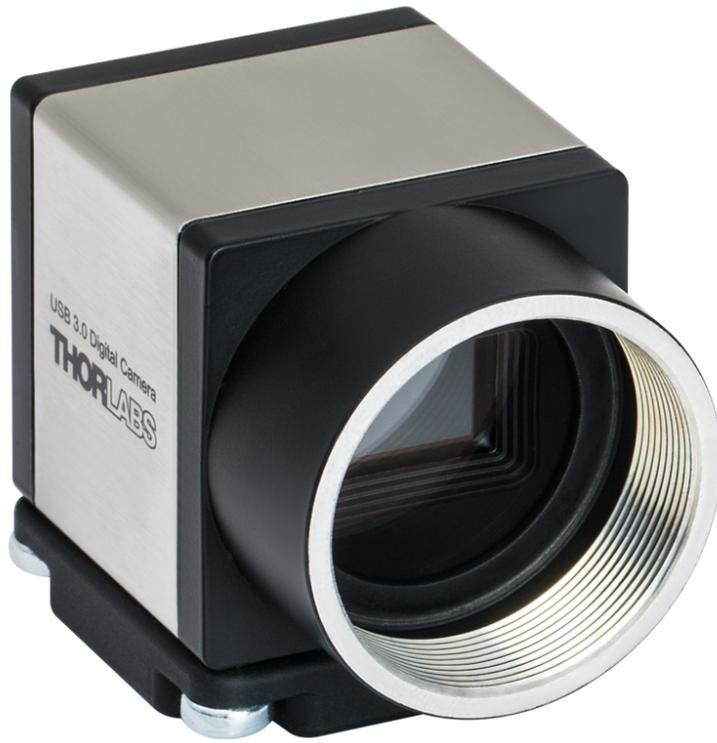| Part Number | Description | Price | Availability |
|---|---|---|---|
| 8050-CAB1 | I/O Cable for Scientific CCD and Compact Scientific Cameras | $76.49 | Today |
| TSI-IOBOB | I/O Break-Out Board for Scientific CCD and Compact Scientific Cameras | $68.96 | Today |
| TSI-IOBOB2 | Customer Inspired!&nbspI/O Break-Out Board for Scientific CCD and Compact Scientific Cameras with Shield for Arduino (Arduino Board not Included) | $99.06 | 5-8 Days |
| USB3-MBA-118 | USB 3.0 A to Micro B Cable, Length: 118" (3 m) | $38.69 | Today |
| USB3-PCIE | USB 3.0 PCI Express Expansion Card | $66.28 | Today |

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## Camera Thread Adapters

Please note that the CML05 CS-Mount to C-Mount Adapter has external and internal 1.00"-32 threading. It allows CS-Mount camera bodies, such as the DCC1545M or DCC1645C, to be used with lenses designed for C-Mount camera bodies by extending the flange-to-sensor distance by 5 mm.

| Item # | CML05 | SM1A9 | SM1A9TS[a] | SM1A39 |
|---|---|---|---|---|
| Image (Click To Enlarge) |  |  |  |  |
| Thread 1 | External 1.00"-32 Threads, Compatible with CS-Mount[b] | External C-Mount (1.00"-32) | | |
| Thread 2 | Internal C-Mount (1.00"-32) | Internal SM1 (1.035"-40) | | External SM1 (1.035"-40) |
| Material | Anodized Aluminum | | Black Delrin | Anodized Aluminum |
| Typical Application | Mount a C-Mount Camera Lens to a CS-Mount Camera | Mount a C-Mount Camera to an Externally Threaded SM1 Lens Tube | Mount a C-Mount Camera to an Externally Threaded SM1 Lens Tube | Mount a C-Mount Camera to an Internally Threaded SM1 Lens Tube |

- a. Thermally Insulating Adapter
- b. Please note that CS-Mount and C-Mount lens mounts both use 1.00"-32 threads but feature different flange-to-sensor distances.

| Part Number | Description | Price | Availability |
|---|---|---|---|
| CML05 | **CS- to C-Mount Extension Adapter, 1.00"-32 Threaded, 5 mm Length** | $18.46 | Today |
| SM1A9 | **Adapter with External C-Mount Threads and Internal SM1 Threads** | $19.96 | Today |
| SM1A9TS | **Customer Inspired!&nbspThermally Insulating Adapter with External C-Mount Threads and Internal SM1 Threads** | $23.61 | Today |
| SM1A39 | **Customer Inspired!&nbspAdapter with External C-Mount Threads and External SM1 Threads** | $21.21 | Today |

## DCC3260M Quantum Efficiency