



Broadcast Products

Technical Bulletin HDCM18-078-TB

DATE: November 18, 2019

SUBJECT: Live Tone Control Function

MODEL: BPU4000
BPU4500
BPU4500A
HDC-P43
HDC-P43
HDC4300
HDC4300
HZC-CSM10
HZC-CSM10
MSU-1000
MSU-1500
RCP-1500
RCP-1501
RCP-1530

SERIAL NO: ALL

Italicized information in green applies to customers outside the United States.

DESCRIPTION

The Live Tone Control function is used to adjust the image quality in real time.

Specifically, the function adjusts the tone of the entire area (Base Tone) and local areas with low and medium luminance (Low Tone and Mid Tone). The adjustments can be performed simultaneously in a superimposed manner.

Base Tone Adjustment

In the Base Tone adjustment, luminance of the entire area can be increased or decreased so that its influence becomes greater as luminance increases.

Low and Mid Tone Adjustments

In Low and Mid Tone adjustments, luminance can be increased or decreased by smoothing the peaks or valleys of low and medium luminance areas.

In Figure 1, Live Tone Control is applied during production to both HDR and SDR outputs simultaneously. Therefore, when an HDR signal is converted to SDR at a later stage, an image equivalent to that of SDR output can be obtained from the camera and BPU.

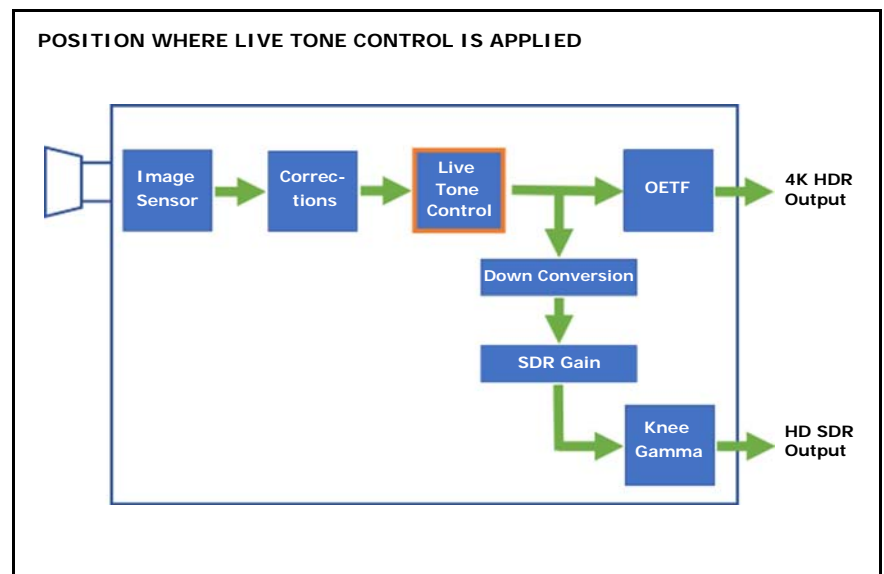


Figure 1. Live Tone Control

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Luminance Level Settings

The following four luminance levels can be set independently for Base, Low, and Mid Tones:

- Red (R Level)
- Green (G Level)
- Blue (B Level)
- Master (Master Level)

The settings for R, G, and B Levels are applied when adjusting the R-ch, G-ch, and B-ch tones received by the sensor. The setting for Master Level is added to the settings for R, G, and B Levels.

Other Settings

- Base Tone: Degree of curvature (Curve)
- Low Tone: Range to be adjusted (Width)
- Mid Tone: Range to be adjusted (Width)
Median value (Center)

Description of Settings

Table 1 describes each Live Tone Control setting.

NOTE: The settings for Base, Low, and Mid Tones in the RCP and MSU menus are equivalent to the Master settings for Base, Low, and Mid Tones respectively.

Table 1. Live Tone Control Settings

Setting	Description
Live Tone Control ON/OFF	Turns Live Tone Control function ON/OFF.
Base Tone ON/OFF	Turns adjustment of entire area ON/OFF.
Low Tone ON/OFF	Turns adjustment of low luminance area ON/OFF.
Mid Tone ON/OFF	Turns adjustment of middle luminance area ON/OFF.
R, G, and B Levels of each Tone: -99 to 99	Sets R,G,B luminance level for each Tone. 0 equals no adjustment; positive value increases luminance; negative value decreases luminance.
Master Level of each Tone: -99 to 99 (Same as Base/Low/Mid Tones in the Live Tone Control 1 menu)	Sets master luminance level of each Tone. 0 equals no adjustment (linear); positive value increases luminance; negative value decreases luminance.
Low Width: -99 to 99	Sets adjustment range of low luminance area. Positive value increases the range; negative value decreases the range.
Mid Center: -99 to 99	Sets median value for the adjustment range of medium luminance area. Positive value increases median; negative value decreases median.
Mid Width: -99 to 99	Sets adjustment range of medium luminance area. Positive value increases the range; negative value decreases the range.
Base Curve: -99 to 99	Sets curvature of curves over the entire area. Positive value steepens the curve; negative value flattens the curve.

