



I n s t r u c t i o n | M a n u a l

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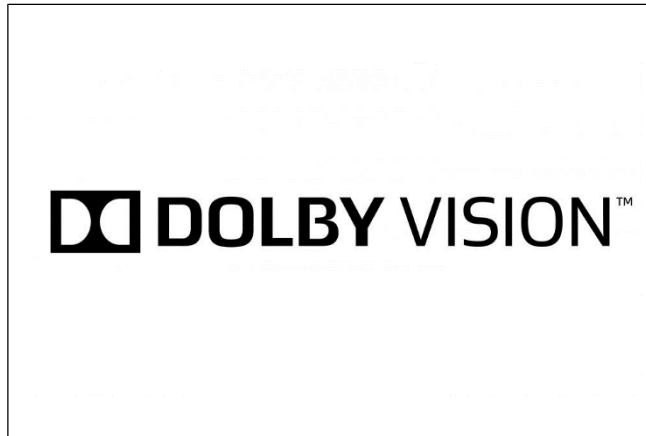
Diversified Video Solutions, LLC.
Telephone: (757) 748-5320
support@diversifiedvideosolutions.com
ryan_masciola@diversifiedvideosolutions.com
<https://diversifiedvideosolutions.com>

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For information, contact:

Dolby Laboratories, Inc.
1275 Market Street
San Francisco, CA 94103-1410 USA
Telephone: (415) 558-0200
Fax: (415) 863-1373
<https://www.dolby.com>

Introduction



Dolby Vision™ transforms your TV experience with dramatic imaging—incredible brightness, contrast, and color that bring entertainment to life before your eyes. By fully leveraging the maximum potential of new cinema projection technology and new TVs’ display capabilities, Dolby Vision delivers high dynamic range (HDR) and wide color gamut content. The result is a refined, lifelike image that will make you forget you are looking at a screen.

Current consumer video delivery and cinema standards are based on the limitations of old technologies and require altering the original content before it can be reproduced for playback—dramatically reducing the range of colors, brightness, and contrast from that captured by modern cameras. Dolby Vision changes that, giving creative teams the confidence that images will be reproduced faithfully on televisions that feature Dolby Vision.

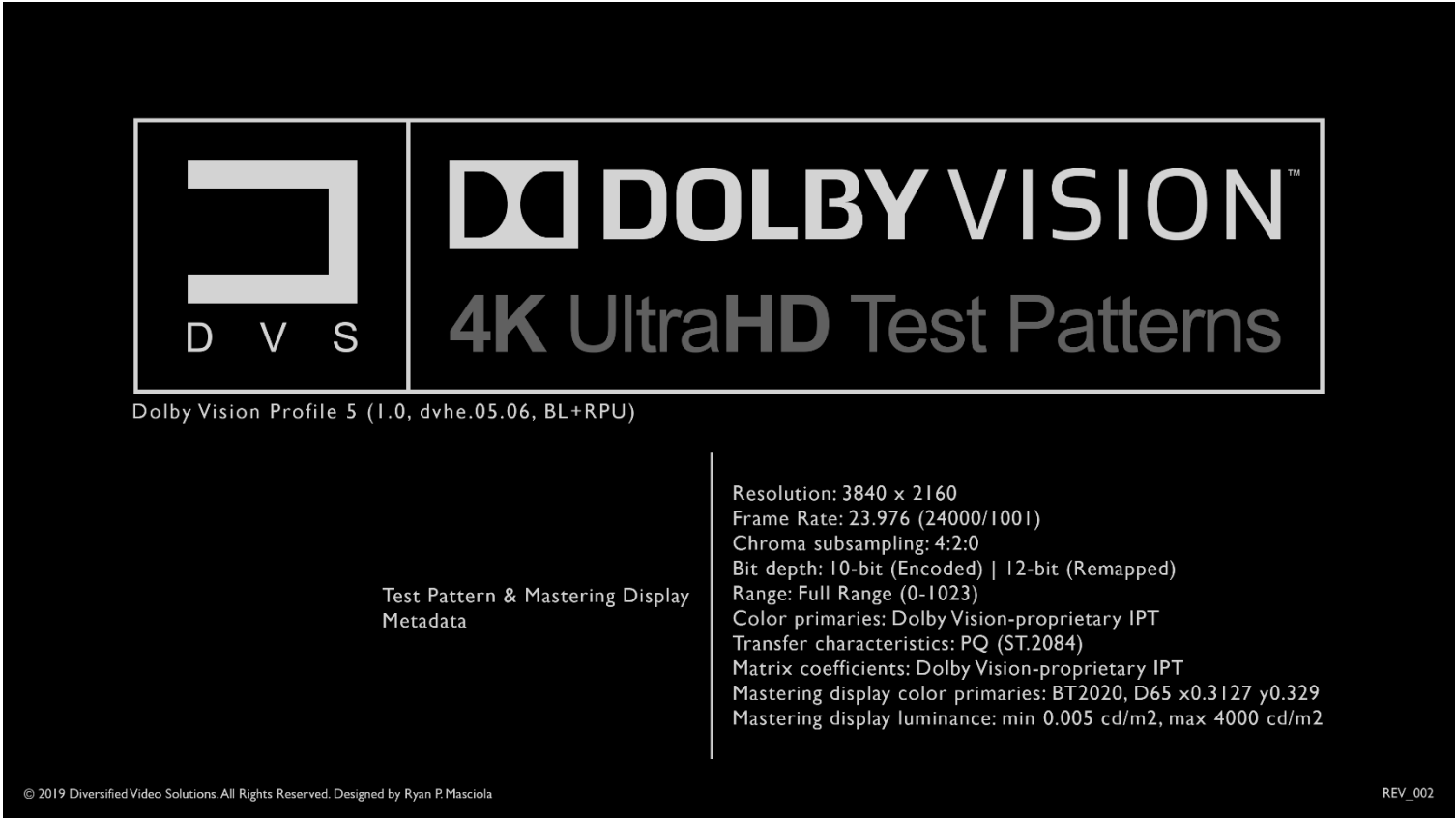
Dolby Vision is a natural complement to Dolby Atmos®. It gives movie, television, and game creators the tools they need to create truly immersive experiences that preserve the creative intent and let consumers take advantage of modern hardware.

For manufacturers of televisions, game consoles, personal computers, and mobile devices, Dolby Vision unlocks the full capabilities of their hardware and creates a premium experience that can increase use and enjoyment of these products.

- Dolby Laboratories

Since current Dolby Vision test patterns are limited, we decided to create an entire suite utilizing profile 5, the most commonly used profile amongst manufacturers. Profile 5, typically utilized for streaming Dolby Vision content, encompasses Dolby Vision’s proprietary IPT for color primaries and color matrix, along with the use of full range for RGB. This test pattern suite incorporates an UltraHD 3840x2160 resolution, proprietary IPT similar to BT.2100 ICtCp, 10-Bit encoded/12-bit remapped and a ST.2084 transfer function. This project follows the same idea behind our “UltraHD|HDR-10 Test Pattern Suite”, an attainable solution to calibrate and/or measure your new HDR display, without having to spend thousands on a new UHD/HDR test pattern generator. Designed around a familiar layout including, Basic Setup Patterns, Advanced Setup Patterns and a complete set of Miscellaneous Patterns, along with two custom Dolby Vision workflows, provided by Portrait Displays and ChromaPure. The custom CalMAN Dolby Vision workflow tutorial can be found on page 11, followed by the ChromaPure workflow tutorial on page 24 of this instruction manual.

These test patterns can easily be downloaded and stored onto a flash drive or external hard drive, providing playback on any compatible Dolby Vision enabled display and/or UltraHD Blu-ray player via USB. These test patterns have been encoded separately into individual files for ease of use and flexibility. Please visit our website at [diversifiedvideosolutions.com](https://www.diversifiedvideosolutions.com) for instruction manuals, products, services, support and see what other HDR video calibration solutions we have available.



Overview

This Pattern suite offers a comprehensive set of reference test patterns (10-bit encoded, 12-bit remapped) to assist in the calibration of your UltraHD Dolby Vision enabled display. This suite is comprised of 825+ patterns that adhere to the newly regulated and updated standards created by Dolby and their proprietary methods, to ensure perfect triplet precision and color accuracy.

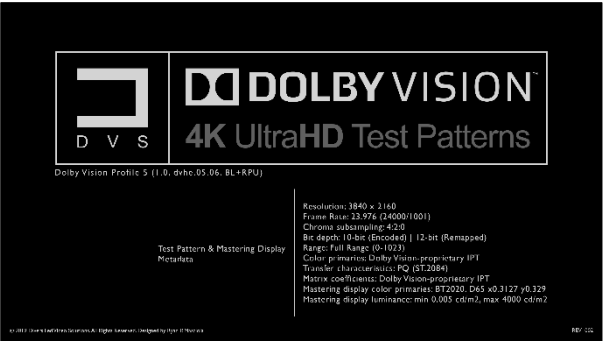
We have divided the entire test pattern suite into four main sections including, Basic Setup Patterns, Advanced Setup Patterns (which encompass a complete set of 10% window test patches for grayscale and color), Miscellaneous Patterns and a custom Dolby Vision independent workflow provided by Portrait Displays. The CalMAN workflow encompasses a full set of test patches that follow a predefined sequence, completely specified by the calibration software itself. Please see the description below for further detail.

Calibration Software

[CalMAN \(version 5.9.XX\)](#) - A paid for software with an extremely powerful engine, customizable workflows and compatible with almost all available meters, reference pattern generators and standalone video processors. One of the most comprehensive and flexible calibration software packages available.

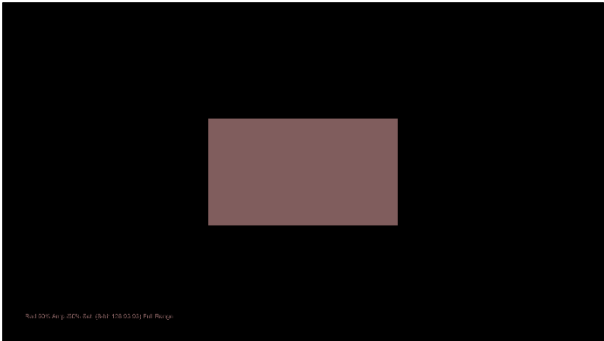
[ChromaPure \(version 3.1.19\)](#) - A paid for software built around a very simplistic yet powerful infrastructure. Simply click one of the buttons along the left side of the program window to open one of its modules. Each module performs a different video calibration function and allows the user to quickly bring a any video display with adequate controls into conformity with industry standards.

Basic Setup Patterns



Title

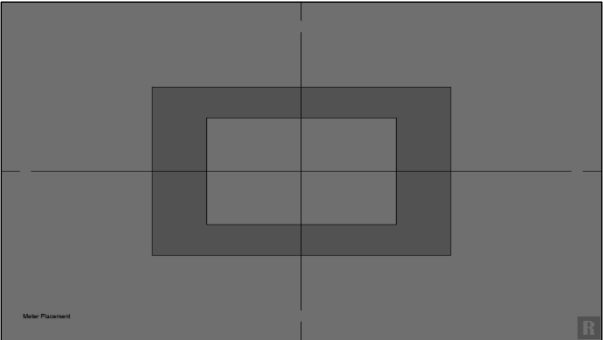
Displaying test pattern and Mastering Display metadata, current revision and copyright. This clip provides pertinent information about the test patterns within the entire suite and will be updated accordingly per revision.



Color Profiling

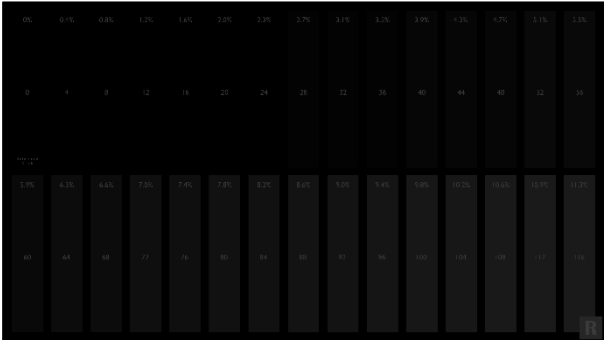
Theses patterns were designed to improve the accuracy of a filter-based colorimeter by creating a calibration profile with a reference spectrophotometer. This profile, applied against your colorimeter measurements, corrects the inaccuracies of the filter-based meter. This makes the colorimeter mimic the accuracy of your

spectrophotometer for this specific display.

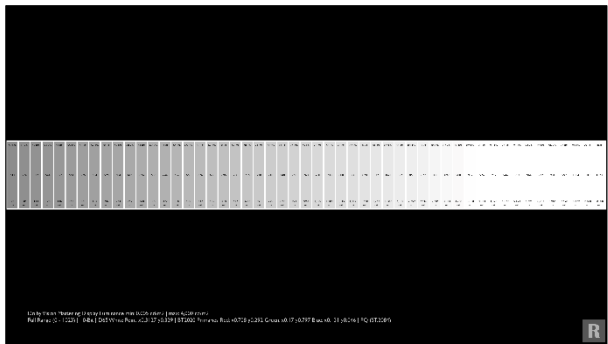


Meter Position

Designed to assist with the centering of your video calibration meter.



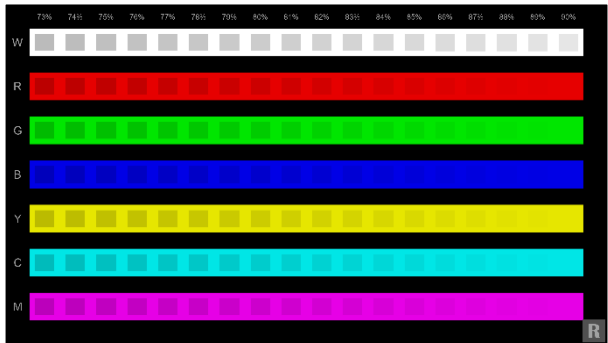
Basic Setup Patterns continued



White Clipping

Demonstrates how well your display tone maps peak luminance information based on the metadata in which it's being feed. The metadata within these particular patterns are designed to clip at 4,000 nit. However, no matter how much you raise or lower the contrast controls, the peak luminance information (flashing bars) will

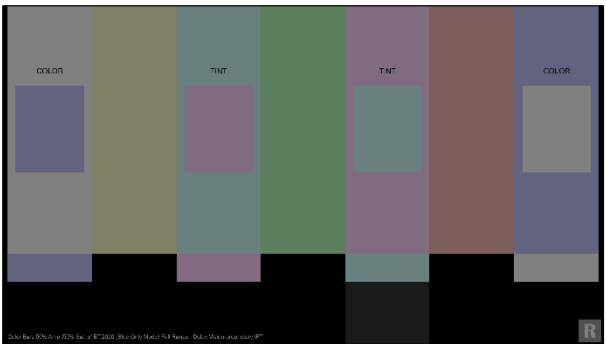
always remain the same, even though the light output may increase or decrease onscreen. This is due to the internal tone mapping of your display.



Color Clipping High

Similar to the white clipping pattern. This clipping pattern demonstrates how well your display tone maps peak luminance information based on the metadata in which it's being feed. With the mastering display luminance set to 4,000 nit. You can observe how well the grayscale, primary and secondary colors are being

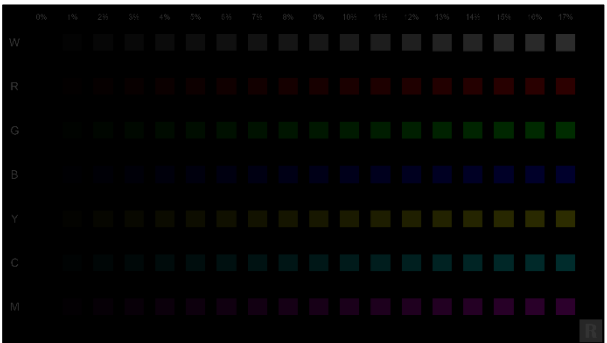
mapped and/or clipped when nearing peak levels, roughly the 90% mark.



Flashing Color Bars 50%/50%

You can use this pattern to reference the color and tint accuracy of your display. If your display is one of the few that includes a color only mode, it can be used to adjust color and tint independently, within each color. Graded to 50% amplitude and 50% saturation of the BT.2020 color gamut, provides an

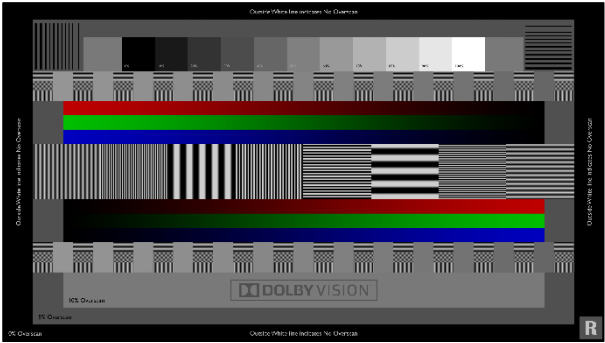
attainable target for most HDR enabled displays to achieve, roughly 100 nit.



Color Clipping Low

This pattern displays colors clipping on the low end of the spectrum. It's Not Vital that all colors flash near the 0% mark, so long as none of the colors flash on the 0% mark. This would imply an elevated black floor or lifted brightness.

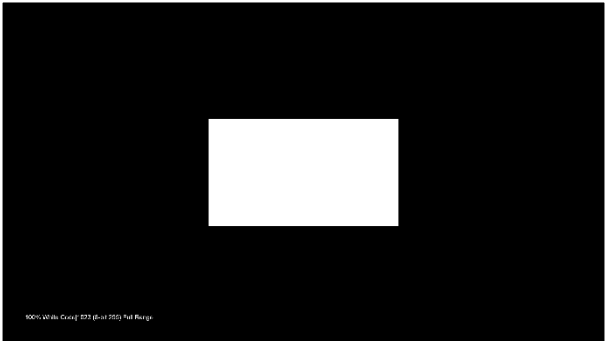
Basic Setup Patterns continued



Sharpness & Overscan

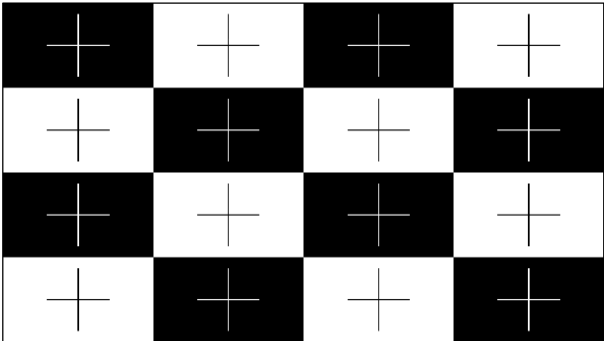
You can use this pattern to properly adjust your display’s sharpness and overscan in order to fill the entire screen properly. Typically, lower sharpness values are recommended. However, if the image looks soft, raise the value until you see ringing or noise around any of the black bars or lines within the pattern, then slowly make adjustments until the ringing goes away. Overscan may be adjusted utilizing the 3 available overscan marks within the pattern. Select your display’s setting that exposes the entire white border outlining the pattern for no overscan.

