

Introduction to Picture Profile

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[1] Introduction to Picture Profile

What is Picture Profile?

Picture Profile is a menu for adjusting and changing parameters that determine an image's characteristics. There are many parameters that can be adjusted, but they can be grouped into 4 types — parameters for selecting basic contrast and color tone, parameters for adjusting gradation (darkness-brightness tone), parameters for adjusting coloring, and parameters for emphasizing image edges.

Select MENU →  (Camera Settings) → [Picture Profile] → the profile you want to change, and you can directly enter the Picture Profile setting mode.

Supporting a wide range of adjustable settings, this camera's Picture Profile menu allows you to change a variety of settings, such as Gamma Curve, Color and Detail. Up to 7 sets of setting combinations can be stored in the internal memory as PP1 through PP7.

Available functions may vary depending on your camera.

Using Picture Profile presets

This camera is equipped with several Picture Profile presets as a default setting. By using these presets, you can match the image texture with other types of cameras equipped with the [Picture Profile] function, or create an image texture that is similar to that of cinematic film.

Difference from image processing using nonlinear video editing software

Picture Profile adjusts colors and the vividness of the image during recording. You can make similar adjustments by using nonlinear editing software after shooting. But there are the following differences.

To fit massive amounts of image data in a limited memory capacity, this camera compresses image data when recording. No matter how advanced a compression format is, any data compression inevitably deteriorates image quality somewhat. Applying sharpness, gamma curve correction and other video effects to recorded images by using nonlinear editing software worsens the image condition further by processing already deteriorated images. For example, if video compression leaves the image with poor contrast or block noise in some areas, applying video effects often make the problems more noticeable.

Because Picture Profile processes video signals before compressing, it changes the gamma curve and corrects colors before image quality is damaged by compression. This makes it possible to carry out highly precise image adjustments while keeping the quality of the subject intact. It should also be noted that recording images with proper contrast is crucial. If image contrast in dark and bright areas is not recorded properly, this will result in underexposed dark and overexposed white areas with no gradations. This means you cannot change image contrast properly later on with nonlinear editing software no matter how hard you try because there will be no gradations to work with.

If you intend to process your video with nonlinear editing software later, it is important that you record your image in the right way.

Nonlinear editing software is a very powerful tool, but can't fix everything. If you adjust various settings to make sure your video is recorded in a way that matches your ideal as much as possible, you will be able to create a video that will be closer to what you have in mind with minimal processing via nonlinear editing software. It will also keep rendering time short and make video editing work more efficient.

What to do with Picture Profile

If you are working on a project with ample time for editing or a short piece, record an image that is as flat as possible to allow for many different kinds of post-production image processing and color adjustments.

If you are working on a project with a tight deadline or a long piece, on the other hand, you can dramatically reduce the amount of post-production image processing and enable highly efficient production by recording the video as close to the vision of the finished image as

possible. Showing the image being recorded to the director and crew as close to the tone of the ideal finished image as possible on a display monitor will greatly boost morale on the scene, which has a major impact on the quality of the finished work. In order to avoid the problems with nonlinear editing described in the previous section, and also to create pieces with mobility that make the most of this camera's unique characteristics, try to fully utilize Picture Profile while recording images at the proper settings.

[2] Introduction to Picture Profile

Gamma and Knee

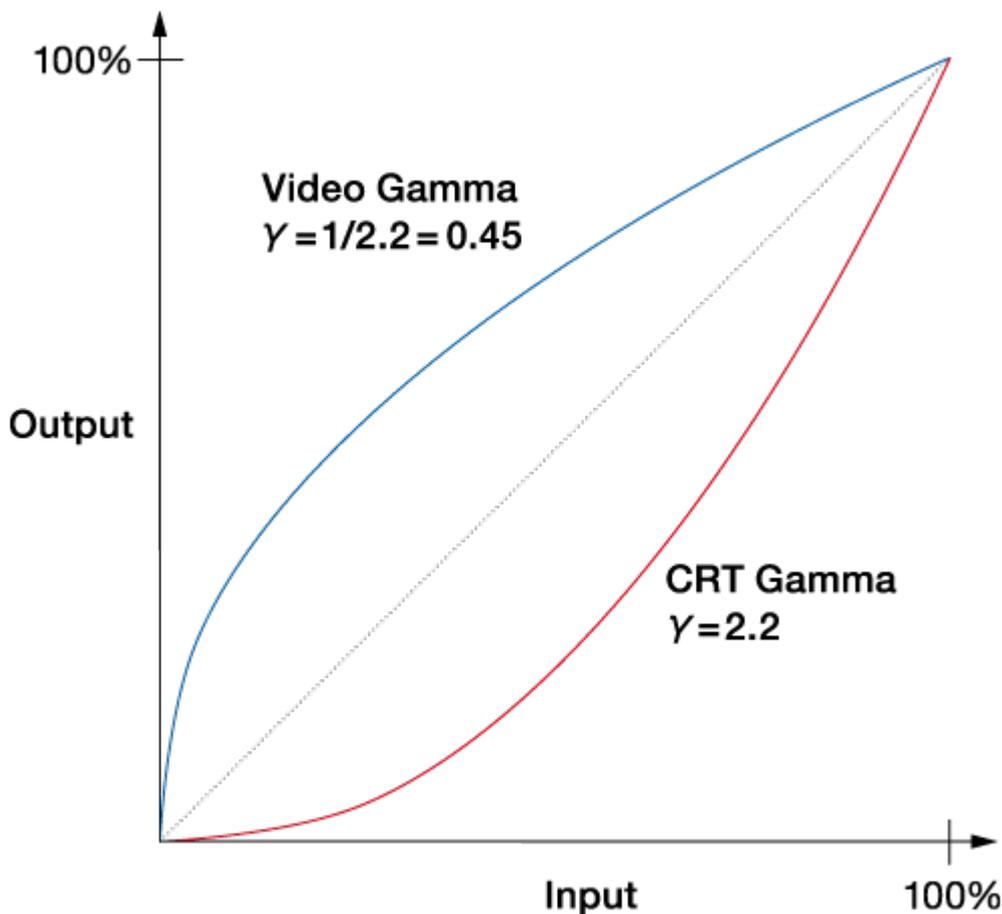
Gamma curve, knee point, and knee slope are elements that exert great influence over image characteristics. By understanding these, you'll be able to utilize Picture Profile efficiently.