Effective Tone Range (See Figure 2.)

The range where each Tone becomes effective is (approximately):

Base Tone	0 to 1300%
Low Tone	0 to 50%
Mid Tone	0 to 400%

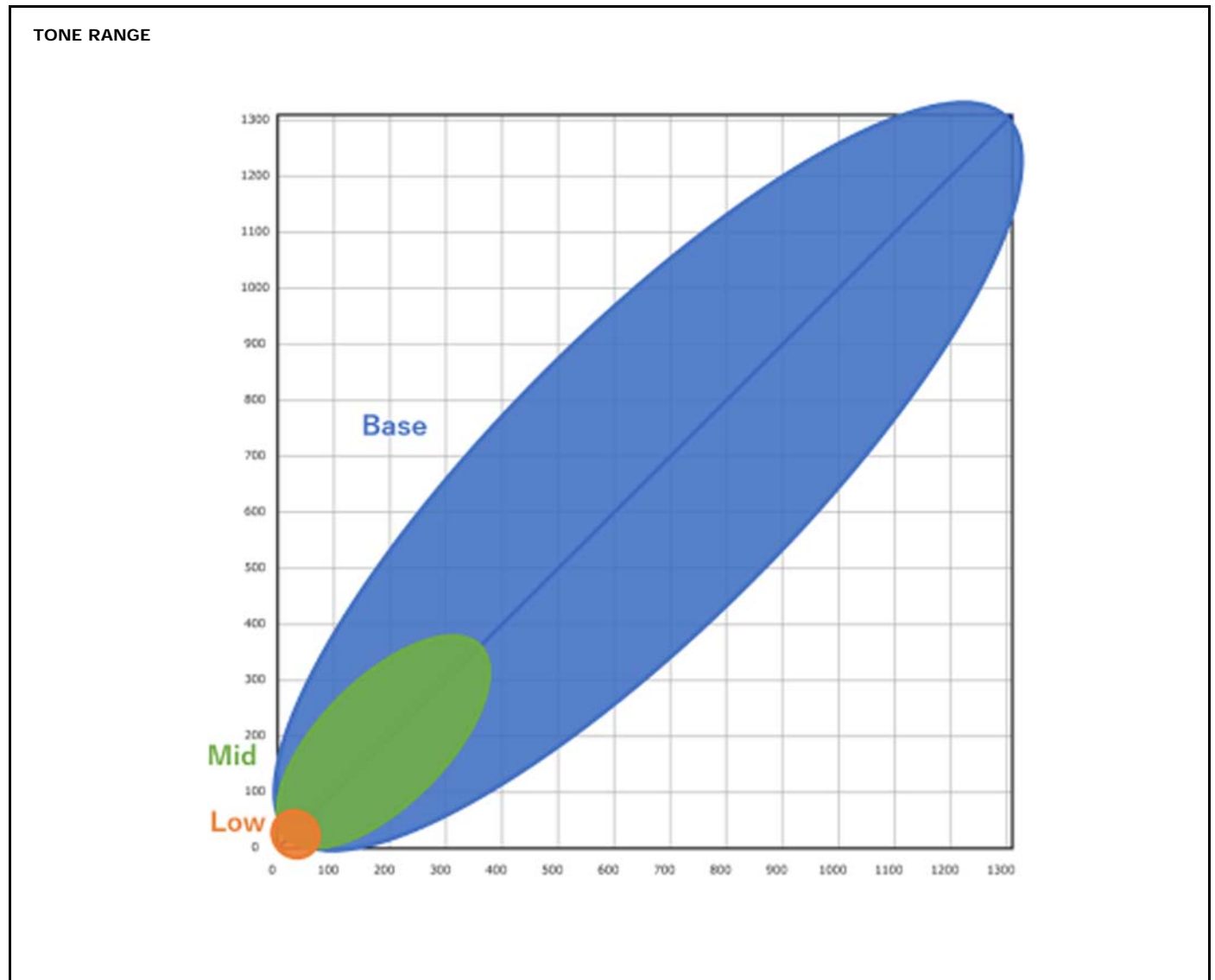


Figure 2. Tone Range

Relationship Between Each Setting and Tone Curve

The approximate relationship between each setting and the Tone curve is as shown in Figure 3. Note that the axis scale differs for Base, Low, and Mid Tones from those described above:

Base Tone	0 to 1300%
Low Tone	0 to 100%
Mid Tone	0 to 350%

NOTE: For convenience, Master, R, G, and B Levels are collectively referred to as Level hereafter.

