BCIR1(/M)
SWIR Camera Beam Profiler

User Guide



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Chapter 1 Introduction

1.1 Intended Use

The BCIR1 SWIR Camera Beam Profiler is designed for laboratory use to measure the shape, size, and position of laser beams. The device may not be used or integrated into equipment that is applied in pharmaceutical, medical, or military applications.

The product may only be used in accordance with the instructions described in this manual. Any other use will invalidate the warranty.

1.2 Explanation of Safety Warnings

NOTICE Indicates information considered important, but not hazard-related, such as possible damage to the product.


Caution


Shock Warning


The CE marking on the product is the manufacturer's declaration that the product complies with the essential requirements of the relevant European health, safety, and environmental protection legislation.


The wheelie bin symbol on the product, the accessories or packaging indicates that this device must not be treated as unsorted municipal waste but must be collected separately.

1.3 Description

The BCIR1 Shortwave Infrared (SWIR) Camera Beam Profiler enables the identification of complex beam mode patterns, such as flat-top or donut profiles, while optimizing a laser system. In contrast to scanning slit beam profilers (e.g., the Thorlabs **BP209 Series**), camera-based profilers provide a true two-dimensional analysis of the beam's power density distribution with higher detail.

The BCIR1(/M) SWIR Camera Beam Profiler is designed for applications in the SWIR spectral range. It combines high resolution with a large field of view and offers excellent thermal stability. For comparison, the **BC207 and BC210C Camera Beam Profilers** provide similar performance in other wavelength ranges.

Several trigger modes are available to support the characterization of pulsed light sources. These include an LVTTL input for external trigger signals.

For warnings and safety information concerning this product, please see Chapter 2.

1.4 Technical Data

1.4.1 Specifications

All technical data are valid at 23 ± 5 °C and 45 ± 15% relative humidity (non-condensing).

Item #	BCIR1(/M)
Camera Beam Profiler Specifications	
Wavelength Range	1050 - 1700 nm
Power Range	1 µW - 1 W[a,b]
Beam Diameter	120 µm - 15.0 mm
Compatible Light Sources	CW, Pulsed
Absorptive Neutral Density Filters	
Nominal Attenuation Values	10 dB, 20 dB, 30 dB, 40 dB, 50 dB, 60 dB
AR Coating Wavelength Range	1050 - 1700 nm
Sensor	
Chip	1.3 MP onsemi Acuros 1280, 24.6 mm Diagonal, Cover Glass With Interference Fringe Suppression
Sensor Size	19.2 mm x 15.4 mm[c]
Pixel Size	15 µm x 15 µm
Resolution (Max)	1280 x 1024 pixel, ROI Selectable
Pixel Operability	99.9% (Typ) 99.75% (Min)
Temperature Stabilization	Single-Stage Thermo-Electric Cooler
Camera	
Shutter	Global
Binning	1 x 1; 2 x 2; 4 x 4; 8 x 8; 16 x 16
Frame Rate @ Full Resolution	18 fps (Max)[d]
Frame Rate @ 640 x 512 Pixels	>28 fps[d]
Frame Rate @ 320 x 256 Pixels	>36 fps[d]
Pulse Frequency	< 1 kHz (Single Pulse Detection, Pulse Width > 0.5 ms) > 10 kHz (Multi-Pulse Detection)
Image Digitization	14 Bit
Temporal Signal-to-Noise Ratio	≤60 dB[e]
Spatial Signal-to-Noise Ratio (Typical)	>45 dB[e]
Exposure Range	0.65 - 30 ms
Image Capture Modes	Single Frame, Continuous, Hardware Triggered
Sensor Distance to Front Filter Holder Surface	17.4 mm (0.69")
Warm-Up Time for Rated Accuracy	10 min

Item #	BCIR1(/M)
Interfaces	
Trigger Input	0 – 3.3 V (LVTTL), BNC Jack; TTL Compatible, Low: 0 to +0.8 V High: 2.0 V to 5.5 V
Trigger Delay	250 µs
Pulse Width	1 µs (Min)
PC Interface	USB 3.0 (Micro-B)
General	
Power Supply Output Voltage Range	6 - 16 VDC
Power Consumption	6.5 W - 12 W
Included Power Supply	12.0 VDC, 24 W
Operating Temperature	10 to 35 °C
Storage Temperature	0 to 55 °C
Mounting Holes	Imperial: 1/4"-20 Metric: M6 x 1.0
Size (H x W x D) Incl. Filter Wheel	101.4 mm x 84.8 mm x 102.6 mm (3.99'' x 3.34'' x 4.04'')
Weight	630 g (1.39 lbs)

a. For 1 mm Beam Diameter at 1550 nm
b. The neutral density filter will begin to heat up and can be damaged if exposed to incident powers above 1 W for more than a few seconds.
c. The corners of the sensor are obstructed by the Ø23 mm input aperture.
d. Actual performance depends strongly on the host PC's CPU/GPU capabilities and the size of the calculation area.
e. Electrical dB

BCIR1(/M)		
Name	**Item #**	**Filter Type**
10 dB	NENIR10B	AR-Coated Absorptive Neutral Density Filter, 1050 - 1700 nm, OD: 1.0[f]
20 dB	NENIR20B	AR-Coated Absorptive Neutral Density Filter, 1050 - 1700 nm, OD: 2.0[f]
30 dB	NENIR30B	AR-Coated Absorptive Neutral Density Filter, 1050 - 1700 nm, OD: 3.0[f]
40 dB	NENIR40B	AR-Coated Absorptive Neutral Density Filter, 1050 - 1700 nm, OD: 4.0[f]
50 dB	NENIR50B	AR-Coated Absorptive Neutral Density Filter, 1050 - 1700 nm, OD: 5.0[f]
60 dB	NENIR60B	AR-Coated Absorptive Neutral Density Filter, 1050 - 1700 nm, OD: 6.0[f]

f. Nominal

Table 1 Specifications of the Filter Wheel

1.4.2 Graphs

Wavelength Dependent Sensitivity

Figure 1 shows the typical relative wavelength response of the BCIR1(/M) SWIR Camera Beam Profiler.

