Leica L-Log

Reference Manual V2.0

November, 2026

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1 Document Version History

Version	Date	Change(s)
1.0	January 11, 2021	■ Initial revision
1.1	May 5, 2022	■ 12 bit and RAW video info added ■ Clipping values added ■ General improvements
1.2	October 28, 2022	■ Info on L-Log exposure added
1.3	February 8, 2023	■ Hint regarding levels interpretation added
1.4	September 14, 2023	■ Q3 data added ■ Explanation on higher ISO value in L-Log added
1.5	February 2, 2024	■ SL3 data added
1.6	October 7, 2024	■ SL3-S data added ■ List of compatible RAW recorders updated
1.7	March 18, 2025	■ Section on supported cameras and native ISO values added ■ Fixed error in color space coordinate visualization in Figure 5
1.8	November 10, 2025	■ Q3 Monochrom data added
1.9	June 25, 2026	■ SL3-P data added
2.0	November 11, 2026	■ Updated document structure to improve maintenance efficiency ■ Some SL (Typ 601) references removed for simplification ■ Sigma cameras added

2 Purpose

This reference manual is meant as a technical guideline for dealing with 10 bit and 12 bit L-Log footage. The first 'L' in L-Log stands for Leica, although other manufacturers use our log format as well.
While the main reason to record in log is to maximize dynamic range and latitude in post production, it can be important for certain applications to be able to match footage from different sources in a defined manner. Requirements for this matching operation are the definition of the log curve and the color space used for recording, both of which are provided in this document. Additionally, specific camera implementations and technical guidelines for recording and processing L-Log footage is addressed.

3 Structure

The L-Log Reference Manual is divided into three major parts:

- **L-Log Specification** defines the L-Log transfer function, colorimetry and signal characteristics.
- **Camera Implementations** describes how L-Log is implemented in different camera families.
- **Workflow** provides recommendations for recording, exposure and post production.

4 L-Log Specification

The L-Log gamma curve is plotted in Figure 1. Linear scene reflection (LSR) values are mapped to L-Log values following the calculation specification described in subsection 4.1.

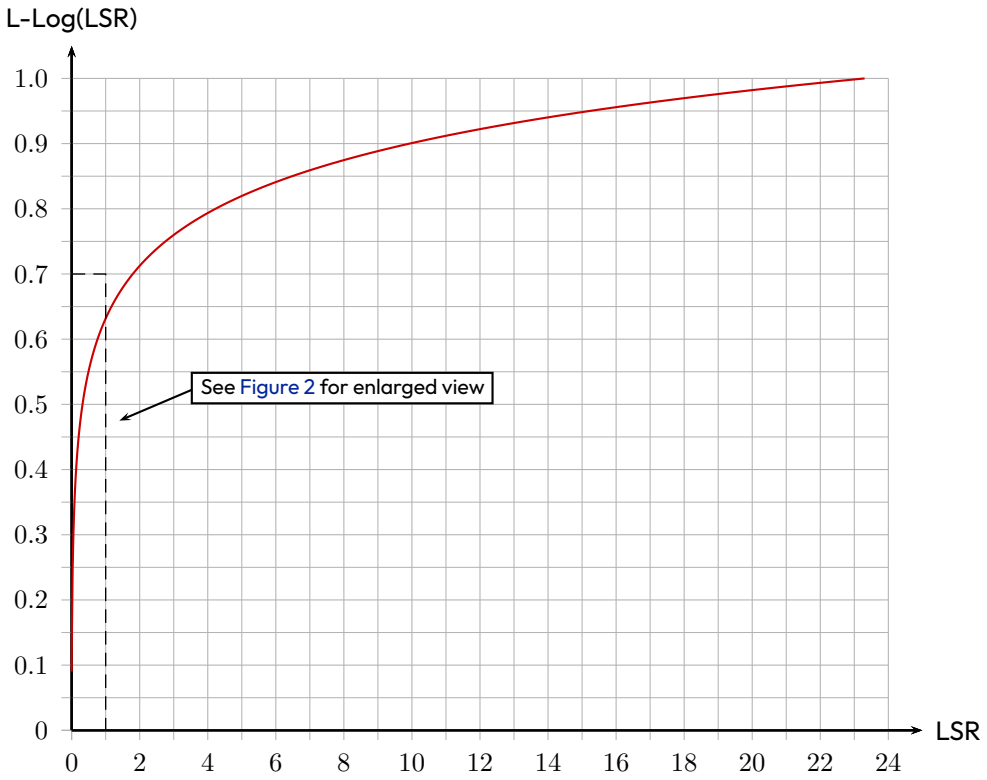


Figure 1: Extended L-Log curve showing when L-Log(LSR) value approaches 1.0.

Figure 2 shows the L-Log gamma curve plotted until it reaches an LSR value of one.

