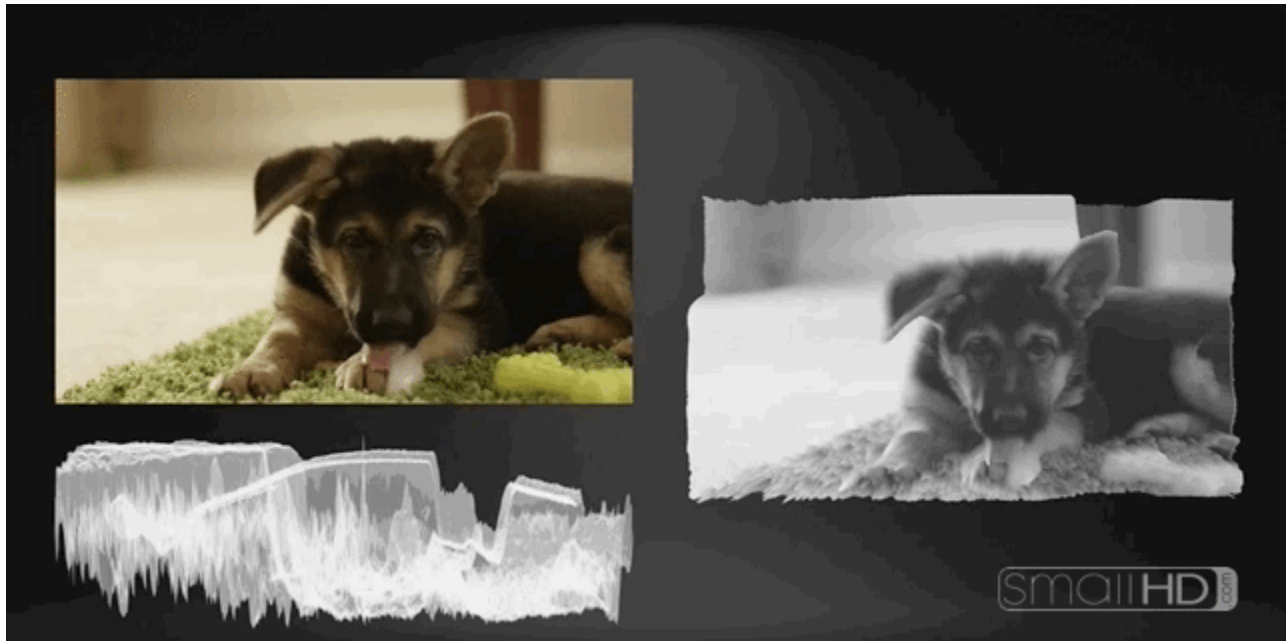# Waveform

The **Waveform** is generally considered the **most robust exposure tool** because it plots your image's luminance (brightness) -- and chrominance if using [RGB mode](#) -- to a graph but unlike the Histogram, it physically **matches the screen from left-to-right**.

1. Waveform - Overview

Although SmallHD provides many available tools to help with setting proper exposure, most of the decision will be down to what works for you. Use this section if you need help deciding where to start.

The Waveform is an extremely comprehensive exposure tool but when needing to understand your exposure levels from a quick glance, [Exposure Assist](#) or [Zebra](#) may be better options.

Once you get comfortable with how the Waveform works you can quickly reach optimal exposure with it by **balancing exposure** between the top and bottom of the graph to **make sure highlights and shadows aren't being clipped too harshly**. If they are, perhaps adding some light into shadow areas or diffusing/ filtering highlights can help compensate.

Waveform is often considered the best exposure tool because it allows very precise measurement of all aspects of the image's luma (brightness) and chroma (color) by setting the 'style' to RGB.

> 💡 Because the Waveform gains the most benefit when using the full width of the screen (so that it matches the image horizontally) it might consume more of your image than you are comfortable with. It might work best as its own screen or taking up the lower portion (1/3) of the screen, but you can use this tool however it will work best for you.

2. Waveform Settings

> Access the Waveform's settings menu by navigating right or pressing the right arrow when the Waveform is highlighted.

On

Toggles the Waveform On/Off. This can also be done on the tool bar by selecting the tool and activating or deactivating it. It will be Green when active and Grey when inactive.

