

CalMAN ColorMatch Quick Start Guide

Thank you for your interest in using the free version of CalMAN ColorMatch. If you haven't already received your free ColorMatch license, follow this link for ColorMatch download and license information: <http://studio.spectracal.com/calman-colormatch>

ColorMatch Analysis

The purpose of CalMAN ColorMatch is to analyze the performance of a display quickly and accurately, across a broad range of color sample points. At the completion of ColorMatch analysis, you will have a comprehensive measurement of a display to verify that it is performing as desired, or that it needs calibration.

With CalMAN ColorMatch, you can perform quality testing or acceptance testing on any free-standing video monitor or television, or on any computer-connected display, in less than 5 minutes. ColorMatch measures a display's performance and compares it to target values for Rec. 709, sRGB, Digital Cinema P3, Adobe RGB, or any custom standard. ColorMatch measures the full grayscale range and a full set of X-Rite/Pantone ColorChecker® SG target colors to determine how closely the display's performance conforms to the selected standard.

CalMAN ColorMatch supports all display technologies. Whether you have a front projector, plasma, CCFL LCD, LED LCD, or OLED, CalMAN ColorMatch measures and conformance checks all of them.

ColorMatch Virtual 3D LUT

The ColorMatch workflow also allows you to perform a virtual calibration, to check how well the display could perform with a corrective 3D LUT (as of CalMAN v5.4.0). ColorMatch creates a virtual 3D LUT, to correct gamma, grayscale balance, RGB crosstalk, and color gamut, plus luminance and saturation nonlinearities.

You can then validate the display performance with the virtual LUT by performing a post-calibration ColorMatch analysis. The post-calibration analysis shows you how well the display would perform with a standard 3D LUT produced by any CalMAN 3D LUT calibration software.

When the display under test is an RGB computer monitor, you can also visually validate the display performance with the newly created virtual LUT, by loading the LUT into the CalMAN Eyeglass 3D LUT Visualization Tool (new with CalMAN v5.4.0).

With CalMAN Eyeglass, you can verify the corrective effects of a display calibration LUT on a loaded image. CalMAN Eyeglass allows you to view still image files, both with and without the effects of the corrective virtual 3D LUT. Eyeglass also loads standard .3dl LUT files.

CalMAN ColorMatch

Online:

<http://calman.spectracal.com/calman-colormatch.html>

Quick Start Guide (this file):

<http://www.spectracal.com/Documents/QSGs/CalMAN%20ColorMatch%20QuickStart.pdf>

CalMAN Eyeglass

Quick Start Guide

<http://www.spectracal.com/Documents/QSGs/CalMAN%20Eyeglass%20QuickStart.pdf>

To get started with CalMAN ColorMatch:

1. Install CalMAN

Using the supplied link, or the one below, download and install the CalMAN software.

<http://studio.spectracal.com/calman-colormatch-download>

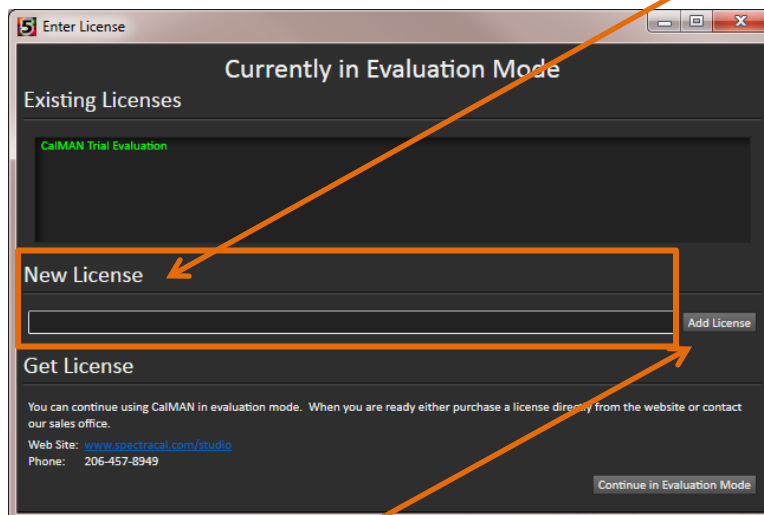
2. Run CalMAN

- A. Open the CalMAN software by double-clicking the new desktop shortcut.