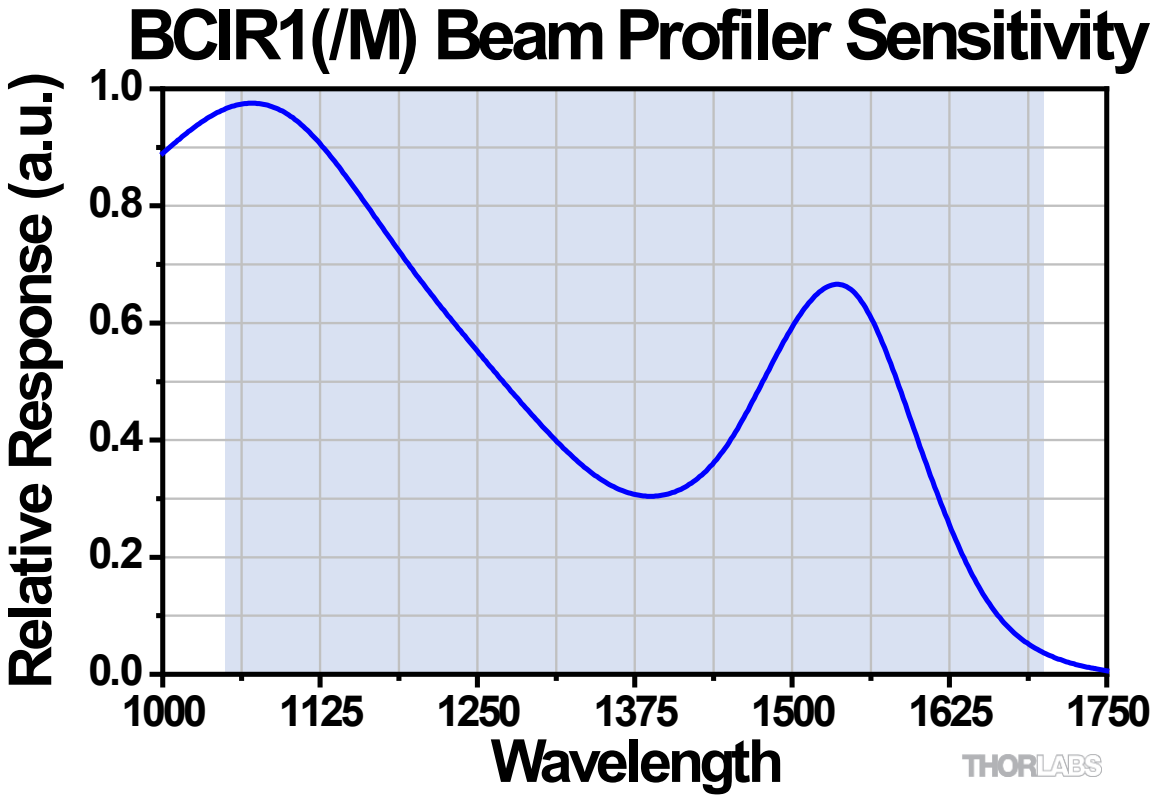


Figure 1 Relative Response

This responsivity diagram is measured without any neutral density filter. The blue shaded region represents the operating wavelength range of the beam profiler.

Power Range

The BCIR1(/M) SWIR Camera Beam Profiler features local maxima of responsivity at 1064 and 1550 nm. Figure 2 refers to both wavelengths.

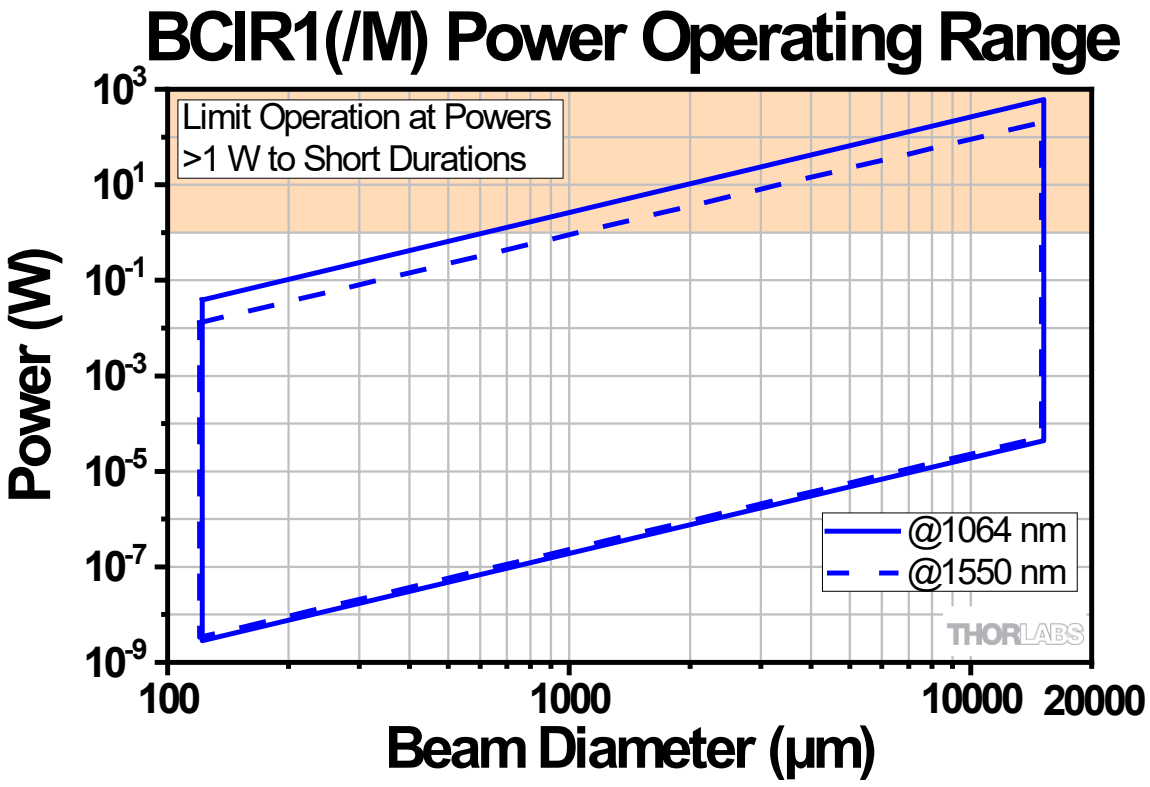


Figure 2 Power Operating Range

The range indicated by the lines represents the operating power range of the BCIR1(/M) SWIR Camera Beam Profiler, including the attenuation effects of the integrated ND filters. Higher input powers require the use of filters with greater attenuation, while beams with lower power densities should be measured using filters with lower attenuation levels.

Please note that the diagram (see Figure 2) reflects the operating power range at specific wavelengths. For other wavelengths, the power range may shift toward higher values. Therefore, adjustments must be made according to the sensor's wavelength-dependent response curve.

1.4.3 Mechanical Drawings

The imperial version has a 1/4''-20 tapped mounting hole while metric devices have a M6 x 1.0 tapped mounting hole.

