



MONITOR PROFILING WITH i1PROFILER

INTRODUCTION

The ability to preview accurate color on your display can save a considerable amount of time and money for anyone in the photo and printing industry. Photographers and designers who need to adjust images find that a color-calibrated monitor is essential for previewing edits. To ensure that the colors you see on screen are the same colors from your file, you simply need to calibrate and profile your monitor. i1Profiler makes this process very simple.

BEFORE YOU PROFILE

Prior to calibration, there are a few things you should do to help produce a positive result.

- Quit any applications that might interfere with the calibration, such as e-mail and messaging applications that flash a dialog on your screen when you receive a message, or screen savers that could activate during the calibration process.
- If there is a chance that someone has previously adjusted the display manually, return your display to its factory settings. See the monitor's user guide for more information.

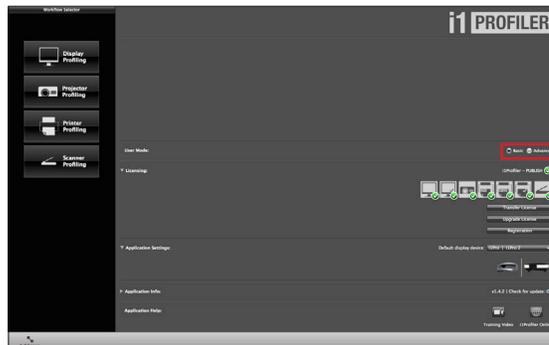
If you are profiling a Mac laptop display:

- The calibration will not be accurate if the operating system is adjusting the brightness as the room lighting changes. Turn off "Auto-Brightness-Adjustment" in **System Preferences > Displays**.
- In **System Preferences > Universal Access**, set the "Contrast Slider" to **Normal** (left position).
- In **System Preferences > Desktop & Appearance** turn off the "Translucent Menu Bar" option because this feature can cause the calibration to fail.
- Turn off the Energy Saving options for Laptop Displays in **System Preferences > Energy**. If left on, the screen may dim due to system inactivity during the calibration, which will result in a poor calibration.

PROFILING YOUR MONITOR

i1Profiler allows you to profile your display using "Basic" and "Advanced" user modes. While "Advanced" mode offers more options, this document will walk you through "Basic" mode, which is sufficient for most users.

1. This is the Main Menu screen. Connect your measurement instrument to your computer and set the "User Mode" to "Basic" by clicking the **Basic** radio button.



2. Under "Application Settings," set the "Default display device" to the instrument you will be using for calibration.

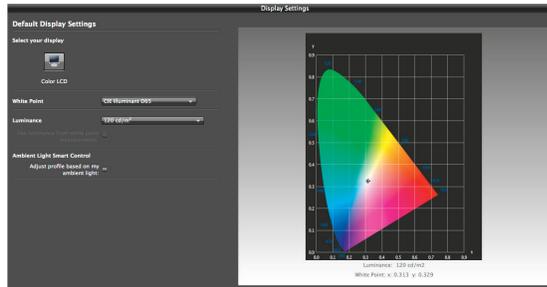


i1Profiler supports the i1Display Pro colorimeter, as well as the i1Pro and i1Pro 2 spectrophotometers.

3. From the "Workflow Selector" in the left pane, click the **Display Profiling** button.
4. Select the display you wish to profile. If you are using the i1 Display Pro, you must also select the technology type of the monitor.
 - If you have multiple displays connected to this computer, they all will appear under "Select your Display." i1Profiler will automatically move to the display you select.

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Hot Tip

When calibrating an LCD display, i1Profiler provides the option to optimize your measurement for different types of backlit technologies. i1Profiler will automatically detect this for most displays. For displays where the backlight type cannot be detected, i1Profiler will default to CCFL. In this case you will need to consult your display's documentation for more information about your technology type.

5. Select the “White Point” pull-down menu and select a color temperature for your display. The goal is to match your paper color when viewed under standard D50 lighting conditions. The choices range from **D50**, a warm yellow-white, to **D75**, a cool-blue white. **D50** and **D65** are the most common settings, and the default is **D65**.

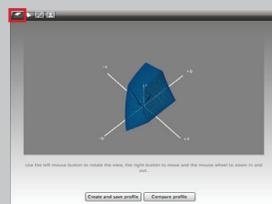
- **D50** is generally used in commercial and publication printing environments where substrates typically have a yellower cast.
- **D65** is less yellow and is a better match to most of today’s ink jet and photographic papers, making it the most common setting for photographers and those in the digital world.

