What is the difference between HDR and 4K?

When buying a TV, the terms 4K and HDR may come across. Both of these technologies improve image quality. However, they do this in very different ways.

Let's find out what 4K and HDR mean through the following article!

overview

4K

1. Refers to the screen resolution (the number of pixels the monitor can hold).
2. Used synonymous with Ultra HD (UHD). Refers to a horizontal screen resolution of around 4,000 pixels.
3. UHD compatible devices and components are required to avoid upscale.

HDR

1. Short for High Dynamic Range.
2. Wide range of colors and dynamic range than Standard Dynamic Range (SDR).
3. Bright tones are brighter without overexposure. Dark tones are darkened without underexposure.

4K and HDR are not competing standards. 4K refers to the screen resolution (the number of pixels a TV monitor can hold). It's sometimes referred to as UHD or Ultra HD, albeit with a bit of a difference.

HDR stands for High Dynamic Range and refers to the contrast or range of colors between the lightest and darkest tones in an image. HDR delivers higher contrast - or greater range of colors and brightness - than Standard Dynamic Range (SDR) and has a more visual impact than 4K. That said, 4K delivers sharper and clearer images.

Both of these standards are increasingly popular in high-end digital TVs and both deliver excellent picture quality. TV manufacturers prioritize HDR application for 4K Ultra HD TVs over 1080p or 720p TVs. 4K resolution can also be referred to as Ultra HD, UHD, 2160p, Ultra High Definition or 4K Ultra High Definition.

Resolution: 4K is standard

4K

1. The standard 4K / UHD TV is 3840 x 2160 pixels. Standard 4K cinema is 4096 x 2160 pixels.
2. Four times the number of pixels by 1080p, which means 4 1080p images can fit in the space of a 4K image.

HDR

1. Regardless of resolution, most HDR TVs are 4K TVs as well.

4K refers to a specific screen resolution, and HDR has nothing to do with resolution. While HDR has competitive standards, some specify a minimum resolution of 4K, a term that typically describes any video or monitor with higher contrast or dynamic range than SDR content.

For digital TVs, 4K can mean one of two resolutions. The most common is the Ultra HD or UHD format that has 3,840 horizontal pixels by 2160 pixels vertical. A less common resolution, mainly for movie theaters and movie projectors, is 4096 × 2160 pixels.

4K resolution is 4 times the number of pixels (or double the number of lines) on a 1080p screen - the next highest resolution you'll find in a regular TV. With an aspect ratio of 16: 9 or 16 x 9, the total number of pixels in a 4K image exceeds 8 megapixels.

4K (like any other TV resolution) remains the same regardless of screen size. However, the number of pixels per inch may vary depending on the size of the screen. This means that as the TV screen increases in size, the pixels are either enlarged or spaced further apart to achieve the same resolution.

HDR TVs must meet a set of standards for brightness, contrast, and color to be considered HDR. Those standards vary, but all HDR displays are identified as having a higher dynamic range than SDR, as well as a minimum 10-bit color depth. Since most HDR TVs are 4K TVs, they have a resolution of 3840 x 2160 pixels (but there are also a handful of 1080p and 720p HDR TVs).

Some HDR LED / LCD TVs have a maximum light output of 1,000 nits or more. In order for an OLED TV to qualify as an HDR TV, it must produce a minimum brightness of 540 nits and a maximum of about 800 nits.

Color and contrast: HDR has a visual impact

4K

1. As a resolution, 4K's impact on color is primarily through higher definition.

HDR

1. Significantly improved color and contrast reproduction. HDR has a larger visual impact than 4K.
2. The visual impact is greater than the SDR. Colors are more accurate, lighting and colors are smoother, as well as more detailed images.

Color reproduction is significantly improved on HDR TVs. As a resolution, 4K doesn't have much of an effect on color, other than providing extra sharpness. This is why 4K and UHD often go hand in hand. These technologies complement the two most important aspects of image quality - sharpness and color.