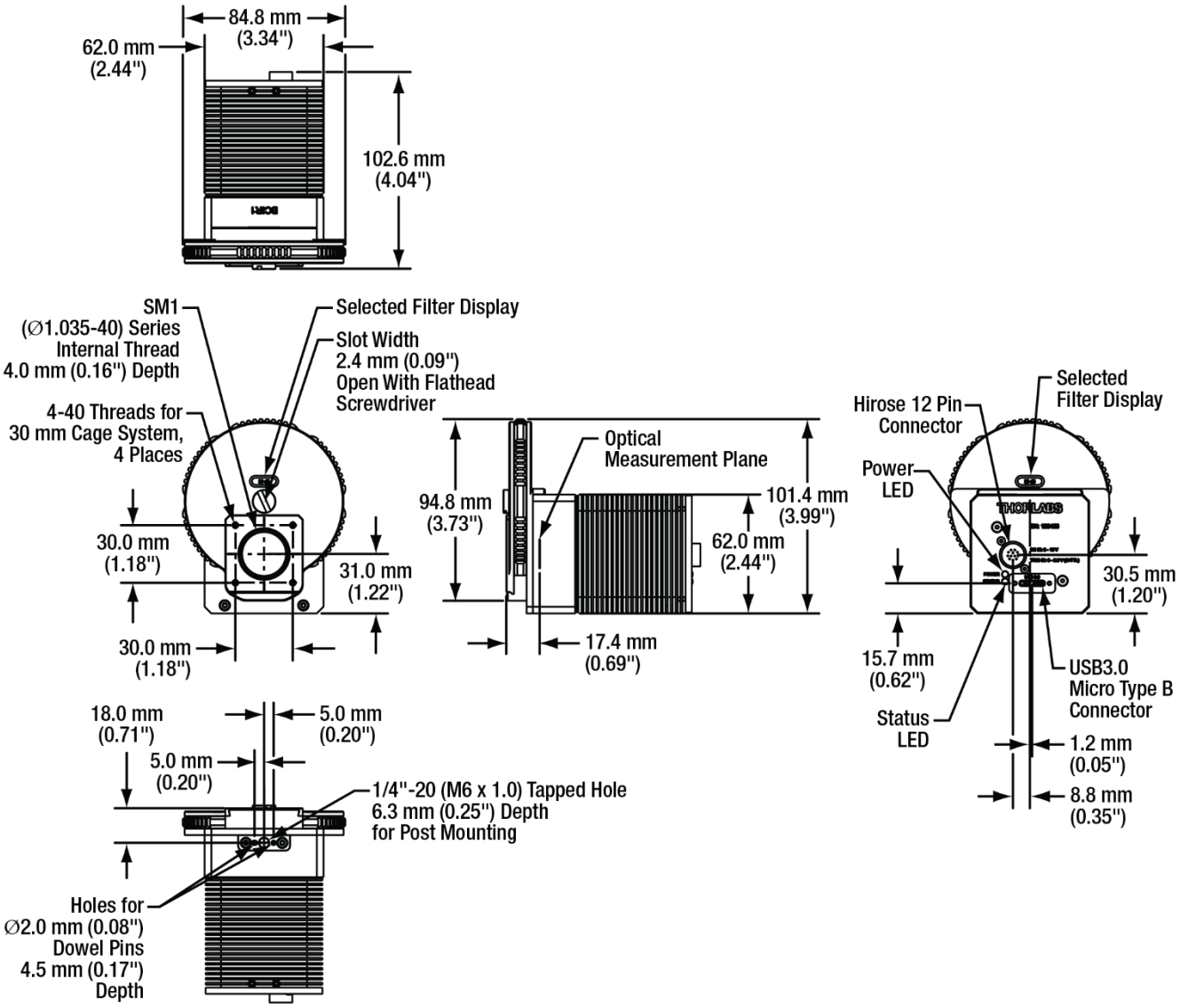


Figure 3 Mechanical Drawing for the BCIR1(/M) SWIR Camera Beam Profiler

1.5 Components

The figures below label the components of the BCIR1(/M) SWIR Camera Beam Profiler. Except for the mounting thread, both versions are identical.

Front Panel

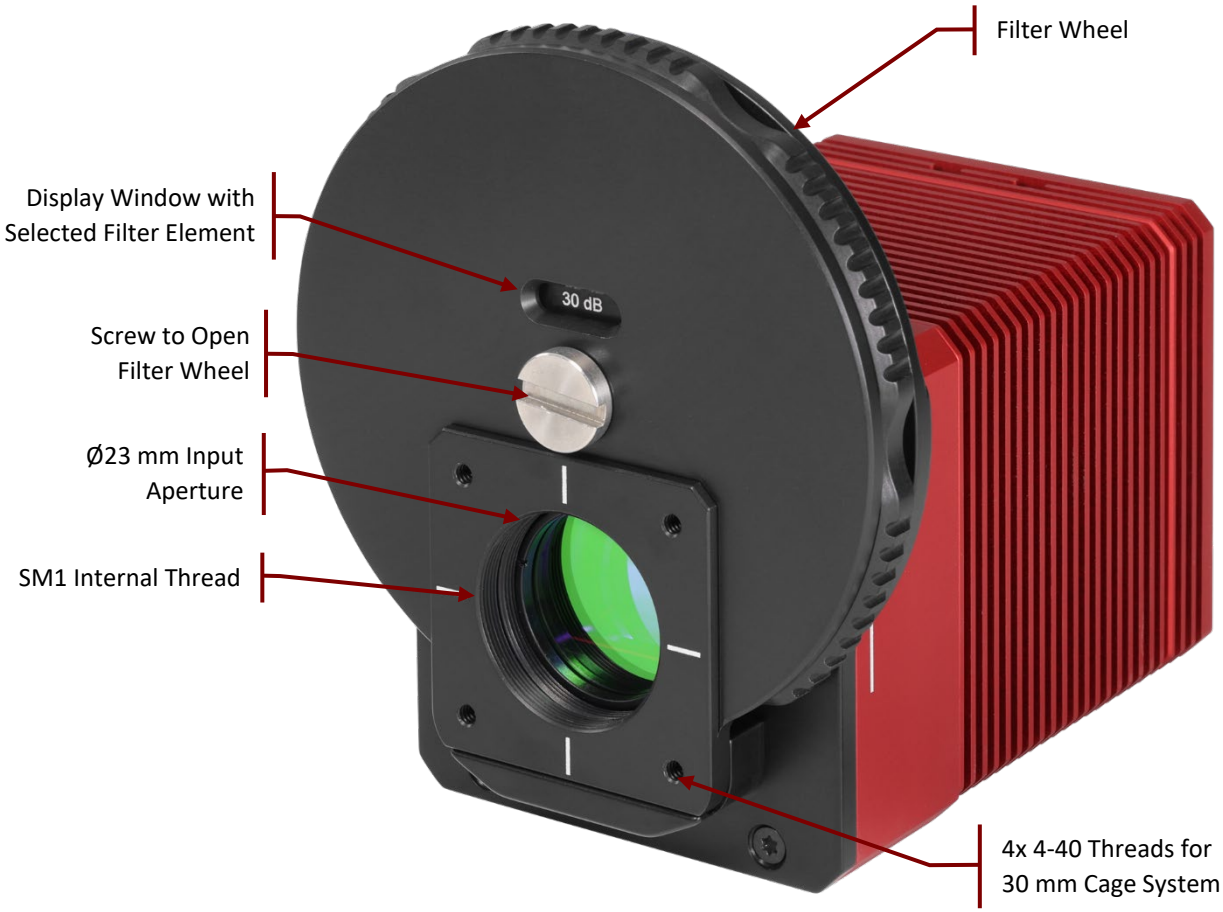


Figure 4 Front Panel of the BCIR1(/M) SWIR Camera Beam Profiler

Rear Panel



Figure 5 Rear Panel of the BCIR1(/M) SWIR Camera Beam Profiler

Bottom

A 1/4"-20 (M6 x 1.0) mounting thread is provided on the bottom of the BCIR1(/M) SWIR Camera Beam Profiler for post-mounting:

