

# CaIMAN Setup Guide

madVR Video Renderer

3D LUT Calibration

Rev. 1.1

## Introduction

CalMAN Display Calibration Software interfaces directly with the Test Pattern Generator that is provided with the madVR video renderer. The generator automatically produces the required test patterns (patches) as CalMAN measures the display that is driven from madVR.

CalMAN controls the Test Pattern Generator as it creates an optimized calibration LUT file for the madVR. CalMAN then automatically loads the calibration LUT file into madVR to apply calibration correction to the display. madVR alters its output signal, according to the LUT data, to correct the display performance to very accurately comply with the selected video standard (e.g. Rec709, sRGB, etc.).

### CalMAN Required Software Version

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- Version 5.5.2 or later

### CalMAN Required Workflow

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- Color Cube (3D LUT)

### madVR Required Software Version

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- Version 0.89.17 or later

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## Software Setup

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### Open madVR Test Pattern Generator

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1. In the madVR folder on the HTPC, locate and run the file, “madTPG.exe.”
2. Position the madVR Test Pattern Generator window in the center of the display to be calibrated.

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### Enable LAN Access

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If CalMAN will be running on a separate computer from the HTPC that is driving the display to be calibrated:

On the HTPC that is driving the display to be calibrated:

1. Right-click on the madVR tray icon.
2. Select “Enable LAN Access.”
3. If a Windows firewall alert appears, select the desired options and click “Allow access.”

*Note: It will be more convenient to run CalMAN either on a separate computer from the HTPC that is driving the display to be calibrated or on a second monitor on the HTPC.*

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### Open CalMAN Color Cube workflow

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1. Open CalMAN.
2. Load the *Color Cube* workflow - in the CalMAN main menu, select “Open Workflow Template,” then select “Color Cube (3D LUT).”
3. If CalMAN is running on the display to be calibrated, make the Test Pattern Generator window as small as possible, while still providing a full target for your color meter.

## Display Calibration

Follow this procedure to:

1. Create a display calibration 3D LUT file for a video display that is driven from madVR and automatically load the 3D LUT file into madVR.
2. Validate the calibrated display performance.

### Create Display Calibration 3D LUT

Proceed through each step of the Color Cube workflow in the normal fashion, using the following notes for madVR specifics.

#### Initial Setup section

In the *Initial Setup* section of the Color Cube workflow (Figure 1), step through the following pages:

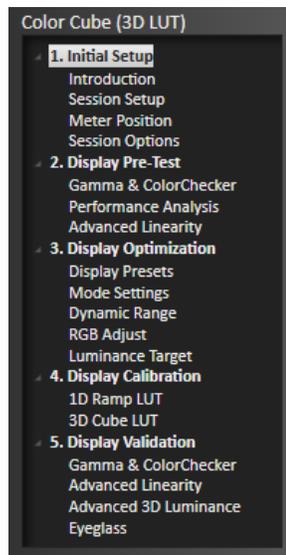


Figure 1. CalMAN Color Cube (3D LUT) workflow outline.

#### Session Setup - Meter Connect

1. Connect your color meter to the CalMAN computer.
2. On the *Session Setup* page, click the *Find Meter* button.
3. If your meter is listed on the *Find Meters* dialog, select it, then click *Search*. If your meter is not listed on the dialog, just click *Search*.
4. Position the meter on the target display.

#### Session Setup - Source Connect

1. On the CalMAN *Session Setup* page, click the *Find Source* button.

2. On the *Source* dialog (Figure 2), under *Manufacturer*, select “madVR.”
3. Under *Model*, select “madVR – madVR Test Pattern Generator.”
4. Enter the IP address of the target computer, shown on the madTPG title bar (if CalMAN is running on the same computer as madVR, the default local IP of 127.0.0.1 also works).
5. Click *Connect*.