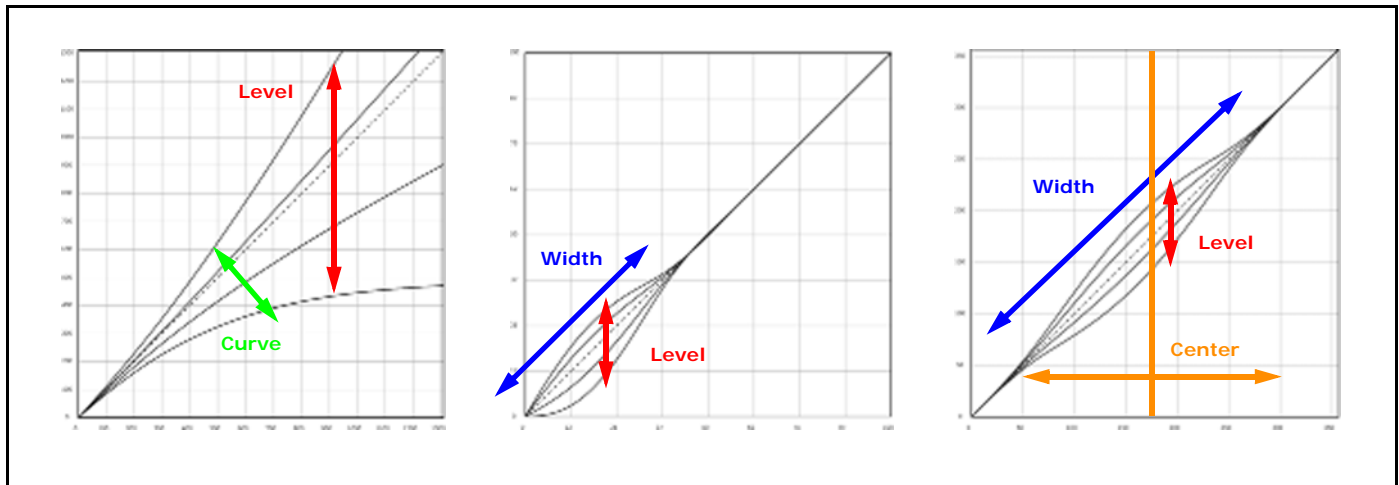


Figure 3. Relationship Between Each Setting and Tone Curve

Relationship Between Base Curve and Tone Curve

The relationship between the Base Curve setting and Tone curve is as shown in Figure 4.

Red line	Level is the maximum (99)
Green line	Level is -50
Blue line	Level is the minimum (-99)

NOTE: The axes of all graphs in Figure 4 are 0 to 1300%.