What is a gamma curve?

Gamma curves show the relationship between the input signal level and the output signal level. The camera converts the brightness signal from the subject into an electrical signal and sends the electrical signal to the display monitor, which converts that signal back to a brightness signal and reproduces the subject as an image. The input signal level is the level of the brightness signals from the subject and the original image, whereas the output signal level is the level of the brightness signal output by the camera or display monitor.

In order to faithfully reproduce a subject in video images, the output signal level needs to be largely proportional to the input signal level, as shown in the straight line below. But the fluorescent material characteristics of a CRT (cathode-ray tube) cause the output signal level from CRT monitors to curve as shown below. This represents the gamma curve of CRT monitors. The camera's video gamma curve plots the opposite curve. For this reason, the properties of the camera and CRT monitor can be offset to faithfully reproduce and display the original subject.

The inherent characteristics of an LCD (liquid crystal display) cause the output signal level from LCD monitors to be largely proportional to the input signal level. However, because the camera is designed for CRT monitors, LCD monitors and OLED (organic light-emitting diode) monitors mimic the CRT's gamma curve.



How the gamma curve's shape influences images

Influence on dark areas and contrast

High-end cameras have a function to slightly change the shape of the gamma curve for dark areas of the image, known as Black Gamma. Changing the gamma curve shape lets you dramatically alter the atmosphere of the image by strengthening or weakening the shading, or contrast, of the image.

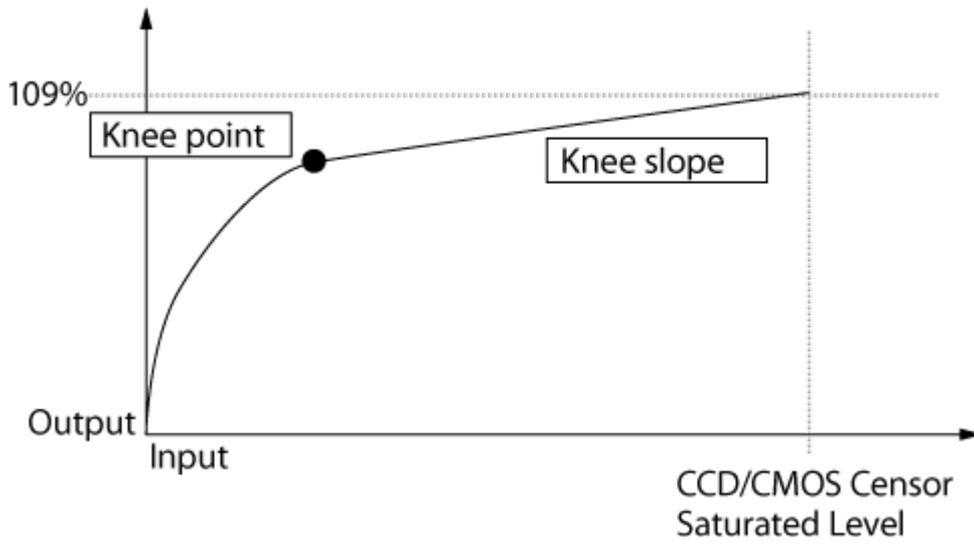
What is knee correction?

Cameras are, in general, not good at clearly capturing a scene that contains extremely different luminance levels, such as one object in bright sunlight and another in the shade. If you set the right exposure for the object in the shade, the object under the sun will be captured too brightly and appear as a plain white object without texture or gradation. Knee correction is a function necessary to keep these kinds of images with a large disparity in luminance levels within the standard range of video signal levels. Just as Black Gamma influences contrast in dark image areas, knee correction deals with contrast in image areas with high luminance levels.

CCD and CMOS sensors can handle an extremely bright input signal. To output it as a video signal, however, we need to keep the signal within the standard range for video. For this reason, the signal output level is kept lower than the signal input level in high-luminance areas that generate input signals over a certain level. In the chart below, the line bends like a knee at a certain point in the high-luminance range. This is called the knee point. The line extending from the knee point is called the knee slope.

By changing the position of the knee point and the inclination of the knee slope, contrast in

the high-luminance range can be altered. The breadth of input signal levels that a system can process is called the dynamic range.