6. Select the “Luminance” pull-down. The luminance of your display determines its brightness and is measured in candelas per square meter.

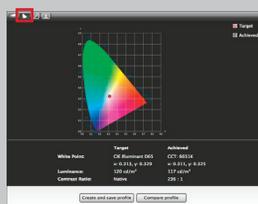


- **80** is a low level luminance while **250** is very bright.
- Values between 80 and 160 will provide enough brightness to see details in shadows

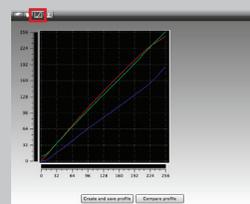
Profile Result Views



Gamut View displays the 3D CIE Lab color space and should look smooth. You can use your mouse to rotate the model. Large holes or jagged edges? You should re-profile.



Results View shows your target and achieved measurement results, including white point, luminance, and contrast ratio, in greater detail.



LUTs View should show fairly smooth red, green and blue channels. Dramatic spikes could identify a problem with your profile.



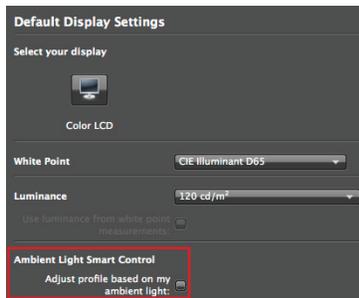
Image View provides a comparison of your display before and after profiling. You can select one of the pre-loaded images or upload your own.



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without being uncomfortable on the eye. If you're working in optimum room lighting, values of 80 - 120 are preferred.

- Finally, you can enable or disable "Ambient Light Smart Control" by checking the box next to "Adjust profile based on my ambient light." This option will adjust your profile based on an ambient light measurement of your surrounding environment.



We recommend adjusting your viewing conditions as opposed to allowing the profile compensate for poor lighting.

- Now select the **Measurement** icon from the "Display Profiling Workflow" at the bottom of the screen, or click the **Next** arrow to continue.



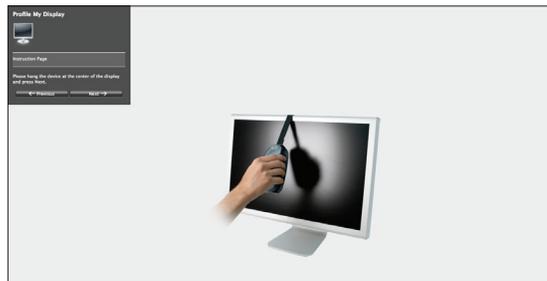
- If you are using an i1Pro or i1Pro 2, you must first calibrate your device. Once calibrated, click on the **Start Measurement** button.



Under "Display Hardware Setup" is an "Automatic Display Control (ADC) option. If enabled, this will automatically adjust your monitor's brightness and contrast to the desired levels. If your computer or display

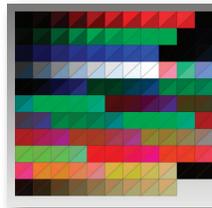
does not support ADC, you will manually adjust these settings in the following steps.

- Follow the on-screen prompts to place the measurement device on the display. It is important that the instrument lies flat against the screen.



- Click **Next** to begin taking measurements. As each color flashes on your screen, your device will record its color values. If your display does not support ADC or if you chose to manually adjust your settings, you will be prompted to make those adjustments.

- When the measurements are complete, your results will be displayed. The top triangle shows your target measurement, and the bottom shows the value that was actually read. The patches may be a little lighter or darker than expected, and the profile will make adjustments.



If any patches are a completely different color, such as red in the upper left corner and black in the lower right, it is possible that another software displayed a dialog window during the calibration. You will need to re-measure the patches.

- If everything looks good, select **ICC Profile** from the "Display Profiling Workflow" or click **Next**.