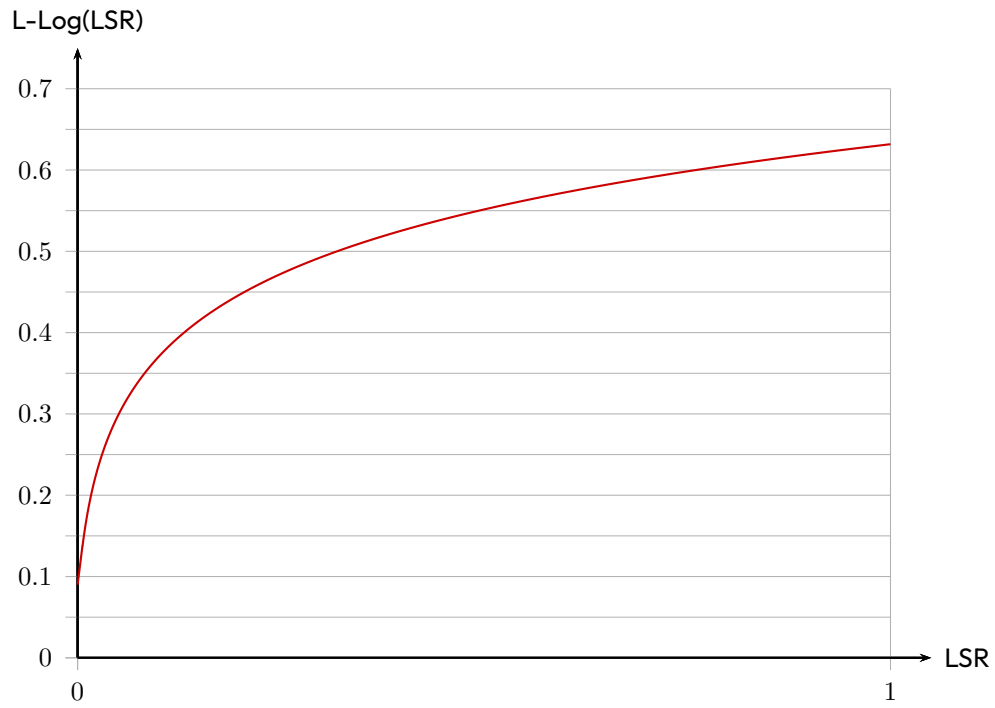


Figure 2: L-Log curve plotted until an LSR value of one is reached.

4.1 LSR-to-L-Log Conversion

For LSR-to-L-Log conversion the following calculation specification is given.

$$\text{L-Log(LSR)} = \begin{cases} a \cdot \text{LSR} + b & \text{for LSR} \leq 0.006 \\ c \cdot \log\left(d \cdot \text{LSR} + e\right) + f & \text{else} \end{cases} \tag{1}$$

where

$$a = 8$$
$$b = 0.09$$
$$c = 0.27$$
$$d = 1.3$$
$$e = 0.0115$$
$$f = 0.6$$

4.2 L-Log-to-LSR Conversion

For L-Log-to-LSR conversion the following calculation specification is given.

$$\text{LSR} = \begin{cases} \frac{\text{L-Log(LSR)} - b}{a} & \text{for L-Log(LSR)} \leq 0.1380 \\ \frac{10^{\left(\frac{\text{L-Log(LSR)} - f}{c}\right)} - e}{d} & \text{else} \end{cases} \tag{2}$$

where

$$a = 8$$
$$b = 0.09$$
$$c = 0.27$$
$$d = 1.3$$
$$e = 0.0115$$
$$f = 0.6$$

4.3 Mapping of LSR to IRE, DV and EV

Typical LSR values and their equivalent in IRE[1], 10 bit and 12 bit digital values (DV) as well as exposure values (EV) are given in Table 1 along with a practical meaning of each entry in the table. Figure 3 and Figure 4 show plots of the relationship between digital and exposure values.

LSR		IRE	L-Log DV		EV	Practical Meaning
			10 bit	12 bit		
0.00	0%	3%	92	369	-8.0	Black Level
0.02	2%	18%	220	880	-3.1	2% Black
0.18	18%	44%	445	1782	0.0	Middle Gray
0.90	90%	65%	634	2537	2.3	90% White
23.30	2330%	109%	1023	4095	7.0	L-Log White Limit

Table 1: Typical LSR values and their equivalents in IRE, L-Log digital values and exposure values.

[1] See https://en.wikipedia.org/wiki/IRE_(unit)

L-Log is defined to offer a maximum dynamic range of 15 stops (as illustrated in Figure 3 and Figure 4). The maximum dynamic range each camera model makes use of is reflected in different white clipping limits. For reference, these values are listed in section 5 for each camera capable of recording L-Log footage.

