RT sCMOS Camera

Hardware Guide

IMAGING™
Take a closer look

NOTES

RT sCMOS CAMERA USER GUIDE

CONTENTS:

WHAT'S IN THE BOX

- Camera (with C-mount dust cap)
- USB 3.0 cable, Type-A to micro-B (locking), 3m
- Hardware guide
- Warranty card

Minimum system required for operating this camera

- An Intel-based computer running Microsoft Windows 7 (or later) or Apple OS X 10.8 (or later).
- One available USB 3.0 (SuperSpeed) port that supports the full USB 3.0 power output of 900ma at 5V.
- An Intel Core i3, i5 or i7 processor (4-core i5 or above preferred)
- 4 GB RAM (8 GB preferred)
- A monitor with resolution of 1024 x 768 (1920 x 1080 or higher preferred)

REGULATORY AND COMPLIANCE NOTES

This equipment complies with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

The equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This product is in conformity with the

- EMC Directive (EMC) 2014/30/EU,
- Low Voltage Directive (LVD) 2014/35/EU, and the
- Restriction of Hazardous Substances (RoHS) Directive 2011/65/EU and carries the CE mark accordingly.

This product has been assessed and determined compliant with the following standards:

EMC: EN 55022:2010/AC:2011, EN 55024:2010

LVD: EN 60950-1:2006/A11:2009/A1:2010/A12:2011/A2:2013

NOTE: this product is exempt from the Low Voltage Equipment Directive due to the fact that its operating voltage is below the minimum applicable input voltage range described in 2014/35/EU, Article 1.

RoHS: EN 50581:2012

This camera is designed for research and industrial imaging applications including the imaging of macroscopic and microscopic specimens. It is the responsibility of the user to qualify that this product meets the requirements for their application. In no event and under no circumstances shall the manufacturer be liable to an individual or entity for any indirect, special, consequential or incidental losses or damages, including without limitation, lost profits.

WEEE – Disposal of Electronic Equipment

This symbol on the camera indicates that it shall not be treated as household waste. To ensure that this electronic equipment will be treated properly, hand over the camera at end-of-life to the applicable collection point for the recycling of electrical or electronic equipment.

For more detailed information about recycling of this product, please contact your local Civic Office, your household waste disposal service or the dealer where you purchased this product.

SAFETY INSTRUCTIONS

- Read these instructions
- Save these instructions
- Follow these instructions

- Install in accordance with the manufacturer's instructions.
- Only use the attachments/accessories specified by the manufacturer.
- Do not attempt to use this product in any manner not specified by the manufacturer, as manufacturer will not be held responsible.
- Do not remove the camera covers, as this will void the warranty.
- This product is designed for indoor use only. Do not expose to rain or excessive moisture.
- Do not expose the camera to dripping or splashing. Do not place objects filled with liquids such as vases, cups, etc. on or over the camera (e.g. on shelves above the unit).
- Do not install the camera near heat sources such as radiators, heat registers, stoves, or other apparatus that produce heat.
- Do not cover the camera with cloth or other materials like plastic while plugged in.
- Do not install in excessively dusty places.
- Avoid impact shock or excessive vibration.
- Be sure there is proper and adequate ventilation where the camera is installed to minimize the risk of fire when using flammable liquids.
- If you smell smoke or other odors coming from the camera or hear strange sounds, turn off camera power and contact customer service.
- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such when liquid has been spilled into the camera, the camera has been exposed to rain or excessive moisture, has been dropped, or does not operate normally.
- There are no consumable materials associated with the camera.

CONNECTING THE CAMERA TO A MICROSCOPE

1. Select the correct C-mount optical adapter (sold separately) to fit the photo port on your microscope.
2. Unscrew the C-mount dust cap from the camera.
3. Screw the C-mount optical adapter into the camera. BE GENTLE! When started correctly, the adapter should easily thread into the camera.
4. Insert the optical adapter (with the camera attached) into the photo port of the microscope and tighten into place using the locking screw on the photo port.