Ignore Look

Allows you to apply a Look (3D LUT) to your footage while monitoring a waveform that is not affected by the Look. This lets you make exposure decisions based on the signal coming from the monitor for ideal flexibility in post-production.

> 💡 **We recommend leaving this on** (Ignoring your LUT) for most shooting scenarios so that the waveform applies to the **footage being recorded** instead of shifting around while adding or adjusting a 3D LUT.

Style
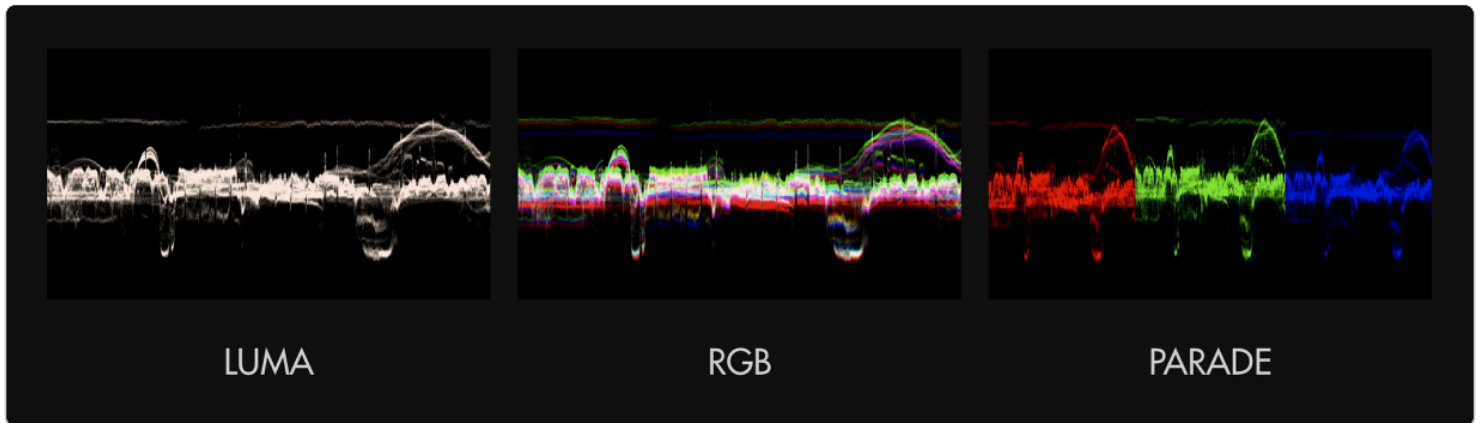
You will have three options:

LUMA displays a brightness/luma plot only

RGB graphs each primary color on top of one another.

RGB PARADE physically separates the Red, Blue and Green channels into discrete sections from left to right so they can be viewed easily in isolation.

LAYOUT

Layout has a set of Submenus that will allow you to set the positioning, scale and visibility of the Waveform.

*Full Screen

Displays the waveform in a full-screen view, useful when viewing from a distance or if using multiple monitors where another can be displaying the image itself.

*Width

Scales the Waveform horizontally.

> 💡 We recommend leaving this at 100 (or set to the same width as your image) to gain the benefit if the graph matching up evenly with your image from left-to-right.

*Color

This is only available if using LUMA Style.
You can select the color of the waveform if desired from a specified set.

*Height

Scales the Waveform vertically.

*Location

Set the location of the Waveform to a spot of your choosing - useful when placing multiple tools/scopes on screen.
There are 9 positions to choose from:

TOP - Left, Center, Right
MIDDLE - Left, Center, Right
BOTTOM - Left, Center, Right

(Full screen is also an option)

*Intensity

Adjusts the brightness of the waveform graph (the plotted portion) - increase if the graph appears too faint. This affects the colored part of the graph, not the black background, adjust the Opacity to change that.

*Opacity

Adjusts the transparency of the black background behind the Waveform. 100 is black, 0 is opaque.

> 💡 For better visibility, boost Intensity to compensate for a lower Opacity if desired.

SPOT METER

Brings up a small, moveable 'window' you can place on the image that highlights the portion of the Waveform it corresponds to. Useful for getting very specific exposure information from a specific part of the image such as skin tones, hot spots or calibration charts.