Without knee correction

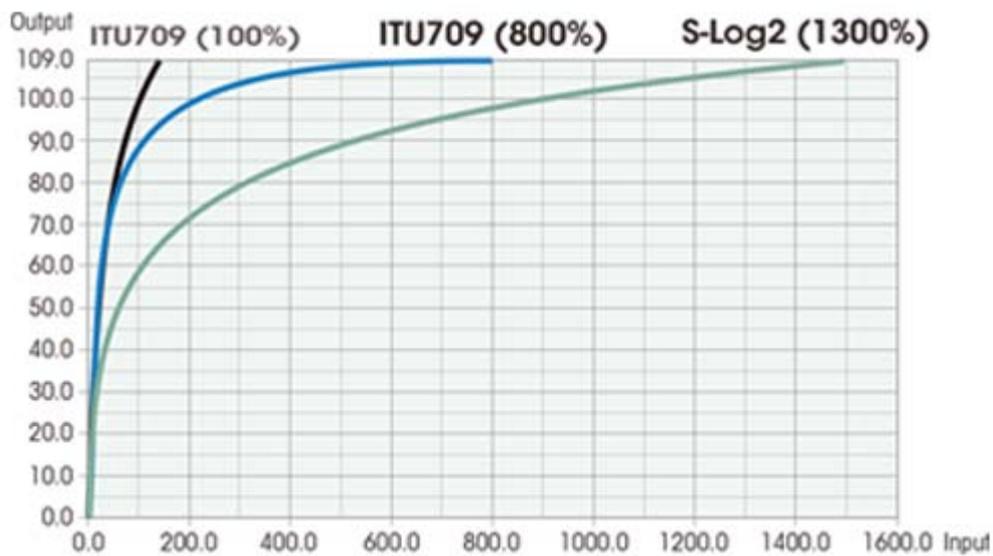


With knee correction

[3] Introduction to Picture Profile

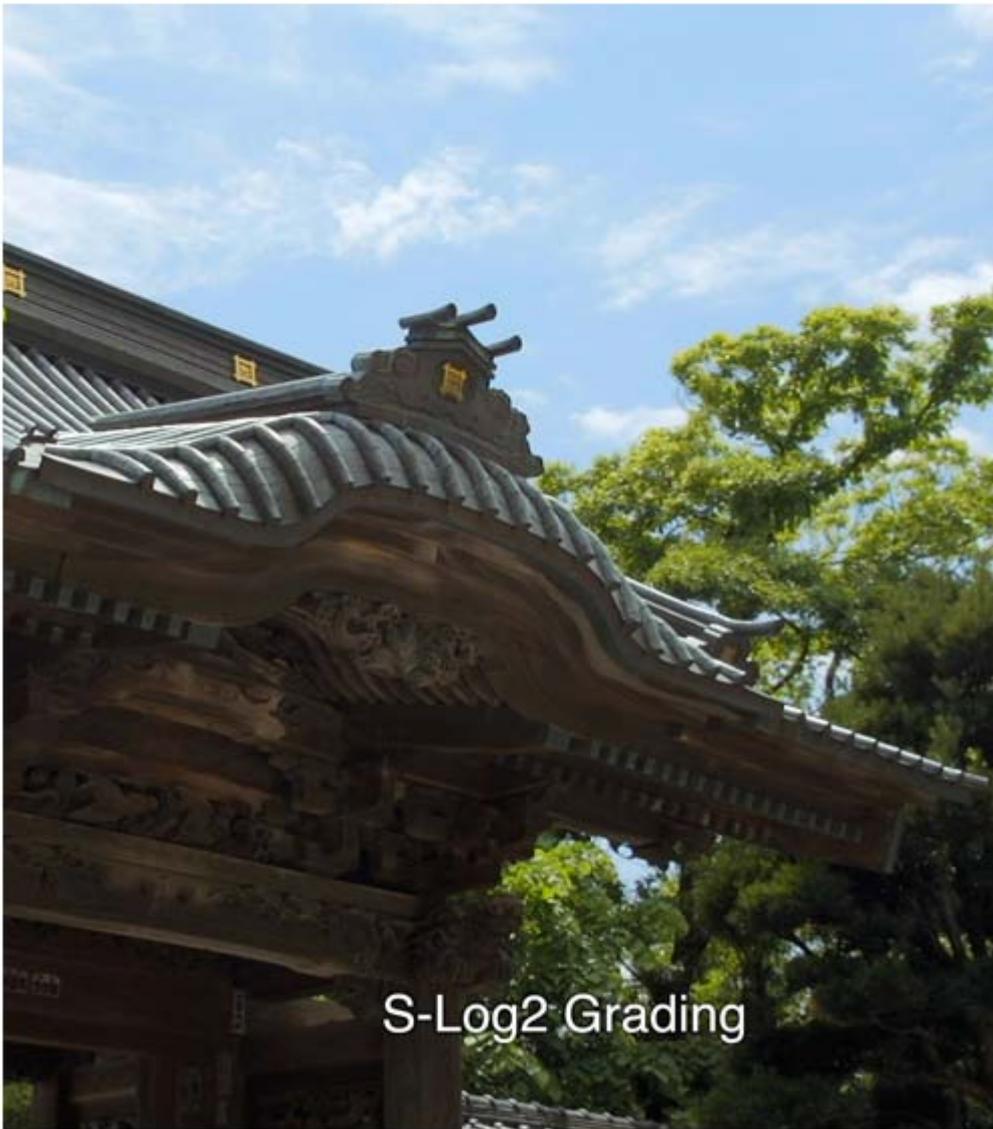
What is S-Log?

The S-Log2 gamma curve is optimized to the dynamic range of the CMOS sensor. In order to bring out the contrast in highlights as much as possible, the sensor output has been extended to 1300% of the dynamic range. Although some color grading work is required, the S-Log2 gamma curve is an effective way to preserve highlight gradations that would otherwise be lost, thereby providing greater exposure latitude in recording.





Camera settings
ISO 2000 24p 1/48
F5.6+ND1/64



Grading settings

Exposure

Shadow: -10%

Mid: +5%

Highlight: -4%

Color

Mid: 165° +1%

Highlight: 352° -1%

Saturation

Global: +49%

Mid: +66%

Highlight: +84%



Camera settings

ISO 2000 24p 1/48

F8+ND1/64



Grading settings

Exposure

Shadow: -1%

Mid: -28%

Highlight: -3%

Color

Mid: 180° +1%

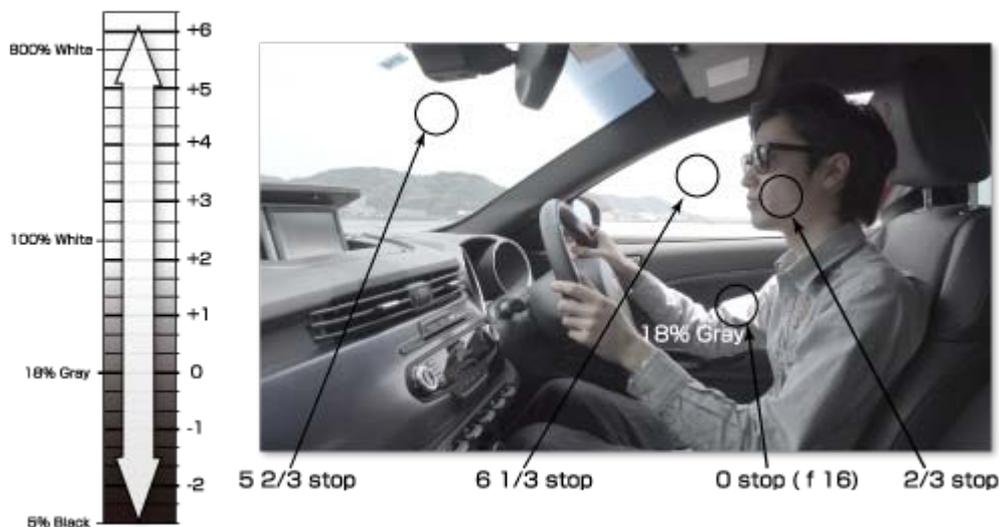
Highlight: 228° -2%

Saturation

Global: +58%

Mid: +33%

Highlight: +47%



[ITU709(800%)]

- [ITU709(800%)] is a gamma curve for easily assessing the level of gradation when grading an image recorded using [S-Log2] to ITU709.

