![Little CMS logo]

Monitor ICC

Tweaker

Version 1.0

Introduction

So, you've just acquired a high-performance monitor, vivid, precise, and ready to deliver exceptional color. Naturally, you'll want an ICC profile to ensure it operates at its full potential. If you're not generating one yourself, sourcing the correct ICC file from the manufacturer can be a challenge. Some brands don't provide profiles at all, and those that do may offer outdated or suboptimal versions.

Creating an ICC profile from scratch is a delicate process, often requiring specialized hardware such as a colorimeter or spectrophotometer to accurately measure your screen's color output. For many users, this can be both technically demanding and time-consuming.

Little CMS Monitor ICC Tweaker is designed for professionals and enthusiasts who demand precise color control. Whether you're refining a manufacturer-supplied profile or enhancing one generated via spectrophotometric measurements, this tool enables intuitive, visually guided adjustments. You can elevate a generic profile to exceptional accuracy, fine-tuning not just color fidelity, but also appearance, viewing conditions, and target-workflow characteristics.

ICC profiling is part science, part art. It's essential for photographers, designers, and anyone working in color critical environments, but it demands patience, precision, and the right tools. If you're serious about it, using this software will pay off in stunning visual fidelity.
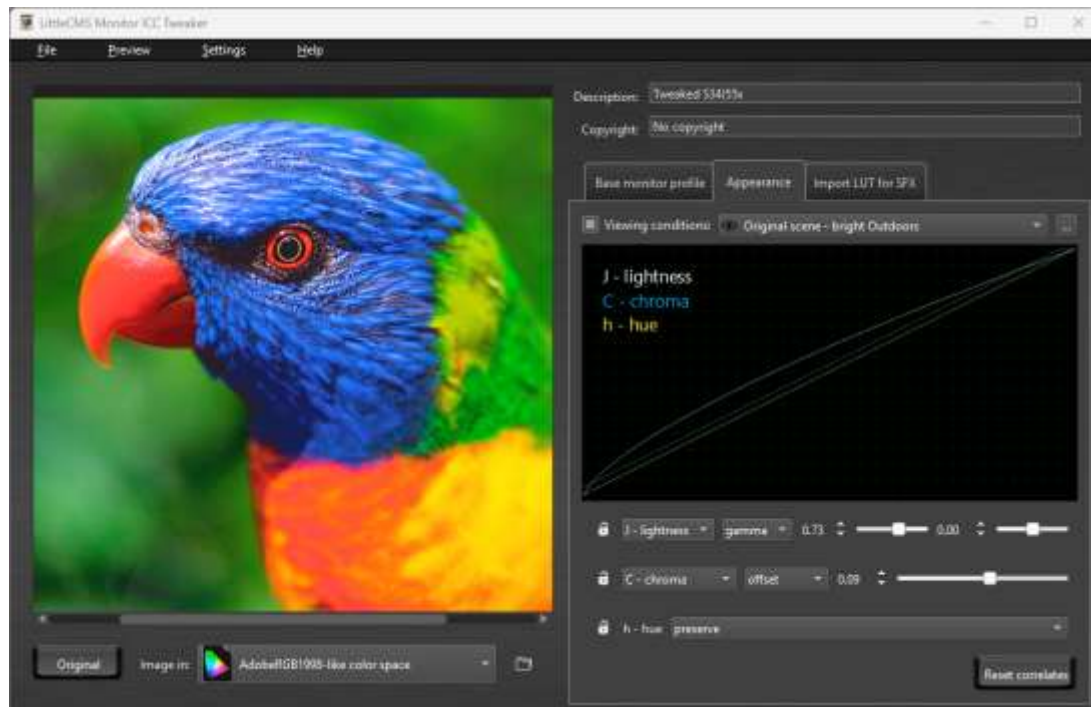
Quick reference

1. Launch the program.
2. Move its window to the monitor you wish to calibrate.
3. Open the "Base monitor profile" tab. The monitor's name will appear, and the combo box will display the currently assigned ICC profile.
4. Load an image into the preview area.
5. Adjust the image using the available controls until it looks correct to your eye.
6. Save the profile via "File - Save." You'll be prompted to associate the tweaked profile with the current monitor.
7. Calibration complete.

You can revert changes by selecting "File – Reset to base monitor profile". Even after restarting the program or the computer.

When you restart the program, it uses the original profile as the base, not the one you previously tweaked. To continue editing your changes, go to 'File - Load' and open your modified profile.