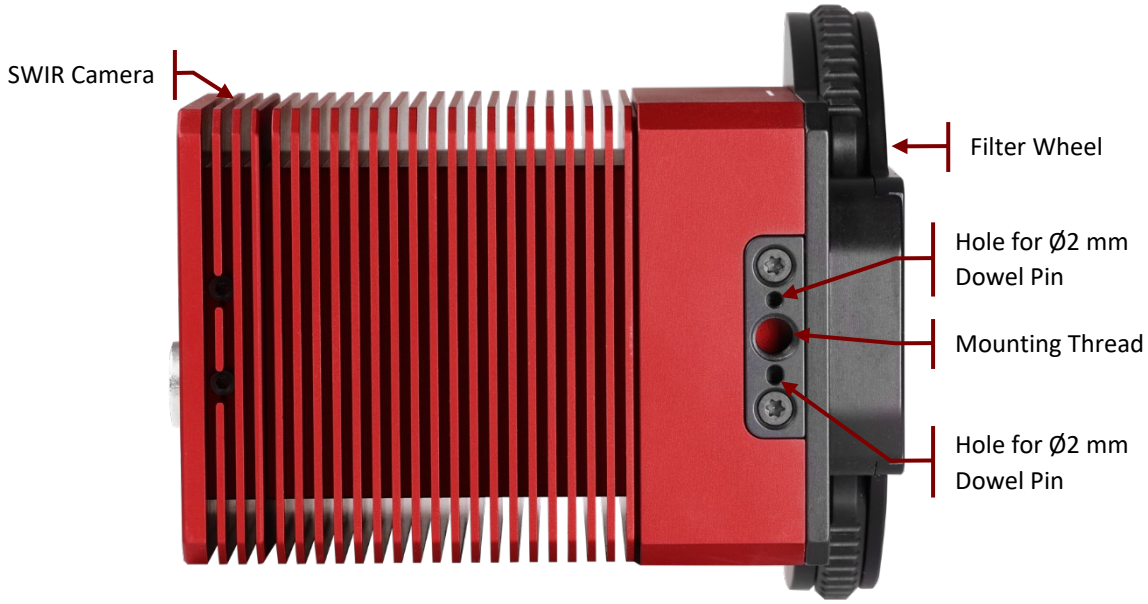


Figure 6 Bottom of the BCIR1(/M) SWIR Camera Beam Profiler

Sensor Position

The sensor is centered relative to the mounting thread holes on the bottom of the device. Its distance from the front surface of the filter wheel is 17.4 mm (0.69"). This position is marked by a fine white line engraved on the housing and is labeled in the drawings as “Optical Measurement Plane”. For exact details, see Section 1.4.3.

1.6 Simplified Declaration of Conformity

The full text of the EU declaration of conformity is available at the following internet address:

https://www.thorlabs.com/newgrouppage9.cfm?objectgroup_id=17830

1.7 FCC Designation

Class A FCC Designation

Note: This equipment has been tested and found to comply 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. This 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.

Chapter 2 Safety

The safety of any system incorporating the equipment is the responsibility of the assembler of the system.

All statements regarding safety of operation and technical data in this instruction manual will only apply when the unit is operated correctly as it was intended.



WARNING: Risk of Serious Injury and Even Death Due to Electrical Shock
Improper grounding and connecting the power supply to the mains can cause electric shock. Electric shock results in damage to your health or even death.
Before turning on the BCIR1(/M) SWIR Camera Beam Profiler, verify that the line voltage range marked on the power supply matches your local supply voltage.



WARNING: Risk of Serious Injury and Even Death Due to Explosion
The BCIR1(/M) SWIR Camera Beam Profiler must not be operated in explosion endangered environments.



CAUTION: Risk of Serious Injuries of Incorrect Use
Pay attention to the following aspects during use:

- Do not obstruct the cooling fins of the housing.
- Do not remove covers or open the device. There are no user-serviceable parts inside.
- Refer servicing to qualified personnel.
- Changes to this BCIR1(/M) SWIR Camera Beam Profiler cannot be made nor may components not supplied by Thorlabs be used without written consent from Thorlabs.

NOTICE

NOTICE: Electrically Sensitive Product
Mobile telephones, cellular phones, or other radio transmitters are not to be used within the range of three meters of this unit since the electromagnetic field intensity may then exceed the maximum allowed disturbance values according to IEC 61326-1.
The BCIR1(/M) SWIR Camera Beam Profiler has been tested and found to comply with the limits according to IEC 61326-1 for using connection cables shorter than 3 m (9.8 ft).

- The instrument must only be operated with a duly shielded and low-resistance USB cable delivered by Thorlabs.
- Only connect duly shielded BNC cables to the BNC connector.

Chapter 3 Installation

3.1 Warranty Information

Thorlabs warrants material and production of the BCIR1(/M) SWIR Camera Beam Profiler for a period of 24 months starting with the date of shipment in accordance with and subject to the terms and conditions set forth in Thorlabs' General Terms and Conditions of Sale which can be found at:

General Terms and Conditions:

https://www.thorlabs.com/Images/PDF/LG-PO-001_Thorlabs_terms_and_%20agreements.pdf

and

https://www.thorlabs.com/images/PDF/Terms%20and%20Conditions%20of%20Sales_Thorlabs

3.2 Packing List

The following items are included in the package:

- BCIR1(/M) SWIR Camera Beam Profiler with SM1EC2B Snap-On Cap
- CABU31 USB 3.0 A to Micro B Cable, Length: 3 m
- Hirose 12-pin Y cable
- Power Supply with Plug Options for North America, Europe, the United Kingdom, Australia and China
- Quick Reference

3.3 Unpacking Instructions

Please inspect the shipping container for damage. Please do not cut through the cardboard, as the box might be needed for storage or returns.

If the shipping container appears to be damaged, keep it until you have inspected the contents for completeness and tested the BCIR1(/M) SWIR Camera Beam Profiler mechanically and electrically.

Verify that you have received the items listed in the Section 3.2 within the package.

3.4 Power Supply

Safety Information

For warnings and safety information related to the power supply, see Chapter 2.

NOTICE

NOTICE: Risk of Damaging the Power Supply
Covering and improper maintenance of the power supply can cause damage to the power supply.
To avoid damage to the power supply, note the following:

- Do not remove any covers.
- Do not cover the power supply.
- Maintain the power supply only by qualified personnel.

NOTICE

NOTICE: Risk of Damaging the Power Supply
Shorting issues can cause damage to the power supply and the BCIR1(/M) SWIR Camera Beam Profiler under test.
To avoid possible damage due to short-circuit problems, make sure that the output plug is connected to the BCIR1(/M) SWIR Camera Beam Profiler under test before switching on the power supply.

Common Causes of Fuse Failure

This unit does not give access to change the fuse. Listed below are common causes of fuse failure:

- Output Short Circuit
- Output Overload

There are two elements utilized to provide safety protection:

- **Short-Circuit Current Limit:** Uses a low dropout regulator with internal current limit circuit to protect against high-load current faults or shorting events.
- **Thermal Fuse:** Uses a thermally sensitive element, which melts and opens the circuit when high temperature is present.

3.5 Installation Instructions

3.5.1 Hardware

Follow the steps below to install and connect the BCIR1(/M) SWIR Camera Beam Profiler for operation.