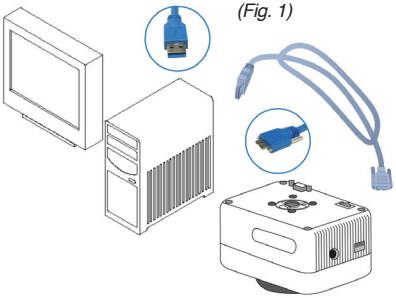
CONNECTING THE CAMERA TO A COMPUTER

1. Install SPOT Software before connecting the camera to a computer.

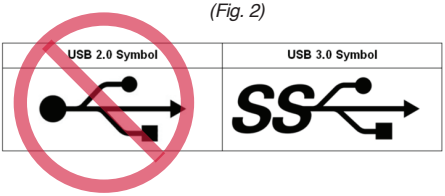
2. A USB 3.0 Type-A-to-micro B (locking) cable is supplied to connect the camera to your computer. (Fig. 1)
    a. One end of the cable has a micro-B connector with two thumb screws for locking the cable to the camera.
    b. The other end of the cable has a type-A connector for connection to your computer.

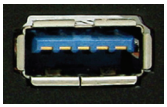
3. Plug the type-A connector into a USB 3.0 port on your computer. Do NOT plug the cable into a USB 2.0 port! The camera will NOT function when plugged into a USB 2.0 port.

(Fig. 1)



(Fig. 2)





(Fig. 3)

    a. Windows PC users: Your computer will have a mixture of USB 2.0 and USB 3.0 ports. The correct port will be identified by the USB 3.0 “SuperSpeed” Symbol. (Fig. 2) or a blue tongue (Fig. 3)

    b. Mac users: Apple does not use the USB 3.0 “SuperSpeed” Symbol or blue tongue connectors on their Mac computers that have USB 3.0 ports. They continue to use the older USB 2.0 Symbol even on USB 3.0 ports. To determine if the USB ports on your Mac computer are USB 3.0 go to Apple Menu > About This Mac > Overview > System Report > Hardware > USB > USB Device Tree and see if you have a “USB 3.0 Bus”. If so, all of your USB ports will be USB 3.0.

    c. The USB ports on tablet computers and some laptop computers may not be able to supply enough power to run the camera. In this case you will have to use the optional power supply or connect the camera to a “powered” USB 3.0 hub.

4. Plug the micro-B connector into the camera and tighten the two thumbscrews.

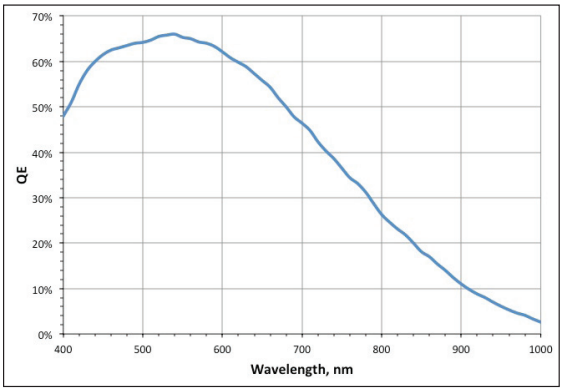
SPECIFICATIONS MODEL RT39M5

Sensor	
Sensor Type	Monochrome
Resolution	5 MP
Live Image Resolution, No Binning	5 MP
Live Image Frame Rate	36 f/s
Live Image Resolution, 2 x 2 Binning	1.25 MP
Live Image Frame Rate, 2 x 2 Binning	70 f/s
Sensor	Sony Pregius™ CMOS, Back Illuminated Enhanced Near-IR, 6th Generation
Sensor P/N	Sony IMX250
Active Pixels	2448 x 2048
Sensor Size	8.47mm x 7.07mm
Pixel Size	3.45µm
Aspect Ratio	6:5
Sensor Diagonal	11.0mm
Optical Format	2/3"
Electronic Shutter	Global
Peak QE	66% at 520nm
QE in NIR	26% at 800nm
Camera	
Lens Mount	C-mount
Computer Interface	USB 3.0
Full Well	10,500 e
Read Noise	2 e
Dynamic Range	74 dB
A-D Bit Depth	12-bit
Analog Gain	1, 2, 4, 8
Analog + Digital Gain	16, 32, 64, 128, 251
Binning	2 x 2
Cooling Technology	Thermoelectric cooler, fan-cooled heatsink, **software fan/ cooler disable**
Cooling	-20˚C (-40˚C differential from 20˚C ambient)
Temperature Readout	In SPOT software
Dark Current	TBD
Exposure Time Range (TBD)	28µs to 60 min
Exposure while Downloading	Automatic
ROI (Region of Interest)	User selectable

