CamIR Adapter User Guide

Introduction

This note discusses how to setup a CamIR Adapter with a WinCamD. This includes attaching the adapter to the camera and focusing it correctly if the adapter was bought separately from the camera. If the camera and adapter were bought together, the adapter should come prefocused with all needed spacers attached. Also included are instructions on adjusting the DataRay software to work correctly with the completed setup.

Figure 1: The CamIR adapter correctly attached and focused - ready for use

Relevant Specifications

The following are relevant specifications for the setup of the CamIR:

- Responds to light with wavelengths from 1475 to 1600 nm using an IR to visible conversion phosphor

- ~70 μm FWHM (Full Width Half Maximum) point spread function due to phosphor

- ±10% spatial response non-uniformity due to phosphor

- Non-linear response to irradiance. Response = (Incident Irradiance)$^\gamma$ where γ=1.414. Gamma (γ) correction is included in the software.

Attachment

The CamIR Adapter is nominally designed for use with C-mount systems, implying a distance of 17.512 mm from the front of the case to the sensor. The WinCamD-LCM has a sensor plane to front of case distance of

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~7.5 mm, so the extra distance required is 10 mm. This means that mounting the adapter to the WinCamD-LCM yourself requires a 10 mm C-mount spacer and possibly additional thin brass spacers placed between the 10 mm spacer and the IR adapter. Other WinCamD series cameras have different sensor to front of the case spacings which must be accommodated for.

Note that, when sold with a WinCamD, the adapter is delivered separately packaged as a pre-focused assembly with the correct spacers installed. If the adapter was separately purchased or needs to be focused by the customer, see **Appendix A** for focusing information.

Using the Adapter

Use the following instructions to prepare the camera and adapter for use:

1. Remove the ND4.0 neutral density filter supplied with the camera. Then remove the rear dust cap and screw on the adapter. Crude alignment can be performed on the fluorescent spot on the screw-on target before unscrewing it.

2. Set up the **Capture Setup Dialog** in the software.

   The magnification of the adapter is nominally 3.50 (within ±2%). The correct value can be read off of the label on the CamIR adapter. In the DataRay software, go to **Setup –> Capture setup dialog** and enter this value in the **X =** entry box on the left in the **Pixel multiply factors** box. Also, check the **Enable IR camera** option and enter a value of **1.41** for **Gamma**. Finally, select **FAST** resolution in the top right, since the effective pixel size in **FAST** mode is 33 µm, below the ~70-100 µm FWHM point spread function of the phosphor. See Fig. 2 for the final settings in this dialog.
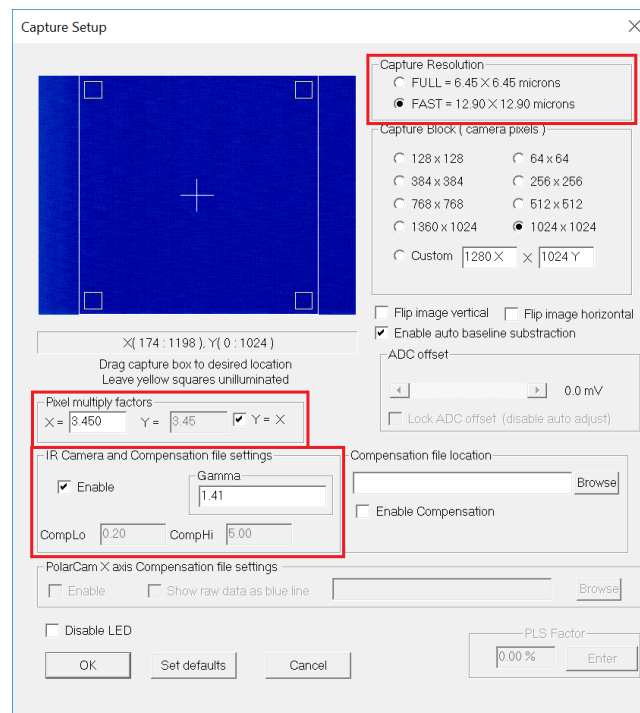

Figure 2: The proper settings entered into the **Capture Setup Dialog** for final use of the adapter setup

3. Remember that, since the FWHM of the point spread function is ~70 µm, the minimum measurable beam diameter at a 50% clip level is ~250 µm. Anything below this will be significantly broadened by the point spread function of the phosphor.

Appendix A: Focusing

Follow these steps to focus the CamIR Adapter:

1. Setup the needed spacers as discussed in the **Attachment** section of this document.

2. In the DataRay software, run the camera and select Xu from the toolbar to place the crosshairs in the center of the screen.