1. Mount the BCIR1(/M) SWIR Camera Beam Profiler securely using the mounting thread at the bottom of the device.
2. Download Thorlabs Beam Software (Version 9.3 or higher) from the Thorlabs website and install it on your PC.
    - For installation details, refer to the BC207 and BC210C Series Camera Beam Profiler **User Guide**.
3. Connect the BCIR1(/M) SWIR Camera Beam Profiler to the PC using the supplied USB 3.0 cable (see Section 3.5.2).
4. Connect the Hirose 12-pin cable to the BCIR1(/M) SWIR Camera Beam Profiler.
5. Install the correct region-specific plug plate into the power supply and plug it into an AC outlet.
6. Plug the power supply into an AC source.
    - Use international plug adapters if required.
7. Plug the power supply cable into the mating DC jack of the Hirose 12-pin Y cable.
8. Launch the Beam Software.
9. With the dust cap still on the beam profiler, adjust the BCIR1(/M) SWIR Camera Beam Profiler so that its optical aperture is aligned with the incident beam path.
10. Ensure that the instrument is operated within its specified power range.
    - Verify the output power of your light source.
    - Select an attenuation filter suitable for the applied laser power.

- Always start with the maximum attenuation to avoid damage.
- If necessary, use additional external attenuation to remain within the specified range.

11. Remove the dust cap.
12. Minimize ambient light entering the aperture of the beam profiler.
13. Switch on the light source.
14. Align the beam to be measured so that it is perpendicular to the front face of the Beam Profiler.
15. For accurate quantitative measurements, allow the beam profiler to stabilize thermally for at least 10 minutes.

3.5.2 Connection to the PC

Follow the steps below to connect the BCIR1(/M) SWIR Camera Beam Profiler to your PC.

1. Connect the BCIR1(/M) SWIR Camera Beam Profiler to a SuperSpeed USB 3.0 port on your PC.
   - Use only the supplied cable or a cable qualified for the SuperSpeed USB 3.0 standard.
2. Wait for the operating system to automatically load the required USB drivers.
   - An icon in the taskbar indicates that the driver installation is in progress.
3. Verify the driver installation:
   - Open the Control Panel from the Start menu.
   - Select Device Manager.
   - Confirm that the instrument is listed.
4. If the instrument does not appear, refer to Chapter 7.

Please note that recognition of the camera by the host PC may take up to 60 s.

3.6 Return of Devices

This precision device is only serviceable if returned and properly packed into the complete, original packaging including the cardboard insert that holds the enclosed devices.

Chapter 4 Operation

4.1 Operation Principle

The BCIR1(/M) SWIR Camera Beam Profiler captures a 2D image of the beam's irradiance on a pixel array, providing the full beam profile in a single shot - no slit or knife-edge scanning required. Complex beam shapes and alignment changes can be viewed and recorded in real time.

A manually indexed, six-position neutral density (ND) filter wheel is mounted at the front of the instrument. The filters provide 10 - 60 dB attenuation and feature AR coatings to suppress interference fringes.

At its core is a large-area colloidal quantum-dot photodiode sensor. Its broad spectral response and high dynamic range make it well-suited for SWIR laser beam profiling. The sensor cover glass is engineered to minimize interference fringes.

4.2 Indication of Status & Power LED

With the Beam Software installed and the BCIR1(/M) SWIR Camera Beam Profiler connected, the Power LED and the Status LED illuminate solid green. During data transfer between the host and the camera, the USB LED additionally blinks yellow.

The table below summarizes the LED status indicators.

LED	State	Description
POWER	Green	Power is Supplied[a]
	Yellow	The Backup Load is Running
	Off	USB is not Connected
USB	Yellow (Blinking)	Indicates Traffic Between the Video Interface and the Host
	Yellow (Solid)	Indicates a Connection of any Speed has been Established, but the Power Connector is Not Receiving Power
	Green (Solid)	SuperSpeed (USB 3.0) Connection is Established
	Off	A USB 2.0 Connection is Established, or USB is not Connected

a. If the POWER LED is solid green while the USB LED is yellow, the power cable may not be providing power to the camera.

Table 2 Status & Mode Indication LEDs of the BCIR1(/M) SWIR Camera Beam Profiler

4.3 Filter wheel

The BCIR1(/M) SWIR Camera Beam Profiler is equipped with a filter wheel that holds six ND filters. It allows the incident power to be quickly adjusted to stay within the dynamic range of the SWIR camera. Ensure that the camera is operated below its saturation power.

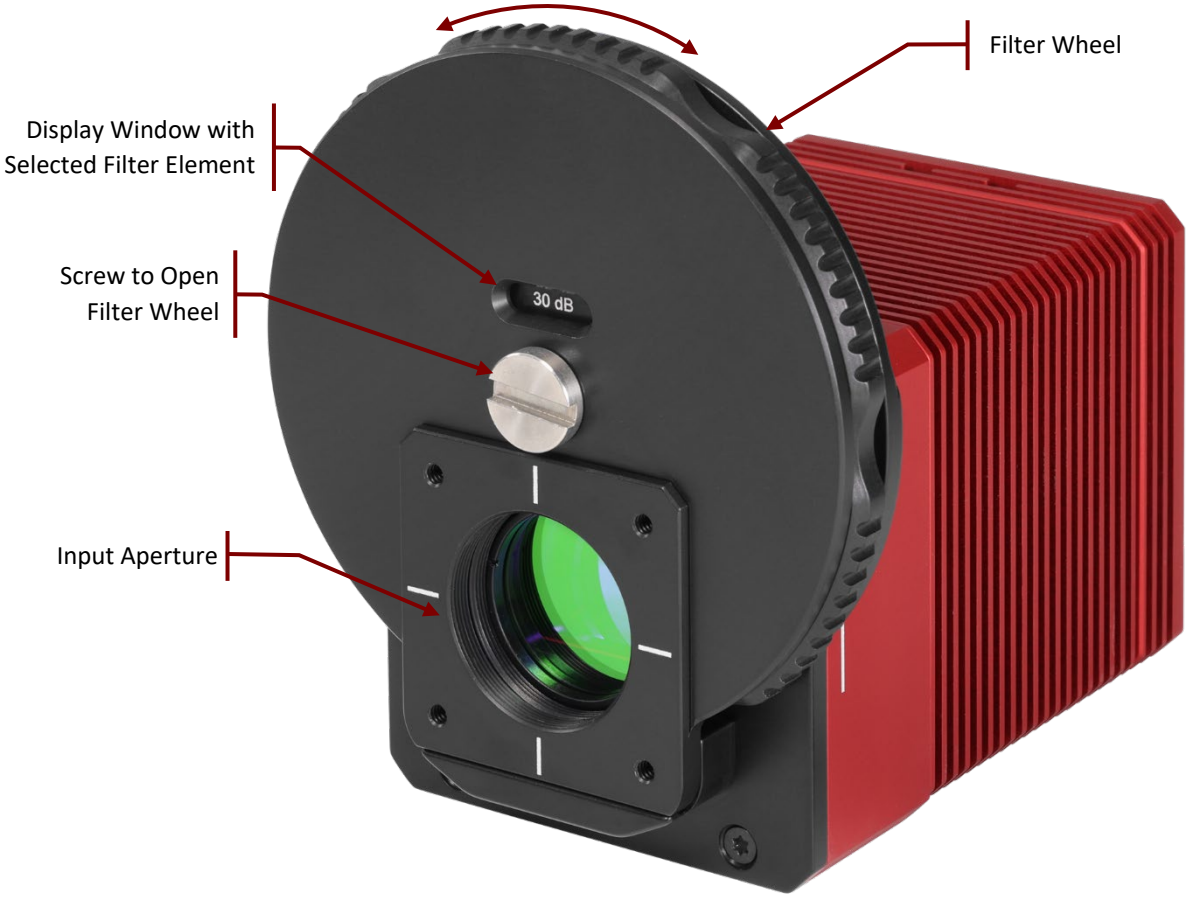


Figure 7 Filter Wheel of the BCIR1(/M) SWIR Camera Beam Profiler

The filters come in a fixed configuration. A small window on the housing above the input aperture shows which filter is selected.