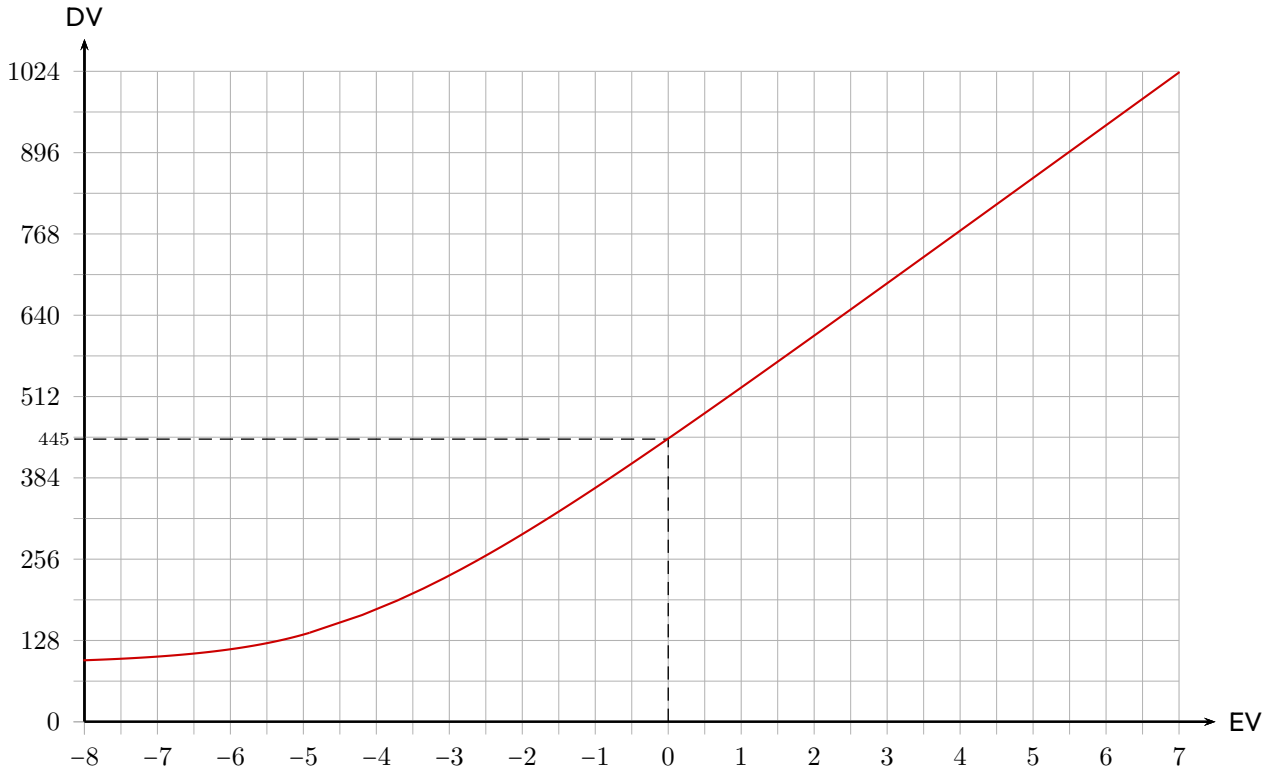


Figure 3: Relationship between linear scene reflection in exposure values and corresponding 10 bit digital values of the L-Log curve. The value of 0 EV corresponds to 18% linear scene reflection.

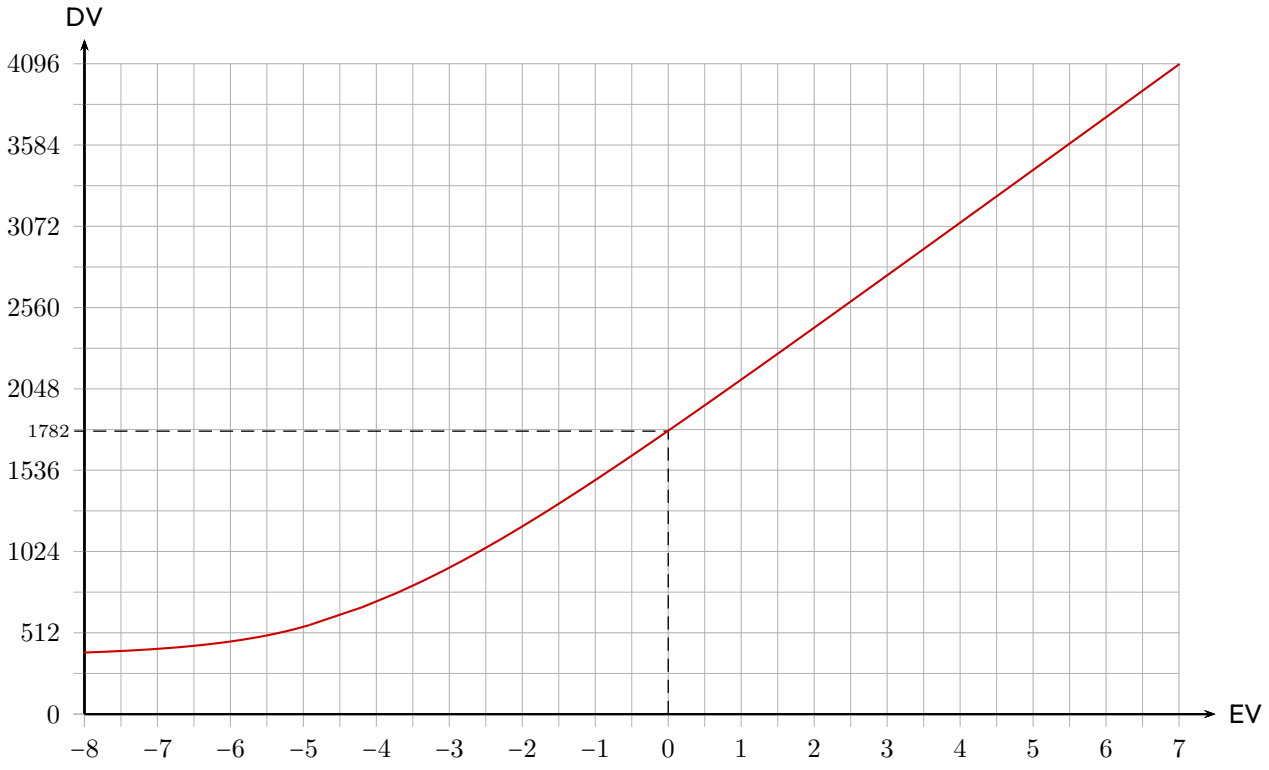


Figure 4: Relationship between linear scene reflection in exposure values and corresponding 12 bit digital values of the L-Log curve. The value of 0 EV corresponds to 18% linear scene reflection.