This will open a submenu for more settings.

*Enabled

Toggles visibility of the Spot Meter. This must be enabled to open the sub menu.

*Width

Adjusts the width of the Spot Meter.

*Height

Scales the height of the Spot Meter.

*Spot Location

Set the location of the Spot Meter to an area of your choosing. It follows a 7x7 grid giving you a preset 49 locations.

LEGEND

Places a guide onto the Waveform graph listing numeric IRE (brightness) values for measuring levels.
This will open up a set of submenus.

*Overlaid

Toggles if the legend is outside of the waveform (right) or over the top of it (left).
*If in full screen mode, the outside will push the legend off the screen. If you want the legend outside and have a full screen waveform, you will need to adjust the size manually rather than using the fill screen and shorten the width 94.

*Num Labels

This breaks the measurements from 0 to 100 into multiples:
2 - x100 (0,100)

3 - x50 (50,100)

4 - x33 (33,66...)

5 - x24 (25,50...)

6 - x20 (20,40...)

7 - x17 (16,33...)

8 - x14 (14,28...)

9 - x13 (12,25...)

10 - x11 (11,22...)

11 - x10 (10,20...)

*Legend Color

Change the legend (numbers) color if in need of extra readability of IRE values against your background.

*Line Color

Change the line color of the graph to more clearly see when your values are reaching a specific level. This will correlate to any numbers on your legend, giving you a horizontal line to use for measurement.

Adjusts the opacity of the graph lines to make them stand out - or invisible to improve graph visibility.

Adjusts the thickness of the graph lines for readability.

Pixel 0-5.

3. Waveform - Quick-Start

Press right on the joystick or tap the right arrow next to 'ADD NEW TOOL' and navigate to **Scopes > Waveform** and select to add it to the current page.


Once added you can **edit the settings** by **navigating right** when 'Waveform' is highlighted.

Select **'Style'** and switch from **LUMA to RGB** - this will let you observe each **Red**, **Green** and **Blue** value simultaneously - a unique benefit of the Waveform.
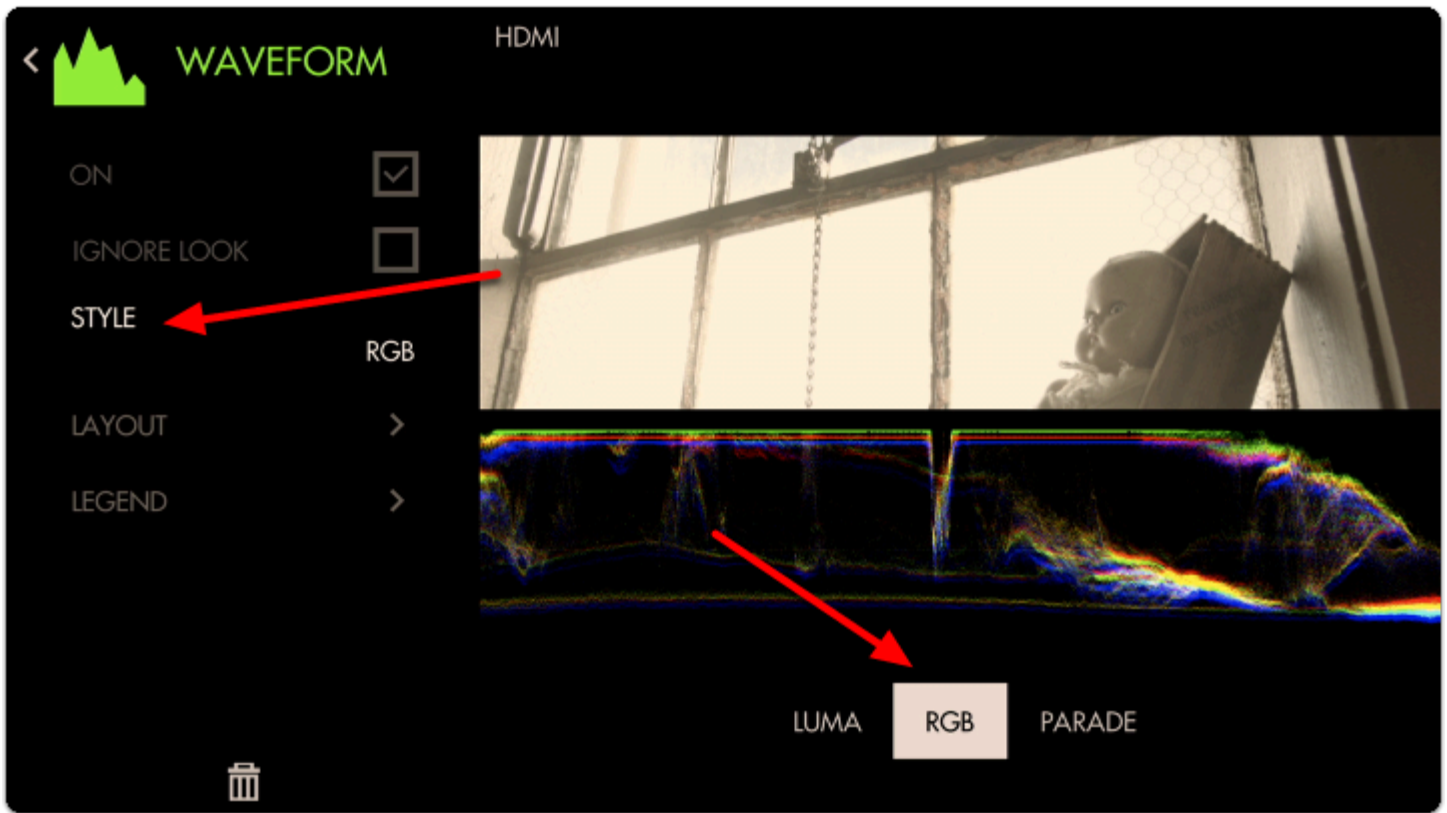
Back out of the Edit Tool menu to observe the waveform in action and to accurately expose your footage.