Choosing Optimal Attenuation

For light sources with unknown power levels, it is strongly recommended to use the camera's automatic exposure control. To prevent damage, always start with the highest attenuation filter (60 dB).

If the Beam Profiler Software displays "Power too high, camera saturated!", the incident power exceeds the maximum detectable level of the BCIR1(/M) SWIR Camera Beam Profiler. In this case, additional external attenuation is required. Thorlabs' prism-based **ATT3x Laser Beam Attenuators** are particularly suitable, as they preserve the polarization, size, and shape of the beam.

If no "Power too high" error appears, it can be operated with this setting, and the measurement results are reliable.

When using a high loss attenuation filter in conjunction with a low power light source the software will display the warning "Power too low". This means the source is too attenuated for the camera's exposure regulation to achieve an evaluable signal level. In this case reduce the attenuation to the lowest available setting (10 dB).

Filters may also be removed from the wheel if lower attenuation is required. To do so, unscrew the front plate of the filter wheel. Take care to avoid dust contamination. Note that the filter slot label will not update automatically; record which filter was removed.

The front plate can also be removed to clean the filters.

Correct Power Measurement

For proper power measurement results, the attenuation value of the currently selected ND filter (in dB) must be entered in the Beam Profiler Software (see Section 5.4.5.1 in the **Camera Beam Profiler User Guide**).

Ambient light

For reliable beam profiling results, prevent ambient light from entering the beam profiler aperture. The ND filters selectively attenuate infrared radiation while maintaining high transmission in the visible spectrum. The BCIR1(/M) SWIR Camera Beam Profiler exhibits strong responsivity across both SWIR and visible wavelengths. Consequently, even minimal levels of ambient visible light may appear in the camera image, including when using ND filters with maximum attenuation. If ambient light cannot be avoided, activate the Ambient Light Correction feature (see Section 5.4.5.1.4 in in the **Camera Beam Profiler User Guide**).

4.4 Trigger input

The BCIR1(/M) SWIR Camera Beam Profiler provides a Low-Voltage Transistor-Transistor Logic (LVTTL, TTL-compatible) trigger input for synchronizing the global shutter with laser pulses. The trigger signal is supplied to the device through the BNC connector integrated into the Hirose 12-pin Y cable.

Instructions on how to configure and use the trigger input are provided in section 5.4.5.3.5 in the **Camera Beam Profiler User Guide**.

The trigger input parameters are listed in Section 1.4.1.

4.5 Mounting a BCIR1(/M) SWIR Camera Beam Profiler on an M2MS

The BCIR1(/M) SWIR Camera Beam Profiler can be mounted to the M2MS Measurement Extension using the BCIRM2A Mounting Adapter. For additional details and photos, refer to the **BCIRM2A Mounting Adapter Spec Sheet.**

4.6 Beam Diameter Requirements with M2MS

Beam quality measurement is based on determining the waist diameter of a focused beam and the beam's convergence (before the waist) or divergence (after the waist). Ideal Gaussian beams exhibit optimal ability to focus, resulting in a diffraction limited waist diameter and an M^2 value of 1. The absolute minimum waist diameter increases with the focal length of the focusing lens. In other words, for a given focal length, a smaller waist diameter indicates a beam closer to the ideal ($M^2 = 1$). Additionally, at a constant M^2 value, the minimum waist diameter increases with wavelength.

Measurement limitations are defined by the capabilities of the beam profiler and the M2MS system:

- The initial (unfocused) beam diameter must not exceed the system's maximum measurable beam diameter (15.0 mm).
- The waist diameter must be larger than the system's minimum measurable beam diameter (120 µm).
- The effective translation range of the M2MS system (200 mm) must be at least four times the Rayleigh length.

The following diagram illustrates the required initial beam diameter as a function of wavelength for $M^2 = 1$ and $M^2 = 2$, using a lens with a focal length of 250 mm (as supplied with the M2MS system):