When you adjust the shooting exposure with [Gamma] set to [S-Log2] and then switch [Gamma] to [ITU709(800%)], a low-contrast image will be displayed with ITU709 contrast applied. Although [ITU709(800%)] applies higher contrast as compared with the S-Log gamma curve, it may be difficult to assess gradations in high-luminance areas. Switch to [ITU709(800%)] as necessary based on the image you want to assess.

* S-Log2 has been designed specifically for 10-bit recording, and therefore may not generate sufficient gradation in dark image areas in 8-bit AVCHD.

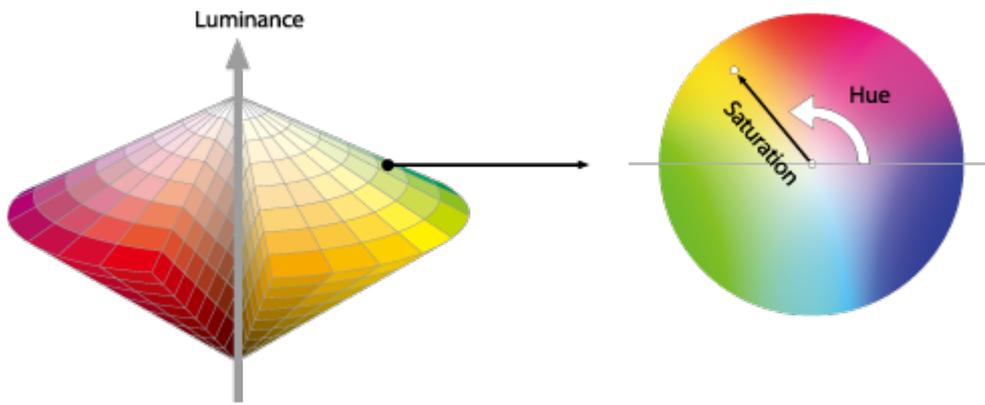
[4] Introduction to Picture Profile

Color Space

This product's Picture Profile uses the concept of a color space based on three dimensions; Hue, Saturation and Luminance.

This color space can be represented as a shape that resembles two cones joined at their bases. When you slice the color space at a certain luminance level, a circular cross section appears. In this cross section, the angle from the circle's center line indicates hue, while the distance from the circle's center represents saturation.

Because some color-related settings in Picture Profile use this color space concept, familiarizing yourself with this concept will make it easier for you to understand how those settings should be used.



[5] Introduction to Picture Profile

Detail

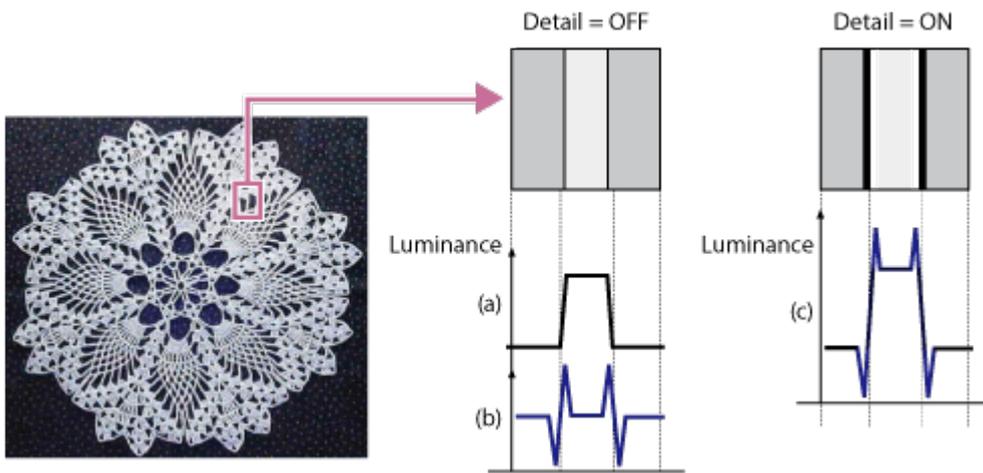
Detail

The Detail function processes video signals to emphasize image outlines. It can be used to make the subject stand out clearly and enhance the fineness of the overall image. The function also influences the image texture, affecting the rendering of coarseness and translucence, for example. Detail is also a very important image setting function when shooting people. This function can change the atmosphere of the person depicted by determining the way face wrinkles and skin tones look. But used inappropriately, the Detail function may lead to a loss of image texture or highly visible image noise. By understanding the principles of detail signal processing as shown below, you should be able to use this function effectively.

Concept of Detail

Detail is a type of signal processing that emphasizes image edges. In the example below, there is a large luminance variation between the lace pattern and the background. In the charts below, whose vertical axes represent luminance, (a) shows the change in luminance levels in the image section inside the red square. The Detail function generates (b) from (a). (b) serves as the basis of the detail signal and combines with (a). The resulting (c) represents (a) with the detail signal applied, emphasizing both the white and black edges in the image.

Because the Detail function emphasizes image outlines and makes the image look sharper, it is sometimes referred to as the Sharpness function.



[6] Picture Profile setting parameters

Setting basic contrast/coloring (Gamma/Color Mode)

The basic contrast and coloring are defined by the combination of [Gamma] (gamma curve) and [Color Mode] (color characteristics) settings.