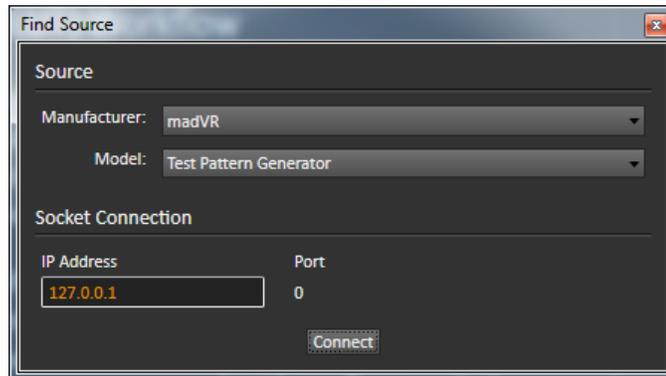


Figure 2. CalMAN Find Source dialog, for connecting to the madVR pattern generator.

**Note:** If you are running CalMAN on the same display that you are calibrating, on the CalMAN Source Settings tab, Set the “Full Screen Mode” option to “On.” This will allow you to see the CalMAN software screen, except while measurements are being made.

The Exclusive mode enables 10-bit operation.

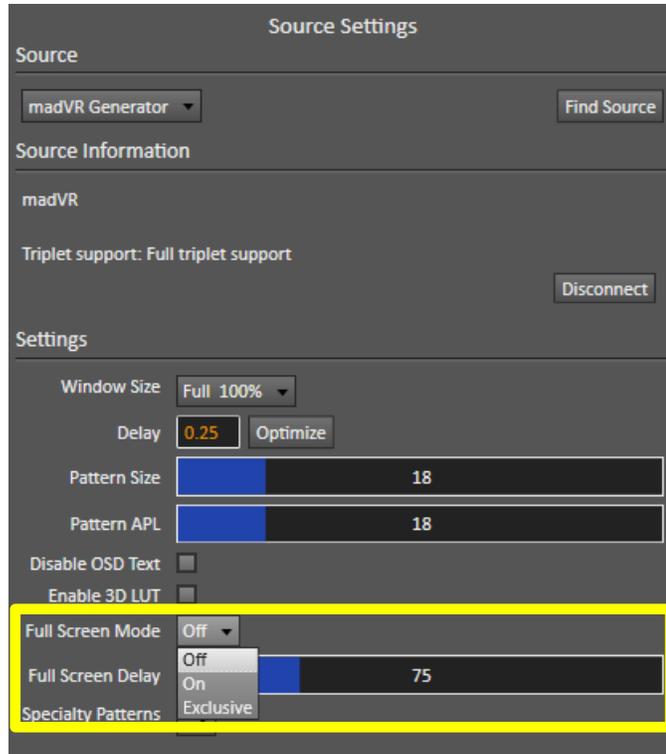


Figure 3. CalMAN Source Setting tab, for selecting test pattern options.

### Session Setup - LUT Device Setup

On the CalMAN *Session Setup* page, click the *Find 3D LUT Device* button.

1. On the *Find Display* dialog (Figure 4), under *Manufacturer*, select “madVR.”
2. Under *Model*, select “3D LUT Generator.”
3. Enter the IP address of the target computer, shown on the madTPG title bar (if CalMAN is running on the same computer as madVR, the default local IP of 127.0.0.1 also works).
4. Click *Connect*.

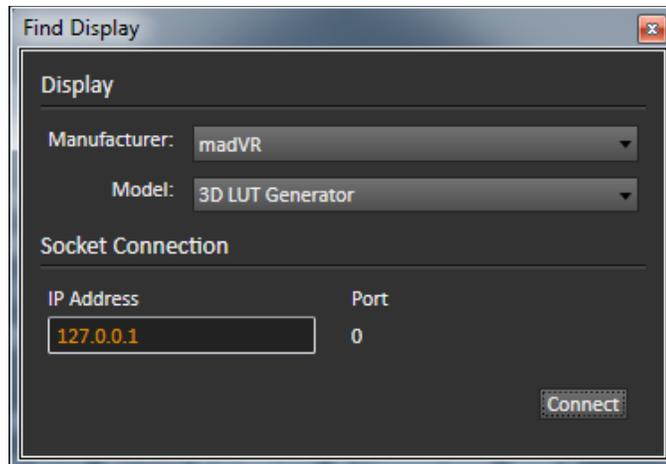


Figure 4. CalMAN Find Display dialog, for connecting to madVR for loading 3D LUT.