SPECIFICATIONS *Continued*

Trigger I/O	Trigger Ready Out Trigger In Synch Out 0 Synch Out 1 Synch Out 2 Synch Out 3 (optically isolated, requires external power supply)
Trigger I/O Cable	Optional, Catalog: STDTRIG1
Power Requirements	TBD
Power Supply	Brick, External 5V DC, 6A (included)
Power Plug	2.5mm x 5.5mm
ON-OFF Switch	Yes
Tripod Mount	Optional, Catalog: QUARTER20AP
Camera USB Connector	USB 3.0 micro-B (locking)
Camera USB Cable (included)	USB 3.0, 3m (10ft), Type-A to Micro-B (locking) cable
Regulatory	CE, FCC Class A, EN60950, RoHS
SPOT Software Application	Windows / Mac
SDK Support	Windows / Mac / Linux
Wide Field Adapter	0.55X C-Mount Adapter (optional)
Model	RT39M5
Weight	2.35 lbs (1.65 kg)

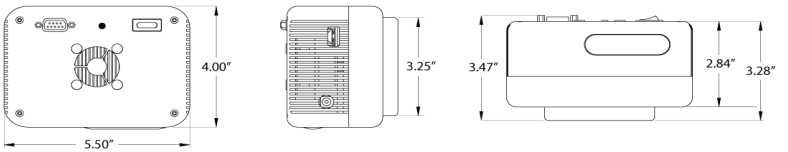
Quantum Efficiency



The suggested applications for this camera include:

Cell Biology
- Spinning Disk Confocal
- High Speed Multicolor Fluorescence
- FRAP

Intrinsic Imaging
- Ion Transport Physiology
- Electrophysiology
- Calcium Imaging
- Ratiometrics Imaging
- Voltage Sensitive Dyes



TROUBLESHOOTING GUIDE

If you run into problems using the SPOT RT sCMOS camera:

Issue	Possible Cause	Suggested Remedy
Upon launching the SPOT software application, "Image Too Dim" message appears	Microscope light may be directed to eyepieces instead of photo port	Position microscope beam splitter to direct light to photo port instead of eye-pieces (refer to your micro-scope hardware guide)
	Microscope Neutral Density filters may be blocking too much light	Experiment with different level ND filters that may allow more light to reach the camera
	Specimen may be very dim	• Increase microscope light to the specimen, or • Increase the gain setting
Black live image window (no message appears)	Light may be directed to the eyepieces instead of the photo port	Position microscope beam splitter to direct light to photo port (refer to your microscope hardware guide)
	Objective may be out of position	Be sure objective turret is in proper position to allow light to pass through
During imaging session, "No Cameras or Interface Card Found" message appears	USB3 camera cable may have become unplugged from the computer port	Reseat the USB3 cable at both ends (camera and computer)
	Using a USB 3.0 cable other than the one tested and approved by SPOT Imaging	Try using the tested and approved USB3 cable included in the SPOT camera box
	A USB 3.0 cable more than 3 meters in length that has not been tested and approved by SPOT Imaging	A tested and approved 5 meter USB 3.0 cable is available from SPOT Imaging

PART NUMBERS

RT sCMOS camera RT39M5

USB 3.0 cable, Type-A to micro-B (locking), 3m (9 ft.) USB3AMB3M

Optional Accessories

USB 3.0 cable, Type-A to micro-B (locking), 5m (15 ft.) USB3AMB5M

Power Supply for camera ..... *#CCPS

Tripod Mount QUARTER20IN

USB 3.0 PCI Express Computer Interface Card USB3PCIE

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