Gamma

Movie	Standard gamma curve for video
Still	Standard gamma curve for still images
Cine1	Softens the contrast in darker image areas and emphasizes gradation changes in lighter image areas, producing a subdued tone overall (equivalent to HG4609G33)
Cine2	Similar results to [Cine1] but optimized for editing with up to 100% video signal (equivalent to HG4600G30)
Cine3	Stronger contrast between dark and light image areas and greater emphasis on black gradation changes (compared to [Cine1] and [Cine2])
Cine4	Stronger contrast than [Cine3] in darker image areas; compared to [Movie], has less contrast in darker image areas and more contrast in lighter image areas
ITU709	ITU709 gamma curve (low-light gain of 4.5)
ITU709 (800%)	Gamma curve for checking scenes recorded using [S-Log2]

S-Log2 Gamma curve for [S-Log2]. This setting is selected when some grading work will be performed after recording.

Color Mode

Movie	Color tones for [Movie] gamma curve
Still	Color tones for [Still] gamma curve
Cinema	Color tones for [Cine1] gamma curve
Pro	Color tones similar to standard Sony broadcast camera image quality (used in combination with [ITU709] gamma curve)
ITU709 Matrix	ITU709 color tones (used in combination with [ITU709] gamma curve)
Black & White	Sets the saturation to 0 for recording in black and white Setting based on the assumption that some grading work will be performed after recording. Used when [Gamma] is set to [S-Log2].
S-Gamut	<ul style="list-style-type: none">S-Gamut is a color space unique to Sony that provides a wide color space equivalent to film cameras. However, the S-Gamut setting on this camera does not support the whole color space of S-Gamut; it is intended to achieve color reproduction equivalent to S-Gamut.

[7] Picture Profile setting parameters

Adjusting contrast (Black Level/Black Gamma/Knee)

Black Level

This function adjusts the black level of the image.

Parameters	Settings
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Black Level	-15 to +15
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As an image effect, you can emphasize the color black to create an image that gives a powerful impression, or you can weaken black to give the image a soft impression. Shifting

Black Level in the minus direction emphasizes the black color in the image, while changing the level in the plus direction weakens the black color.

If you want to simulate an old film, or capture winter morning fog, the black level value should be increased. If you decrease the value, gradations in dark areas will be smoothed out, making the areas appear in crisp black.

When using multiple fixed cameras to shoot the same subject from different angles, the balance between subject and background often varies. This balance variation may cause the black color in the subject to appear different when cameras are switched. However, this is an optical illusion. If it occurs, you can correct it by adjusting Black Level to make the black color look the same.

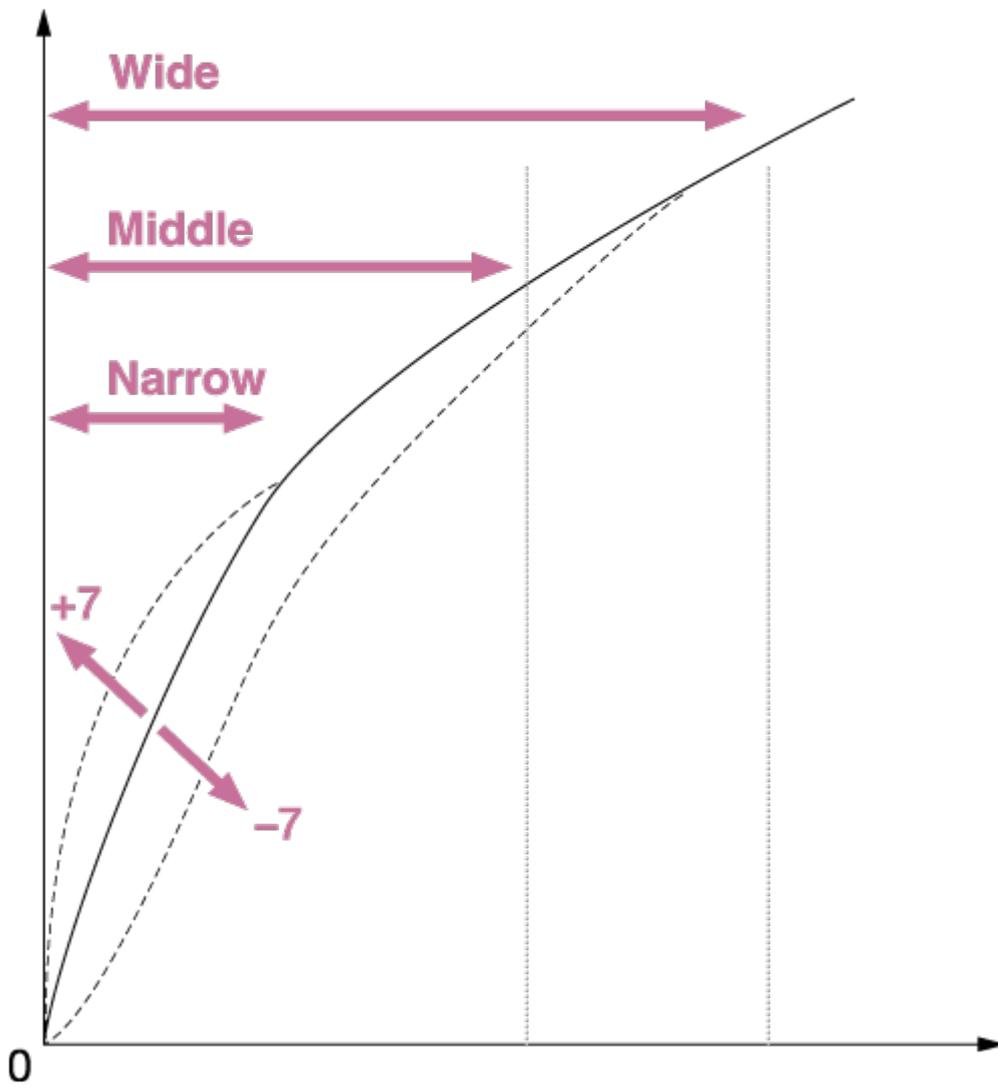
Black Gamma

This function lets you alter the shape of the selected gamma curve and adjust gradations in dark image areas.

Parameters	Settings
Black Gamma > Range	Wide / Middle / Narrow
Black Gamma > Level	-7 to +7

[Range] controls the luminance range that Black Gamma influences. The [Narrow] setting keeps the range close to black, while the [Wide] setting extends the range to gray. [Range] should be set narrower when you want to control the quality of dark areas. If you want to adjust the overall image tone, [Range] should be set wider. At first, it may be a good idea to start from the [Narrow] setting.