In Windows, you can check the tweaked profile by using the 'Photos' app. Note that Windows may require opening the image twice to refresh its internal ICC profile cache. On macOS, you may use the 'Preview' app.

Monitor ICC Tweaker user interface.

After opening the application, you can see a window like this. Mac, Windows and Linux look almost identical. On Mac, menus look slightly different just because Mac conventions.
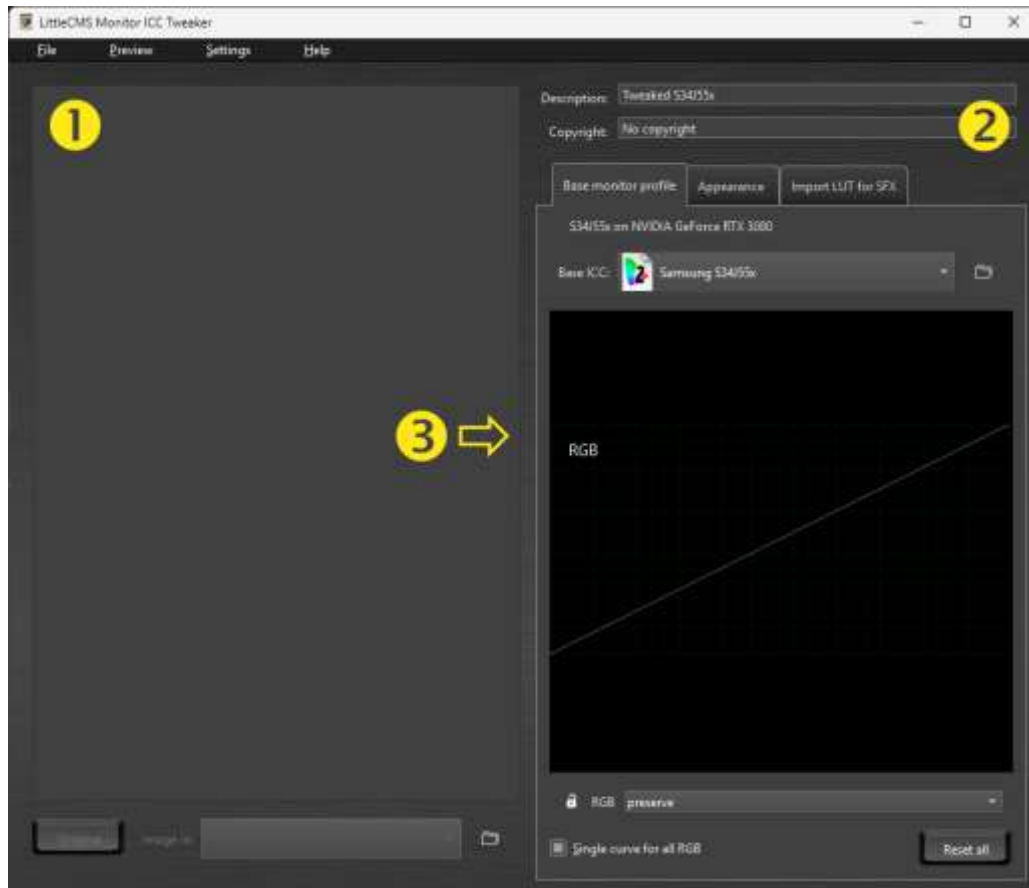
In the left part (1) an image preview allows you to see how your monitor profile affects images. The right part of the window (2) holds the controls. You can resize right-left areas by dragging the middle separator (3).

In settings you can select plain OS-native UI appearance if you don't like the looking.

Image preview

The best way to see how your monitor profile works, is by using an image of yours as example. You can use whatever image you wish. PNG, BMP and JPEG are supported. You can paste images from other programs as well.

Load any of your images as the preview by:

- Using the main menu: "Preview- Load preview image"
- Right click, (control click on Mac) – Load preview image
- Copy & paste image data over the previewer
- Drag & drop an image file over the previewer

Only RGB images can be used as preview. As some of those load methods does not allow to use embedded ICC profiles, the original color space of your image has to be explicitly stated in the combo box (1). This is equivalent to "assign profile" in Adobe Photoshop. When you load an image that has an embedded ICC profile, it is shown and selected in this combo. This image will preview all the changes you do in the monitor profile.

Navigating on preview image

You can zoom and pan your test image by using the mouse and keys.