4.4 Colorimetric Characteristics

The latest Leica cameras capable of L-Log recording use the ITU-R BT.2020 color space, while the SL (Typ 601) uses the ITU-R BT.709 color space. The properties of ITU-R BT.2020 is shown in Table 2.
Figure 5 shows a comparison of common color spaces on a CIE 1931 xy chromaticity diagram.

Color Space	White Point		Primary Colors					
	x_W	y_W	x_R	y_R	x_G	y_G	x_B	y_B
ITU-R BT.2020	0.3127	0.3290	0.708	0.292	0.170	0.797	0.131	0.046

Table 2: L-Log color space properties.

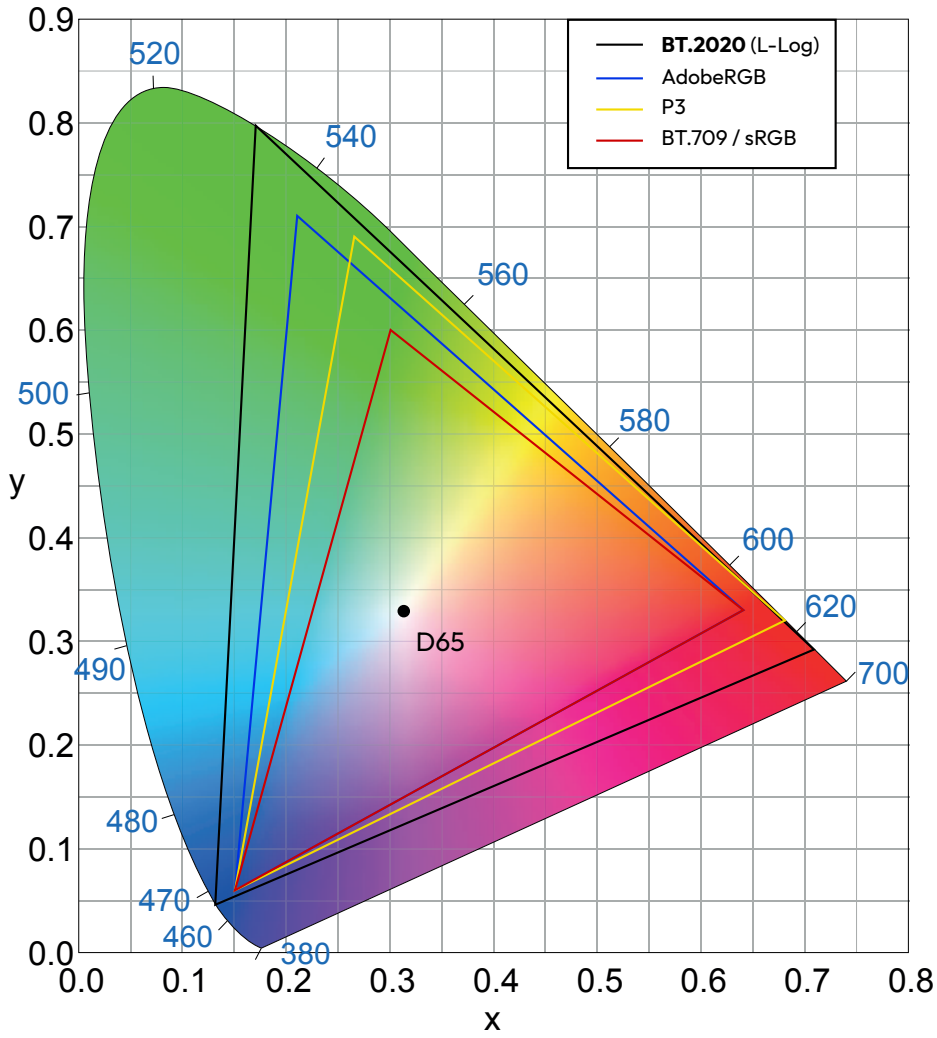


Figure 5: Comparison of color spaces.

4.5 Colorimetric Conversions

Converting from BT.2020 to XYZ color space is defined as:

$$\text{BT.2020 to XYZ} = \begin{bmatrix} 0.6370 & 0.1446 & 0.1689 \\ 0.2627 & 0.6780 & 0.0593 \\ 0.0000 & 0.0281 & 1.0610 \end{bmatrix}$$

The reverse conversion is defined as follows:

$$\text{XYZ to BT.2020} = \begin{bmatrix} 1.7167 & -0.3557 & -0.2534 \\ -0.6667 & 1.6165 & 0.0158 \\ 0.0176 & -0.0428 & 0.9421 \end{bmatrix}$$

Additional colorimetric conversions (e.g. between BT.2020 and BT.709) can be found in relevant literature.

5 Camera Implementations

The following sections cover the implementation of L-Log for supported cameras.