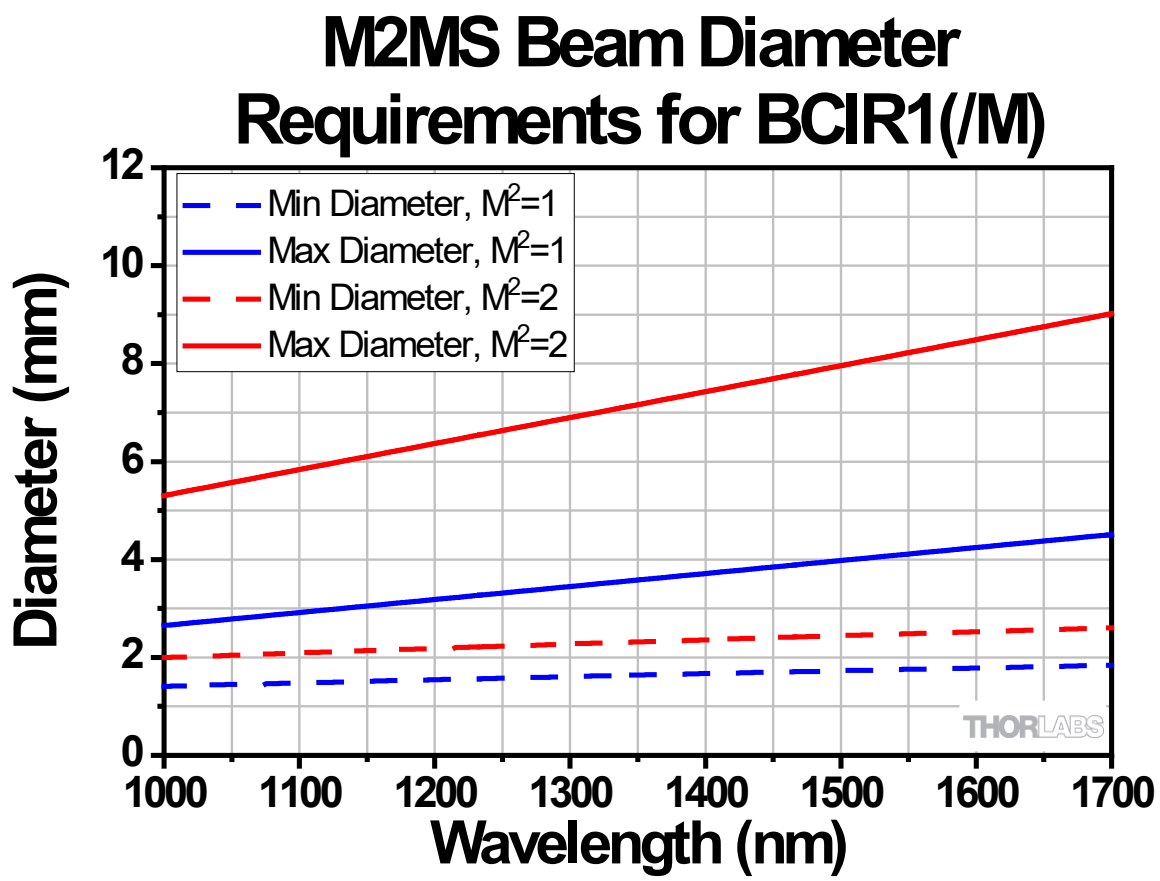


Figure 8 BCIR1(/M) Beam Diameter Requirements for Beam Quality Measurements with the M2MS

Limitation to the travel range

Due to the camera's exposure time specifications, it may not always be possible to utilize the full travel range of the translation stage for M^2 measurements while maintaining optimal sensor saturation levels. In such cases, the following options are available:

- If supported by the laser source, adjust the output power so that, at a given ND filter setting, the exposure time at the beam waist position is at or near the minimum value.
- Limit the travel range of the M^2 measurement to ensure that the sensor saturation remains within the optimal range throughout the measurement, while still maximizing the travel range for accurate M^2 determination.
- Alternatively, use the filter wheel to adjust the attenuation if the sensor saturation falls outside the optimal range. To simplify this process, the Timeout setting in the Beam Quality Settings can be increased.

Divergence measurements

For divergence or convergence measurements, the previously mentioned limitations do not apply. Instead, it must be ensured that the beam width remains within the specified measurement range throughout the selected travel range.

Chapter 5 Software

The BCIR1(/M) SWIR Camera Beam Profiler is operated using the Thorlabs Beam Software.

For a detailed software description, refer to the **BC207 and BC210C Series User Guide**, which is included with the Beam Software installation.

The following sections explain the specific features and components of the Thorlabs Beam Software that have been customized for use with the BCIR1(/M) SWIR camera beam profiler.

5.1 Device Connection

When the application is started, the connected instrument is recognized, automatically connected, and shown in the Beam Settings panel:

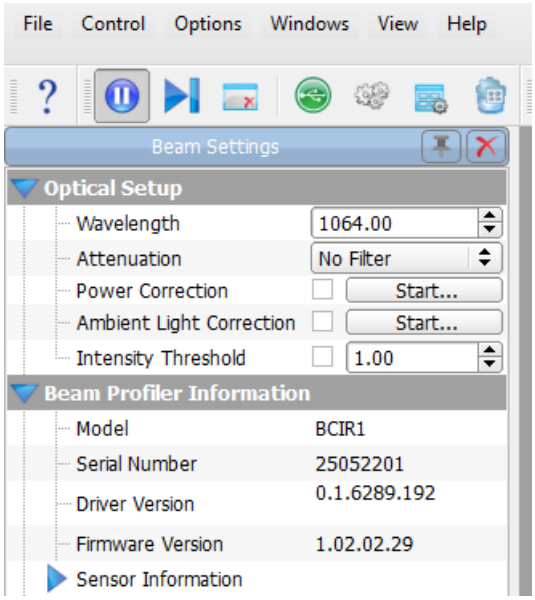


Figure 9 Screenshot of the Beam Settings Panel in the Beam Software

Usually, the Beam Software connects automatically to the instrument that has been connected first. If you have connected more than one beam profiler and want to use a different connected device, select the icon *Device Connection* tab and click the desired instrument.

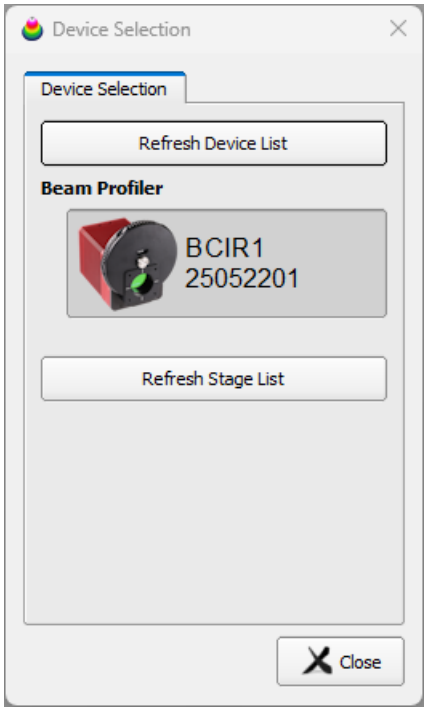


Figure 10 Device Selection Panel in the Beam Software

Click on the *Refresh Device List* button for an update if you have very recently connected or removed a beam profiler instrument from your PC. If an expected instrument is still missing check if the USB driver is properly installed (see Chapter 7). After selecting a beam profiler, it will be connected and displayed in the Beam Settings Panel, where all available settings and adjustments to the beam profiler can be made.

5.2 Camera Beam Profiler Parameter

This chapter contains the camera settings that are accessible by the user. Please become familiar with the meaning of these controls to prevent improper adjustments which may lead to erroneous measurement results.

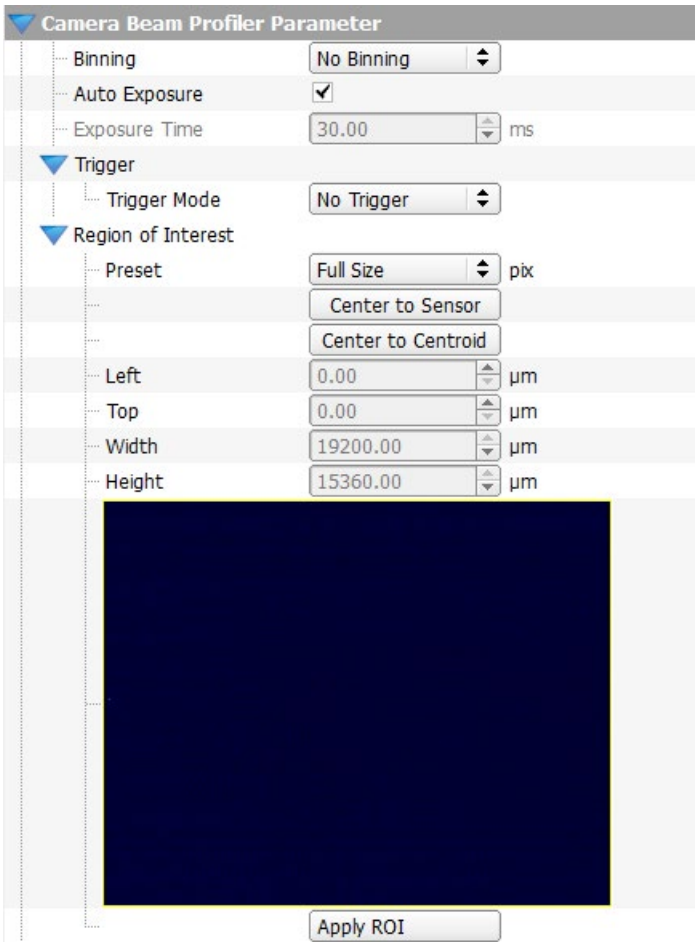


Figure 11 Window of the Camera Beam Profiler Parameter

Details of the individual parameters are explained in Section 5.4.5.3. of the **Camera Beam Profiler User Guide**.