- To zoom the image, use the mouse wheel or press keys + and -
- To pan the image, click and drag
- You can right click or control-click on Mac to access context menu.
- On Mac you can also use magic mouse touch pad to zoom the image.

Comparison of changes

You can visually compare the image rendered with your monitor's original ICC profile against the version produced after applying all adjustments and tone curves.

- Pressing the "Original" button (2)
- Pressing the "O" hotkey
- Pressing [Spacebar]

By default, the display reflects your current adjustments in real time. To compare with the unmodified profile, use the "Original" button or its shortcut keys. Subtle differences can be surprisingly hard to spot, toggling between the tweaked and original views helps train your eye to detect even the most nuanced changes.

ICC monitor profile identification

The right side of the main window contains the profile tweaking controls. At the top, you'll find fields to define and edit the metadata visible to others when sharing your monitor profile. You're free to enter any content, typically, a brief description of the profile's intended use or visual effect.
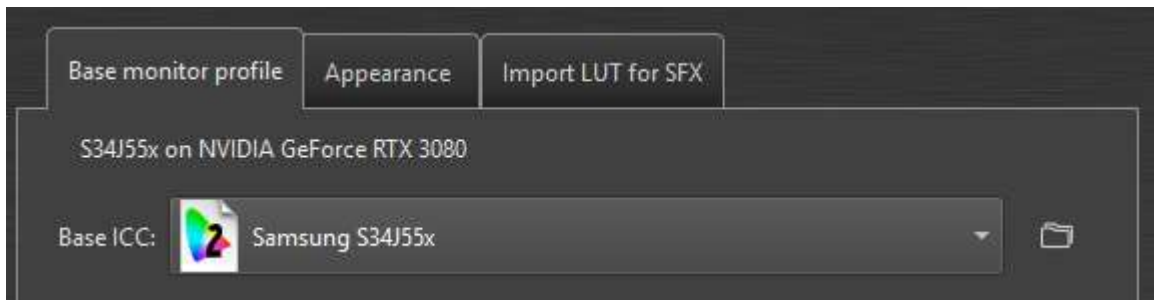

In v1.0 only English localization is currently supported.

Hardware detection

Just below, you'll find a series of tabbed controls. The first tab provides access to the basic monitor profile settings. Here, you can view details about your connected display hardware and graphics adapter, as well as the base ICC profile currently assigned to the monitor.


In multi-monitor setups, simply drag the application window onto the screen you wish to adjust; this ensures the correct profile is targeted. If the monitor cannot be identified, the application defaults to using a standard sRGB profile as the baseline.

You can manually select the base profile at any time. However, when the application window is moved, the system re-detects the underlying monitor and automatically resets the base profile accordingly.

Monitor profile types

ICC display profiles typically come in two forms: matrix-shaper and LUT-based. Matrix-shaper profiles use a combination of tone curves and a 3×3 transformation matrix to approximate the display's color behavior. They're lightweight, fast, and well-suited for monitors with predictable, linear responses. On the other hand, LUT-based profiles employ multidimensional lookup tables to map color values with greater precision, capturing subtle nonlinearities and device-specific quirks. These are ideal for high-end displays or workflows demanding maximum accuracy. While matrix profiles offer simplicity and reversibility, LUT profiles provide finer control at the cost of complexity and processing overhead.

[M] +
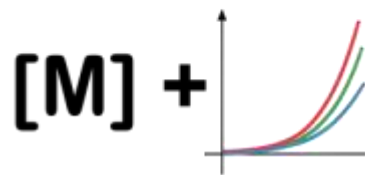
Matrix-Shaper
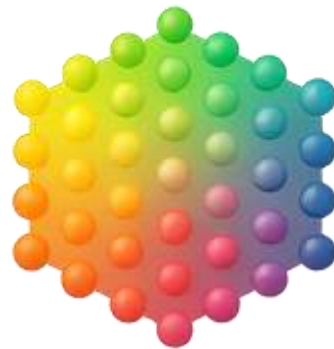
LUT-based

MacOS Limitation: MacOS does not support assigning LUT-based profiles to monitors. This app lets you create and edit them for use in programs like Adobe Suite®, but they can't be linked to the display. To assign profiles on macOS, use matrix-shaper types. Set this in Preferences under "Matrix-shaper only".