5.1 Capability Overview

The following table shows an overview of the capabilities of all cameras that support L-Log.

Make	Model	Variant / Setting	Native L-Log ISO		RAW Recording	
			Lower	Upper	Internal	External
Leica	SL3-P	DR Boost On	400	1600	✗	✓
		DR Boost Off	200	800		
	SL3-S		400	2500	✗	✓
	SL3		200	640	✗	✗
	SL2-S		400	1600	✗	✓
	SL2		400	1600	✗	✗
	Q3	28, 43	200	640	✗	✗
		Monochrom	800	2500		
Sigma	BF		1250	8000	✗	✗
	FP2	–	1250	10000	✓	✓
		Extended Low ISO 640				
		Extended Low ISO 320				

Table 3: Capability Overview.

The following subsections cover camera families and manufacturers, each with their own page to show information regarding the specific implementation of L-Log in these cameras.
Each page gives an overview of the supported cameras and their native ISO values as well as LSR, IRE, white clipping and exposure values that correspond to the information given in Table 1. Lastly, each page details RAW recording capabilities of the respective camera models.

5.2 Leica SL3 Series

The Leica SL3 series comprises the following camera models with their respective native L-Log ISO values:

Camera	Setting	Native L-Log ISO Values
SL3		200, 640
SL3-S		400, 2500
SL3-P	DR-Boost On	400, 1600
	DR-Boost Off	200, 800

All SL3 series cameras implement the standard L-Log transfer function described in Section 4.1 and record using the ITU-R BT.2020 color space.

5.2.1 LSR, IRE, Clipping and Exposure Values

The LSR, IRE, white clipping and exposure values for the L-Log format are given in Table 1, while the specific **white clipping** values for the SL3 series are listed below.

Camera	Setting	LSR		IRE		L-Log Digital Value		Exposure
				h.264, h.265	ProRes	10 bit	12 bit	Value
SL3		4.07	407%	86%	–	814	–	4.5
SL3-P	DR Boost Off				78%		3258	
	DR Boost ON	8.15	815%	95%	88%	897	3590	5.5
SL3-S								

5.2.2 RAW Recording

The SL3-S and SL3-P support external 12 bit RAW video recording via HDMI. Supported output formats are detailed below.

Camera	Resolution	Frame Rate [fps]	Sensor Format	
			35mm (LF)	APS-C (S35)
SL3-P	8K OG (8128×5418)	23.976	✓	✗
	C8K (8128×4302)	23.976, 25, 29.97	✓	✗
	7.2K 3:2 (7232×4820)	25, 29.97	✓	✗
	4.8K 4:3 (4752×3568)	23.976, 25, 29.97, 50, 59.94	✗	✓
SL3-S	6K (5888×3312)	23.976, 25, 29.97	✓	✗
	C4K (4128×2176)	23.976, 25, 29.97, 50, 59.94	✗	✓
	3.5K 4:3 (3536×2656)	23.976, 25, 29.97, 50	✗	✓

5.3 Leica Q3 Series

The Leica Q3 series comprises the following camera models with their respective native L-Log ISO values:

Camera	Native L-Log ISO Values
Q3	200, 640
Q3 43	
Q3 Monochrom	800, 2500

All Q3 series cameras implement the standard L-Log transfer function described in Section 4.1 and record using the ITU-R BT.2020 color space.

5.3.1 LSR, IRE, Clipping and Exposure Values

The LSR, IRE, white clipping and exposure values for the L-Log format are given in Table 1, while the specific **white clipping** values for the Q3 series are listed below.

Camera	LSR		IRE	L-Log Digital Value 10 bit	Exposure Value
Q3	4.07	407%	86%	814	4.5
Q3 43					
Q3 Monochrom					

5.3.2 RAW Recording

RAW video recording is not supported on Q3 series camera models.

5.4 Leica SL2 Series

The Leica SL2 series comprises the following camera models with their respective native L-Log ISO values:

Camera	Native L-Log ISO Value
SL2	400, 1600
SL2-S	

Both cameras implement the standard L-Log transfer function described in Section 4.1 and record using the ITU-R BT.2020 color space.

5.4.1 LSR, IRE, Clipping and Exposure Values

The LSR, IRE, white clipping and exposure values for the L-Log format are given in Table 1, while the specific values for the SL2 series are listed below.

Camera	LSR		IRE	L-Log Digital Value		Exposure Value	Practical Meaning
				10 bit	12 bit		
SL2	8.15	815%	95%	897	–	5.5	White Clipping
SL2-S					3590		

5.4.2 RAW Recording

The SL2-S supports external 12 bit RAW video recording via HDMI. Supported output formats are detailed below.

Camera	Resolution	Frame Rate [fps]	Sensor Format	
			35mm (LF)	APS-C (S35)
SL2-S	C4K (4128×2176)	23.976, 25, 29.97, 50, 59.94	✗	✓

5.5 Sigma Cameras

The following Sigma camera models support L-Log and are given with their respective native L-Log ISO values:

Camera	Native L-Log ISO Value
BF	1250, 8000
FP2	1250, 10000

Both cameras implement the standard L-Log transfer function described in Section 4.1 and record using the ITU-R BT.2020 color space.

5.5.1 LSR, IRE, Clipping and Exposure Values

The LSR, IRE, white clipping and exposure values for the L-Log format are given in Table 1, while the specific **white clipping** values for the BF are listed below.