Miscellaneous Patterns



Contrast Ratio

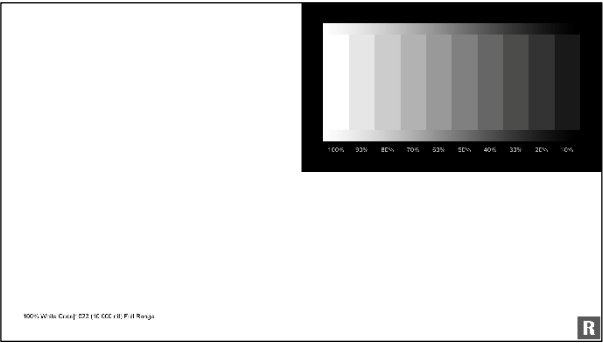
Utilizing a meter. Measure the absolute peak luminance and black level of your display. These measurements will provide you with your display’s dynamic contrast ratio.



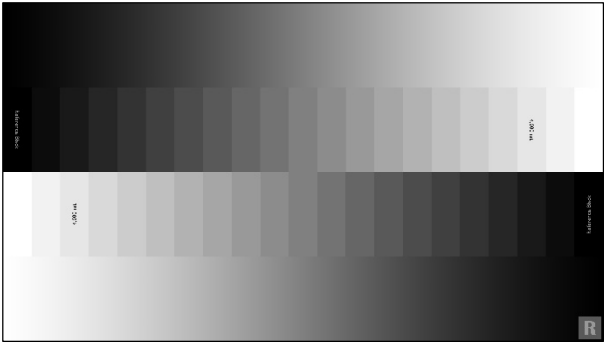
ANSI Contrast

Utilizing a meter. Take individual ANSI contrast measurements of your display. This will provide a true representation of your display’s native contrast ratio.

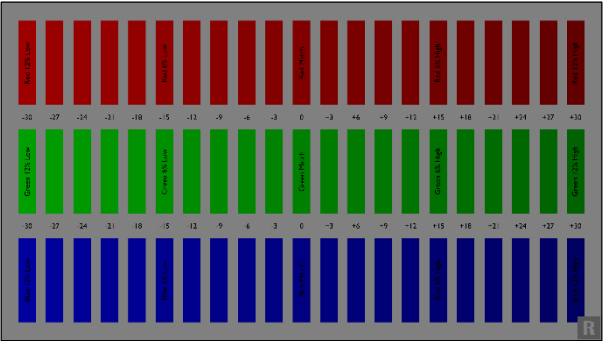
Miscellaneous Patterns continued



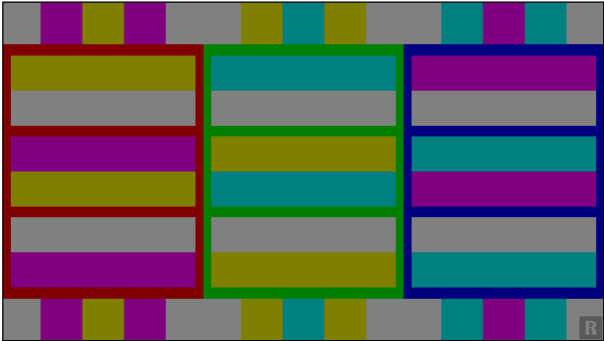
Dynamic Contrast
Primarily utilized for quick observations. Check for any possible changes that might occur as the APL varies. As the full field pattern cycles, watch for any changes within the grayscale window. If the grayscale changes with the cycle, your display is dynamically adjusting picture levels.



Grayscale Ramps
This pattern set provides a multitude of 10-bit gradients and steps for grayscale. These patterns range from 0 to 10,000 nit (10-bit digital range 0 – 1023). However, the mastering display metadata is set to 4,000 nit, so clipping will be apparent above 90% on all of test patterns.

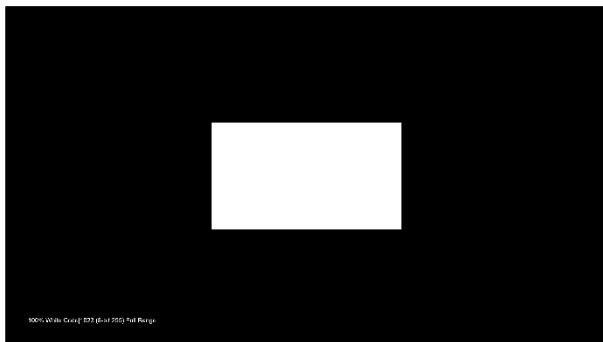


Color Decoding
This pattern can be used to observe how the primary colors (red, green and blue) relate to gray. In order to take full advantage of this test pattern, a display device with a “color only mode” is necessary.



Flashing Color Primary
This pattern shows red, green and blue bars (primary colors) and the three related secondary colors (yellow, cyan and magenta) flashing on top. Above and below each primary color the two secondary colors related to the primary color also flash in between.

Miscellaneous Patterns continued



Grayscale Sweeps

This pattern file folder is comprised of ten subsection that include 11 step grayscale sweeps at different patch sizes. The patches range from 2% all the way up to Full Field. Utilizing a meter, you can observe any change within measurements based on the onscreen APL between patch sizes.



Color Gamuts in BT2020 Patterns

This file folder is comprised of 4 separate subsections. Including a 6-point color and 30-point saturation sweep for both P3 and BT.709 color axis points within the BT.2020 color gamut.



ColorChecker Sweeps

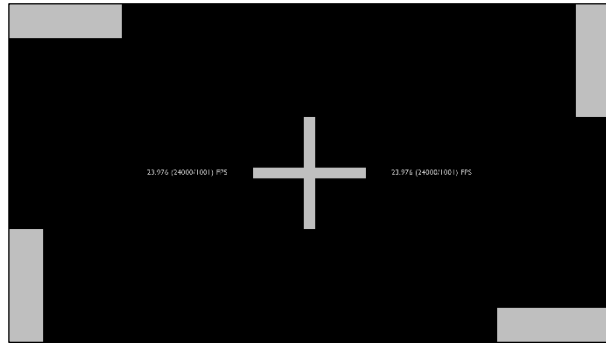
This pattern file folder is comprised of four separate subsections. The 24 Point MCD Original ColorChecker, 18 Point ChromaPure Skin Tone ColorChecker, 24 Point Pantone Skin Tones ColorChecker, and The 23 Point Calman Default ColorChecker. These four pattern sets have been designed to accurately target 50% of the BT.2020 color gamut, roughly 100 nit. The methodology behind this decision was to provide an attainable target for most HDR enabled displays.



Test Footage

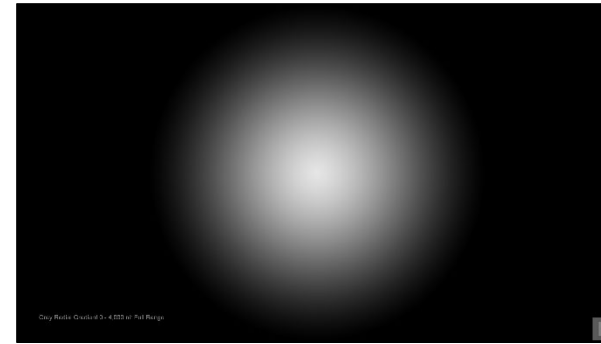
This file folder includes eight still frame reference Dolby Vision test clips, along with two FMV scenes. Landscape, Nature, Skin Tone, City Sunset (which is displayed in a 1.85:1 aspect ratio), Oceanside (which is displayed in a 2.40:1 aspect ratio), Pantone SkinTone, Restaurant Scene, Indian Market, Walk In The City and the Rooftop Scene. Each of these test footage clips are native sRGB that have been converted to BT2020/ST2084 and have been graded to 200 - 300 nit, with peak nit levels reaching 4,000 nit. Each of the ten test clips can act as a reference point for before and after calibration observations.

Miscellaneous Patterns continued



Frame Rate & Judder Patterns

Primarily utilized for quick observations regarding improper frame rate handling, unintentional film judder and/or other associated frame rate artifacts. Also designed to expose any negative side effects brought on by frame interpolation.



Radial Gradient Patterns

Designed to expose banding artifact. This 10-bit gradient pattern is offered in both primary and secondary colors, along with grayscale. These patterns range from 4,000 nit peak from center down to a 0 nit surrounding, in 1% increments.

CalMAN Dolby Vision Workflow Tutorial



Overview

Dolby Vision enables a dramatic new imaging experience by providing higher dynamic range and wider color gamut images. With deeper blacks and brighter highlights, images become more realistic, with added depth and detail. To fully appreciate this experience, the Dolby Vision workflow allows users to characterize and calibrate Dolby Vision enabled display devices.

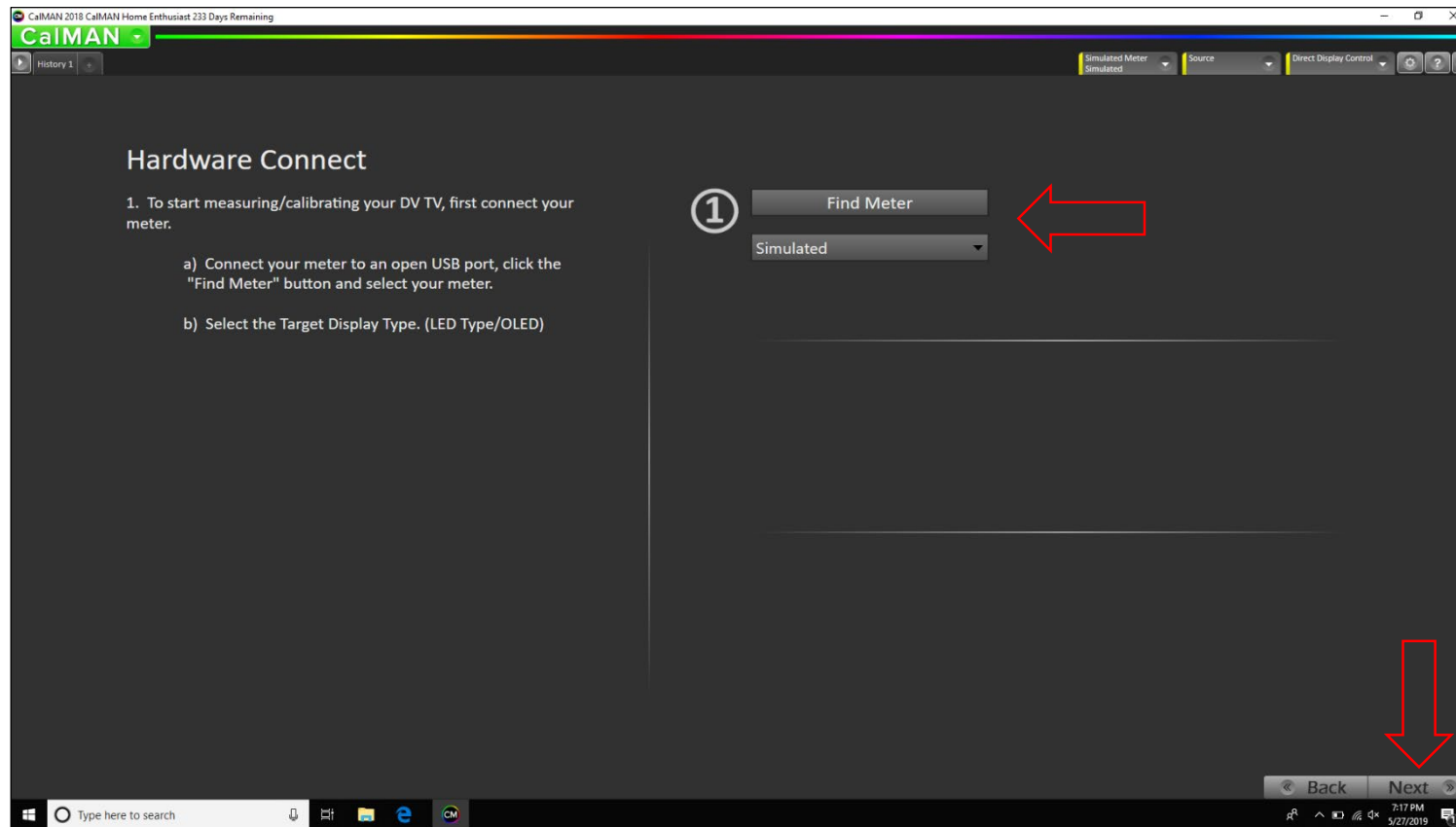
Dolby Vision has several key differentiators that are important to understand to characterize devices. First, when using the Dolby Vision workflow, it is important to note that Dolby Vision works with absolute luminance values in cd/m^2 instead of relative values. Dolby Vision supports very large color volumes with luminance levels ranging from 0.0 (absolute black) to 10,000 cd/m^2 and wider color gamuts such as Rec.2020 color. As common display devices are unlikely to support the full extent of this range, each Dolby Vision enabled display maps content in real-time from this large input color volume to the color volume of the actual display device. This process preserves as much of the fidelity of the original source color volume as possible.

Additionally, unlike today's systems that use Gamma curves, Dolby Vision utilizes a new tone response curve (also called 'EOTF'), and bit depths of 10 Bits or higher. This helps to avoid any potential quantization errors that can cause image artifacts such as contouring or 'banding'. The new EOTF is described in SMPTE standard ST.2084.

Once the [Dolby Vision Calibration.cwfx](#) file has been downloaded, simply unzip, double click the file, this will launch the CalMAN software and load the custom Dolby Vision workflow. Once fully loaded, you should see the image shown above.

Click "Next".

CalMAN Dolby Vision Workflow Tutorial



Hardware Connect

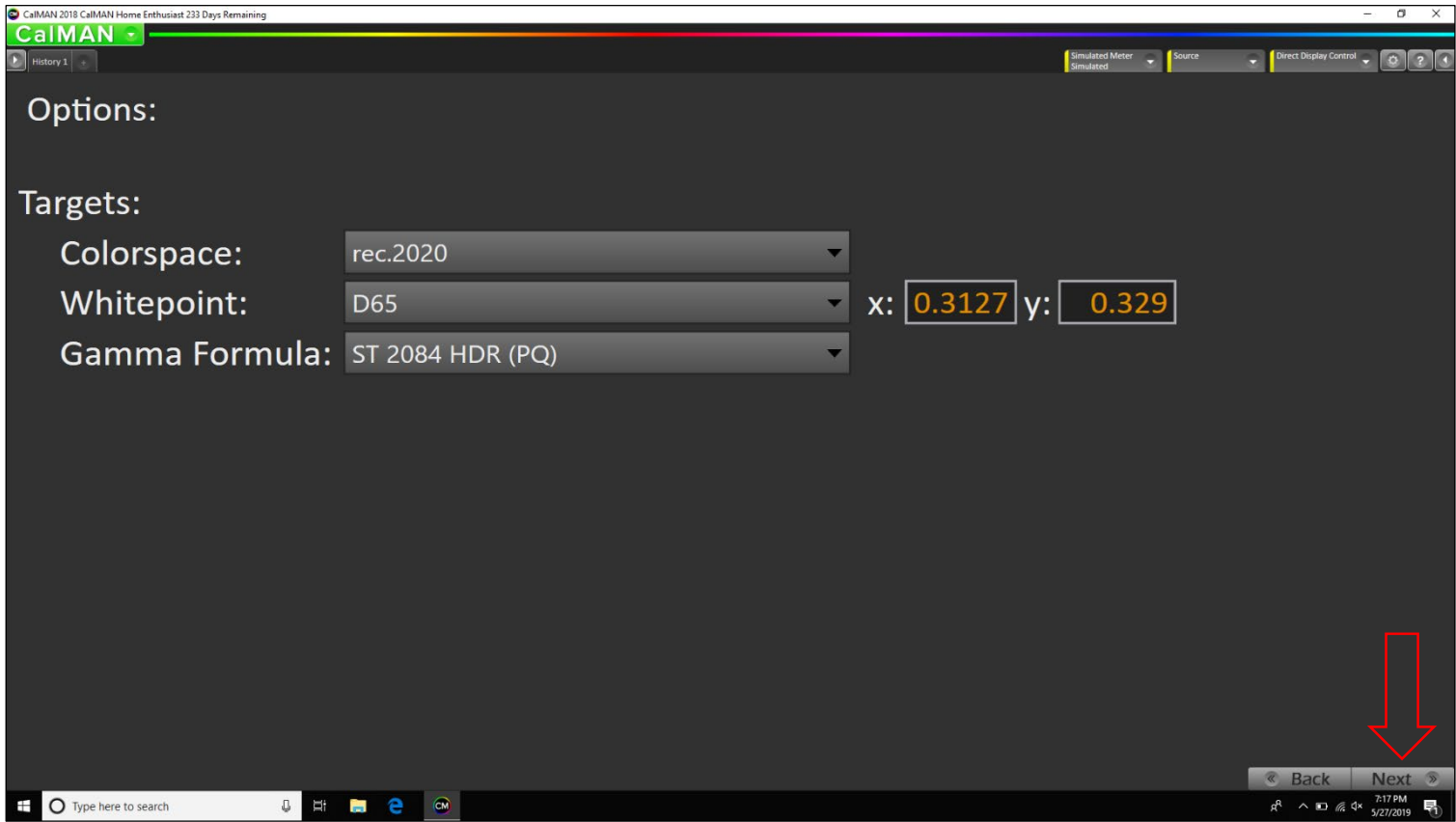
To start measuring/calibrating your Dolby Vision display, first you will need to connect your meter.

Please connect your meter to an open USB port, click the "Find Meter" button and select your meter.

Then select the "Target Display Type", i.e. LED Type or OLED.

Then click "Next".