Basic curves adjust

Below the information fields, you can see three tabs. Those tabs select the *family of tweaks* you are using. All three families can be used together, although matrix-shaper profiles only accept the base ones.
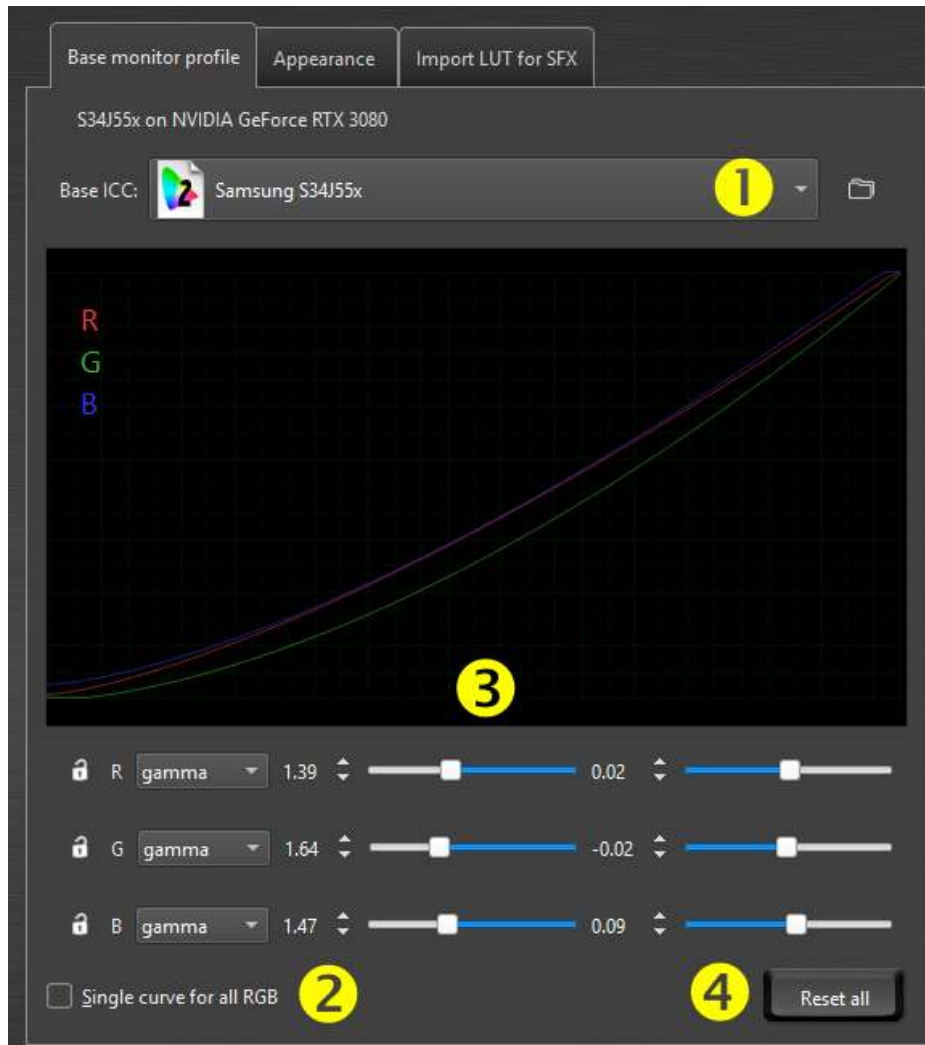
In section (1), you can choose the base ICC profile to modify. To locate your profiles, click the white folder icon next to the color space adjustment combo box; this opens the directory where your ICC profiles are stored, which may vary depending on your operating system. A selection of predefined profiles is always available. Because the monitor's color space is RGB, you'll have up to three channel modifiers. You can either group all RGB channels into one or handle them separately by toggling option (2). The curve adjustments are shown visually in section (3), and the graph behaves like the preview image—it can be panned and resized freely. If you need to reset everything, press (4). To protect a finely tuned channel from accidental reset, click the lock icon on the left to secure it.