5. On the CalMAN *Session Setup* workflow page, select the madVR gamut memory that you wish to calibrate (Figure 5).

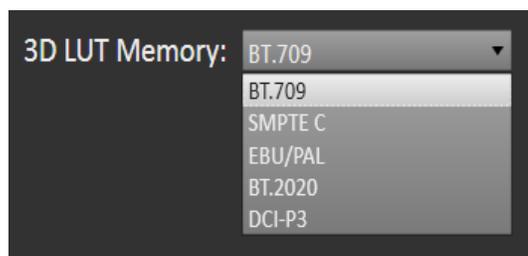


Figure 5. Memory selection on CalMAN *Session Setup* page, for selecting which madVR gamut memory to calibrate.

### **Session Options page**

On the CalMAN *Session Options* page, you need to select the *Input Signal Levels* to match the display you are calibrating and the selected output levels in madVR (see the madVR Settings window in Figure 6).

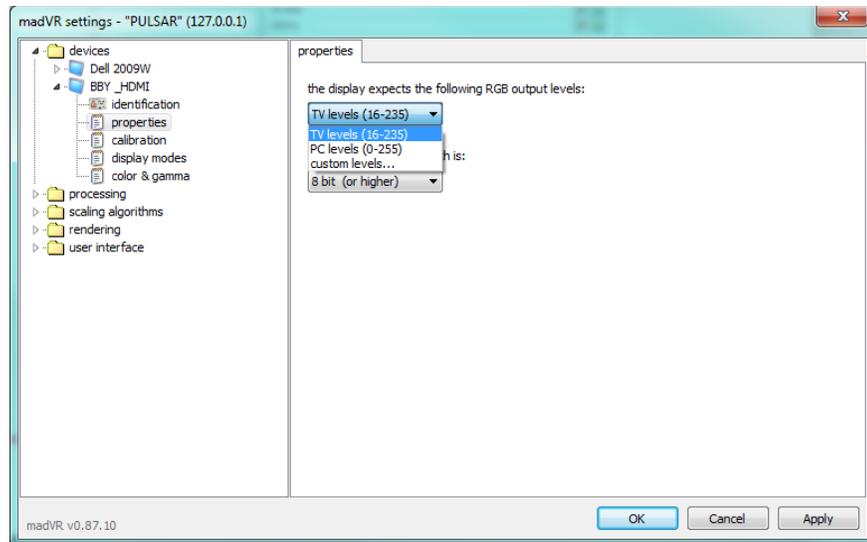


Figure 6. madVR Settings window, showing pattern level options that need to be matched by CalMAN.

If the madVR output levels are set to 'TV levels (16-235)':

- In CalMAN (Figure 7), for 'Input Signal Levels,' select 'Video (16-235).'

If the madVR output levels are set to 'PC levels (0-255)':

- In CalMAN (Figure 7), for 'Input Signal Levels,' select 'PC (0-255).'