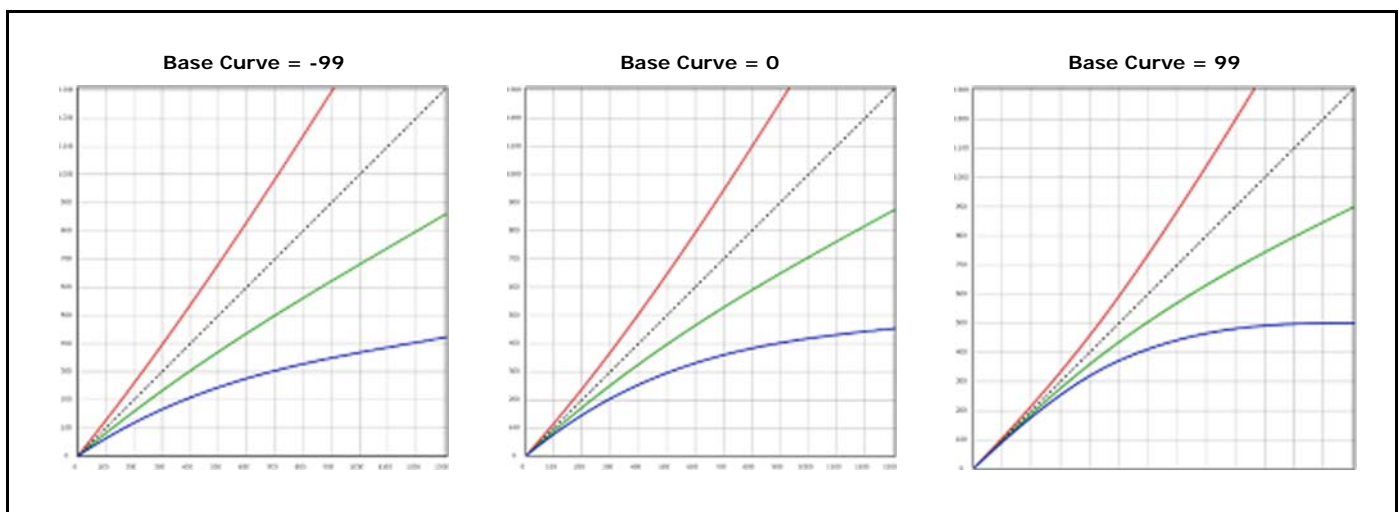


Figure 4. Relationship Between Base Curve and Tone Curve

Relationship Between Low Width Settings and Tone Curve

The relationship between the Low Width setting and Tone curve is as shown in Figure 5.

- Red line Level is the maximum (99)
- Blue line Level is the minimum (-99)

NOTE: The axes of all graphs in Figure 5 are 0 to 50%.

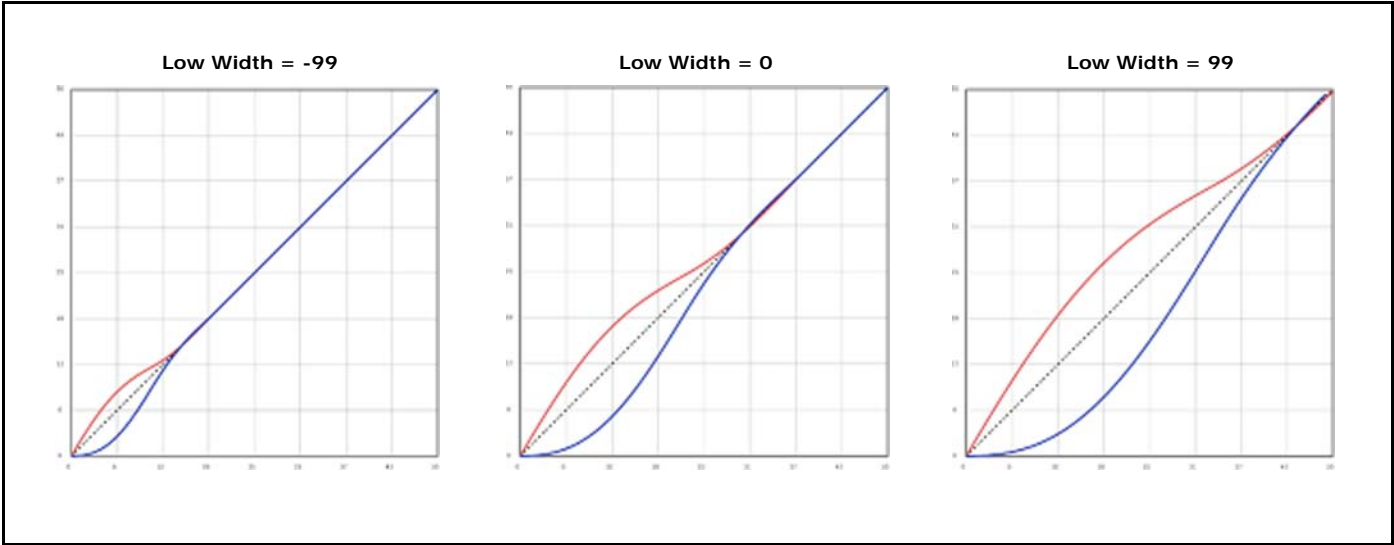


Figure 5. Relationship Between Low Width Setting and Tone Curve

Low Width Settings and Range of Luminance

The range of luminance that can be adjusted for Low Width settings are shown in Table 2.

Table 2. Low Width Settings and Range of Luminance

Low Width Setting	Range of Luminance Adjusted
-99	0 to 15%
0	0 to 30%
99	0 to 45%

Relationship Between Mid Center/Mid Width Settings and Tone Curve

The relationship between the Mid Center/Mid Width settings and Tone curve is as shown in Figure 6.

Red line Level is the maximum (99)

Blue line Level is the minimum (-99)

NOTE: The axes of all graphs in Figure 6 are 0 to 400%.