Channel modifiers

Channel modifiers are adjustable controls used throughout the application to define tone curves that influence individual color channels. You can find channel modifiers in base tweaks and appearance tweaks.
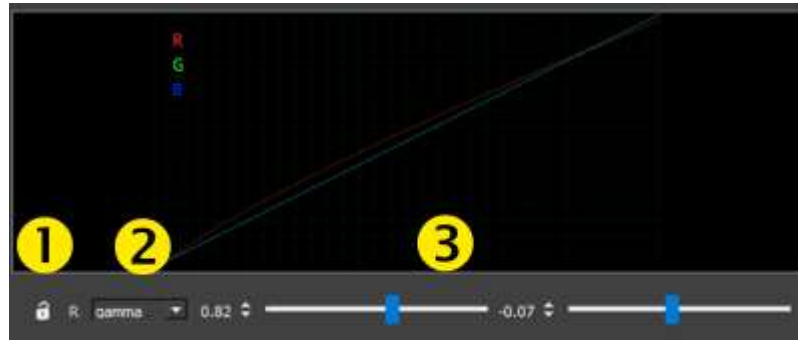
Clicking on (2) lets you choose the curve type for each modifier. Available types have distinct parameters; for example, gamma uses exponent and offset, while sigmoidal offers strength and offset. The lock icon (1) protects a channel from accidental changes; locked modifiers are unaffected by reset operations.

Values can be adjusted by typing directly, using the up/down arrows, or dragging the slider. These controls are synchronized, changing one updates the others. Right-clicking (or control-clicking on macOS) opens a context menu with a reset option, which restores the modifier to a neutral state (e.g., gamma = 1.0, offset = 0). Locked modifiers cannot be reset. A button at the bottom resets all unlocked channels.

Above the modifier area, a curve graph provides visual feedback. You can zoom with the mouse wheel and pan by clicking and dragging.

Some modifiers allow to change the *channel correlate*. This happens when using the *CIECAM16 appearance model.* For example, selecting *J-lightness* or *Q-Brightness* in luma channel allows you to modify the corresponding attribute. Please note the meaning of channel may drastically change when using a different correlate, so same numbers will yield different effects on different correlates.

User curves

A special case is the *user* type of curves, which can be specified as tabulated or point list. By using those types, you can specify whatever type of curve you want. Pressing the "D*ata…*" button launches the **tabulated curve** or the **point list** dialogs.

This dialog supports copy and paste from sources like Microsoft Excel. You need to provide a number of points that conforms your curve. The "**Normalize**" check box forces your values to be scaled in the [0 .. 1.0] range. You can reduce noise in your data by using the "*smooth*" feature. On more aggressive the smoothing, "flatter" the resulting curve will be.


*User curves are recommended to be monotonic.*

CIE CAM 16 appearance model

CIECAM16 is an advanced appearance model being actually investigated by the CIE. This model is a fixed and slightly simplified spin-off of the CIECAM02 model which does a comparable job matching experimental data. See the committee webpage here:

http://cie.co.at/technicalcommittees/new-colour-appearance-model-colour-management-systems-ciecam16
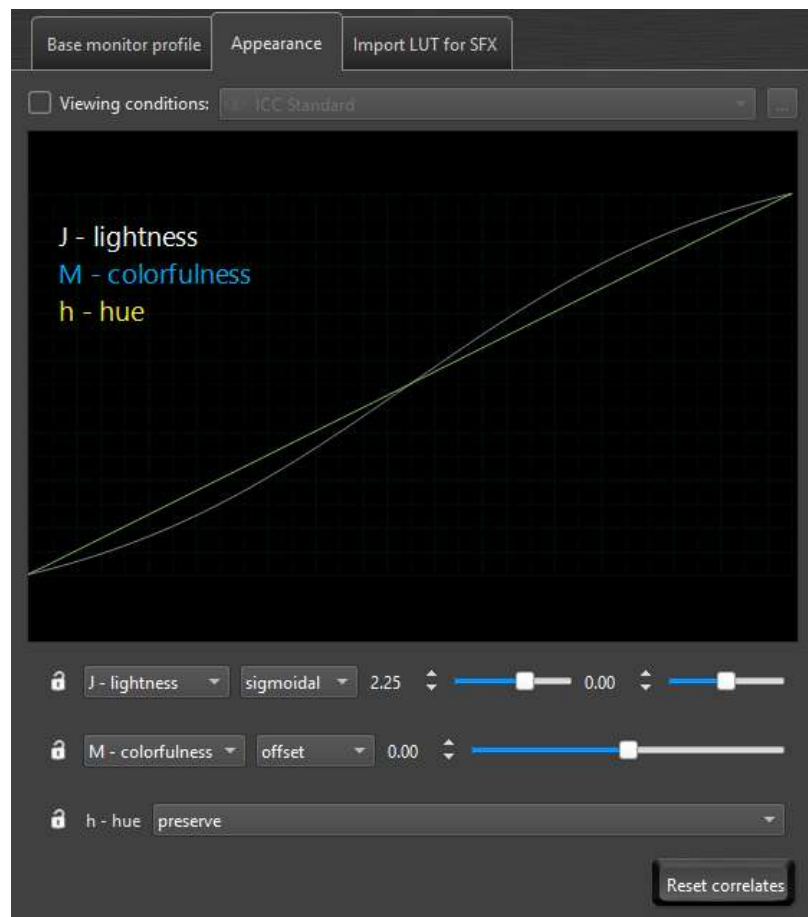