The Waveform **'flattens'** at the top when highlights are being **blown or 'clipped'** - this will result in footage that is a solid 'block' of color **without the ability to manipulate** it meaningfully in post production.
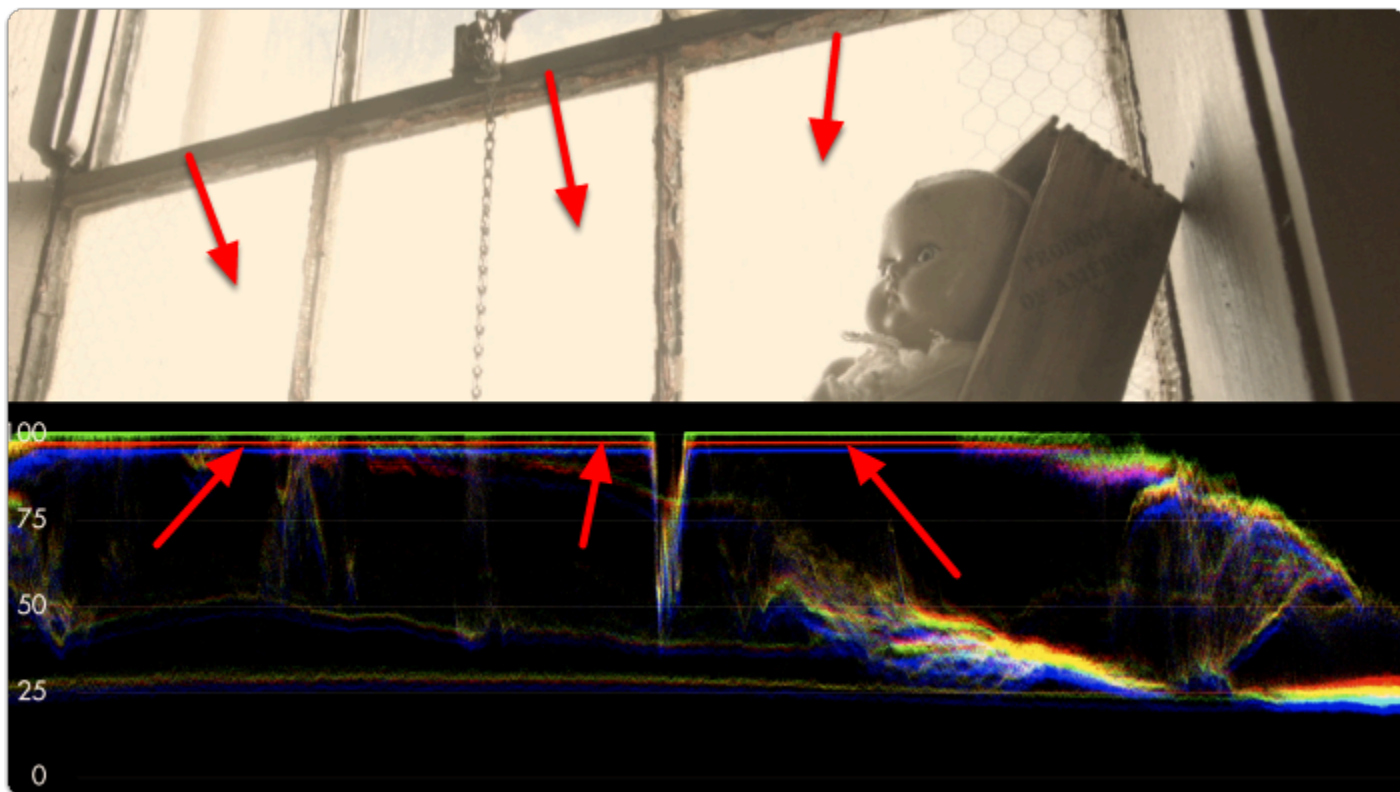
Rolling exposure downwards, the lines **'un-flatten'** and much more of the window can now be **manipulated in color grading** while some areas **remain overexposed.**
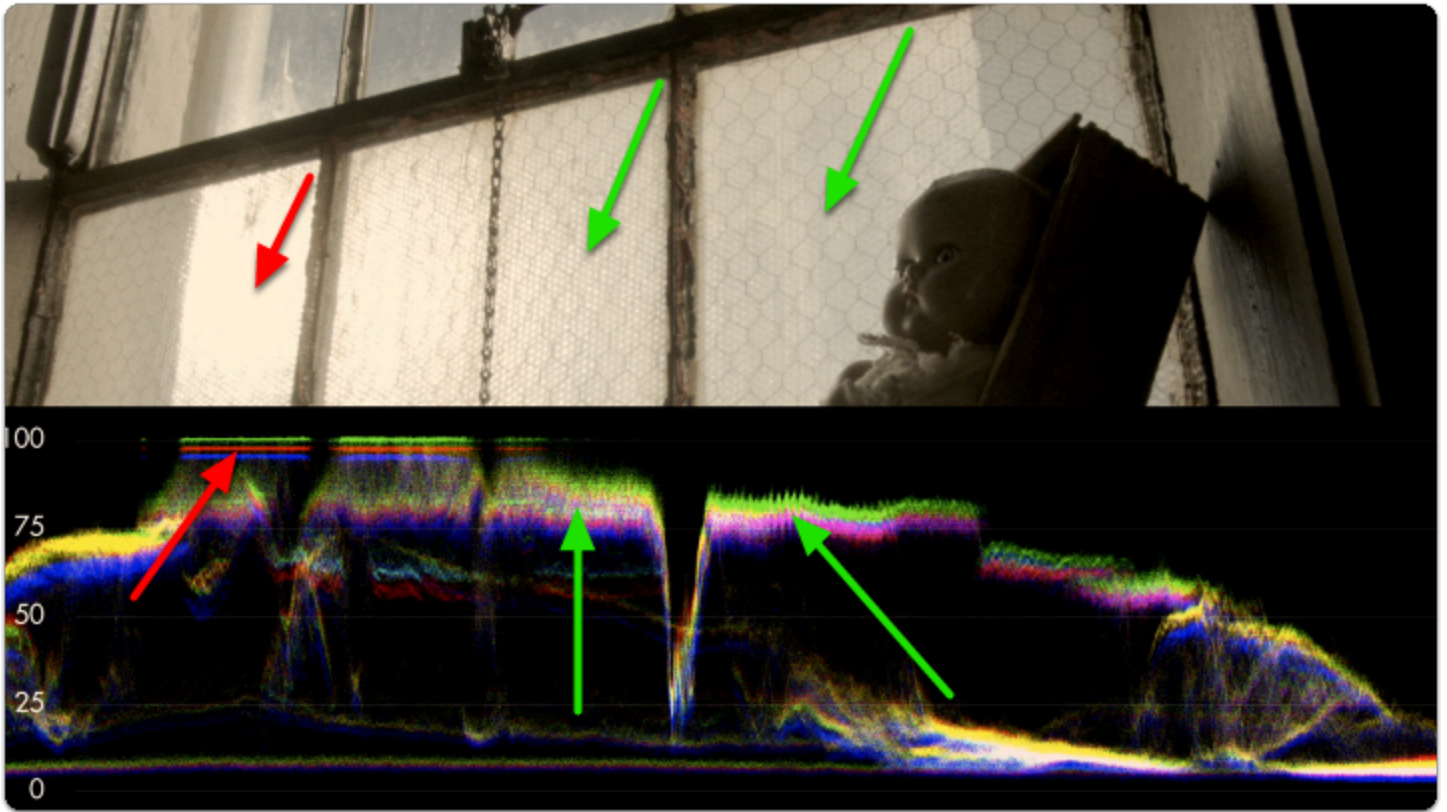
If we keep rolling exposure down (closing the aperture) we will continue seeing more 'into' the brighter details at the expense of **shadow details** which become **'crushed'** or **'clipped'** and **effectively lost** similar to overexposure.