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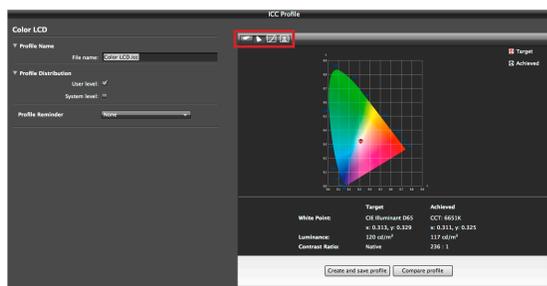
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14. Give your profile a meaningful name. You may want to include your monitor type, manufacturer, and the date.
15. Decide who has access to your profile. On a Mac, you can save your profile to the “User level”, which means only the user who is currently logged in has access to this profile. If another user logs into this computer under a different user name, they will not be able to use this profile. Mac OSX 10.6 and earlier also provides an option to save in the “System level.” which allows all users to use this profile. In Windows, you can only save it to the “System level.”
16. You can set a “Profile Reminder” to pop up when it is time to re-profile your display every **one, two, three, or four** weeks. If you are doing a lot of color critical work, you should profile every week. Otherwise, every three or four weeks may be sufficient. Select **None** to not be reminded.
17. Click **Create and save profile** to finish.

Hot Tip

If you enabled “Ambient Light Smart Control,” you will also be able to enable “Ambient Light Monitoring” which will update your display profile based on changes in ambient lighting conditions. This requires your device to remain plugged in.

17. Once your profile is created, your profile results will be displayed with four views to evaluate your profile: Gamut, Results, LUTs, and Image.

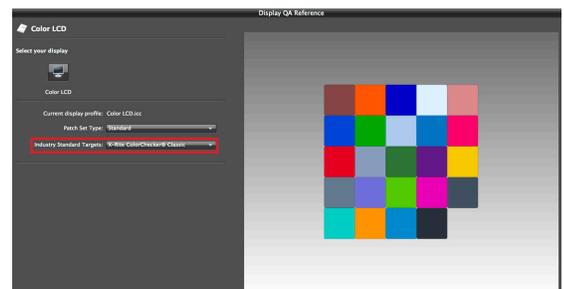


18. After viewing your results, click the **Home** button to return to the Main Menu.

DISPLAY QUALITY

After your display has been profiled, you can use the “Quality” feature in i1Profiler to ensure it is performing consistently, adjust tolerances, and determine if it is time to profile again.

1. From the Main Menu, with your measurement instrument connected to your computer, set the “User Mode” to “Advanced” by clicking the **Advanced** radio button.
2. From the “Workflow Selector” in the left pane, select **Quality** located under the “Display” menu
3. Select the display and technology type you will be testing.
4. Under the “Patch Set Type” pull-down, select **Standard**.
5. Under the “Industry Standard Targets” pull-down, select **X-Rite ColorChecker® Classic**.



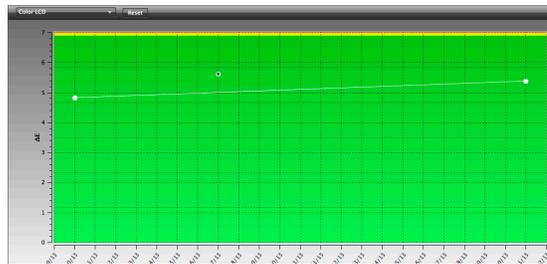
6. Now select the **Measurement** icon from the “Display QA Workflow” or click **Next**.
7. If asked, calibrate your device and click **Start Measurement...** to begin taking measurements.
8. When complete, your results will display on screen. Like before, the target measurement and actual measurements should match fairly closely.



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9. Click **QA Report** from the “Display QA Workflow” or click **Next**.
10. Your results will be displayed along with the following:
 - Under “Data Set,” you will see the reference target used.
 - Under “Result” you will receive a PASS or FAIL message depending on your tolerances.
 - Under “ ΔE Type” you can adjust the average and maximum ΔE threshold. This will determine your PASS or FAIL result.
 - You will also see additional detailed results for your measurements.
 - To the right you can view the readings for each patch. The patch with the highest ΔE will be highlighted in red and the second highest will be in yellow. Clicking on a patch will show you the DE for that specific patch.