3. Add ColorMatch license to CalMAN

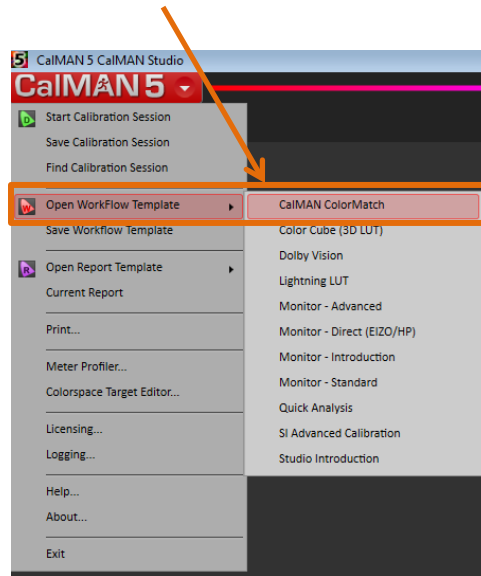
- A. Paste the entire ColorMatch license string that you received into the *New License* text box.



- B. Click the *Add License* button.

4. Open the ColorMatch workflow

- A. From the main menu, select *Open Workflow Template*.
- B. Select the “ColorMatch” workflow.



5. Connect measurement hardware

- A. On the Session Setup page, follow the instructions to connect CalMAN to your color meter.
- B. Position your meter at the center of your display screen.

See the Appendix, below, for additional information on color meters.

The screenshot shows the 'Hardware Connect' screen in CalMAN Studio. It is divided into three main sections:

- Hardware Connect:** Contains instructions for connecting the meter and source.
 1. Connect your meter.
 - a) Connect your meter to a USB port, click the *Find Meter* button, and select your meter.
 - b) Select the Target Display Type.
 2. Connect your reference test pattern source.
 - a) Connect your source to your computer, click the *Find Source* button, and select your source.
 - b) Select the pattern Window Size.
 - c) If not using an external source, use the built in pattern window on your computer monitor by pressing the *Open Pattern Window* button.
- Session Options:** Contains instructions for selecting the target Whitepoint, Gamma, and Colorspace.
 3. Select the target Whitepoint, Gamma, and Colorspace for the display.
 - Click *Next* to perform ColorChecker analysis.

The 'Find Meter' and 'Find Source' sections are highlighted with a red box. The 'Find Meter' section shows 'Name: SpectraCal C6' and 'LCD (CCFL)'. The 'Find Source' section shows 'Name: Source' and 'Constant APL 50'. The 'Session Options' section shows 'Whitepoint: D65', 'Gamma: ITU BT.1886', and 'Colorspace: rec.709/sRGB'. There are 'Back' and 'Next' buttons at the bottom right.