Camera	Setting	LSR		IRE	L-Log Digital Value		Exposure
					10 bit	12 bit	Value
BF		23.30	2330%	109%	1023	–	7.0
FP2	–	23.30	2330%	109%	1023	4095	7.0
	Extended Low ISO 640	11.56	1156%	100%	939	3756	6.0
	Extended Low ISO 320	5.74	574%	90%	855	3420	5.0

5.5.2 RAW Recording

The Sigma FP2 supports internal RAW video recording. Supported output formats are detailed below.

Camera	Resolution (Manufacturer Name)	Frame Rate [fps]	Sensor Format	
			35mm (LF)	APS-C (S35)
FP2	6K 3:2 (6016×4012)	23.98, 24, 25, 29.97	✓	✗
	6K 16:9 (6016×3384)	23.98, 24, 25, 29.97	✓	✗
	6K 17:9 (6016×3172)	23.98, 24, 25, 29.97	✓	✗
	6K 4:3 (5348×4012)	23.98, 24, 25, 29.97	✓	✗
	4K 3:2 (3840×2560)	23.98, 24, 25, 29.97, 47.95, 48, 50, 59.94	✓	✓
	4K 16:9 (3840×2160)	23.98, 24, 25, 29.97, 47.95, 48, 50, 59.94	✓	✓
	4K 17:9 (4096×2160)	23.98, 24, 25, 29.97, 47.95, 48, 50, 59.94	✓	✓
	4K 4:3 (3408×2560)	23.98, 24, 25, 29.97, 47.95, 48, 50, 59.94	✓	✓
	2K 16:9 (1920×1080)	23.98, 24, 25, 29.97, 47.95, 48, 50, 59.94, 100, 119.88	✓	✓

For external RAW video recording via HDMI, please refer to the Sigma support website.

6 Workflow

The following pages describe how to work with L-Log footage, covering the topics of recording externally, exposing correctly and providing some notes on editing and ISO values.

6.1 Recording L-Log Externally

In order to record an L-Log signal via HDMI the camera must be set to output L-Log, which is ensured by selecting the appropriate gamma setting (as described in the camera's user manual). The recorder can be set to display the signal "as is", showing the "flat" appearance of the log footage. Or it can be set to apply a viewing LUT to give the camera operator a better idea of the final result (i.e. in ITU-R BT.709 color space and gamma). Suitable LUTs for this purpose can be uploaded to the recorder.
It should be noted that LUTs can also be "baked in", effectively recording the footage in the final look that the LUT provides. In most cases this should be avoided, because it limits the advantages of recording log footage and therefore represents a rather impractical workflow.

RAW Video: an externally connected video recorder must be set to accept a RAW video input via HDMI. Currently, the following recorders are supported:

Manufacturer	Model	Codec
Atomos	Ninja	Apple ProRes RAW Apple ProRes RAW HQ
	Ninja TX	
	Ninja V	
	Ninja V+	
	Ninja Ultra	
	Shogun Ultra	
	Shogun Connect	
Blackmagic Design	Video Assist 12G HDR	Blackmagic RAW (BRAW)

See section 5 for camera-specific support of external RAW video recording.

Hints for recording with Atomos recorders:

- Please note that RAW recording on the SL3-P is only supported by the newest Atomos recorders (Ninja TX series).
- Matching the camera signal in the "CAMERA OUTPUT" section on the "Input" tab of the recorder is only required for in-recorder HDR processing. For typical workflows "Log/HDR" can remain off.
- When a RAW video signal is detected by the recorder the camera output parameters are detected automatically.

6.2 Exposure Workflow

There are two approaches to exposing L-Log:

Easiest LUT application: this is the exposure that L-Log LUTs are designed for.
Best image quality: this is the exposure that ensures that the best image quality and dynamic range are achieved, but it requires exposure correction in post if an L-Log LUT is intended to be used.

The following subsections describe each approach in more detail.

6.2.1 Exposing for Easiest LUT Application

Since L-Log is designed to reproduce middle gray (18% reflectivity) at 44% IRE, it is important to hit this exposure relatively accurately if one desires do use LUTs designed for L-Log without any exposure correction in post. This means that the shot should include a gray card in the frame and a waveform monitor to help gauge the exposure. Figure 6 shows a scene with a gray card placed in it and the corresponding view of a waveform monitor. The exposure in this case is dialed in so that the gray card is exposed at about 44% IRE.