3. Right-click on the 2D screen and select **Force crosshairs to 0 degrees**.

4. Navigate to **Setup –> Capture setup dialog**. Select **FULL** resolution in the top right and set the **Cpature Block** to **384x384**. The dialog should look like that shown in Fig. 3. Press **OK** to save the changes.
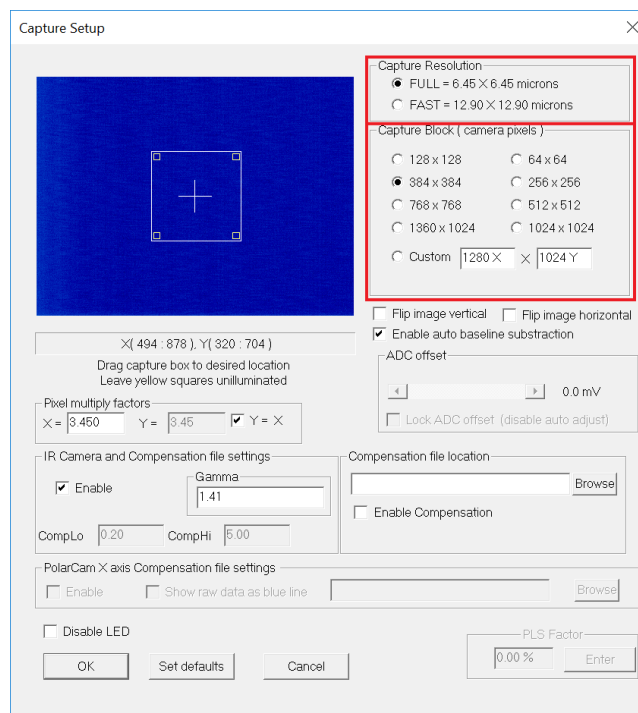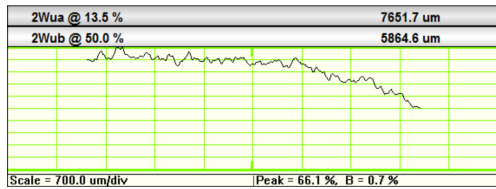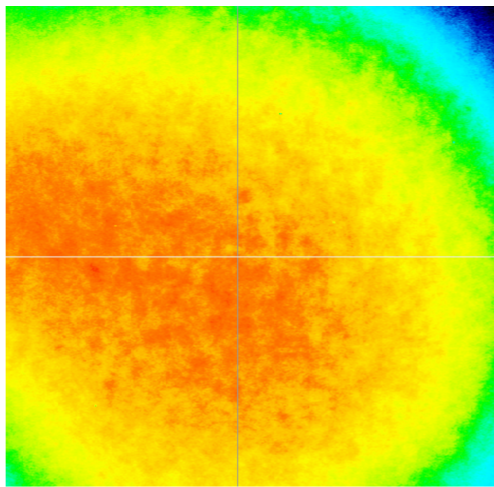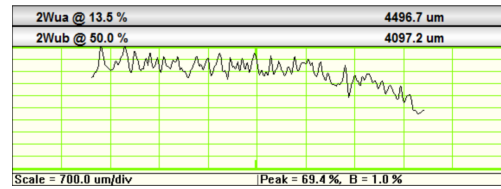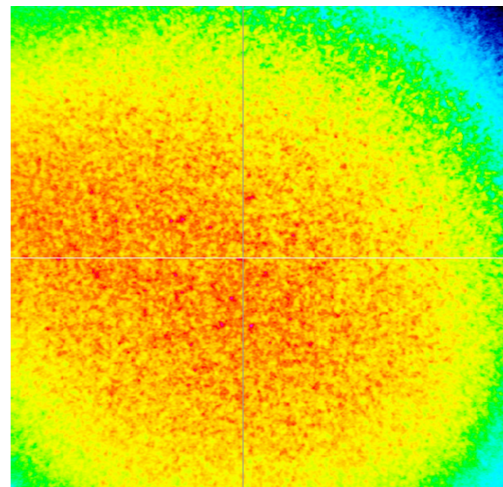

Figure 3: Additional settings for the **Capture Setup Dialog** for focusing the adapter setup. The settings from Fig. 2 should remain the same.

5. In the **Filter** pulldown menu, select **No Filtering**.

6. Focus the adapter under ambient illumination by rotating the rear focus ring until the image and profiles show the maximum modulation (due to the granular structure of the phosphor converter coat). See Fig. 4 for an example of an unfocused vs. focused beam. If you do this in daylight rather than under room lights, the focus will normally coincide with a maximum value of the **Peak %** value on the left of the screen. If the focus is beyond either end of the adjustment, a different brass spacer ring will be required.

7. Once focused, it is recommended that the position of the focus ring be marked, adjacent to a mark on the fixed part of the barrel, using the provided label.

2Wua @ 13.5 % 7651.7 um	2Wua @ 13.5 % 4496.7 um
2Wub @ 50.0 % 5864.6 um	2Wub @ 50.0 % 4097.2 um
Scale = 700.0 um/div Peak = 66.1 %, B = 0.7 %	Scale = 700.0 um/div Peak = 69.4 %, B = 1.0 %

(a) The display of the **unfocused** adapter   (b) The final result of the **focused** adapter

Figure 4: The software displays showing the state of an unfocused adapter vs. a focused adapter