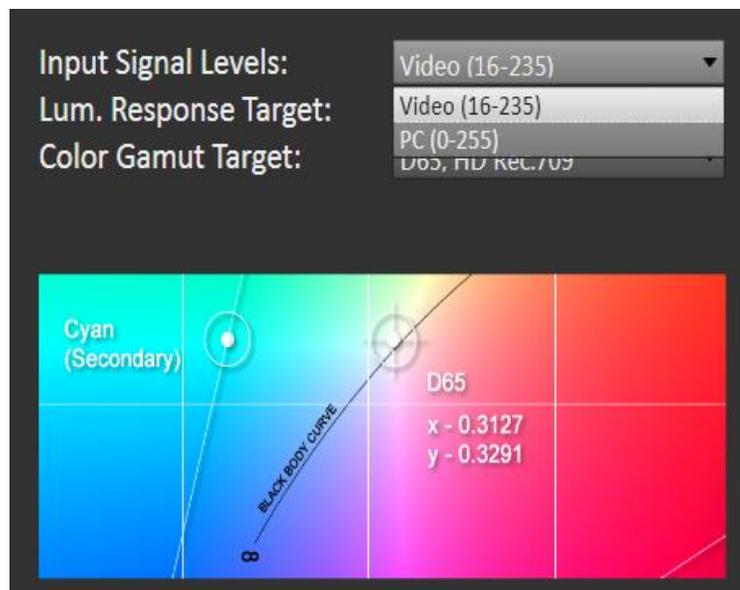


Figure 7. CalMAN selections for pattern level options.

## Display Pre-Test section

In the *Display Pre-Test* section of the Color Cube workflow, you can measure the performance of a display before you calibrate it, on the *Gamma & ColorChecker* page.

**CAUTION:** While CalMAN is running, it disables any existing 3D LUT in madVR, by default.

*If there is already a 3D LUT loaded in madVR and you wish to first measure the performance of the display with that 3D LUT, you need to enable the LUT during your display Pre-Characterization steps.*

To enable an existing madVR LUT:

- On the CalMAN Source Settings tab, check the box for “Enable 3D LUT.”

*(The button on the madVR Test Pattern Generator screen will not be active.)*

*The text at the top of the Test Pattern Generator screen indicates the status of any installed madVR 3D LUT.*

On the *Performance Analysis* page, the display measurements from the *Gamma & ColorChecker* page are evaluated in a series of pass/fail performance parameters.

- If the display fails any of the parameters on the *Performance Analysis* page, you should consider using the following *Display Optimization* section of the workflow to optimize control adjustments on the display itself.
- If the display passes all of the parameters on the *Performance Analysis* page, you can skip the *Display Optimization* section and go immediately to the *Display Calibration* section of the workflow.

## Display Optimization section

In the *Display Optimization* section of the Color Cube workflow, you are guided to optimize any controls the display may have for picture mode, color gamut, color temp, gamma, dynamic range, white point balance, or white point luminance.

**CAUTION:** Before you make any adjustments to optimize the display controls or perform 3D LUT calibration, be sure to disable any existing madVR LUT.

**Failure to disable an existing madVR LUT before making any adjustments or creating a new LUT will result in an inaccurate display calibration.**

To disable an existing madVR LUT:

- On the CalMAN Source Settings tab, uncheck the box for “Enable 3D LUT.”

*The text at the top of the Test Pattern Generator screen indicates the status of any installed madVR 3D LUT.*

On the *RGB Adjust* page, if the display has RGB Gain controls, under the *RGB Adjust Levels* selection, select “2 Point 30, 100%.” Click *Read Continuous* and adjust the display’s RGB Gain controls for RGB balance at 100%. Accurate RGB balance at 100% is beneficial as a foundation for 3D LUT calibration.

## Display Calibration section

In the *Display Calibration* section of the Color Cube workflow, there are provisions for calibrating both a 1D LUT (on the *1D Ramp LUT* page) and a 3D LUT (on the *3D Cube LUT* page).

When we are using the madVR 3D LUT Generator function to produce a 3D LUT file for madVR, we will skip the 1D Ramp LUT page and use only the *3D Cube LUT* page.

### 1D Ramp LUT page

Skip over the *1D Ramp LUT* page when using the madVR 3D LUT Generator function to produce a calibration LUT file for madVR.

### 3D Cube LUT page

1. On the *3D Cube LUT* page, click the *AutoCal* (rotating arrows) button at the right end of the meter action buttons. The *AutoCal Setup* dialog then appears (Figure 8).