This tweaker allows a lot of special effects, like adding more chroma, converting to gray, emulating dark room etc. Feel free to experiment. It supports CIECAM16 correlates and ***Viewing Conditions modelling***. By default, the viewing conditions are set to the standard ICC profile connection space (**PCS**). To model a change in the viewing conditions, check the "***viewing conditions***" checkbox and select viewing conditions for observer. You can use the predefined set of viewing conditions, or define your own. To define a new viewing condition preset press the *"…"* button.

Using the viewing conditions dialog
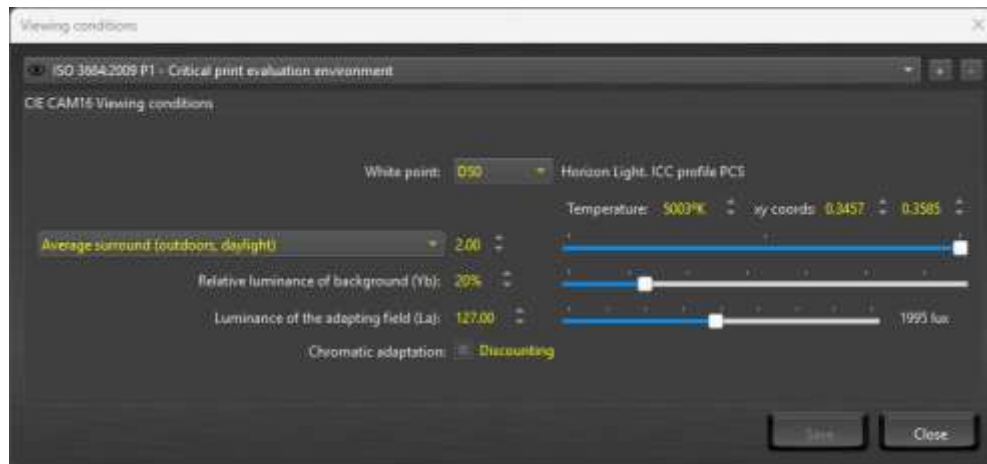
You can use the predefined set of viewing conditions, or define your own preset. Pressing the [+] button allows you to clone the selected preset. Once you have modified the parameters as you wish you can save it. User viewing conditions definition is saved into the profile and you can edit it latter as well. The [-] button deletes custom-made presets. Built-in presets cannot be deleted.
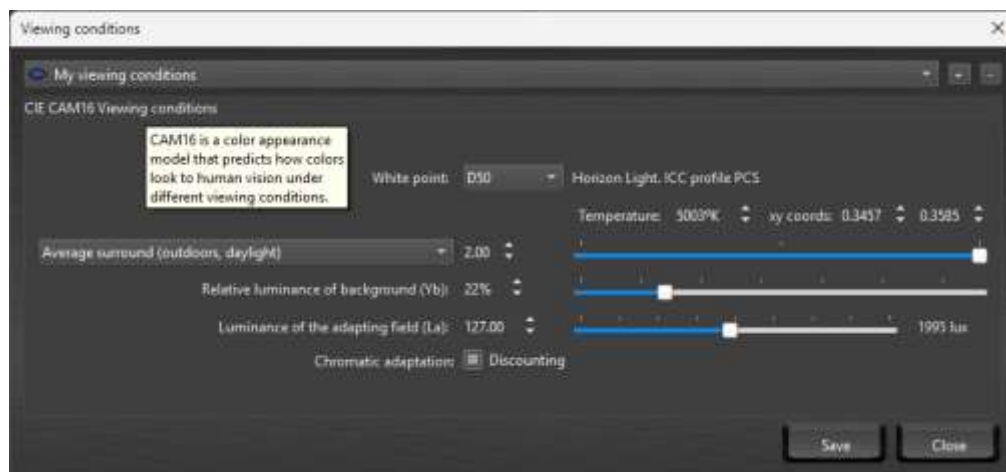
LUT tweaks