> 💡 The key to finding a healthy exposure relies on a graceful balance between clipped highlights (top of graph) and crushed/noisy shadows (bottom of graph).
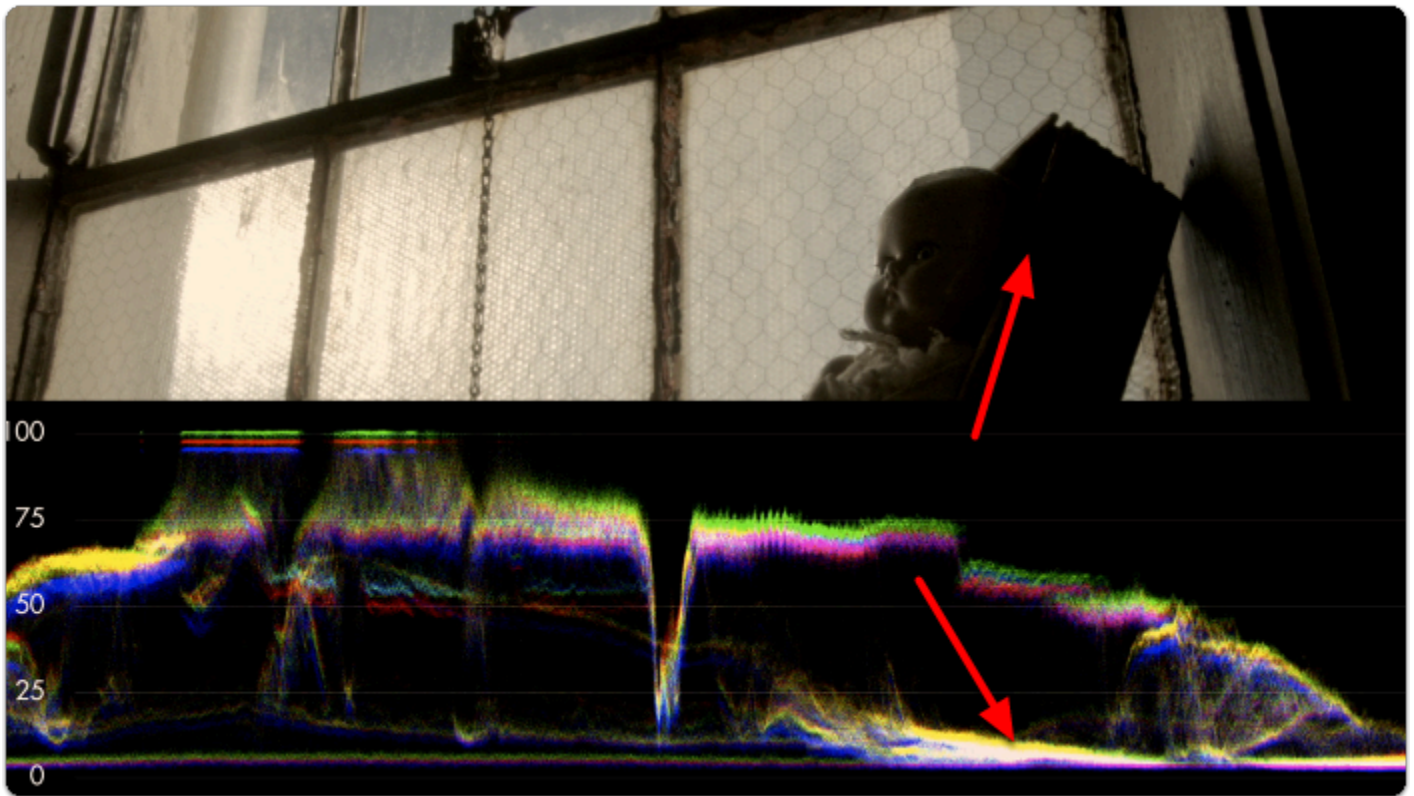
> 💡 The **difference** between the **darkest** and the **brightest** areas that a camera can effectively see detail is known as its **dynamic range** - this is why high dynamic range is a highly sought after feature among cameras; you are able to capture and therefore **manipulate more of your image**.