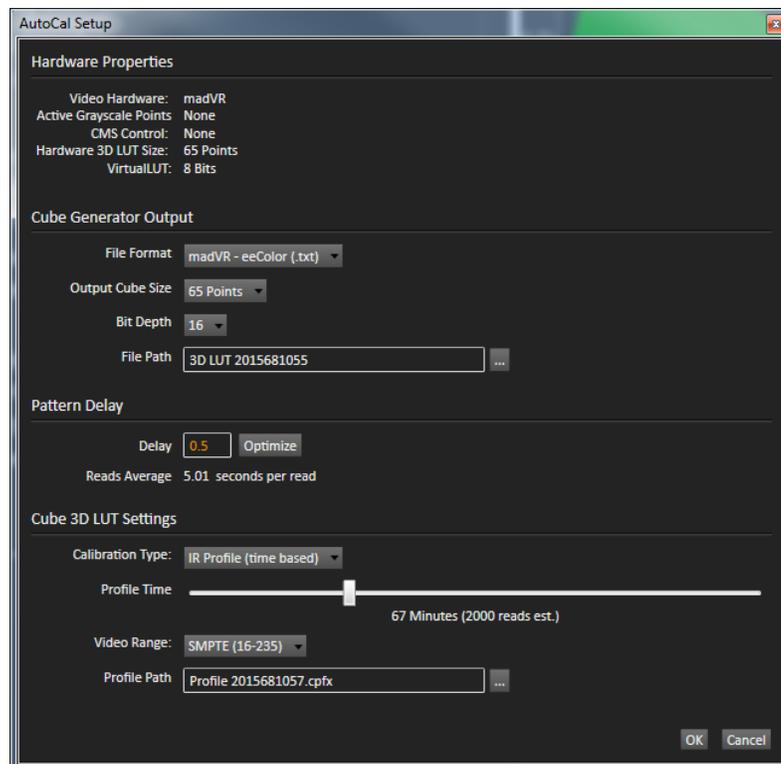


Figure 8. CalMAN AutoCal Setup dialog, for selecting options for 3D LUT creation.

2. Under *File Path*, select the desired directory path and provide a name for the LUT file that CalMAN will create (e.g. monitor ID, color space, and date).
3. Under *Calibration Type*, select the desired type of 3D LUT calibration process.
  - **IR Profile (time based)**: Creates the best quality display calibration 3D LUT possible in the selected period of time. You select how much display quality you have time for, from 30 minutes to maximum display quality (6,000 points max). Uses Intelligent Resolution Profiling to search out the most nonlinear color space areas and correct those first.
  - **IR Profile (point based)**: Creates the best quality display calibration 3D LUT possible with the selected number of measurement points (1,000 - 10,000 points). Uses Intelligent Resolution Profiling to search out the most nonlinear color space areas and correct those first.
  - **Lightning LUT**: Creates a display calibration 3D LUT in five minutes or less. Produces a very high quality result on professional displays with moderate linearity. Displays with significant nonlinearity may produce marginal results.
4. Under *Video Range*, select “SMPTE (16-235)” if you are calibrating a video display that clips or compresses signals above reference white, as tested on the CalMAN *Dynamic Range* page.
5. Click *OK*.

As the AutoCal process completes, CalMAN automatically loads the calibration LUT file into madVR (see below).

## Verify CalMAN 3D LUT file in madVR

View the madVR Settings window to verify that the LUT file has been loaded into the desired color space slot (Figure 9).