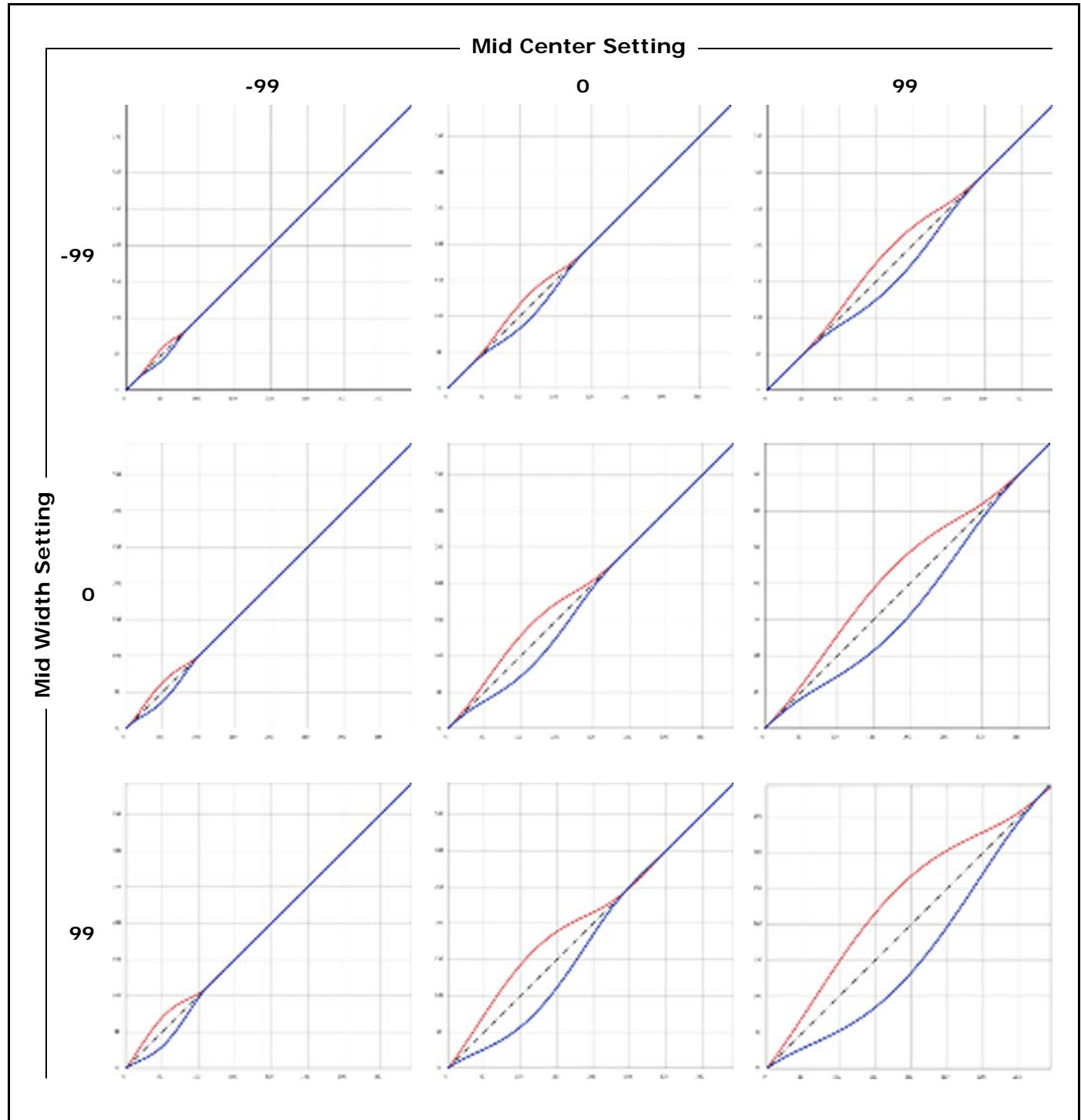


Figure 6. Relationship Between Mid Center/Mid Width Settings and Tone Curve

Mid Center/Mid Width Settings and Range of Luminance

The range of luminance that can be adjusted for Mid Center and Mid Width settings are shown in Table 3.

Table 3. Mid Center/Mid Width Settings and Range of Luminance

Setting	Range of Luminance		
	Mid Center = -99	Mid Center = 0	Mid Center = 99
Mid Width = -99	15 to 85%	30 to 190%	45 to 295%
Mid Width = 0	0 to 105%	0 to 230%	0 to 360%
Mid Width = 99	0 to 110%	0 to 240%	0 to 375%