Increasing the [Level] value brightens the image, whereas decreasing the value makes the image darker. For example, if you set [Range] to [Narrow] and decrease the [Level] value, you can create an image with dark areas that are similar to the ones seen in films. Unlike Black Level, Black Gamma Level adjusts luminance subtly.



Black Gamma (+7)



Black Gamma (0)



Black Gamma (-7)

Knee

This function sets the knee point and slope for video signal compression to prevent over-exposure by limiting signals in high intensity areas of the subject to the dynamic range of your camera.

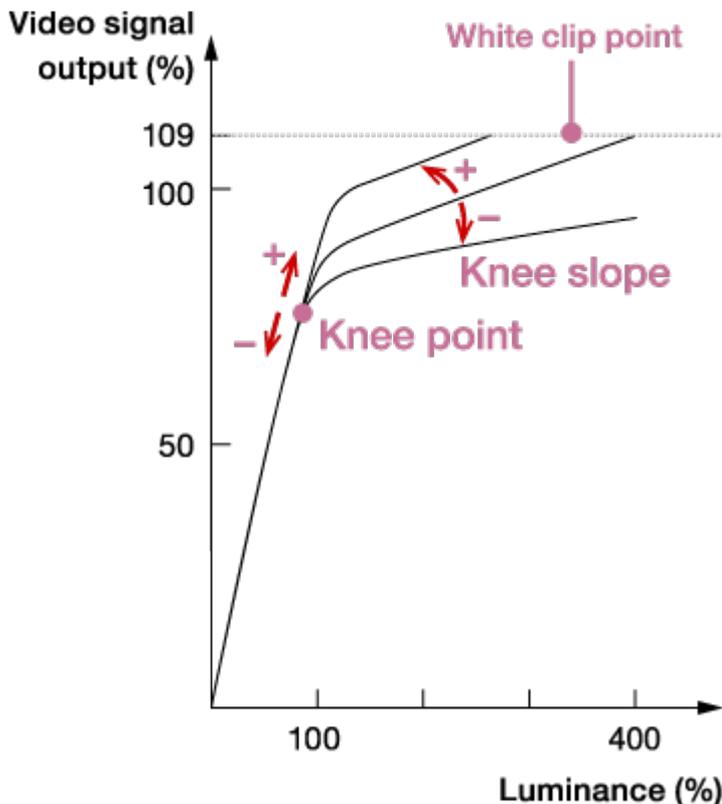
First, select whether to set the knee point and slope automatically or manually in [Mode], and then adjust each setting.

Parameters	Settings
Knee > Mode	Auto / Manual
Knee > Auto Set > Max Point	90% to 100%

Knee > Auto Set > Sensitivity High / Mid / Low

Knee > Manual Set > Point 75% to 105%

Knee > Manual Set > Slope -5 to +5



Mode

Auto:

Automatically adjusts the knee based on what is selected in the following settings (when [Movie] or [ITU709] is selected in [Gamma]).

- [Max Point] determines the maximum knee point level (white level). The knee slope is automatically adjusted according to the Max Point setting. The standard is to keep it at 100%. A lower setting will turn white grayish, while a higher setting will discard gradations in high luminance areas.
- [Sensitivity] changes the luminance level at which the knee's automatic adjustment starts. When set to [Low], the knee's automatic adjustment starts at lower input signal levels than normal. When set to [High], the knee's automatic adjustment starts at higher input signal levels than normal.
- When a parameter other than [Movie] or [ITU709] is selected in [Gamma], the gamma curve will not exceed the White clip point and over-exposure rarely occurs. When [Mode] is set to [Auto] with these settings, the Knee function is disabled. If you want to enable the Knee function, set [Mode] to [Manual].

Manual:

Sticks to settings based on the following selections.

- [Point] sets the position of the knee point output level.
- [Slope] determines the inclination of the knee slope.
A negative slope setting results in a gentler knee slope angle. This expands the dynamic range, but reduces the ability to produce rich gradations. A positive slope setting makes the knee slope inclination steeper. This shrinks the dynamic range, but bolsters the ability to express gradations. When [Slope] is set to +5, the Knee function is disabled.
- Set [Point] and [Slope] in [Manual Set] in combination. If you select a higher setting for [Point] and a gentler setting for [Slope], you can obtain video-like sharp highlight effects. If softer film-like highlight effects are desired, select a lower setting for [Point] and a steeper setting for [Slope]. In practical terms, move [Point] and [Slope] up and down in opposite directions while checking the gradations in high luminance areas until you find the ideal settings.

[8] Picture Profile setting parameters

Adjusting coloring (Saturation/Color Phase/Color Depth)

Saturation

This function adjusts the color saturation.

Parameters	Settings
Saturation	-32 (fainter in color) to +32 (richer in color)

A positive value results in more vivid colors, while a negative value presents faded colors. Saturation must be adjusted in tandem with contrast. Bright and vivid settings produce video-like images, while dark and vivid settings result in film-like images. The combination of bright and light creates pastel tones, whereas dark and light settings create artistic finishes.