CalMAN Dolby Vision Workflow Tutorial

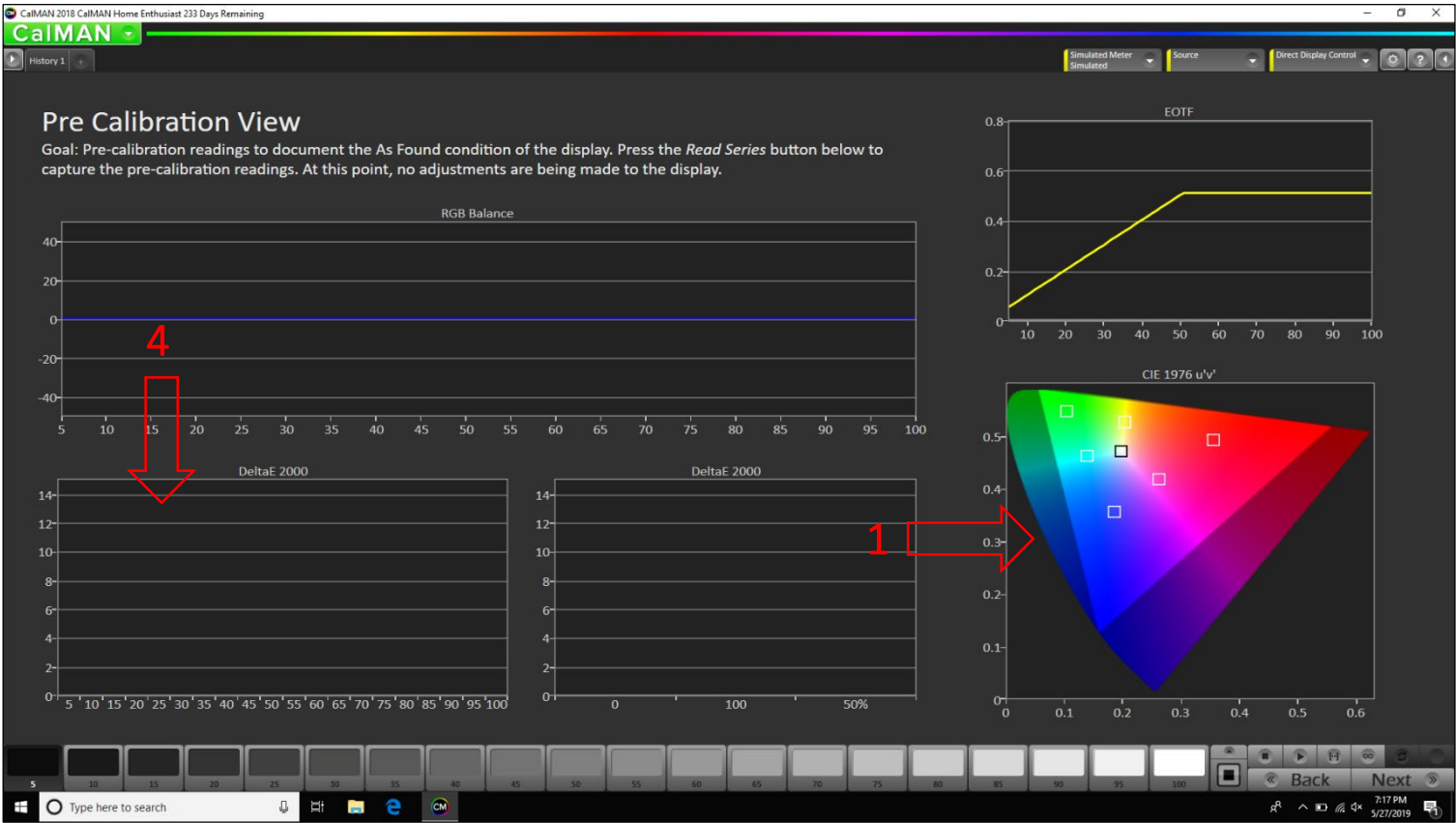


Target Select

Unless you are trying to target a different Colorspace, White Point and/or Gamma Formula. Leave the default settings.

Then click “Next”.

CalMAN Dolby Vision Workflow Tutorial



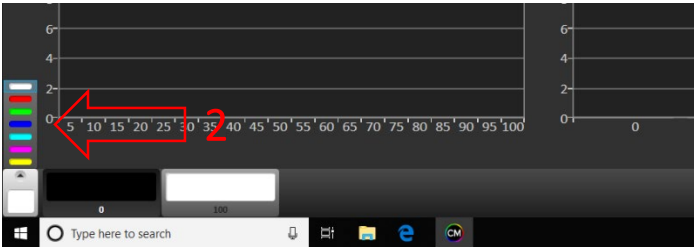
Pre Calibration View

Pre-calibration readings to document the As Found condition of the display. Press the Read Series button below to capture the pre-calibration readings. At this point, no adjustments are being made to the display.

To follow the pattern sequence found with the test pattern suite. You will first need to click on the CIE chart show within the image. This will populate the 0% black and 100% white options, along with the 50/50 RGBYCM color patches.

Now follow the pattern order within the test pattern suite, which matches the same pattern sequence found within the CalMAN software:

1. 0% - Black
2. 100% - White
3. 50%/50% - Red
4. 50%/50% - Green
5. 50%/50% - Blue
6. 50%/50% - Yellow
7. 50%/50% - Cyan
8. 50%/50% - Magenta



Once completed with the first set of color readings, it's time to measure grayscale. Simply click anywhere on the grayscale DeltaE 2000 chart to repopulate the grayscale patch options.

CalMAN Dolby Vision Workflow Tutorial



Pre Calibration View

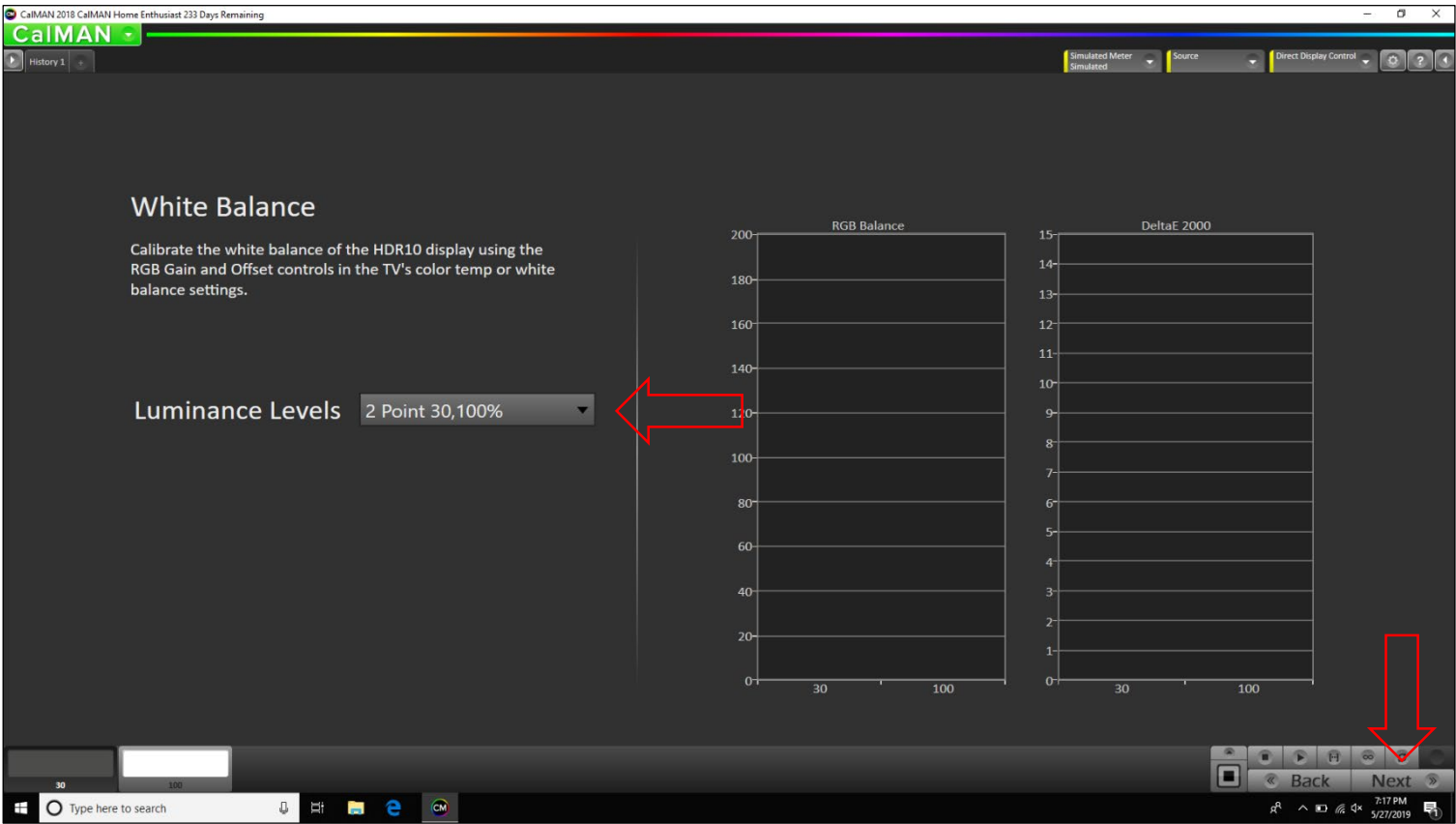
First start off by selecting the “100” patch option and take a measurement of the 100% white test pattern. Next you will need to select the “5” patch option and take a measurement of the 5% white test pattern. Repeat this method from 10 through 95 as you work your way up through the grayscale steps until of the all available patches have been measured.

Depending on the peak nit level capabilities of your display, will dictate the EOTF roll off on the chart. Even though the test patterns within the suite are mastered at 4,000 nit, they will be tone mapped down to the peak nit capabilities of your display.

You have now completed the “Pre Calibration View” module.

Click “Next”.

CalMAN Dolby Vision Workflow Tutorial



White Balance

Calibrate the white balance of the Dolby Vision display using the RGB Gain and Offset controls found within the TV's color temp or white balance settings.

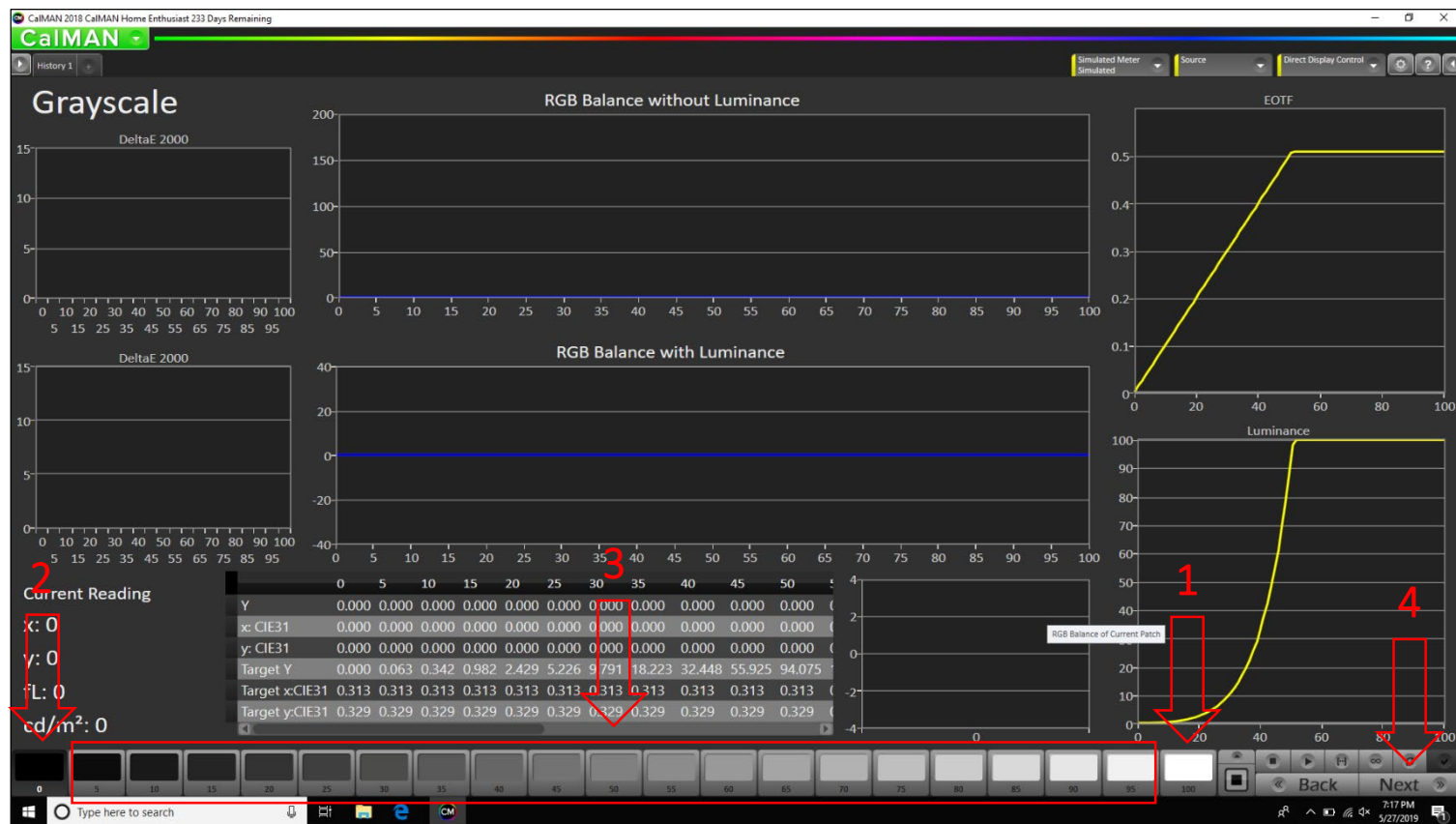
There are 8 “Luminance Levels” available. Choose the best 2-point options that best suits your display.

Measure both grayscale patches and then balance the RGB levels accordingly to obtain the lowest DeltaE capable.

You have now completed the “White Balance” module.

Click “Next”.

CalMAN Dolby Vision Workflow Tutorial



You have now completed the “Grayscale” module.

Click “Next”.

Grayscale

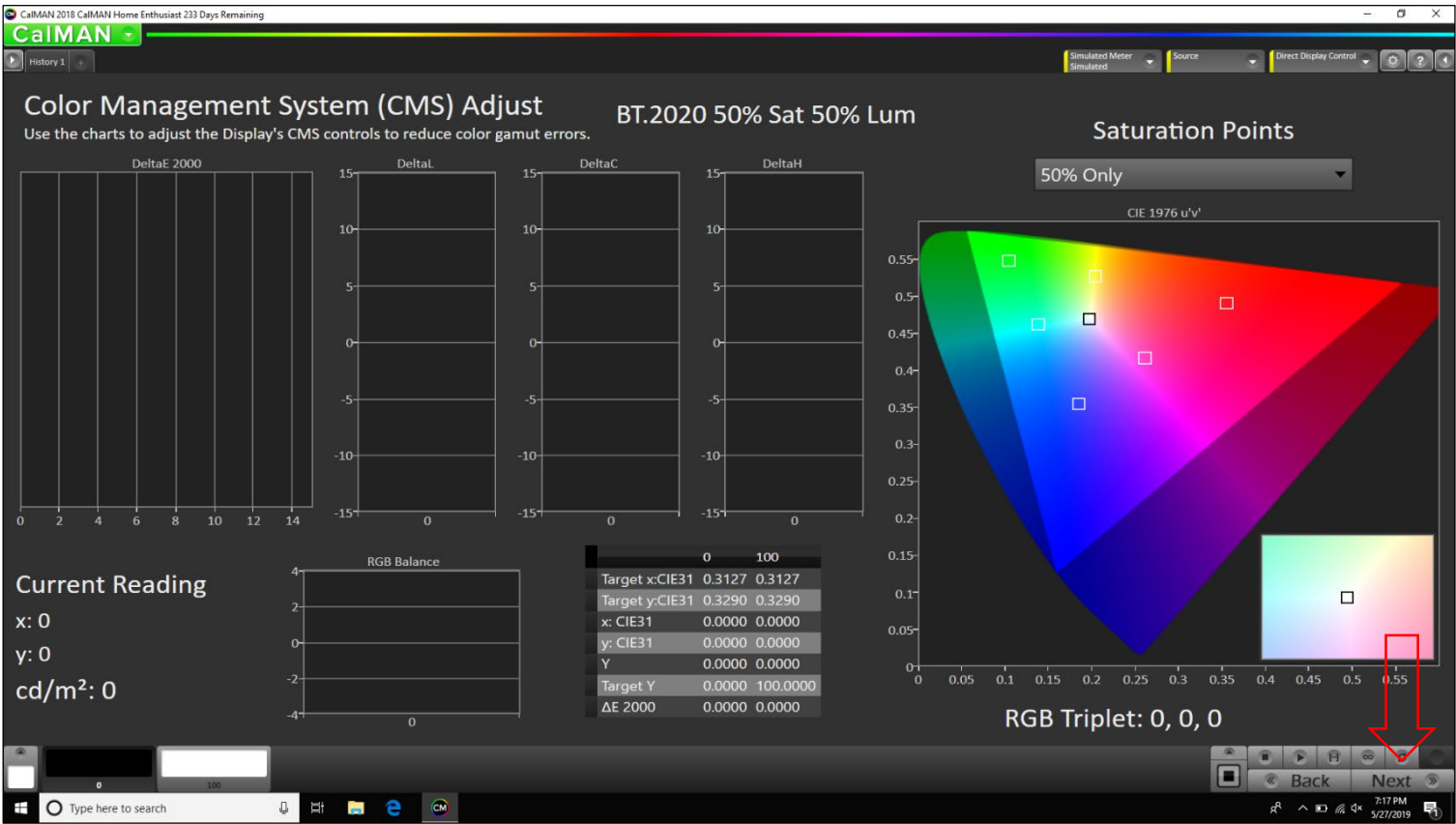
First start off by selecting the “100” patch option and take a measurement of the 100% white test pattern. Next you will need to select the “0” patch option and take a measurement of the 0% black test pattern. Repeat this method from 5 through 95 as you work your way up through the grayscale steps until of the all available patches have been measured.

Depending on the peak nit level capabilities of your display, will dictate the EOTF roll off on the chart. Even though the test patterns within the suite are mastered at 4,000 nit, they will be tone mapped down to the peak nit capabilities of your display.

Example: If your display has the ability to produce 1,000 nit, then the roll off will take place around 75%. Whereas a 4,000 nit capable display will roll off around 90%.

Balance your RGB levels accordingly to try and obtain the lowest DeltaE capable, focusing on the lower to mid stimulus levels.

CalMAN Dolby Vision Workflow Tutorial



Color Management System (CMS) Adjust

Use the charts to adjust the Display's CMS controls to reduce color gamut errors.

First start off by selecting the “0” patch option and take a measurement of the 0% black test pattern. Next you will need to select the “100” patch option and take a measurement of the 100% white test pattern.