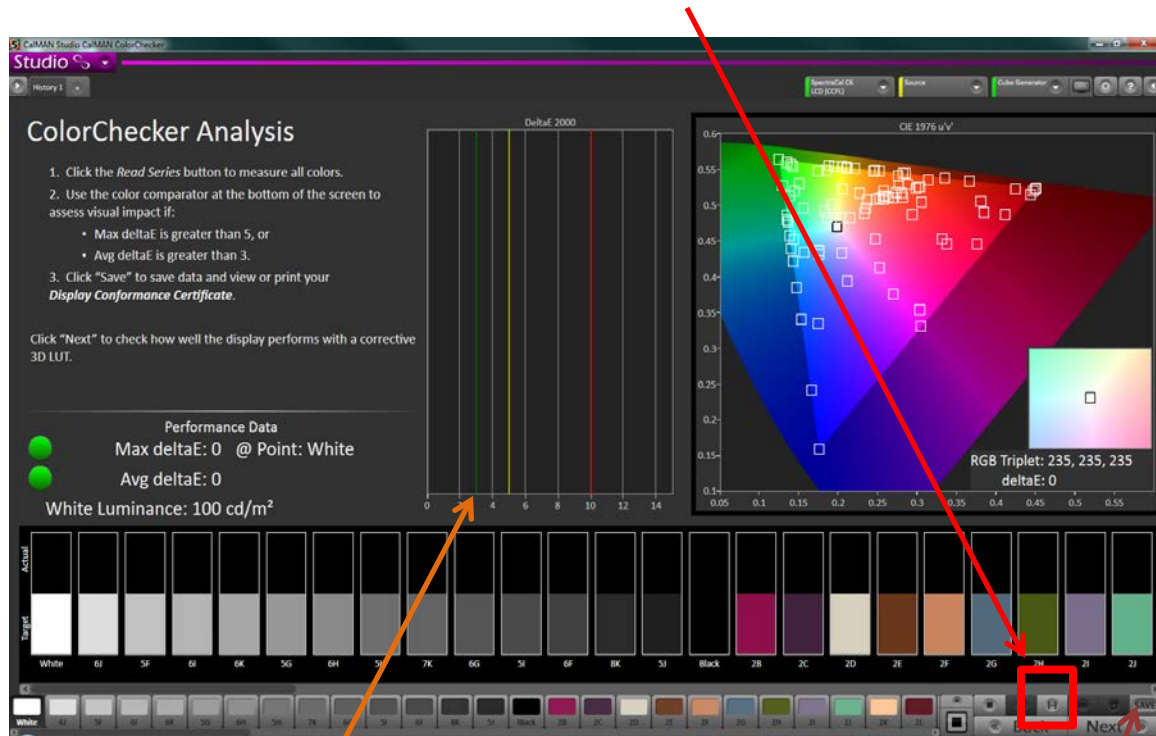
- C. On the Session Setup page, follow the instructions to connect CalMAN to your test pattern source.

See the Appendix, below, for additional information on test pattern sources.

Note: If you use the DPG-2000 as your test pattern source, you will need to switch the ColorMatch workflow to use the ColorMatch Classic test patterns. In the CalMAN Settings panel, on the Workflow Basic Options tab, under Color Checker Settings, check "Color Checker Classic" and uncheck "Color Checker SG."

6. Perform ColorChecker Analysis

A. On the ColorChecker page, click the *Read Series* button to start the display performance test.



B. Read the DeltaE 2000 Chart.

These delta E lines represent the amount of error in each measured value, compared to the target value. Below the red line is good, below the yellow line is better, and below the green line is best. Any errors below the 3 delta E green line are generally unperceivable to the human eye.

C. View the display performance report.

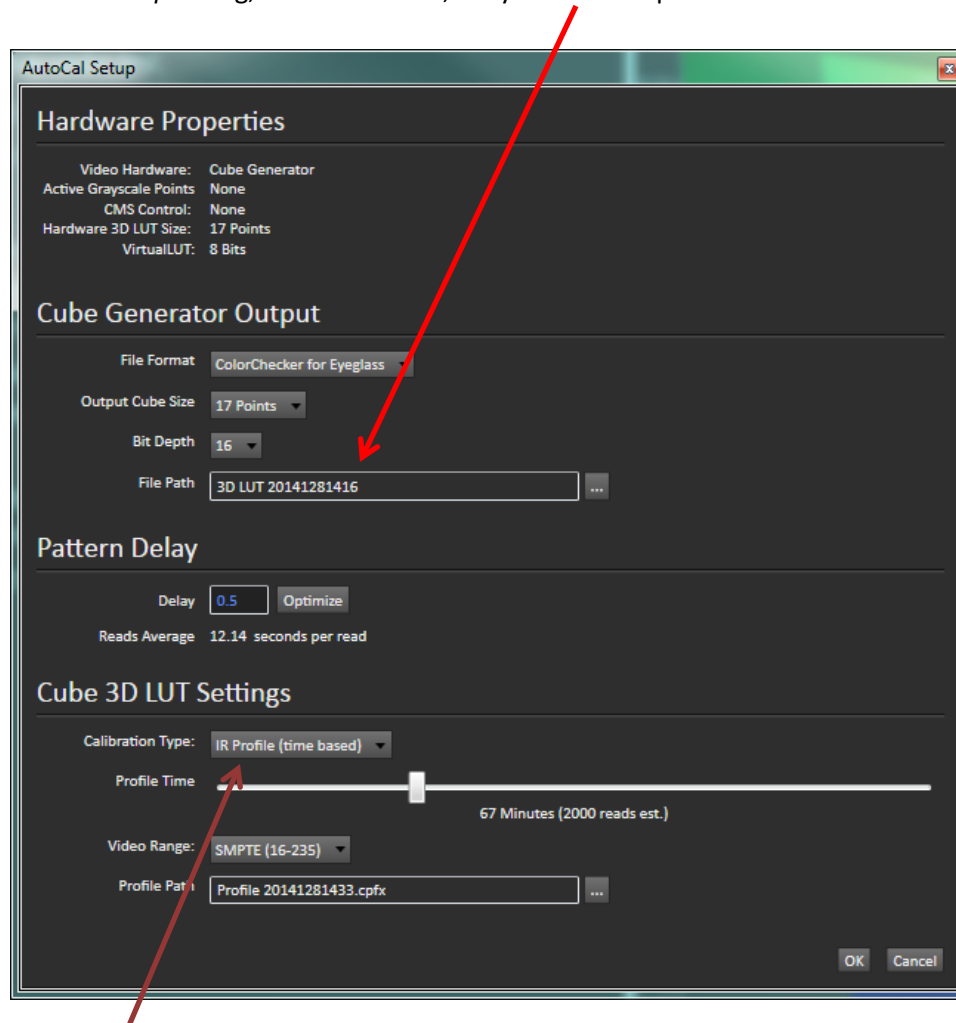
Click the *Save* button, then select “Save Session and view report” to view the display performance certificate.