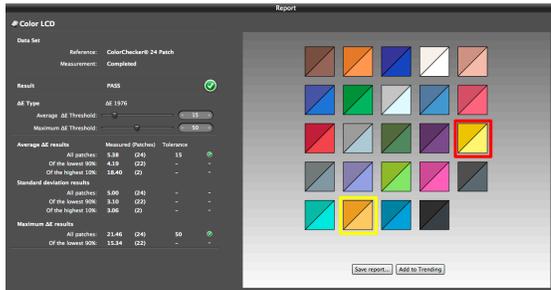
11. Click **Add to Trending** before continuing. When the pop-up appears, click **OK**.
12. Click **Trending** from “Display QA Workflow” or click **Next** to continue. Here you can see how your display is performing over time. If you start shifting to an unacceptable tolerance, you may need to re-profile or replace your display.



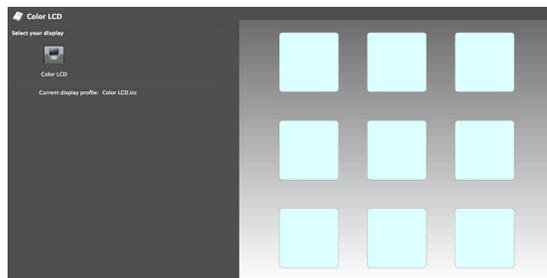
DISPLAY UNIFORMITY

When you profile your display you are only taking measurements from a single location; but with Display Uniformity can see how color and luminance vary across your entire display. This is a great tool for determining which areas of your monitor are not performing as well as others.

1. From the Main Menu, with your measurement instrument connected to your computer, set the “User Mode” to “Advanced” by clicking the **Advanced** radio button.
2. From the “Workflow Selector” in the left pane, select **Uniformity** under the “Display” menu.
3. Select the display and technology type you will be checking for uniformity.



ΔE is used to describe the difference between two color (Lab) values. The higher your value, the farther apart the two colors are in your color space. A perfect match would be a ΔE of 0. However, this is not realistic. In practical terms, an average of below 5 may be acceptable, and below 2 is good. Ideally the maximum should be below 4, and must be below 10, to be acceptable. A higher ΔE may indicate that the display is not accurate enough to judge color.

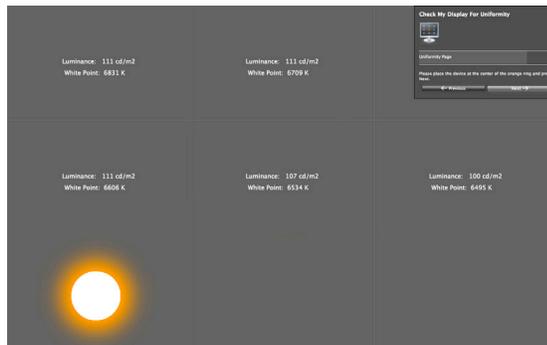


4. Select the **Measurement** icon from the “Display Uniformity Workflow” or click **Next** to continue.

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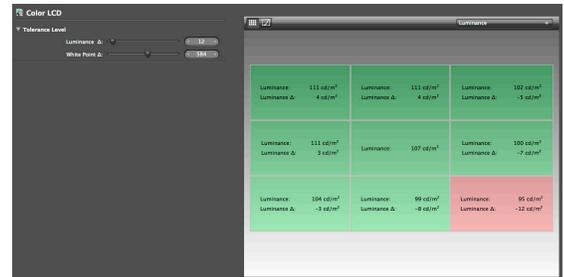
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- If prompted, calibrate your device and click **Start Measurement...**
- Place your instrument in the center of the orange ring displayed on screen. Make sure it lies flat and click **Next**. Your instrument will read the luminance and white point of that area.
- The orange ring will move to each box on the screen. Continue placing the device in each of the areas identified and taking measurements.



- Select **Results** from the “Display Uniformity Workflow” or click **Next** to continue.
- Here is the consistency across your display. Use the pull-down menu in the top right corner to change between **Luminance** and **White Point**.

10. Adjusting the Luminance and White Point ΔE tolerance levels on the left will change your Pass/Fail limits. This graph shows one section out of tolerance.



FOR MORE INFORMATION

X-Rite Color Services offers a variety of classroom, onsite, seminar and online training opportunities. These courses are highly interactive and taught using the latest equipment and software. If you would like to learn more about color management or the advanced features of i1Profiler, check out our Color Control Freak eLearning course at:

http://www.xrite.com/top_services.aspx?segmentid=5&eventid=907



For information on a variety classroom, custom on-site, and highly interactive on-line training options, see X-Rite’s Color Services web site at <http://www.xritecolorservices.com>

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