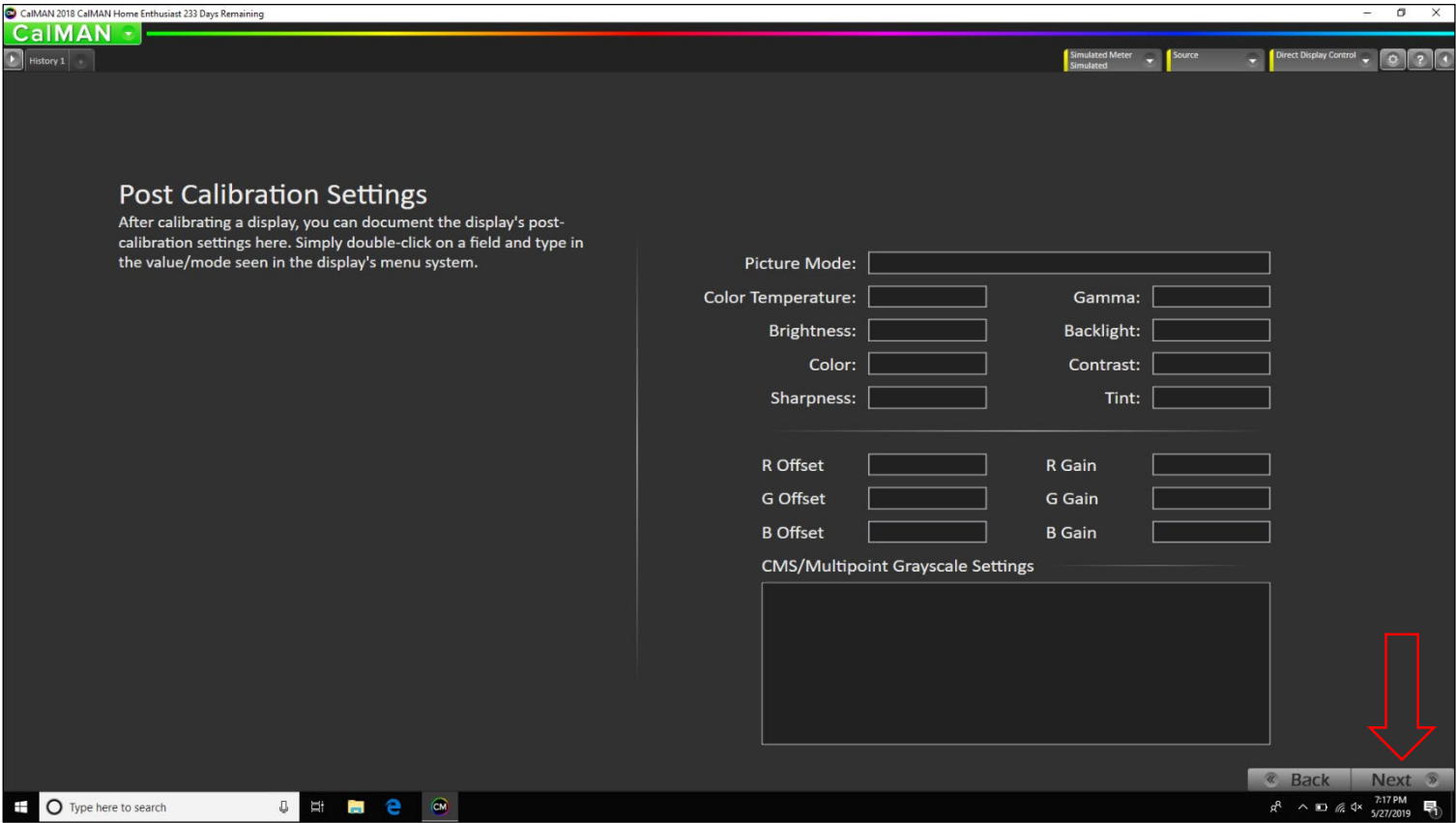
Now that the reference points are captured, follow the remaining pattern order for color within the test pattern suite, which matches the same pattern sequence found within the CalMAN software:

1. 0% - Black
2. 100% - White
3. 50%/50% - Red
4. 50%/50% - Green
5. 50%/50% - Blue
6. 50%/50% - Yellow
7. 50%/50% - Cyan
8. 50%/50% - Magenta

Additionally, unlike legacy methods of adjusting the CMS, within HDR you will need to focus more on the “x” and “y” targets and less on the “Y” (Luminance). This may cause higher than desired DeltaE values. However, this is the proper methodology, as any luminance shifts within color may affect the tone mapping of your display. The measured luminance values are based on your display's ability to accurately tone map the higher nit values to or within its capabilities. Example: A Dolby Pulsar monitor, which is capable of 4,000 nit, would be able to accurately display the proper luminance values of these patterns, since these patterns have a mastering display value of 4,000 nit. If you were to display the same color pattern on say an OLED panel that's only capable of 750 nit, the x and y coordinates would align, but the “Y” (luminance) value would be quite lower.

You have now completed the “Color Management System (CMS) Adjust” module. Click “Next”.

CalMAN Dolby Vision Workflow Tutorial



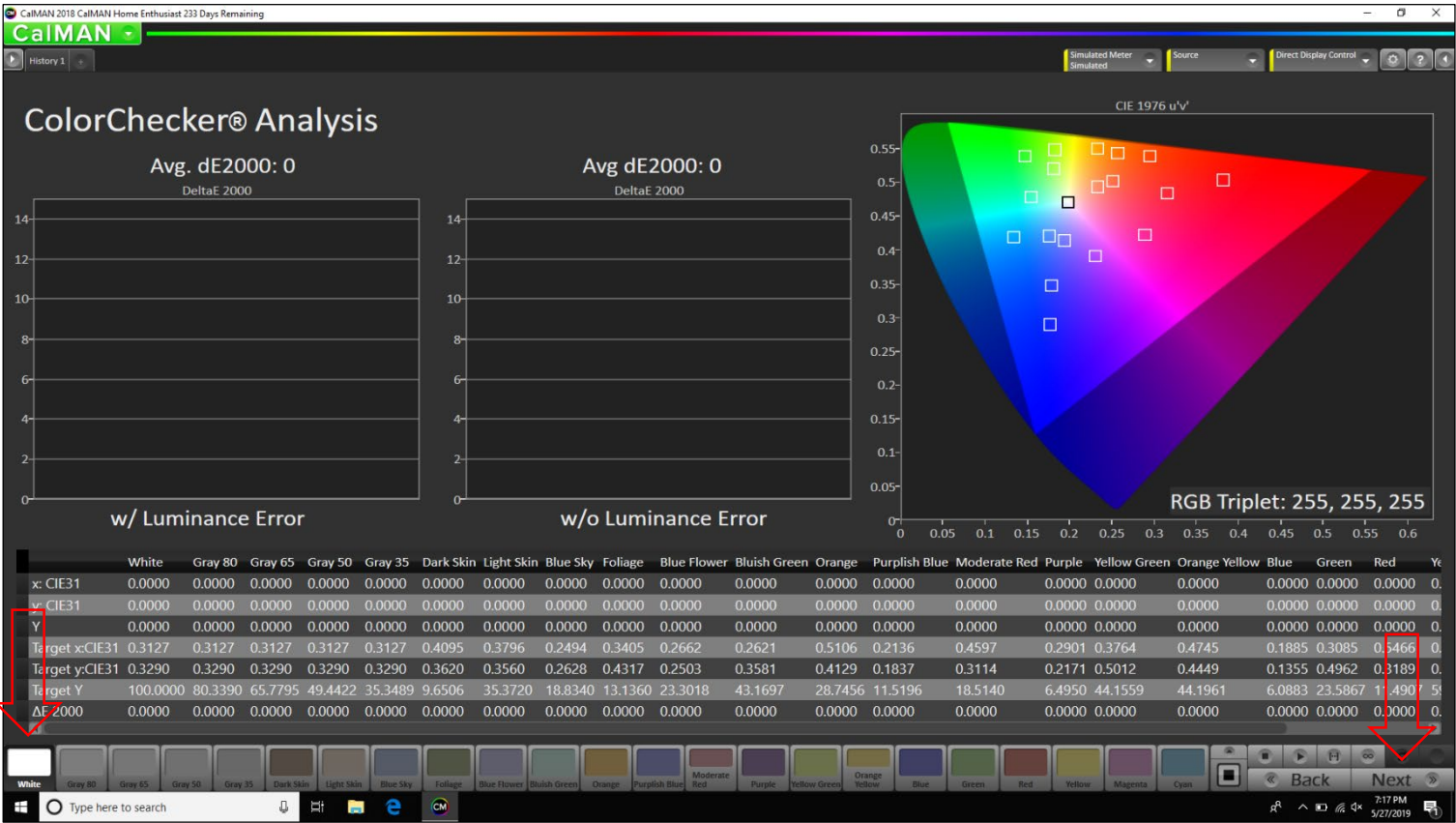
Post Calibration Settings

After calibrating a display, you can document the display's post-calibration settings here. Simply double-click on a field and type in the value/mode seen in the display's menu system.

You have now completed the “Post Calibration Settings” module.

Click “Next”.

CalMAN Dolby Vision Workflow Tutorial



ColorChecker® Analysis

The purpose of CalMAN ColorChecker is to analyze the performance of a display quickly and accurately, across a broad range of color sample points. This module was designed to accurately target 50% of the BT.2020 color gamut, roughly 100 nit. The methodology behind this decision was to provide an attainable target for most HDR enabled displays.

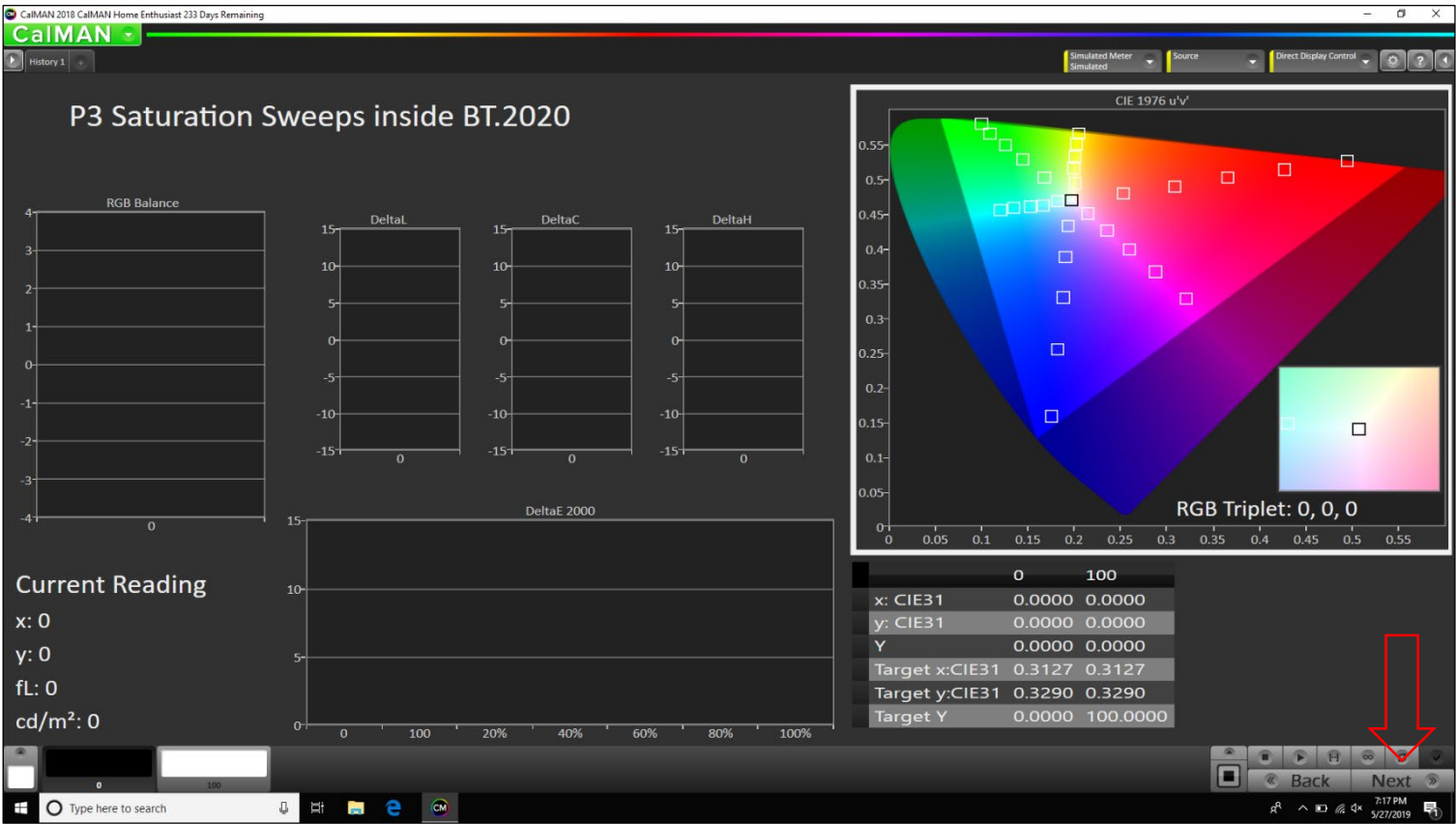
Start by clicking the “White” patch option as you work your way through the entire ColorChecker sweep.

At the completion of ColorChecker analysis, you will have a comprehensive measurement of a display to verify that it is performing as desired, or that it needs further calibration.

You have now completed the “ColorChecker® Analysis” module.

Click “Next”.

CalMAN Dolby Vision Workflow Tutorial



You have now completed the “P3 Saturation Sweeps inside BT.2020” module.

Click “Next”.

P3 Saturation Sweeps inside BT.2020

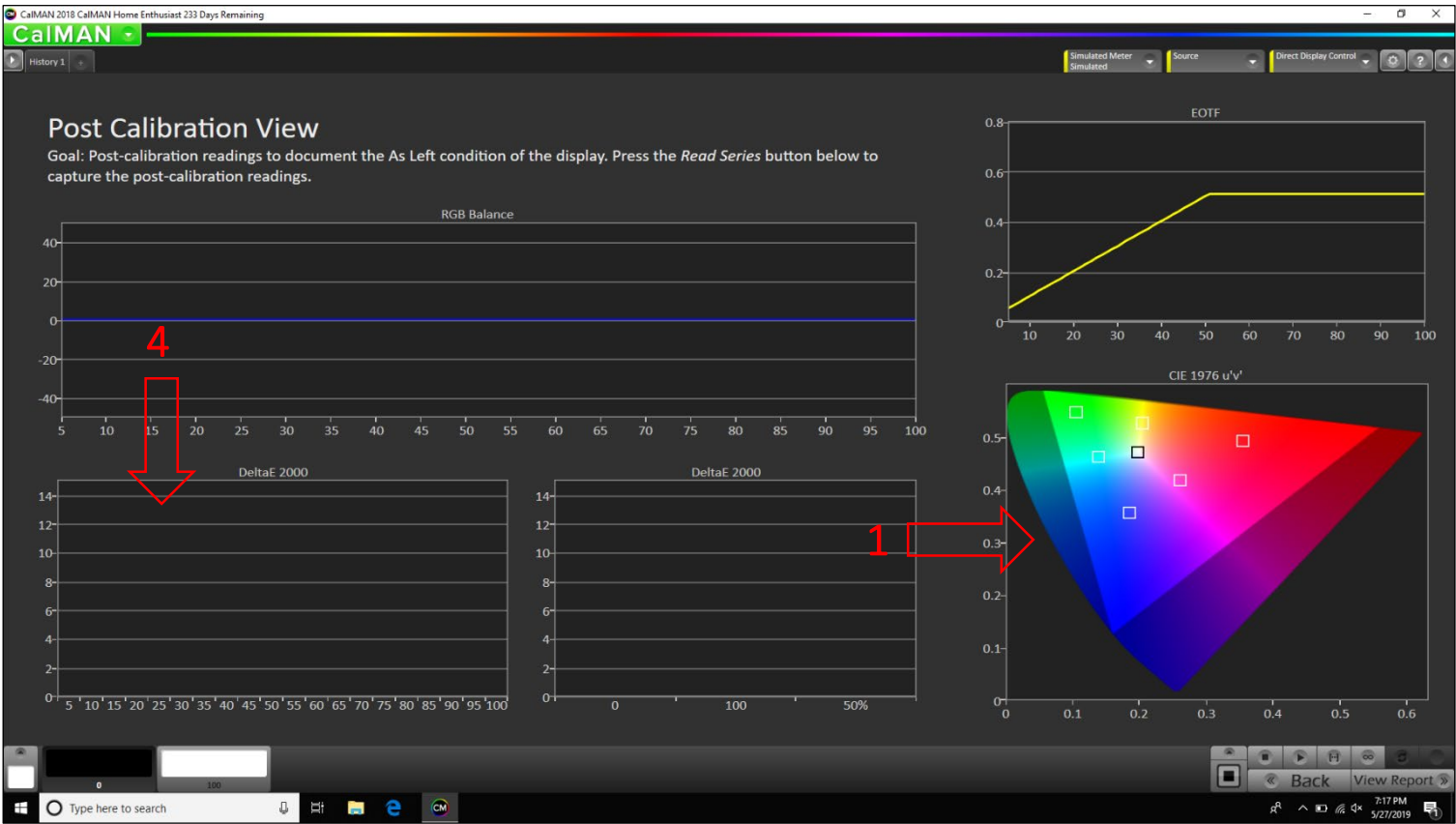
The purpose of the “P3 Saturation Sweeps inside BT.2020” module is to analyze the saturation performance of a display quickly and accurately, across all primary and secondary colors. This module was designed to accurately target 50% of the BT.2020 color gamut, roughly 100 nit. The methodology behind this decision was to provide an attainable target for most HDR enabled displays.

First start off by selecting the “0” patch option and take a measurement of the 0% black test pattern. Next you will need to select the “100” patch option and take a measurement of the 100% white test pattern.

Now that the reference points are captured, follow the remaining pattern order for color within the test pattern suite, which matches the same pattern sequence found within the CalMAN software.

At the completion of the P3 Saturation Sweep, you will have a comprehensive measurement of a display to verify that it is performing as desired, or that it needs further calibration.

CalMAN Dolby Vision Workflow Tutorial



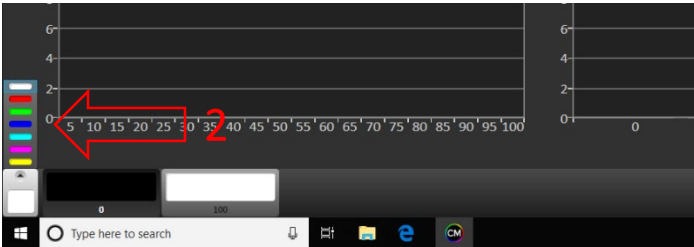
Post Calibration View

Post-calibration readings to document the As Left condition of the display. Press the Read Series button below to capture the post-calibration readings.

To follow the pattern sequence found with the test pattern suite. You will first need to click on the CIE chart show within the image. This will populate the 0% black and 100% white options, along with the 50/50 RGBYCM color patches.