This concludes the ColorChecker Analysis section of the workflow.

To also create a virtual 3D LUT, to check how well the display could perform with a corrective 3D LUT, click *Next* to continue to the next workflow step.

7. Create Virtual 3D LUT

- A. To prepare for the virtual LUT calibration, on the *LUT Control Setup* page, click the LUT Control button to connect to the Cube Generator function. Click Next to advance to the Create Virtual 3D LUT page.
- B. On the *Create Virtual 3D LUT* page, click the *AutoCal* button to initiate the display calibration process with the *AutoCal Setup* dialog (below).
- C. On the *AutoCal Setup* dialog, under File Path, set your LUT file path and file name.



Under *Calibration Type*, select:

- **IR Profile (time based)** for the best and most user-friendly 3D LUT AutoCal process, to select how much display quality you have time for, from 30 minutes to maximum display quality (6,000 points max).
- **IR Profile (point based)** to limit the 3D LUT AutoCal by the number of profiled color points (1,000 - 10,000 points), rather than by the total measurement time.
- **Lightning LUT** if you have only five minutes to create a 3D LUT that delivers a very high quality result on professional displays with moderate linearity.

8. Display Validation

- A. To validate the display performance with the newly created virtual LUT, click the *Read Series* button on the *ColorChecker Validation* page.
- B. Review the performance data for the display performance with the corrective 3D LUT. To compare the corrected display performance to the uncorrected performance, step back to the *ColorChecker Analysis* page.
- C. If the display under test is an RGB computer monitor, you can also visually validate the display performance with the newly created virtual LUT, by loading the LUT into the CalMAN Eyeglass 3D LUT Visualization Tool. You should load image content or family photos that are familiar to you. The Eyeglass Validation page in the ColorMatch workflow outlines the process.

WHAT NEXT?

For additional information on CalMAN 3D LUT software, please contact SpectraCal at:

Phone: +1 206 420 7514, or

Email: info@spectracal.com

We will answer your questions and work with you to get the best solution for your needs.

APPENDIX

Color Meter

You will need a color meter (sensor) to measure your display under test with CalMAN ColorMatch. ColorMatch supports basically all available color meters, except the Spyder meters which have quality consistency issues. CalMAN supports over 50 different measurement instruments, and climbing. From Photo Research, Klein Instruments, Konica Minolta, X-Rite and more. Either you, a friend, or a co-worker may already have a color meter that you can use to get started testing your displays.

If you don't already have access to a color meter to use with ColorMatch, the most convenient option may be to rent a color meter from SpectraCal.

Call 206-420-7514 for information on renting a SpectraCal color meter.