Initial Settings

Parameter	Default Value
Binning	No Binning
Auto Exposure	Enabled
Exposure Time	NA due to Auto Exposure
Trigger Mode	No Trigger
Region of Interest Preset	Full Size

Table 3 Initial Settings Parameter

5.3 Reset Application Settings to Default



This button resets all Beam Software application settings to defaults. For the BCIR1(/M) SWIR Camera Beam Profiler these are:

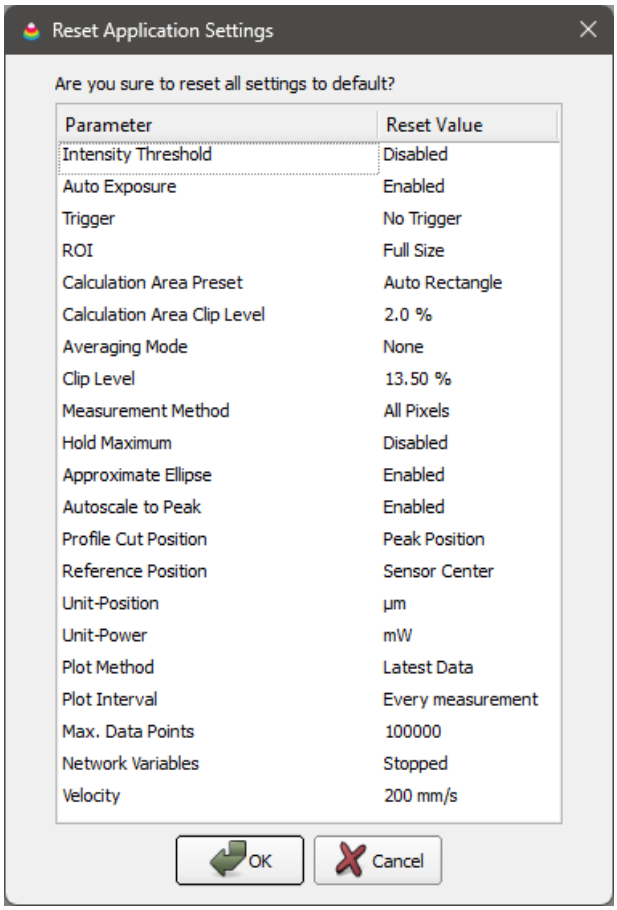


Figure 12 Reset Application Settings Window

Chapter 6 Maintenance and Cleaning

Maintenance

The unit does not need regular maintenance by the user. It does not contain any modules and/or components that could be repaired by the user themselves. If a malfunction occurs, please see the Section 3.6 and contact Thorlabs for return instructions (see Chapter 9 for contact information).

Do not remove covers!

Cleaning

NOTICE

NOTICE: Risk of Damaging the BCIR1(/M) SWIR Camera Beam Profiler
The BCIR1(/M) SWIR Camera Beam Profiler is not water resistant. If the BCIR1(/M) SWIR Camera Beam Profiler comes into contact with fluids, the BCIR1(/M) SWIR Camera Beam Profiler can be damaged.
To avoid damaging, do not expose the BCIR1(/M) SWIR Camera Beam Profiler to:

- Spray
- Liquids
- Solvents
- Adverse Weather Conditions

Follow the steps below to clean the BCIR1(/M) and its optical components.

1. Clean the ND filters using pure ethanol and lint-free cleaning tissue. The front surface can be cleaned without removing the filter holder.

NOTICE

NOTICE: Risk of Damaging the ND Filters
Inappropriate cleaning agents or excessive force may damage the coating of the ND Filters.
Observe the points below to protect the ND filters from damage.

- Use only pure ethanol, lint-free tissue, and compressed air.
- Clean the rear surface only if required.

2. Remove residual lint with compressed air. If dust remains visible, unscrew the filter holder and clean the rear surface of the ND filter.
3. To clean the sensor cover glass, use only oil- and water-free compressed gas (e.g., Thorlabs Duster). Hold the nozzle at least 4" (10 cm) away from the surface.

NOTICE

NOTICE: Risk of Damaging the Sensor
Contact or liquid cleaning may damage the sensor.
Observe the points below to protect the Sensor from damage.

- Do not use solvents, water, or wipes on the cover glass.
- Keep sufficient distance to avoid liquid drops or pressure damage.

4. Clean the outer housing surfaces with a damp lint-free cloth.

Chapter 7 Troubleshooting and Repair

The following checks may help resolve common issues. For further assistance, contact your Thorlabs technical support.

If the BCIR1(/M) SWIR Camera Beam Profiler does not power on correctly, verify the following:

- Confirm that the AC outlet is powered.
- Ensure that main power cable is fully seated at both ends.
- Ensure that the USB cable is securely connected at both ends.

The color of the Power LED also indicates specific operating conditions (see Section 4.2).

Black Sun Effect

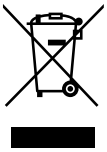
The Black Sun Effect is a visual phenomenon that may occur when the camera captures extremely bright light sources, such as the sun or focused laser beams. Instead of appearing white or overexposed, the light source is displayed as a dark or black spot in the image.

This effect is caused by sensor saturation: when the photodiodes receive more photons than they can store, the excess charge leads to incorrect pixel readouts or charge leakage, resulting in an inverted intensity value.

NOTICE

NOTICE: Black Sun Effect
The Black Sun Effect is a characteristic of CCD and CMOS sensor technology and does not indicate a malfunction of the BCIR1(/M) SWIR Camera Beam Profiler.

Chapter 8 Disposal



Thorlabs verifies our compliance with the WEEE (Waste Electrical and Electronic Equipment) directive of the European Community and the corresponding national laws. Accordingly, all end users in the EC may return “end of life” Annex I category electrical and electronic equipment sold after August 13, 2005 to Thorlabs, without incurring disposal charges. Eligible units are marked with the crossed out “wheelie bin” logo (see right), were sold to and are currently owned by a company or institute within the EC and are not dissembled or contaminated. Contact Thorlabs for more information. Waste treatment is your own responsibility. “End of life” units must be returned to Thorlabs or handed to a company specializing in waste recovery. Do not dispose of the unit in a litter bin or at a public waste disposal site. It is the user’s responsibility to delete all private data stored on the device prior to disposal.

Chapter 9 Thorlabs Worldwide Contacts

For technical support or sales inquiries, please visit us at **www.thorlabs.com/contact** for our most up-to-date contact information.



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