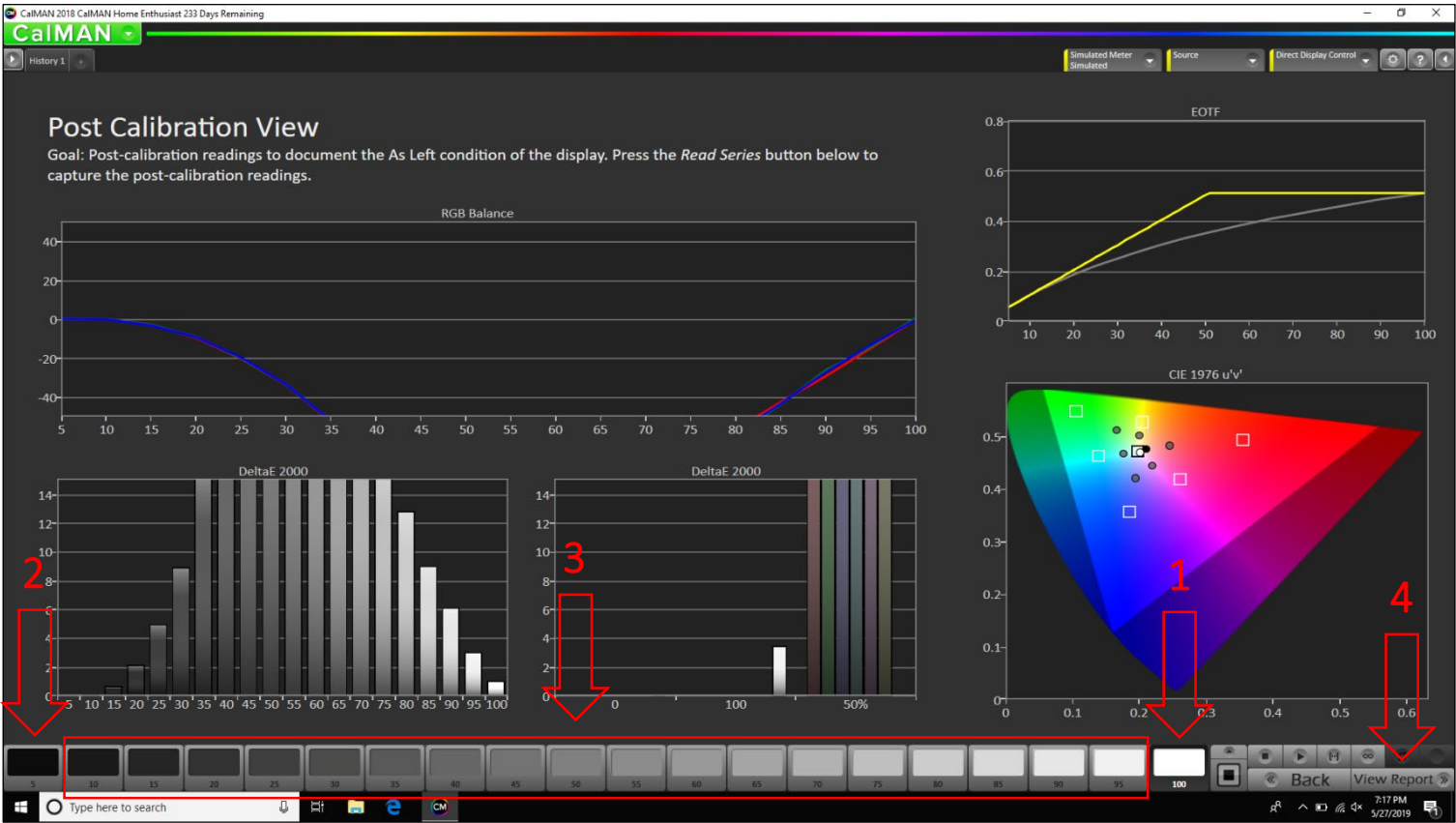
Now follow the pattern order within the test pattern suite, which matches the same pattern sequence found within the CalMAN software:

1. 0% - Black
2. 100% - White
3. 50%/50% - Red
4. 50%/50% - Green
5. 50%/50% - Blue
6. 50%/50% - Yellow
7. 50%/50% - Cyan
8. 50%/50% - Magenta



Once completed with the first set of color readings, it's time to measure grayscale. Simply click anywhere on the grayscale DeltaE 2000 chart to repopulate the grayscale patch options.

CalMAN Dolby Vision Workflow Tutorial



Post Calibration View

First start off by selecting the “100” patch option and take a measurement of the 100% white test pattern. Next you will need to select the “5” patch option and take a measurement of the 5% white test pattern. Repeat this method from 10 through 95 as you work your way up through the grayscale steps until of the all available patches have been measured.

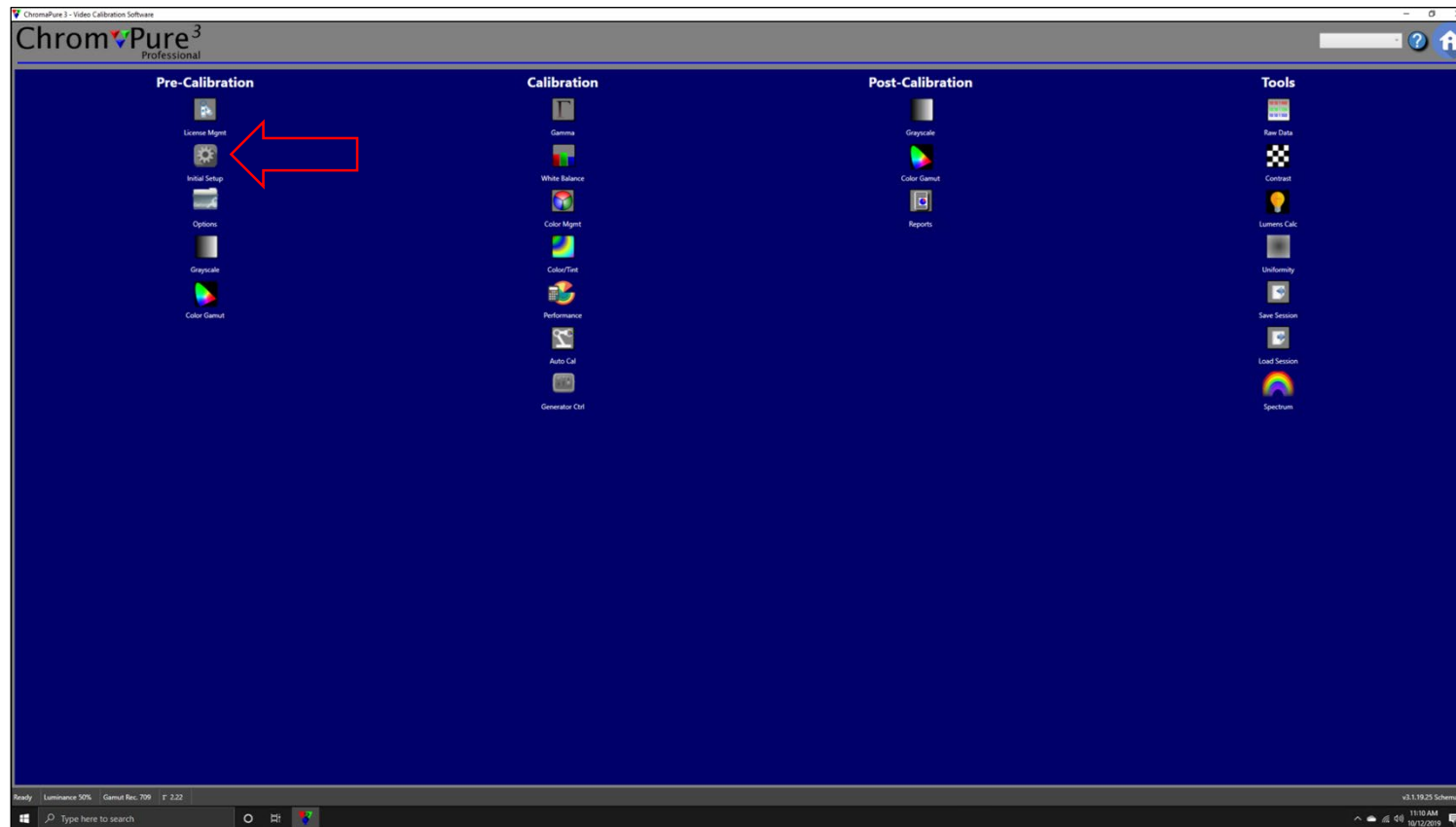
Depending on the peak nit level capabilities of your display, will dictate the EOTF roll off on the chart. Even though the test patterns within the suite are mastered at 4,000 nit, they will be tone mapped down to the peak nit capabilities of your display.

You have now completed the “Post Calibration View” module.

Click “View Report”.

You have now completed the CalMAN Dolby Vision workflow!

ChromaPure Dolby Vision Workflow Tutorial



Overview

Dolby Vision enables a dramatic new imaging experience by providing higher dynamic range and wider color gamut images. With deeper blacks and brighter highlights, images become more realistic, with added depth and detail. To fully appreciate this experience, the Dolby Vision workflow allows users to characterize and calibrate Dolby Vision enabled display devices.

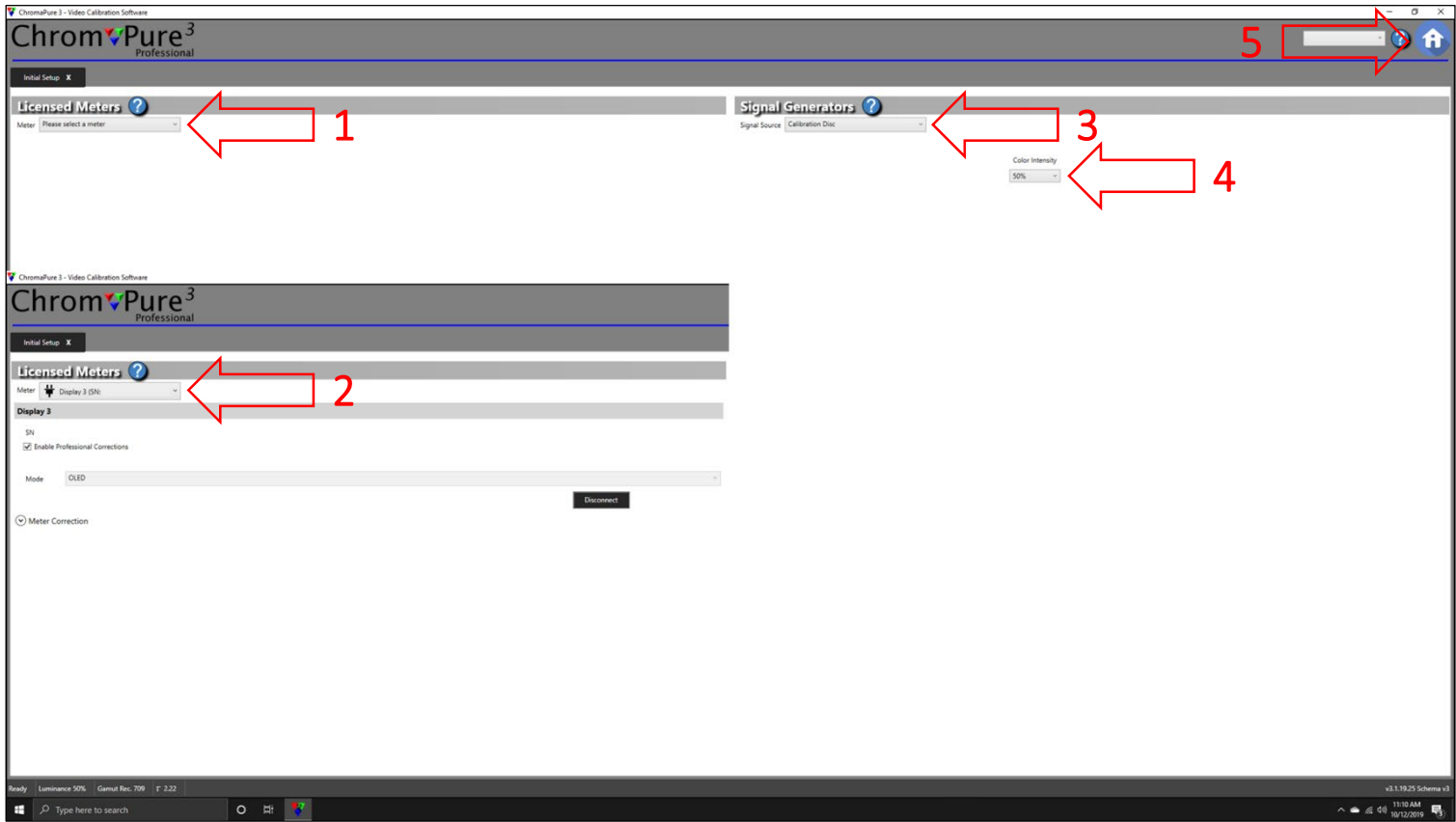
Dolby Vision has several key differentiators that are important to understand to characterize devices. First, when using the Dolby Vision workflow, it is important to note that Dolby Vision works with absolute luminance values in cd/m^2 instead of relative values. Dolby Vision supports very large color volumes with luminance levels ranging from 0.0 (absolute black) to 10,000 cd/m^2 and wider color gamuts such as Rec.2020 color. As common display devices are unlikely to support the full extent of this range, each Dolby Vision enabled display maps content in real-time from this large input color volume to the color volume of the actual display device. This process preserves as much of the fidelity of the original source color volume as possible.

Additionally, unlike today's systems that use Gamma curves, Dolby Vision utilizes a new tone response curve (also called 'EOTF'), and bit depths of 10 Bits or higher. This helps to avoid any potential quantization errors that can cause image artifacts such as contouring or 'banding'. The new EOTF is described in SMPTE standard ST.2084.

Upon launching ChromaPure, there are a few initial settings that will need to be configured. In order to properly setup the software and align with the DVS Dolby Vision Workflow test pattern sequence, you will need to enter the initial setup menu.

Click "Initial Setup".

ChromaPure Dolby Vision Workflow Tutorial



Initial Setup

Within the initial setup menu, you will select your licensed meter/meters, signal generation method and your desired color intensity.

First, you will need to select your ChromaPure licensed meter from the meter drop-down menu.

Second, you will need to select your desired mode and click connect.

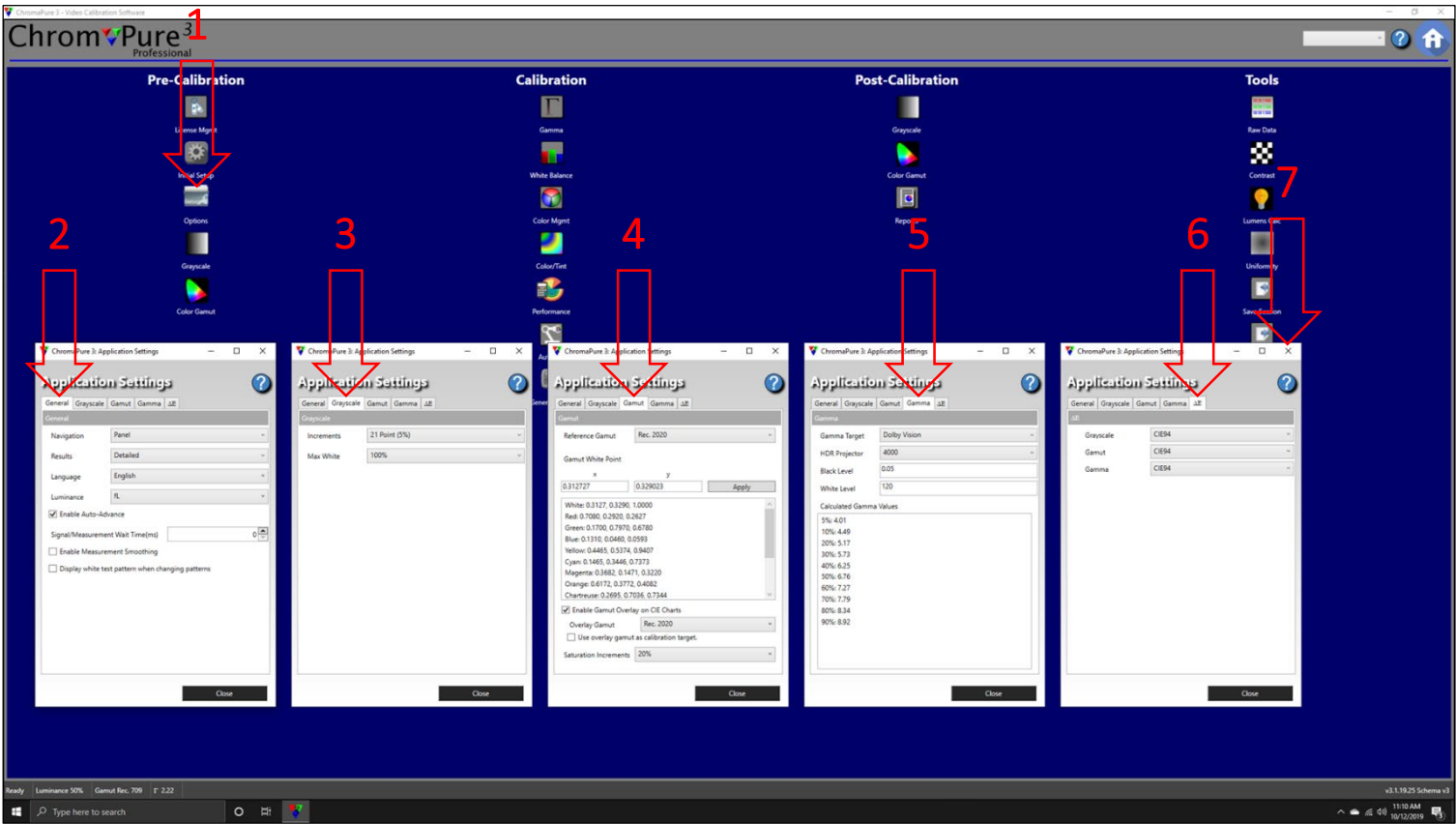
Third, you will utilize the default Calibration Disc as your signal source

Fourth, select 50% as your default color intensity

Once all options have been properly selected, click the Home button to return to the main menu.

Click the Home button.

ChromaPure Dolby Vision Workflow Tutorial



Options (Applications Settings)

Within the Options menu, you will configure your general options, grayscale increments, reference gamut/saturation increments, target gamma and preferred Delta E model.

First, you will need to select the Option folder which will open the application setting pop-up menu.

Second, you will need to select your desired general setup options (default is recommended).

Third, select the Grayscale tab. You can choose between 21 Point (5%) or 12 Point (10%) grayscale increments. Both are available within the DVS workflow. Max White can be left at the default value of 100%.