Reference Test Pattern Source

You will also need a source of reference test patterns to generate the patterns on screen for the meter to measure. CalMAN Supports dedicated pattern generator hardware and software pattern generators with RGB triplet output to generate any of the 16.78 million 8-bit RGB colors. Again, CalMAN supports all the major products on the market.

Note: CalMAN does not support laptop HDMI output for reference test patterns, as the HDMI output levels cannot be accurately predicted or controlled, due to manufacturer gamma customization.

Following are the three major configurations that you may encounter for displays that you wish to test. Each display configuration has options for supplying reference test patterns.

1. **Desktop monitor connected to computer through standard graphics adapter.**

Note: If the monitor is to be tested for full range, rather than SMPTE legal range, in the CalMAN Settings panel, on the Workflow Basic Options tab, under Luminance Levels, select "PC (0-255)."

Option: If CalMAN is running on the computer that the monitor to be tested is connected to, use the pattern test window built into CalMAN. On the CalMAN Session Setup page, click the "Open Pattern Window" button and position the pattern window on the desired monitor.

Option: Download CalMAN Client 3 and install it on the computer to supply reference test patterns.

PC - <http://studio.spectracal.com/calman-client-3-pc>

Mac - <http://studio.spectracal.com/calman-client-3-mac>

Option: Use a signal processor with available test patterns. One of the following processors can be connected to the monitor to be tested, to supply reference test patterns: Lumagen Radiance, DVDO Duo, Fujifilm IS-Mini, Cine-tal Davio, or Pandora Pluto.

Option: Use a reference test pattern generator. One of the following generators can be used to supply reference test patterns: AV Foundry VideoForge models, Quantum Data 780 (with current firmware), AccuPel models, Phabrix models. Follow these links for information on test pattern generators:

<http://www.spectracal.com/AppLinks/pro-shopsources.aspx>

Or, call 206-420-7514 for information on renting a reference test pattern generator.

2. **Video monitor connected to computer through Kona or DeckLink video output device.**

Option: If the computer is a Mac, AV Foundry VirtualForge generator software can run on the Mac to supply reference test patterns. Follow this link for information on the VirtualForge generator software:

<http://studio.spectracal.com/store/pattern-generators/virtualforge.html>

Option: Use a signal processor with available test patterns. One of the following processors can be connected to the monitor to be tested, to supply reference test patterns: Lumagen Radiance, DVDO Duo, Fujifilm IS-Mini, Cine-tal Davio, or Pandora Pluto.

Option: Use a reference test pattern generator. One of the following generators can be used to supply reference test patterns: AV Foundry VideoForge models, Quantum Data 780 (with current firmware), AccuPel models, or Phabrix models. Follow these links for information on test pattern generators:

<http://www.spectracal.com/AppLinks/pro-shopsources.aspx>

Or, call 206-420-7514 for information on renting a reference test pattern generator.

3. **Video monitor, television, or projector that does not receive its video signal from a computer.**

Option: Use a signal processor with available test patterns. One of the following processors can be connected to the monitor to be tested, to supply reference test patterns: Lumagen Radiance, DVDO Duo, Fujifilm IS-Mini, Cine-tal Davio, or Pandora Pluto.

Option: Use a reference test pattern generator. One of the following generators can be used to supply reference test patterns: AV Foundry VideoForge models, Quantum Data 780 (with current firmware), AccuPel models, Phabrix models. Follow these links for information on test pattern generators:

<http://www.spectracal.com/AppLinks/pro-shopsources.aspx>

Or, call 206-420-7514 for information on renting a reference test pattern generator.

Option: If the CalMAN calibration computer is a Mac (with VMware Fusion), AV Foundry VirtualForge generator software can run on the Mac with an AJA T-Tap video output device to supply reference test patterns. Follow this link for information on the VirtualForge generator software:

<http://www.spectracal.com/AppLinks/pro-shopsources.aspx>

Option: If you have a Western Digital WD TV Live media player, the SpectraCal VPS-2000 Video Pattern Set converts the player to supply reference test patterns. Follow this link for information on the VPS-2000. <http://color.spectracal.com/store/pattern-sources/vps-2000.html>