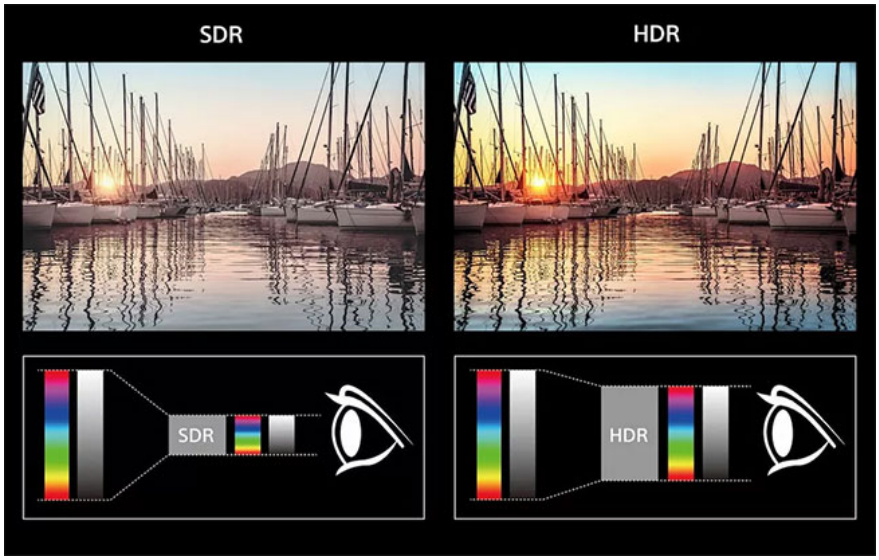
As a technology, HDR widens the gap between white and black. This makes the contrast stronger without overexposing bright colors or causing underexposed with dark ones.

When taking high dynamic range photography, the information is used during post-production to categorize content and obtain the widest possible dynamic range. Images are graded to produce a wide color gamut, resulting in deeper, more saturated colors, as well as smoother shadows and more detailed images.

Gradation can be applied to individual frames or scenes, or as static reference points for an entire movie or show.

When the HDR TV detects HDR-encoded content, bright whites appear without glare, and deep blacks are not blurred. In simple terms, the colors look more saturated.

For example, during a sunset, you will see the bright sunlight and darker parts of the image with similar clarity, along with all the brightness levels in between. See the example below:



There are two ways for the TV to show HDR:

- **Content is encrypted HDR** : 4 format is HDR10 HDR / 10 +, Dolby Vision, HLG and Technicolor HDR. The brand or model of the HDR TV determines the format it is compatible with. If the TV cannot detect a compatible HDR format, the TV displays the picture in SDR.

- **Handling from SDR to HDR** : Similar to upgrade resolution TV, TV HDR with the ability to upgrade from SDR to HDR information analysis contrast and brightness of the signal SDR. It then expands the dynamic range to achieve an approximate HDR quality.

Compatibility

4K

1. Full 4K UHD resolution requires a 4K-compatible device from source to screen - including a set-top box or Blu-ray player, streaming device, HDMI cable, and TV.

HDR

1. Requires end-to-end compatibility.
2. Available content is limited compared to 4K.

4K TVs require end-to-end compatibility between all components to produce true or true 4K resolution. This is also generally true of HDR. You need both an HDR TV and content produced in HDR. There is less HDR content than 4K, however, but that is starting to change.

To enjoy the full 4K UHD resolution, you need a 4K compatible device. That includes home theater receivers, media streamers, Ultra HD Blu-ray players and video projectors, as well as the native resolution of the content you're watching. You will also need a high speed HDMI cable. 4K is more common among large TVs because the difference between 4K and 1080p is negligible on screens smaller than 55 inches. However, the HDR effect may vary between TVs, depending on the amount of light that the screen emits.

Some 4K devices upgrade to lower resolution to 4K, but the transition hasn't always been smooth. Likewise, not all HDR TVs can upgrade from SDR to HDR. When buying an HDR-capable TV, consider the TV's compatibility with HDR10 / 10 +, Dolby Vision and HLG formats, as well as the TV's ability to maximum brightness, measured in nit.

How well an HDR-enabled TV displays HDR depends on how much light the TV emits. This is called maximum luminance and is measured in nit. For example, content encoded in the Dolby Vision HDR format can provide a 4,000 nits range between the darkest blacks and the whitest whites. Very few HDR TVs emit so much light, but more and more screens are reaching 1,000 nits. Most HDR TVs display less than this.

The OLED HDR TV reaches a maximum of about 800 nits. More and more LED / LCD HDR TVs emit 1,000 nits or more, but lower-end devices can emit 500 nits (or less). On the other hand, since the pixels in an OLED TV are individually illuminated, allowing the pixels to display absolute black, these TVs can have higher dynamic range even with lower maximum luminance levels.

When the TV detects an HDR signal but cannot emit enough light to show its full dynamic potential, the TV uses tone mapping to match the dynamic range of the HDR content with the dynamic range of the played content. light out on TV.

Do you have to choose between HDR and 4K?

4K and HDR aren't competitive standards, so you don't have to choose between the two. And because most high-end TVs have both, you don't need to focus on one over the other, especially if you're buying a TV larger than 55 inches. If you want a TV smaller than that, you might be satisfied with a 1080p screen, as you probably won't notice a difference in resolution.

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