.CUBE files are RGB lookup tables commonly used in video and visual effects software. The LittleCMS Monitor ICC Tweaker can import these files, but note that they are not colorimetric—intended more for creative effects than precise color management.
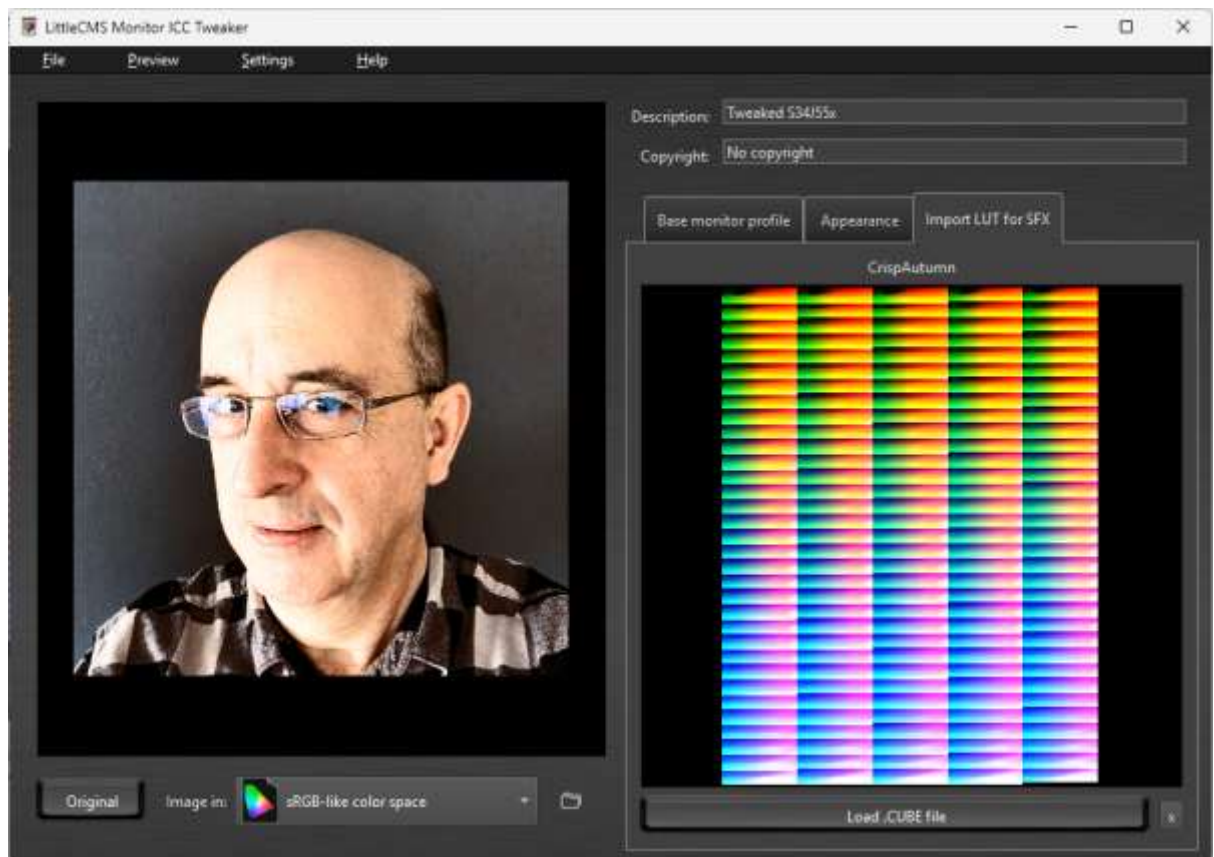
Monitor ICC LUT profile Internals

Internally, the application stores the behavior of the profile by using a look up table (LUT). You can choose between V2 and V4 abstract ICC profiles. V4 is fairly superior to V2, so try to avoid V2 except in cases where backwards compatibility is needed.
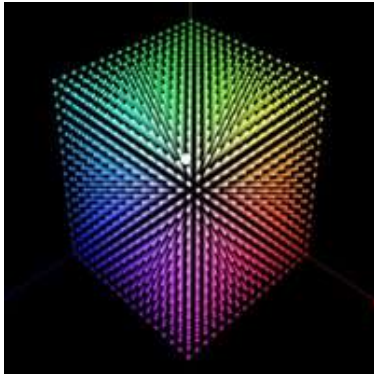
In the preferences dialog you can select the number of nodes used. 25 nodes or more is suggested.