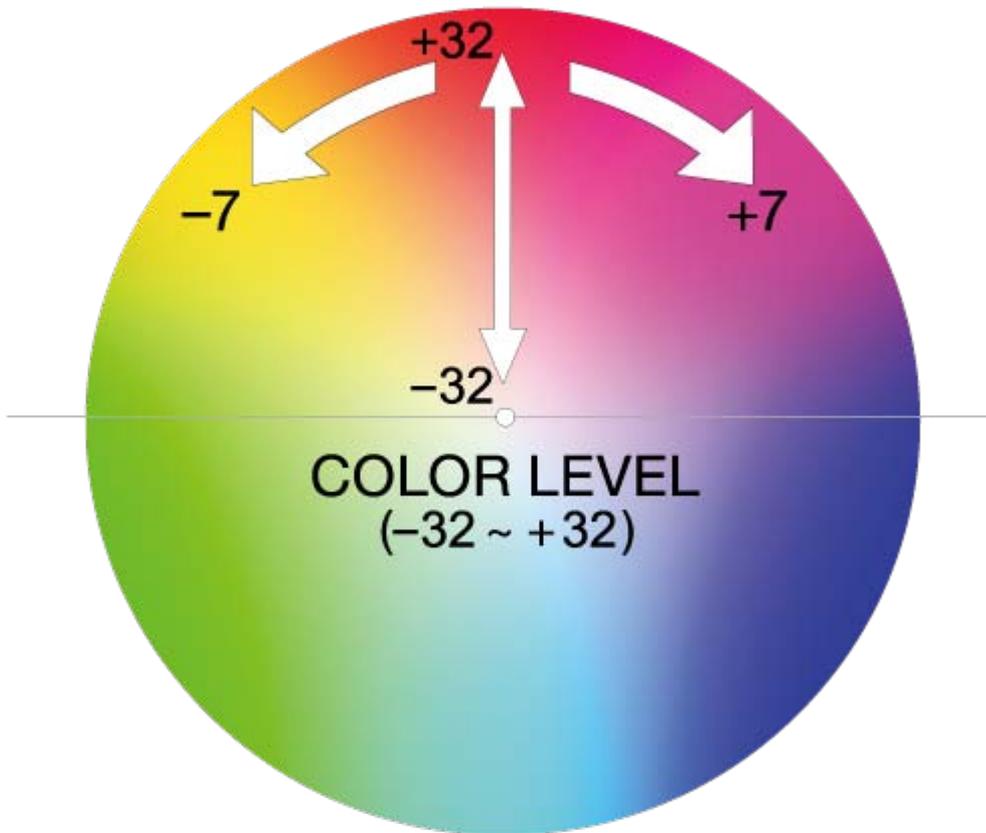
Color Phase

This function adjusts the color hue.

Parameters	Settings
Color Phase	-7 (Greenish) to +7 (Reddish)

As you rotate the color wheel to the left (decreasing the set value) or to the right (increasing the set value), the colors shift along the spectrum from red to yellow, green, cyan, blue, magenta and red. Because this affects all colors, it is difficult to make specific adjustments exactly as intended. Use this function when matching coloring closely between different cameras.

COLOR PHASE (-7 ~ +7)



Color Depth

This function adjusts the luminance for each color phase. The luminance changes more drastically when the selected color is richer (higher saturation). It does not change much at all when the color is achromatic.

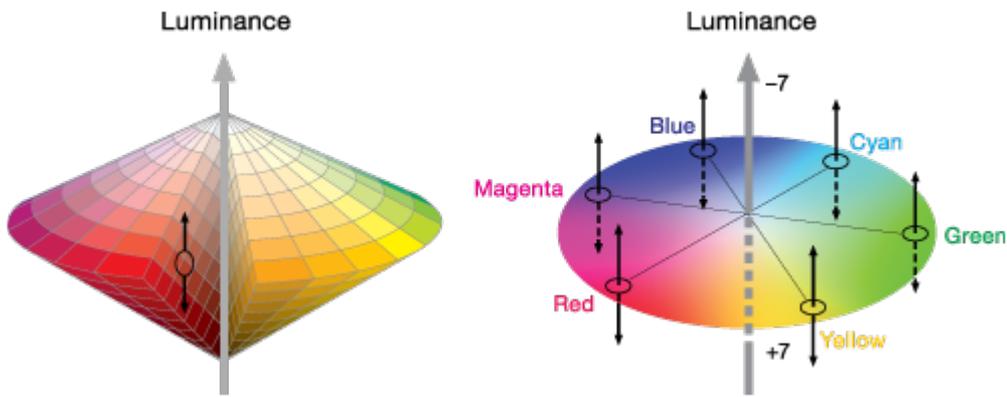
Parameters	Settings
Color Depth > R	-7 to +7
Color Depth > G	-7 to +7
Color Depth > B	-7 to +7
Color Depth > C	-7 to +7
Color Depth > M	-7 to +7
Color Depth > Y	-7 to +7

A higher set value lowers luminance while deepening the color. A lower set value increases luminance, making the color look paler.

This setting doesn't only enhance the apparent vividness of colors, but also can express deep, dark colors.

Because each of the 6 colors — R (Red), G (Green), B (Blue), C (Cyan), M (Magenta), Y

(Yellow) — can be adjusted individually, you can apply this function to just the colors you want to emphasize.



R+



± 0



R-

[9] Picture Profile setting parameters

Emphasizing image edges (Detail)

This function adjusts how much detail is applied to the subject's image edges.

Because settings other than [Level] are quite complex, we recommend you start by adjusting only the [Level] setting first.

Parameters	Settings
Detail > Level	-7 (Weak) to +7 (Strong)
Detail > Adjust > Mode	Auto / Manual
Detail > Adjust > V/H Balance	-2 (Stronger Vertical (V) detail) to +2 (Stronger Horizontal (H) detail)
Detail > Adjust > B/W Balance	Type1 (Higher proportion of black detail) to Type5 (Higher proportion of white detail)
Detail > Adjust > Limit	0 (Strongly restricted) to 7 (No restriction)
Detail > Adjust > Crispening	0 (No restriction) to 7 (Strongly restricted)

Detail > Adjust > Hi-
Light Detail

0 (Smaller detail amount) to 4 (Larger detail amount)

Level

This function determines the strength of detail image processing to be applied.

- If you apply too much detail, the subject's original atmosphere may be undermined, as its translucence may be lost or it may be given an unnatural luster. Excessive detail when shooting shiny leaves, for instance, may result in the leaves looking as if they are made of plastic. It is also advisable to apply detail only modestly when shooting paintings.
- Because Detail makes image edges wider, the original texture of a subject consisting of very fine lines may be lost if too much detail processing is applied. (Example: thin lace curtains)
- Also, be aware that Detail may fatten up the edges of noise particles that appear under a high gain setting, and may make such particles highly noticeable. In such cases, you can adjust the amount of detail processing on the noise particles by using the [Crispening] function.
- The image edges become more visible when viewed on large screens. It may be advisable to ease off on Detail if you plan to view the image on large TVs or screens.