As mentioned before, because we're looking at an **RGB Waveform** we can can use it to make color decisions in addition to luminance.

If a **pure white** or **pure gray** element occupies part of your scene, you can actually **white balance** with the **waveform**. Many newer cameras will do this automatically, but it is a good idea to use the spot meter if using a local source.

*Using a Macbeth or Grey card in the field works well.
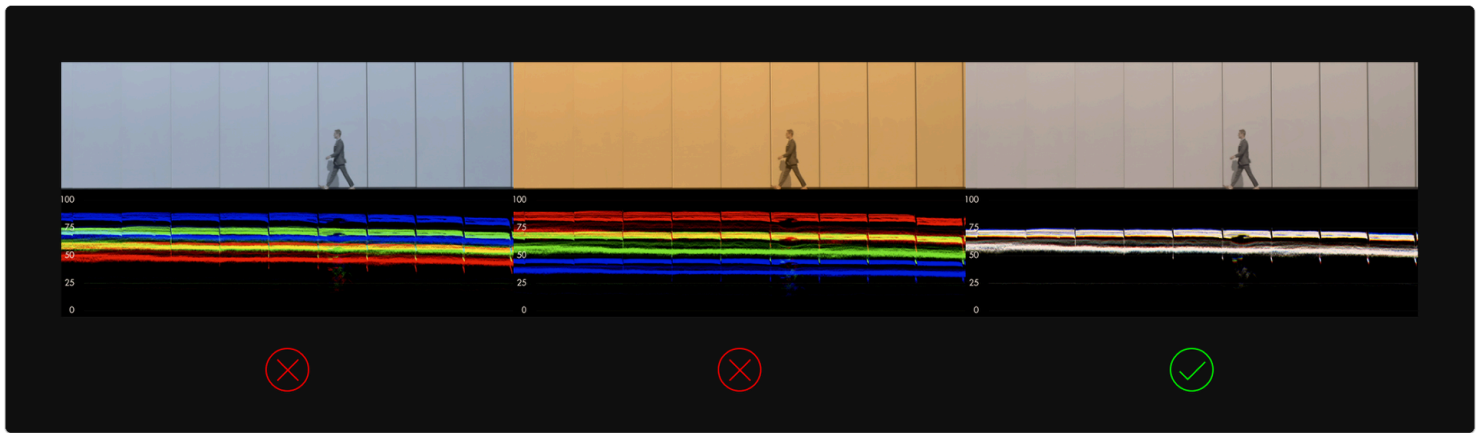
Notice how adjusting the white balance setting on the camera shifts the RGB 'bands' - when lined up they **turn white**, indicating a **proper white balance** setting.