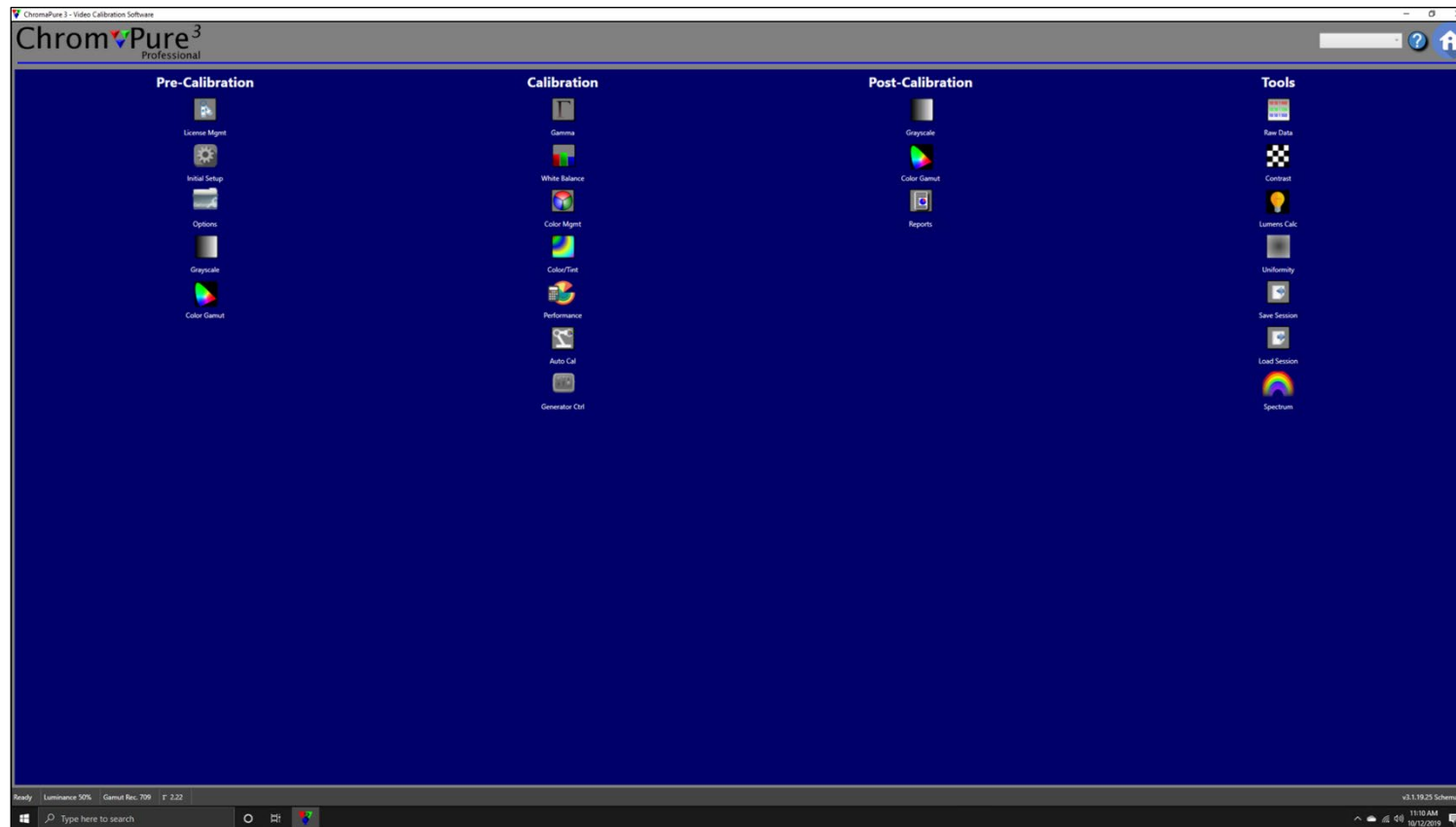
Fourth, select the Gamut tab. You will need to select the Rec. 2020 option within the drop-down menu. Next, select Enable Gamut Overlay on CIE Charts and select Rec. 2020 for the overlay gamut. Next, select 20% for Saturation Increments as this matches the sequence within the DVS workflow.

Fifth, select the Gamma tab. Here you will need to select the Dolby Vision option within the Gamma Target drop-down menu. ChromaPure will now properly target Dolby Vision profile 5 and align with the DVS Dolby Vision workflow test patterns.

Sixth, select the Delta E tab. Here you can select your preferred Delta E model. (default is recommended). Once completed, you can close the Applications Settings pop-up menu.

Click the “X” to close the Applications Settings pop-up menu to continue

ChromaPure Dolby Vision Workflow Tutorial



Dolby Vision Workflow

You are now ready to start the Dolby Vision workflow. You will need to follow the order provided within the software, Pre-Calibration, Calibration and Post-Calibration.

First, you will need to select the Grayscale option under the Pre-Calibration vertical (please see page 28).

Second, you will need to select the Color Gamut option under the Pre-Calibration vertical (please see page 29).

Third, you will need to select the Gamma option under the Calibration vertical (please see page 30).

Fourth, you will need to select the White Balance option under the Calibration vertical (please see page 31).

Fifth, you will need to select the Color Mgmt option under the Calibration vertical (please see page 32).

Sixth, you will need to select the Color/Tint option under the Calibration vertical (please see page 33).

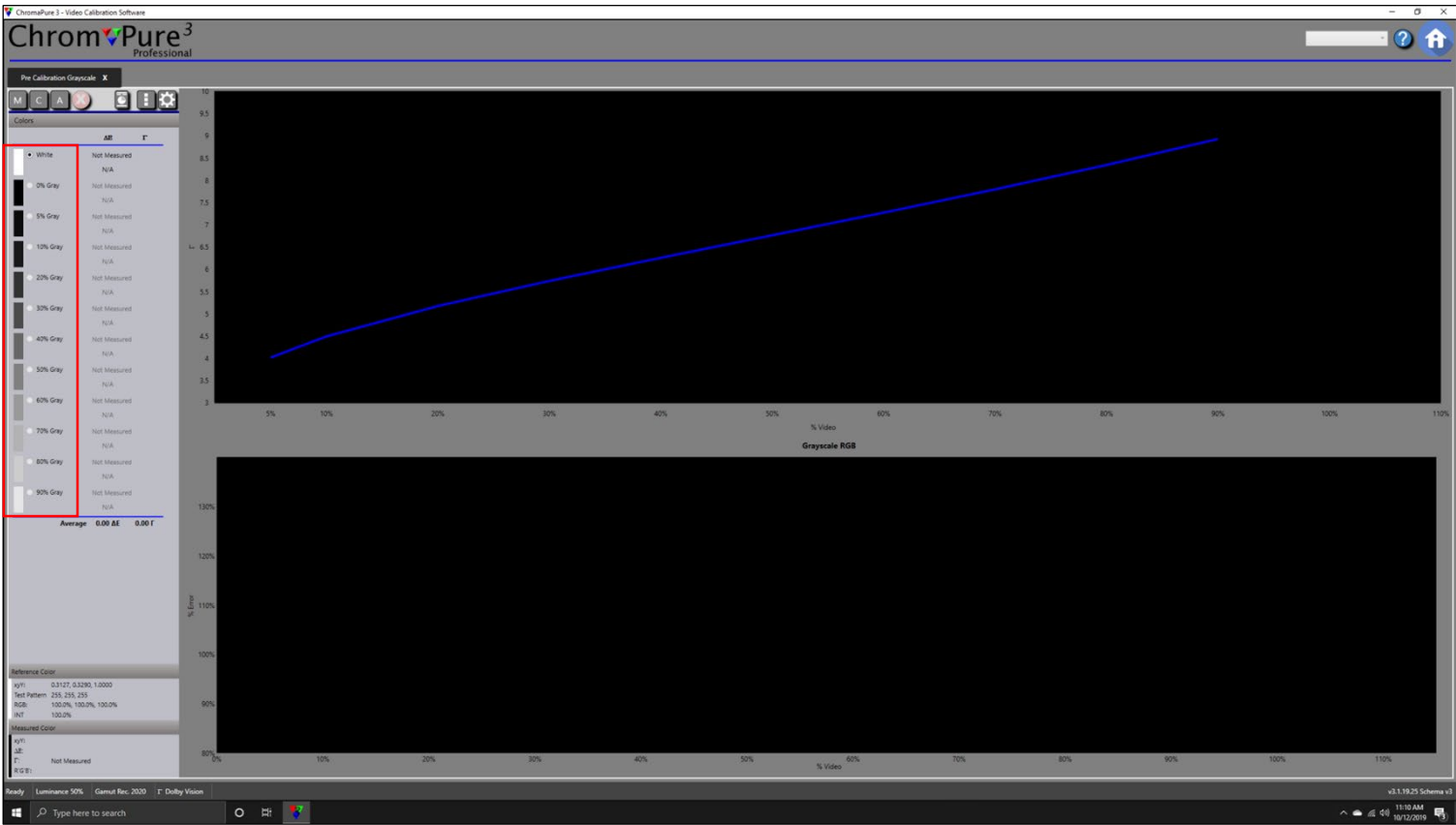
Seventh, you will need to select the Performance option under the Calibration vertical (please see page 34).

Eighth, you will need to select the Grayscale option under the Post-Calibration vertical (please see page 35).

Ninth, you will need to select the Color Gamut option under the Post-Calibration vertical (please see page 36).

Tenth, you have completed your Dolby Vision calibration and can now run your report. This report will provide you with a before and after view of your calibration.

ChromaPure Dolby Vision Workflow Tutorial



Grayscale (Pre-Calibration)

The Pre-Calibration Grayscale module is identical to the Post-Calibration Grayscale module. It is included only for the purpose of recording the results of calibration for use in reporting.

Grayscale module options

You can set the dynamic range of the grayscale sweep to 0%-100% (default)

You can also select the number of grayscale points you wish to measure

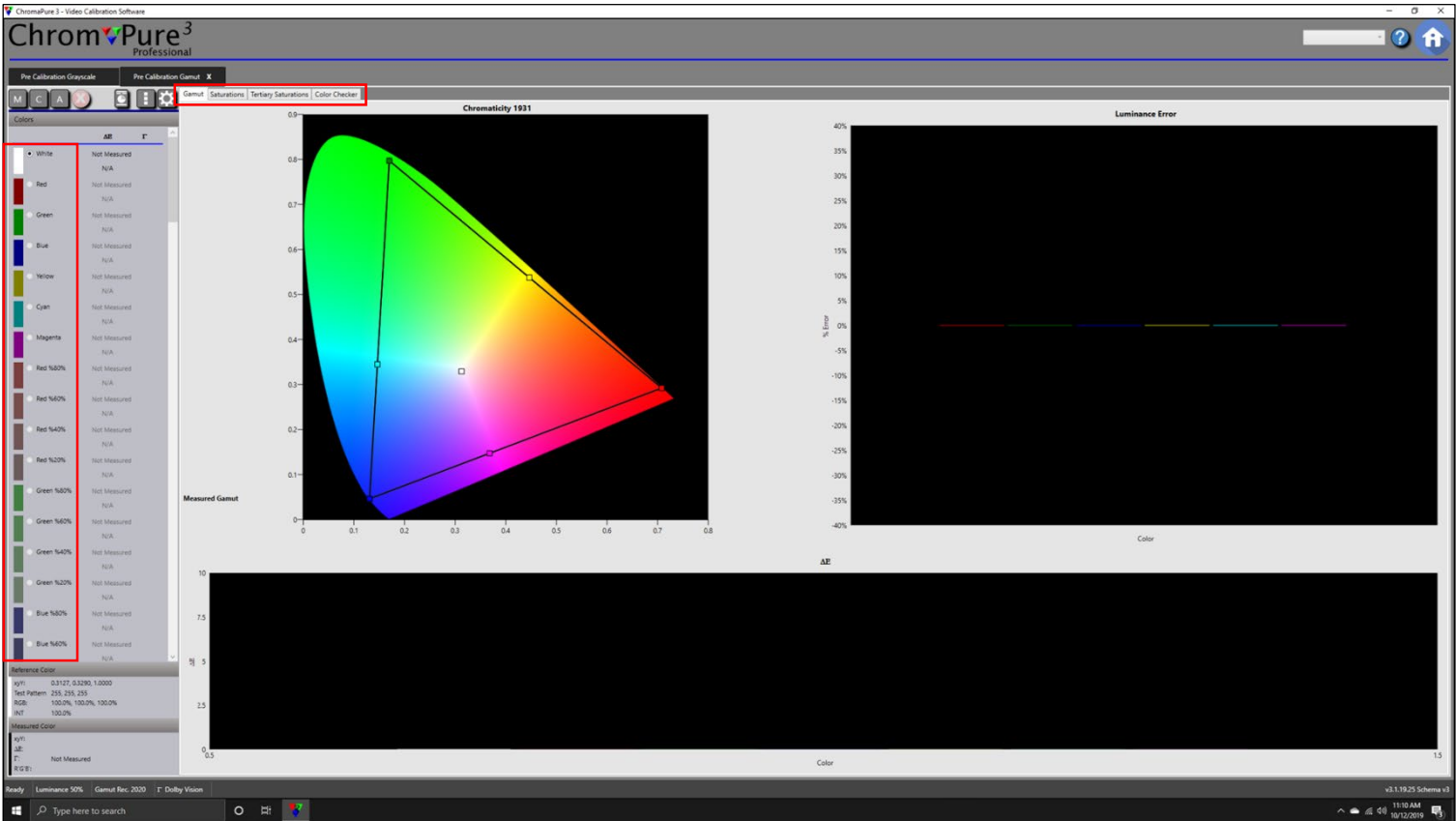
12 points

21 points

Note: If you don't want to measure black, you can click M to measure 100% and then select 5% (or 10% if you wish to skip 5% as well) and then click A to measure the remaining colors in the series. This will speed up the measurement process, but you will lose the ability to report contrast ratio.

Once completed, you can either “X” out of the Pre-Calibration Grayscale tab or click on the main home button in the top right corner to continue with the workflow.

ChromaPure Dolby Vision Workflow Tutorial

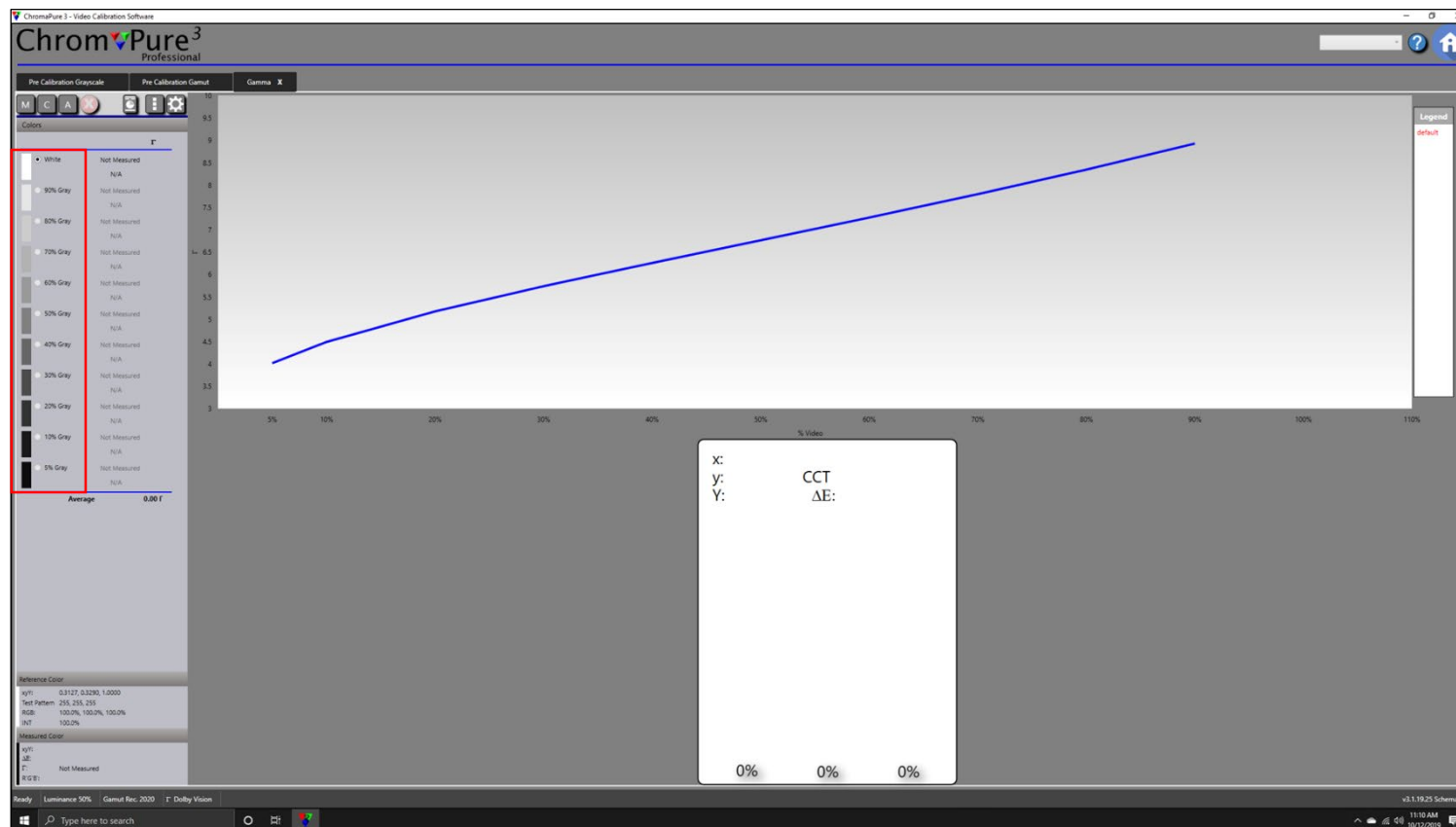


Color Gamut (Pre-Calibration)

The Pre-Calibration Color Gamut module is identical to the Post-Calibration Color Gamut module. It is included only for the purpose of recording measured colors for use in reporting. It provides a useful snapshot of your display's color performance prior to calibration.

Once completed, you can either “X” out of the Pre-Calibration Gamut tab or click on the main home button in the top right corner to continue with the workflow.

ChromaPure Dolby Vision Workflow Tutorial



Gamma (Calibration)

From the main navigation toolbar, click the Gamma icon. The Gamma module will appear.

Display a 100% white test pattern and take your initial measurement. Follow the remaining sequence until you have reached the last patch within the sequence.

When the measurements have finished, you have a snapshot of the gamma performance of your display.

If your display or processor offers the ability to perform multi-point gamma adjustment, then click the Continuous Measurement button and make the needed adjustment at whatever gamma level requires correction. You will see the results of your adjustments in real time.