Detail: –



Detail: +

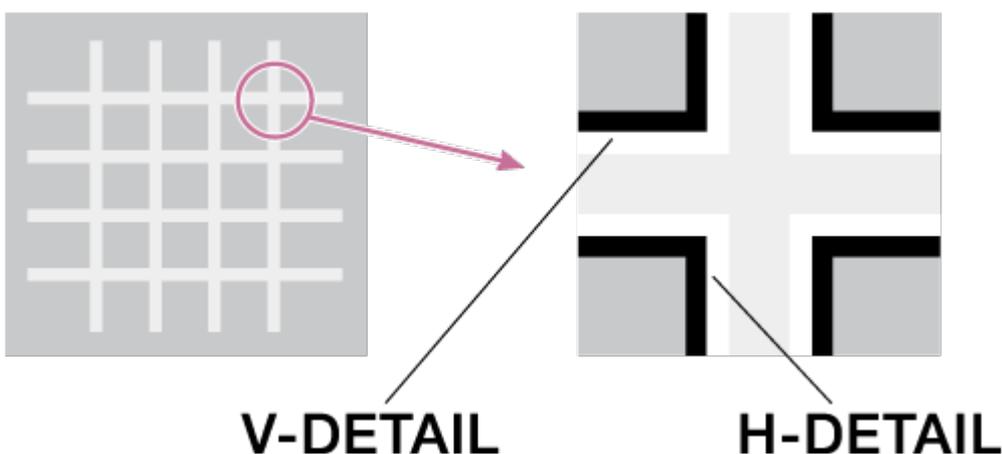
Mode

If you want to make finer adjustments to detail, set [Mode] in [Adjust] to [Manual] and adjust the following settings.

V/H Balance

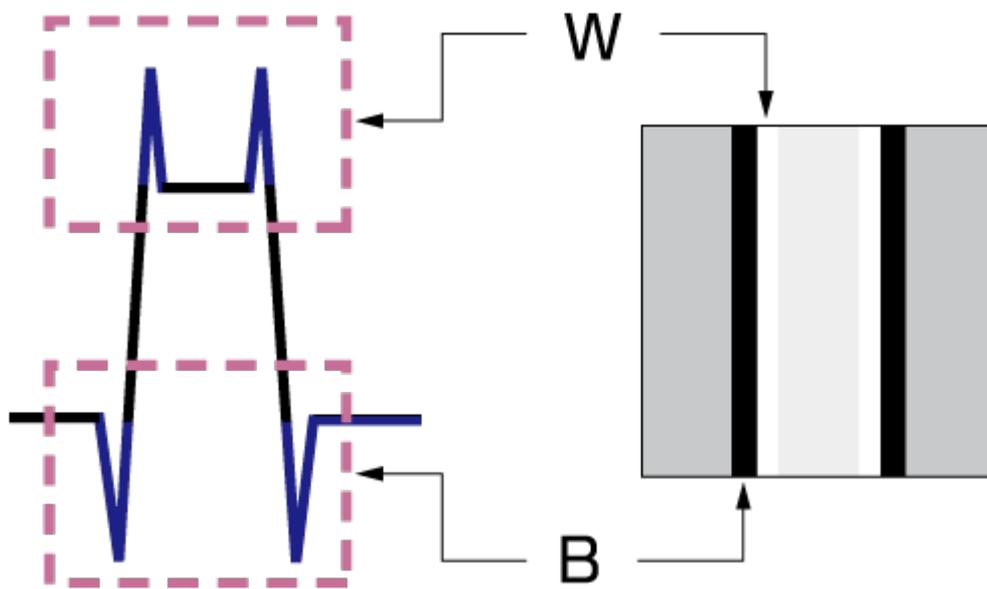
This function regulates the balance between Vertical (V) detail and Horizontal (H) detail. Vertical (V) detail boosts image edges by expanding them upward and downward. Horizontal (H) detail emphasizes image outlines by thickening them to the left and right.

- The results of detail processing may appear differently depending on the TV, computer display or other type of display monitor. Adjust [V/H Balance] as needed.
- To emphasize the impression of a subject that has many horizontal elements, such as a human face (with eyes and mouth), you can increase the proportion of Vertical (V) detail by lowering the setting (selecting a lower set value).



B/W Balance

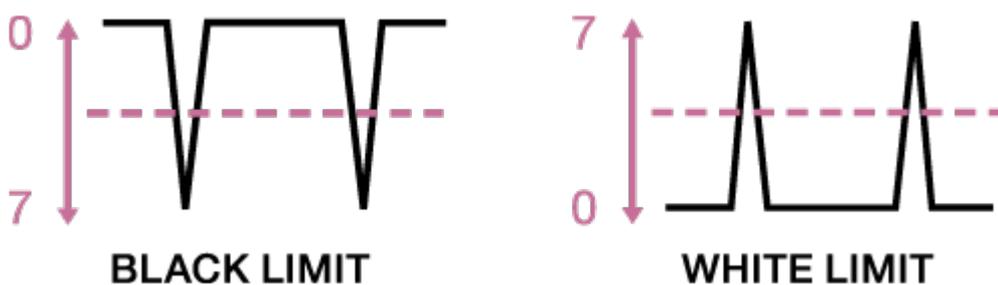
This function changes the balance between the amount of black detail for low-luminance areas and the amount of white detail for high-luminance areas.



Limit

This function restricts the amount of black detail for low-luminance areas and white detail for high-luminance areas by setting a maximum value. The maximum value cannot be set independently for black detail and white detail.

- [B/W Balance] and [Limit] adjust the amount of black detail and white detail added to image edges.
- Black detail adds the impressions of “power,” “hardness,” and “presence” to the subject. But it may bring undesirable effects because it emphasizes wrinkles and pores.
- White detail gives the subject a “clean” and “glossy” impression. You can increase the proportion of white detail and reduce that of black detail when shooting jewelry and glass objects to heighten their clarity and translucence.



Crispensing

This function reduces detail that accompanies visual noise to prevent noise from being emphasized.

You can use this function when you want to apply detail processing to the subject while keeping noise as unnoticeable as possible.

Hi-Light Detail

This function adjusts the detail level for bright subjects.

You can use this to emphasize the edges of a bright subject in front of a high-luminance

background.