Since a*/b* represents chromatic components, and the LUT covers all near infinite CIE Lab gamut, it is likely the profile will waste nodes on the most extremely saturated colors. To optimize that, you can use an S-shaped sigmoidal curve. The effect of this curve is to assign more nodes to the central part, close to neutral grays and less nodes to the extremes. The strength of this curve is selectable.

PCS a*/b* prelinearization

Some of those curves are not directly encodable in the ICC format, the sigmoid for example. In this case the program creates a sampled curve with a given number of points. You can select how many points you want to use in the *"linearization curve points"* setting. 1024 points should be enough in most cases.

Preferences

Aside the settings discussed above, you can select the resolution when drawing curves, which is only a way to represent the curves and has nothing to do with the profile accuracy.
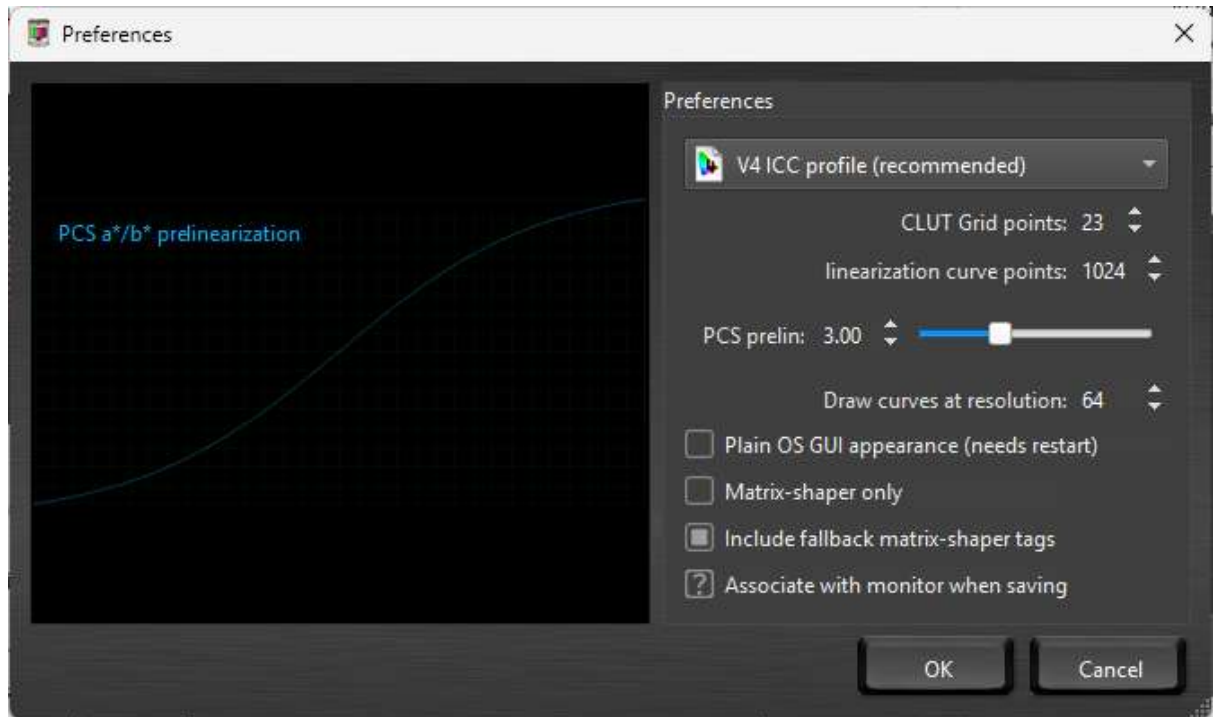
Finally…

This is a short manual for a tool that has been created with simplicity in mind. While it streamlines the process, remember it's just a tool, the real finesse comes from experimenting. Finding the right curves and combinations often involves a touch of artistry. Explore, adjust, and enjoy the creative side of monitor profile tweaking!

Regarding Qt6 LGPL

LittleCMS Color Abstractor is using Qt under LGPL v3

The Qt source code needed to build the DLL, so or dylib dynamic libraries used by this program is available upon request. Please contact us at sales@littlecms.com to get source code. Additionally, you can get this code from the Qt Company https://www.qt.io/ No modifications have been done on those libraries. Compiling Qt6Core Qt6Gui and Qt6Widgets and substituting those found in the installation directory allows you to use your LGPL v3 rights.