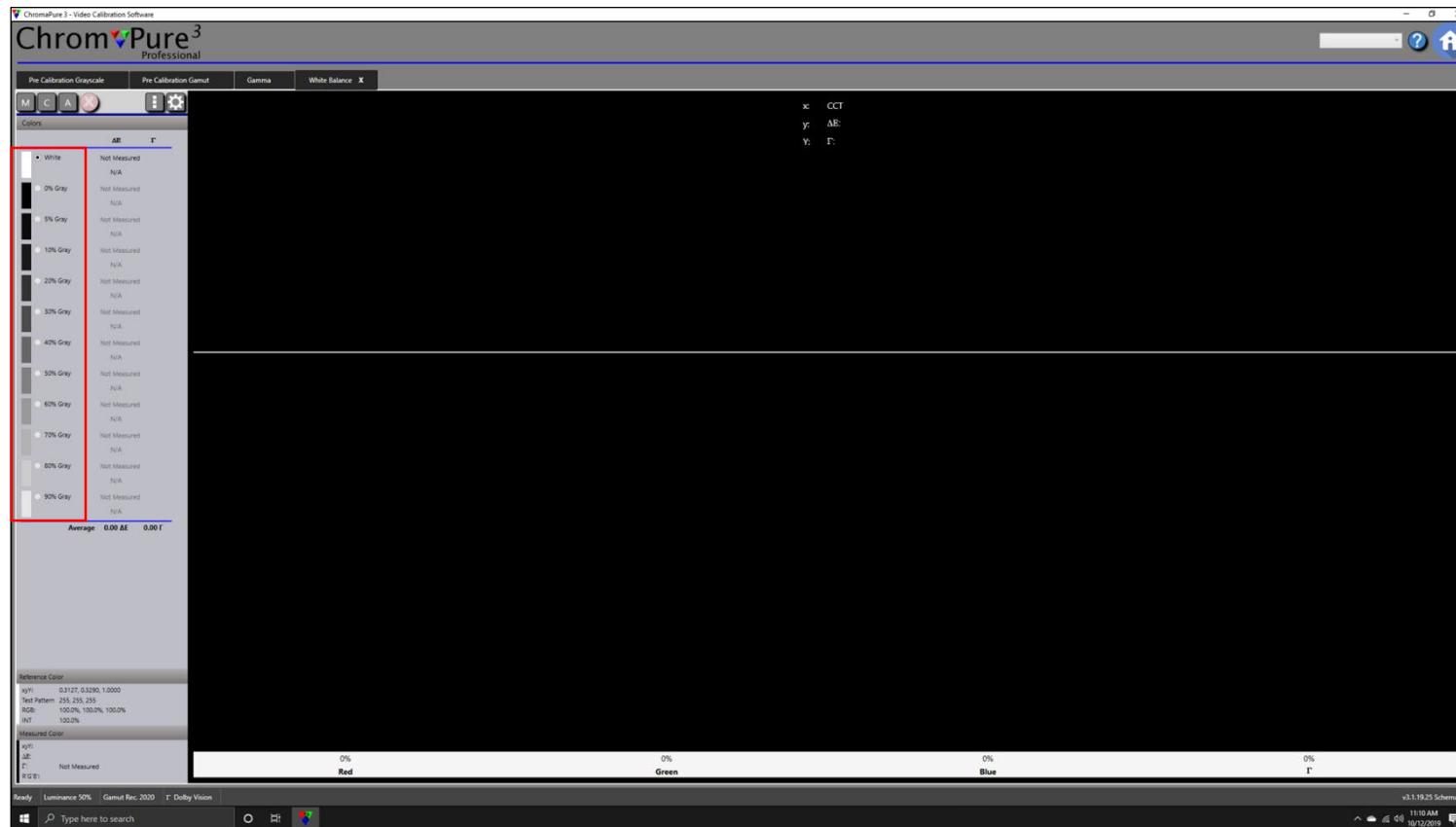
NOTE: The values of 0%-100% have no gamma. 100% is only used as a reference from which gamma at other levels is calculated. 0% is not measured at all.

Displays offer two ways of adjusting gamma to achieve the optimal gamma response possible within the prescribed range. Select various gamma presets or adjust the luminance output at each video level.

You can use either of these methods to adjust your gamma response. It all depends on what controls your display offers. If you put the Gamma module into continuous mode, you can see changes in real time to the gamma response at any level of stimulus. When the measurements are complete, you will have gamma values at each level of stimulus and an average gamma value.

Once completed, you can either “X” out of the Calibration Gamma tab or click on the main home button in the top right corner to continue with the workflow.

ChromaPure Dolby Vision Workflow Tutorial



White Balance (Calibration)

Setting the white balance is arguably the most important step in calibration. Getting the color of white correct affects all viewing material, even black-and-white content. The correct white balance is achieved when white contains equal amounts of red, green, and blue of the target gamut. As it turns out, all of the commonly used gamuts (SMPTE-C, Rec. 709 and Rec. 2020) use the same white point, $x0.3127$, $y0.329$.

To set the white point:

Open the White Balance module.

Measure 100% white.

Next, select anywhere between 70% - 80% gray for the upper range.

Click Continuous Measure.

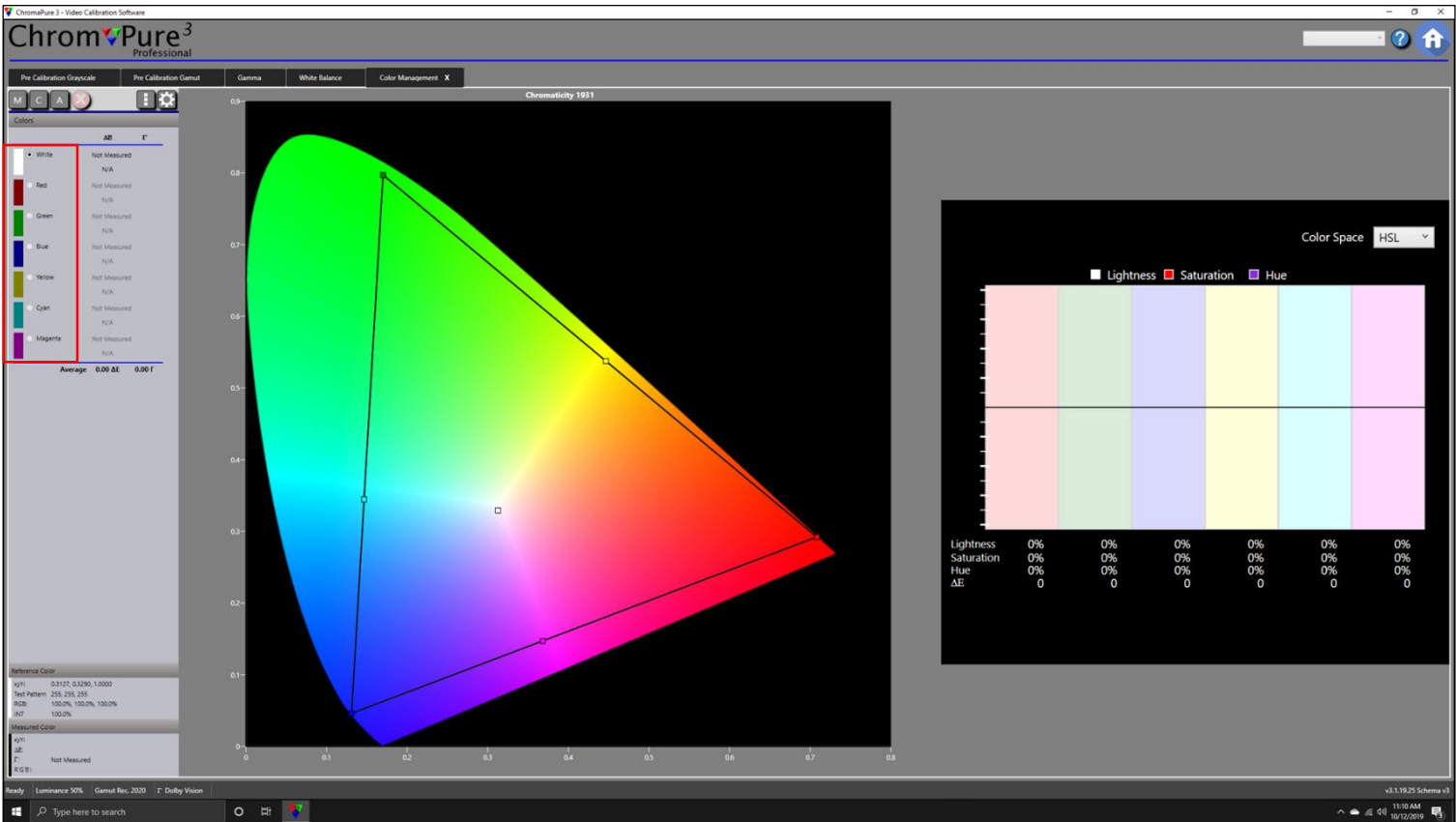
This initial measurement provides a snapshot of the white balance at that video level, and the application will show the data listed above as it changes in real time.

Now display a 20% gray test pattern. Adjust your display's white balance controls to get the RGB balance as close to 100% for red, green, and blue as possible.

When finished, click Stop. Repeat steps as necessary until both levels (upper and lower) are accurate.

Once completed, you can either “X” out of the Calibration White Balance tab or click on the main home button in the top right corner to continue with the workflow.

ChromaPure Dolby Vision Workflow Tutorial



Color Management (Calibration)

The main Color control affects the luminance saturation of all the colors. Use the Color control to adjust the primary colors' luminance to the correct position.

The main Tint or Hue control affects the position of the secondary colors. Use the Tint control to adjust the secondary colors' hues to their correct position.

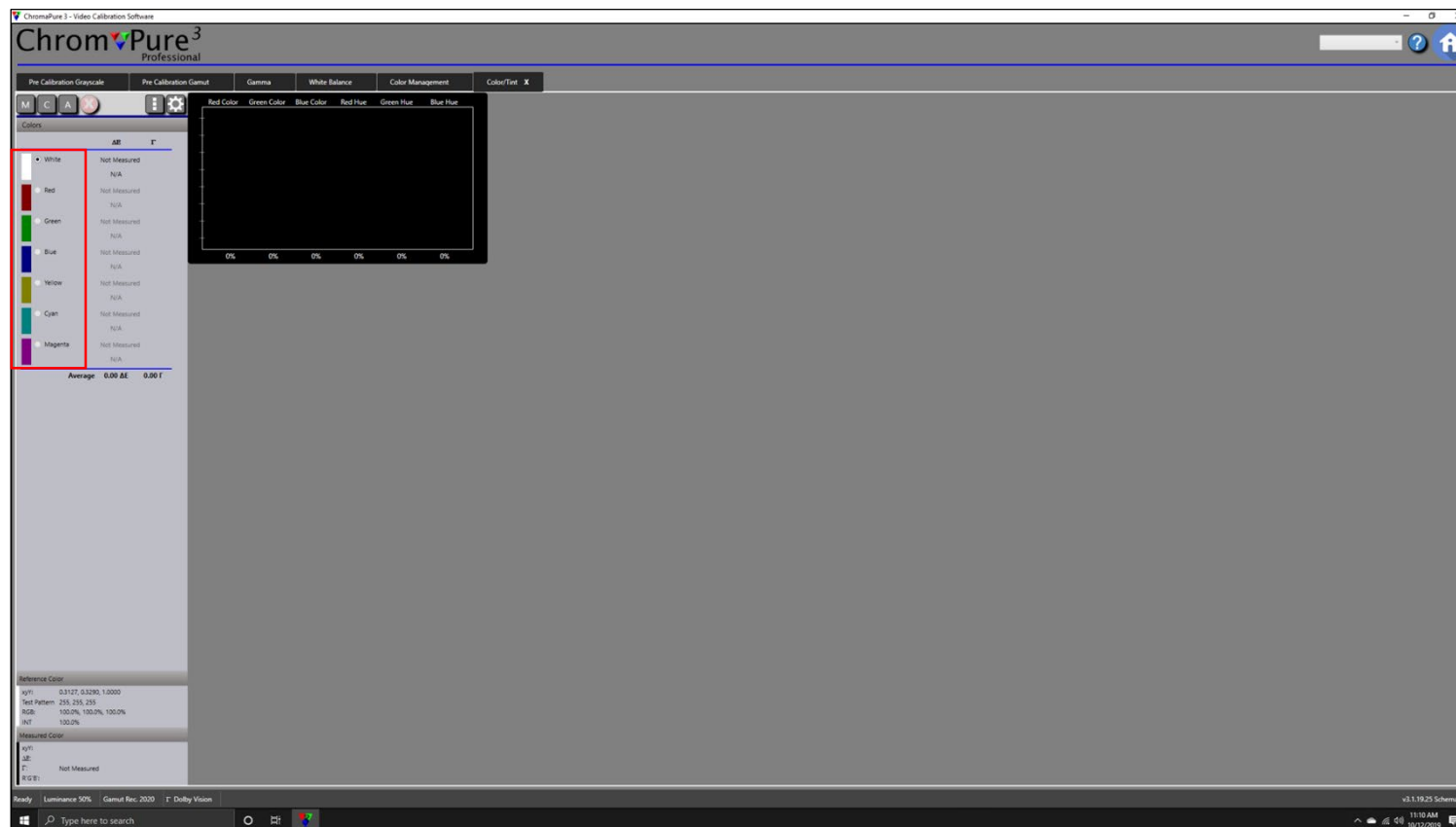
If your display has a Color Management System, then adjustment of Color and Tint is not generally necessary. It should be used only if the CMS controls run out of adjustment range.

The goal for color is to minimize the luminance error for all the primaries, not just red. After adjusting red with the Red Color control, you may want to continue and repeat the process for the Blue Color and Green Color controls to get the lowest possible average % error for all three primaries

The goal for tint is to minimize the hue error for all of the secondaries, not just cyan. After adjusting cyan with the Blue Hue control, you may want to continue and repeat the process for the Red Hue (magenta) and Green Hue (yellow) controls to get the lowest possible average % error for all three secondaries.

Once completed, you can either “X” out of the Calibration Color/Tint tab or click on the main home button in the top right corner to continue with the workflow.

ChromaPure Dolby Vision Workflow Tutorial



Color/Tint (Calibration)

The main Color control affects the luminance saturation of all the colors. Use the Color control to adjust the primary colors' luminance to the correct position.

The main Tint or Hue control affects the position of the secondary colors. Use the Tint control to adjust the secondary colors' hues to their correct position.

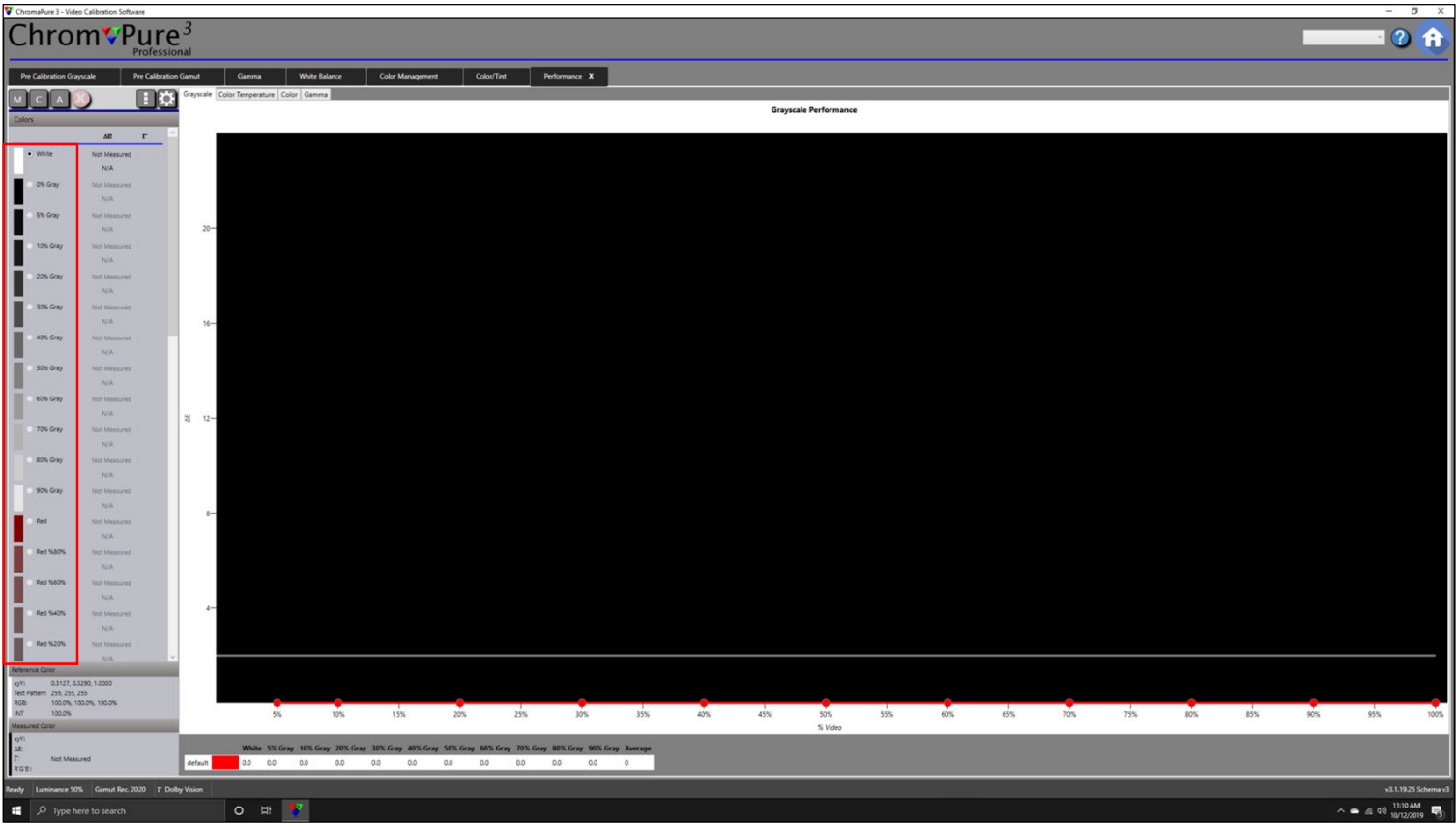
If your display has a Color Management System, then adjustment of Color and Tint is not generally necessary. It should be used only if the CMS controls run out of adjustment range.

The goal for color is to minimize the luminance error for all the primaries, not just red. After adjusting red with the Red Color control, you may want to continue and repeat the process for the Blue Color and Green Color controls to get the lowest possible average % error for all three primaries

The goal for tint is to minimize the hue error for all of the secondaries, not just cyan. After adjusting cyan with the Blue Hue control, you may want to continue and repeat the process for the Red Hue (magenta) and Green Hue (yellow) controls to get the lowest possible average % error for all three secondaries.

Once completed, you can either “X” out of the Calibration Color/Tint tab or click on the main home button in the top right corner to continue with the workflow.