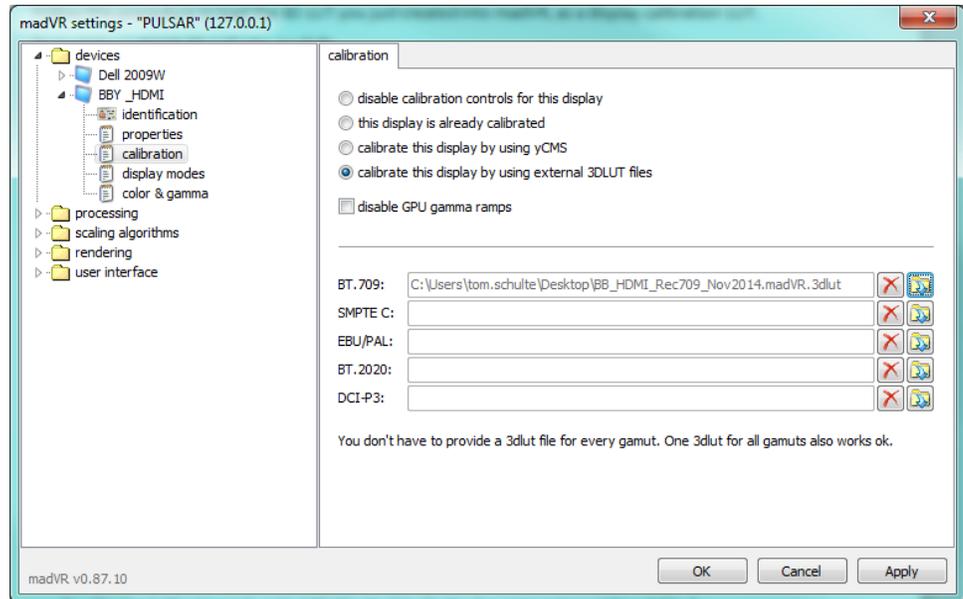


Figure 9. madVR Settings window, showing 3D LUT files for each color gamut memory.

With the 3D LUT loaded into the desired color space slot, you are ready to verify the accuracy of the resulting display calibration (see below).

## Display Validation section

In the *Display Validation* section of the Color Cube workflow, you can validate the accuracy of the resulting display calibration.

To validate the 3D LUT display calibration:

1. On the CalMAN Source Settings tab, check the box for “Enable 3D LUT.”
2. On the CalMAN *Gamma & ColorChecker* page, click the *Read Series* button to make a complete series of display validation measurements.
3. Observe the calibrated Max and Avg performance data.
4. On the *Gamma & ColorChecker* page, click the *Save* button to save the measurement and 3D LUT data.

## Retarget Profile to Other LUT Memories

After you have profiled a display with CalMAN and created a 3D LUT, you can create additional 3D LUTs targeted to the other 3D LUT memories in madVR.

This retargeting of an existing profile to a new 3D LUT takes just minutes and does not require additional display measurements.

To retarget a CalMAN profile to another madVR memory:

1. On the *Display Control* tab, select the new 3D LUT memory that you wish to create.
2. On the *Display Control* tab, click the “Retarget LUT From Profile” button.
3. On the file *Open* dialog, select the CalMAN profile file from the original calibration.
4. On the *Import 3D LUT* dialog, select the *Colorspace Target and Gamma Formula* that matches the madVR LUT memory that you selected in step 1, above.
5. Click *OK*.
6. Repeat for any other 3D LUT memories that you wish to create.

Close CalMAN to disconnect from madVR.

***NOTE: madVR is not a SpectraCal product, and SpectraCal does not provide technical support for madVR.***

***For madVR support, visit one of the following forums:***

- Doom9 Forum > Hardware & Software > Software players (madVR home)  
<http://forum.doom9.org/forumdisplay.php?f=15>
- AVS Forum > Video Components > Home Theater Computers  
<http://www.avsforum.com/forum/26-home-theater-computers/>

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Portrait Displays, Inc., since 1993, is a leading application software provider (ASP) for PC, smartphone, and tablet displays. The Portrait Displays team now includes **SpectraCal**, the world's leading provider of video display calibration software. The combined companies offer value-added, feature-rich solutions to both OEM display manufacturers and end users seeking improved accuracy and manageability of their displays.

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