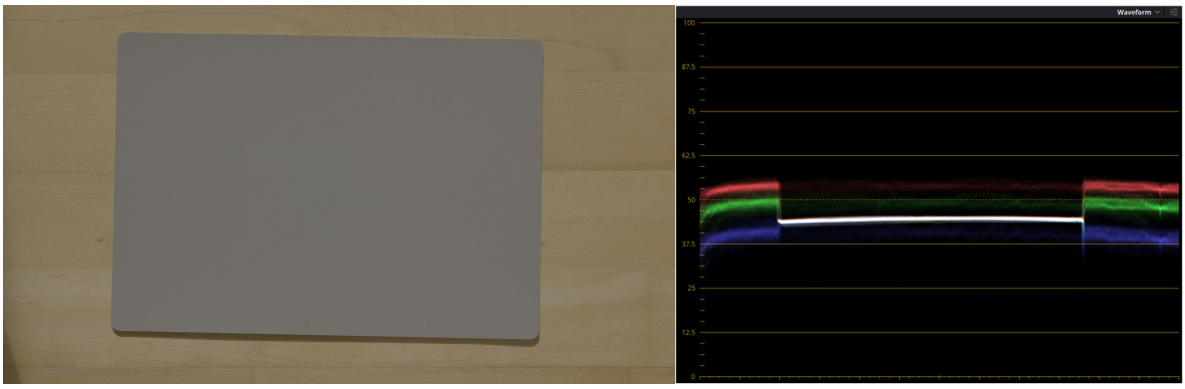


Figure 6: Left: gray card placed in the scene to set exposure; right: waveform monitor view of the scene on the left showing an exposure of the gray card of approximately 44% IRE.

6.2.2 Exposing for Best Image Quality

In case the goal is to capture the highest dynamic range along with the cleanest shadows with L-Log, the exposure should follow the principle of ETTR (exposure to the right). With this technique the footage is exposed as bright as possible without clipping anything in the highlights that is important to you as the cinematographer.

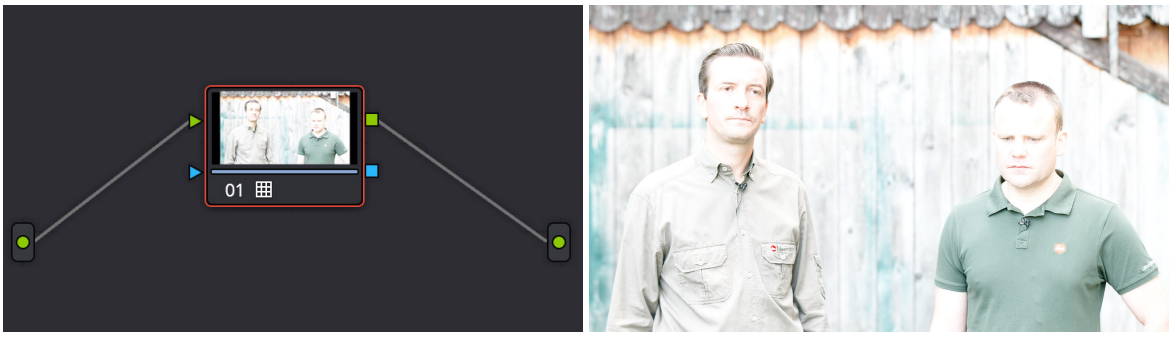


Figure 7: LUT applied to ETTR footage without exposure correction.

When this approach is pursued it is important to remember that an exposure correction is necessary in post if a LUT is used that was designed for L-Log. Figure 7 shows the result of an L-Log LUT being applied to an image that was recorded brighter than what the LUT is designed to work with. If the LUT is applied before the exposure has been corrected, as shown in Figure 8, the result is plagued by posterization issues and thus a very flat impression. This issue is often much more subtle than in the given example, in which case it will typically be most noticeable in faces and show up as flat areas where details and gradients should be visible.

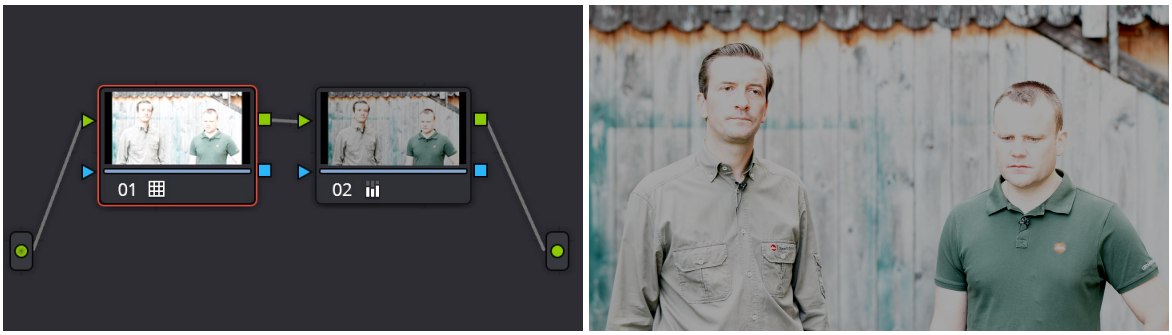


Figure 8: LUT applied to ETTR footage before exposure correction.

The correct handling of this approach is illustrated in Figure 9, where the LUT is applied after the exposure correction to conform the exposure of the footage to that which the LUT was designed for.

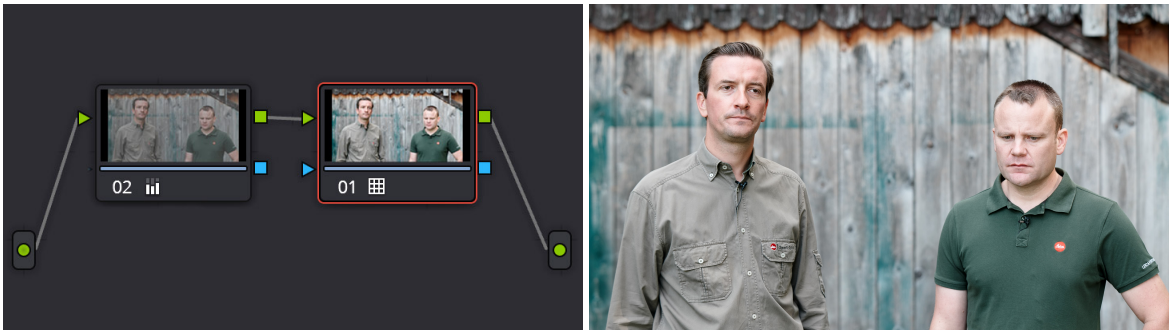


Figure 9: LUT applied to ETTR footage after exposure correction.