ChromaPure Dolby Vision Workflow Tutorial



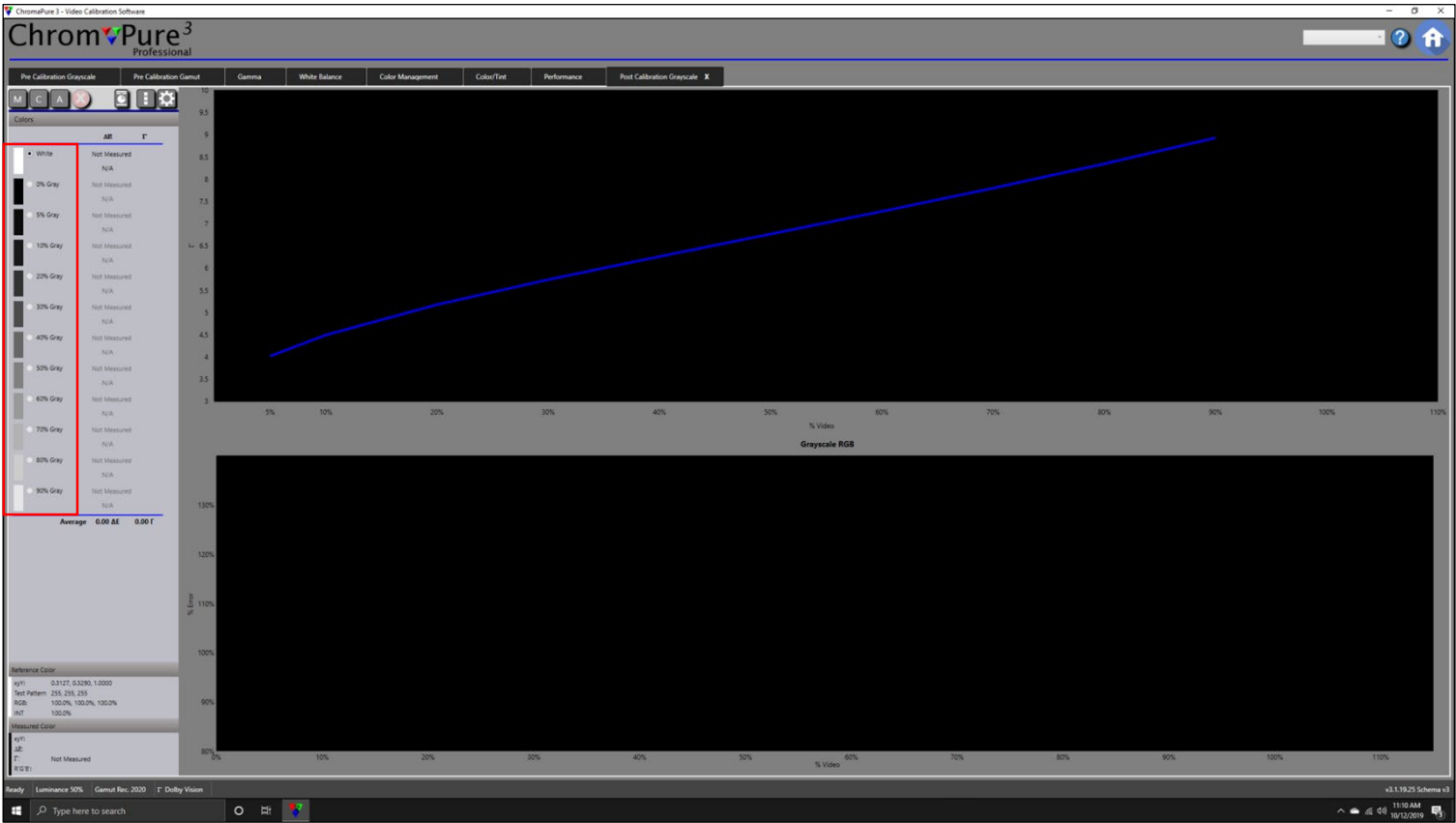
Performance (Calibration)

The performance module provides you with a semi-post calibration view of how well your display devices tracks grayscale, color temperature, color/tint and gamma.

Display a 100% white test pattern and take your initial measurement. Follow the remaining sequence until you have reached the last patch within the sequence.

Once completed, you can either “X” out of the Calibration Performance tab or click on the main home button in the top right corner to continue with the workflow.

ChromaPure Dolby Vision Workflow Tutorial



Grayscale (Post-Calibration)

The Post-Calibration Grayscale module is identical to the Pre-Calibration Grayscale module. It is included only for the purpose of recording the results of calibration for use in reporting.

Grayscale module options

You can set the dynamic range of the grayscale sweep to 0%-100% (default)

You can also select the number of grayscale points you wish to measure

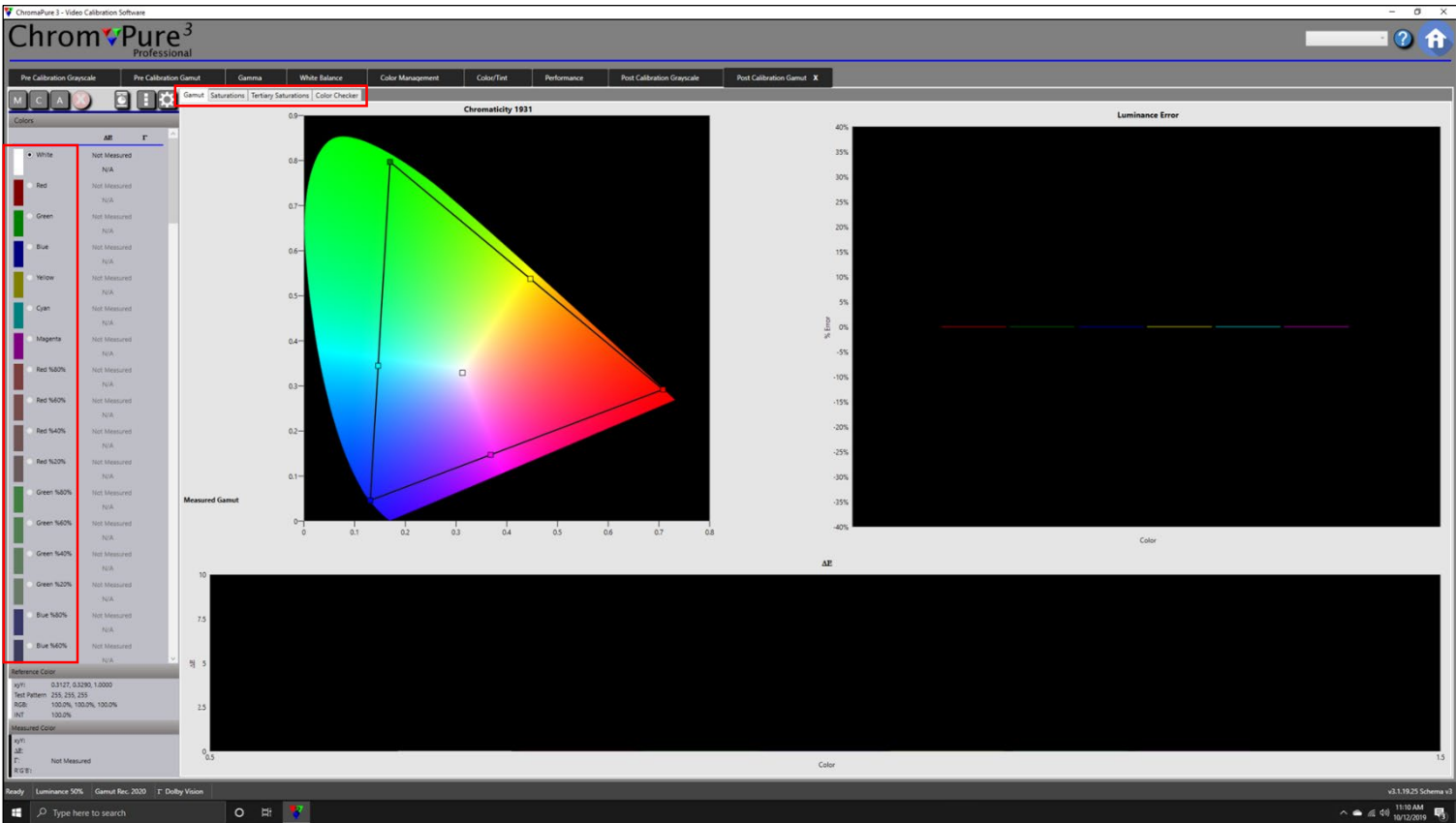
12 points

21 points

Note: If you don't want to measure black, you can click M to measure 100% and then select 5% (or 10% if you wish to skip 5% as well) and then click A to measure the remaining colors in the series. This will speed up the measurement process, but you will lose the ability to report contrast ratio.

Once completed, you can either “X” out of the Post-Calibration Grayscale tab or click on the main home button in the top right corner to continue with the workflow.

ChromaPure Dolby Vision Workflow Tutorial

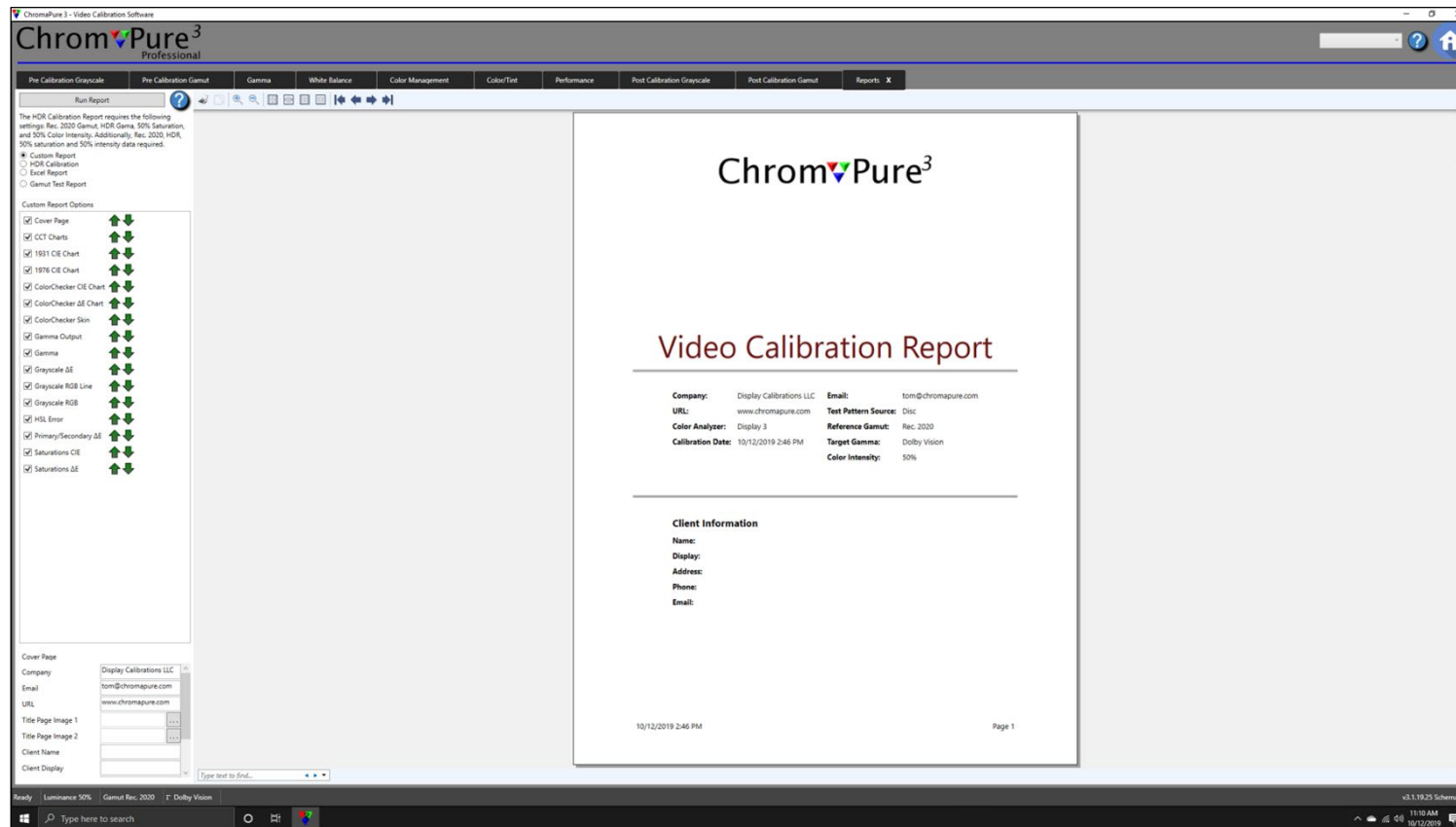


Color Gamut (Post-Calibration)

The Post-Calibration Color Gamut module is identical to the Pre-Calibration Color Gamut module. It is included only for the purpose of recording measured colors for use in reporting. It provides a useful snapshot of your display's color performance prior to calibration.

Once completed, you can either “X” out of the Pre-Calibration Gamut tab or click on the main home button in the top right corner to continue with the workflow.

ChromaPure Dolby Vision Workflow Tutorial



Reports (Post-Calibration)

Once you have completed your calibration session, it is useful to have a permanent record of the results. ChromaPure provides three types of calibration reports

- Multi-page customizable report
- Multi-page comprehensive results report in Microsoft Excel format
- Gamut test report

The reports contain both raw data and charts and graphs displaying the pre and post-calibration performance of your display.

You have now completed the ChromaPure Dolby Vision workflow!

DVS UltraHD | Dolby Vision Test Pattern Suite

Basic Setup

- Title (REV_002)
- Meter Placement
- Meter Profile (10% Window Patterns Red, Green, & Blue @ 50% Amp/50% Sat)
- Black Clipping (1 & 2)
- White Clipping (1, 2, 3 & 4)
- Color Bars (50% BT.2020)
- Color Clipping (Color Clipping High & Low)
- Sharpness & Overscan

Calibration Workflows

CalMAN Dolby Vision Workflow (version 5.9.XX)

- Pre Calibration View
- White Balance
- Grayscale
- CMS Adjust
- ColorChecker Analysis
- P3 Sat Sweep inside BT2020
- Post Calibration View

ChromaPure Dolby Vision Workflow (version 3.1.19)

- Pre-Calibration Grayscale
- Pre-Calibration Color Gamut
- Calibration Gamma
- Calibration White Balance
- Calibration Color Management

Calibration Workflows

ChromaPure Dolby Vision Workflow (version 3.1.XX)

- Calibration Color & Tint
- Calibration Performance
- Post-Calibration Grayscale
- Post-Calibration Color Gamut

Advanced Setup Patterns

10% Window Patterns

- 11 Step Grayscale
- 21 Step Grayscale
- 10 Step Gamma
- 20 Step Gamma
- 50% Amplitude/100% Saturation Color
- 50% Amplitude/75% Saturation Color
- 50% Amplitude/50% Saturation Color
- 50% Amplitude/25% Saturation Color
- 50% Amplitude Color Saturation Sweep
- 23 Point ColorChecker
- Contrast

Miscellaneous Setup Patterns

- Contrast Ratio (10% Window Patterns)
- ANSI Contrast (ANSI Meter Placement & ANSI Contrast)
- Dynamic Contrast
- Grayscale Ramps (Grayscale Steps, Grayscale Ramp & Grayscale Ramp Mix)
- Color Decoding (Color Decoding 50% Amp)
- Color Flashing Primary
- Grayscale Sweeps (10% Window Patterns)
- Color Gamuts in BT2020 Patterns
- ColorChecker Sweeps
- Test Footage (Landscape, Nature, Skin Tone, City Sunset 1.85:1, Oceanside 2.40:1, Pantone Skin Tone, Restaurant Scene, Indian Market, Walk In The City & Rooftop Scene)
- Frame Rate & Judder Patterns (Judder Test 24 FPS, Judder Test 60 FPS, & Multi-Bar Judder Test 24 FPS)
- Radial Gradient Patterns

Test Pattern Information & Metadata

Video Metadata

ID: 1
Format: HEVC
Format/Info: High Efficiency Video Coding
Format profile: Main 10@L5@High
Dolby Vision: 1.0, dvhe.05.06, BL+RPU
Codec ID: dvhe
Codec ID/Info: High Efficiency Video Coding with Dolby Vision
Duration: 1 min 0 s
Bit rate: 1129 kb/s
Width: 3840 pixels
Height: 2160 pixels
Display aspect ratio: 16:9
Frame rate mode: Constant
Frame rate: 23.976 (24000/1001) FPS
Color space: YUV
Chroma subsampling: 4:2:0
Bit depth: 10 bits
Bits/(Pixel*Frame): 0.006
Stream size: 8.09 MiB (90%)

Writing library: x265 3.0_Au+17-b36242b9f354:[Windows][GCC 6.3.0][64 bit] 10bit

Encoding settings: cpuid=1111039 / frame-threads=4 / numa-pools=20 / wpp / no-pmode / no-pme / no-psnr / no-ssim / log-level=2 / input-csp=1 / input-res=3840x2160 / interlace=0 / total-frames=48 / level-idc=0 / high-tier=1 / uhd-bd=0 / ref=4 / no-allow-non-conformance / repeat-headers / annexb / aud / hrd / info / hash=0 / no-temporal-layers / open-gop / min-keyint=48 / keyint=48 / gop-lookahead=0 / bframes=8 / b-adapt=2 / b-pyramid / bframe-bias=0 / rc-lookahead=48 / lookahead-slices=0

scenecut=40 / radl=0 / no-splice / no-intra-refresh / ctu=64 / min-cu-size=8 / rect / amp / max-tu-size=32 / tu-inter-depth=3 / tu-intra-depth=3 / limit-tu=0 / rdoq-level=2 / dynamic-rd=0.00 / no-ssim-rd / signhide / no-tskip / nr-intra=0 / nr-inter=0 / no-constrained-intra / no-strong-intra-smoothing / max-merge=5 / limit-refs=0 / no-limit-modes / me=3 / subme=4 / merange=57 / temporal-mvp / weightp / weightb / no-analyze-src-pics / deblock=0:0 / sao / no-sao-non-deblock / rd=6 / no-early-skip / rskip / no-fast-intra / no-tskip-fast / no-cu-lossless / b-intra / no-splitrd-skip / rdpenalty=0 / psy-rd=2.00 / psy-rdoq=1.00 / no-rd-refine / no-lossless / cbqpoffs=0 / crqpoffs=0 / rc=abr / bitrate=50000 / qcomp=0.60 / qpstep=4 / stats-write=0 / stats-read=0 / vbv-maxrate=70000 / vbv-bufsize=50000 / vbv-init=0.9 / ipratio=1.40 / pbratio=1.30 / aq-mode=2 / aq-strength=1.00 / cutree / zone-count=0 / no-strict-cbr / qg-size=32 / no-rc-grain / qpmax=69 / qpmin=0 / no-const-vbv / sar=0 / overscan=0 / videoformat=5 / range=1 / colorprim=2 / transfer=2 / colormatrix=2 / chromaloc=0 / display-window=0 / max-cll=0,0 / min-luma=0 / max-luma=1023 / log2-max-poc-lsb=8 / vui-timing-info / vui-hrd-info / slices=1 / no-opt-qp-pps / no-opt-ref-list-length-pps / no-multi-pass-opt-rps / scenecut-bias=0.05 / no-opt-cu-delta-qp / no-aq-motion / no-hdr / no-hdr-opt / no-dhdr10-opt / no-idr-recovery-sei / analysis-reuse-level=5 / scale-factor=0 / refine-intra=0 / refine-inter=0 / refine-mv=0 / refine-ctu-distortion=0 / no-limit-sao / ctu-info=0 / no-lowpass-dct / refine-analysis-type=0 / copy-pic=1 / max-ausize-factor=1.0 / no-dynamic-refine / no-single-sei / no-hevc-aq / no-svt / qp-adaptation-range=1.00

Color range: Full
Codec configuration box: hvcC+dvcC

Test Pattern Information & Metadata

Audio Metadata

ID: 2
Format: AAC LC
Format/Info: Advanced Audio Codec Low Complexity
Codec ID: mp4a-40-2
Duration: 1 min 0 s
Bit rate mode: Constant
Bit rate: 125 kb/s
Channel(s): 2 channels
Channel layout: L R
Sampling rate: 48.0 kHz
Frame rate: 46.875 FPS (1024 SPF)
Compression mode: Lossy
Stream size: 918 KiB (10%)

Quick Links

[Dolby Vision White Paper – PDF](#)

[Dolby Vision profiles and levels - Dolby Laboratories – PDF](#)

[Dolby Vision Best Practices Color Grading v3.0 – PDF](#)

[Why Master Dolby Vision – PDF](#)

[Diversified Video Solutions Official Website](#)

[Portrait Displays Official Website](#)

[CalMAN Dolby Vision Workflow - Dolby Vision Calibration.cwfx](#)

[ChromaPure Official Website](#)

[AVS Forum – Display Calibration Threads](#)