6.2.3 Using False Color

False Color helps the user achieve optimal exposure in a very intuitive fashion. With False Color enabled, brightness ranges in the image are displayed as colored regions. While a histogram only gives a global estimate of exposure and the waveform monitor expands on this by providing a horizontal overview of the recorded frame, False Color shines by providing a way for the exposure to be judged on the local features in the image.
Below is an overview of the meaning of different colors when the False Color function is enabled. Please note that the white clipping region moves depending on the capabilities of the individual camera model. The right bound of the red area always ends at the white clipping values given in section 5 and the yellow area moves with it accordingly.

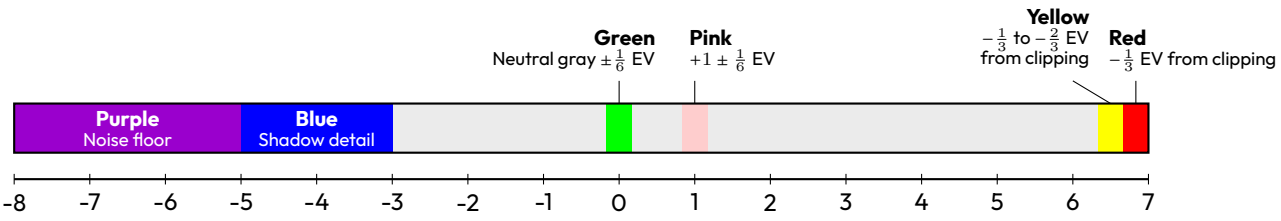


Figure 10: False Color Reference.

6.3 Editing Workflow

Non-RAW recorded L-Log footage can be edited just like any other log material as long as the recorded format (container, codec, etc.) is supported by the editing application. Leica provides several LUTs to allow the editor to make use of an out-of-the-box look for both ITU-R BT.709 and BT.2020 workflows. These LUTs can be downloaded from the Leica website.

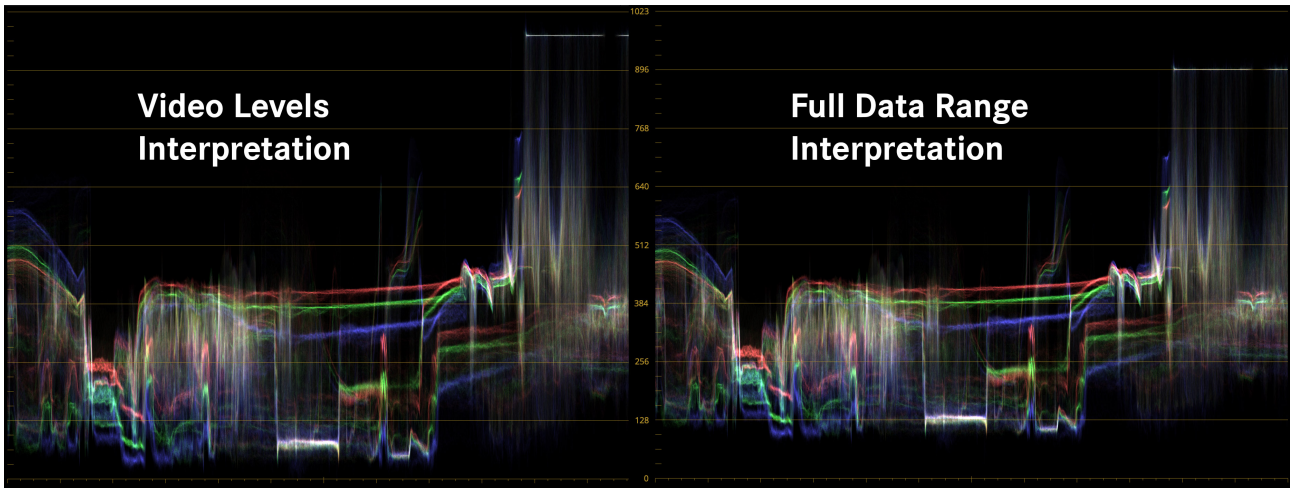


Figure 11: Comparison of L-Log interpretation with video levels and full data range.

L-Log is recorded with full data range (0 – 1023 for 10 bit) in most cases. However, in the case of Apple ProRes internal recording video levels (64 – 940) are used. Depending on the software that is used to postprocess L-Log it might be necessary to manually change the levels to be able to correctly judge the contrast and colors of the recorded material. By recording a scene with over- and underexposed elements the correct interpretation can be verified with a waveform monitor as illustrated in Figure 11 and the clipping values specified for the corresponding camera family in section 5.

Please note that the provided L-Log LUTs were not designed to work with the Leica SL (Typ 601) since it records L-Log in the BT.709 color space.

Das Wesentliche