OPPO O-Log2

White Paper

Version	Author	Change Note
2026.4.17	*Cris Yan*	*CHN to ENG Translation*

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1 Introduction

OPPO O-Log2 is a scene-referred encoding system built on a logarithmic curve and a wide color gamut. Its purpose is to maximally preserve the dynamic range and color information of the original scene when capturing. Footage captured using O-Log2 is not intended for direct viewing; rather, it is used as source material in post-production workflows.

2 Transfer Function

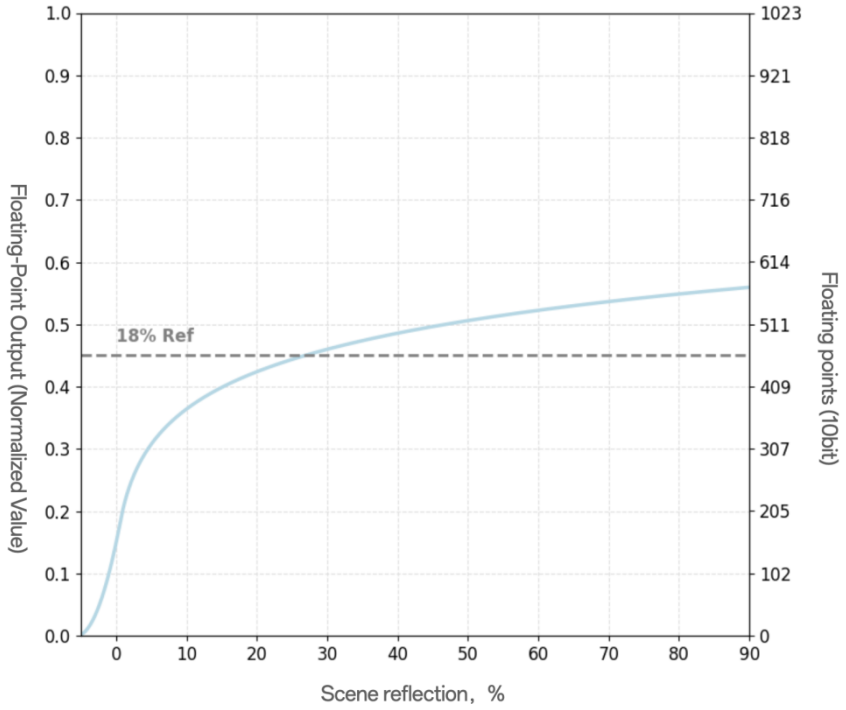

Figure 1: Log curve encoded values applied to the linear input signal

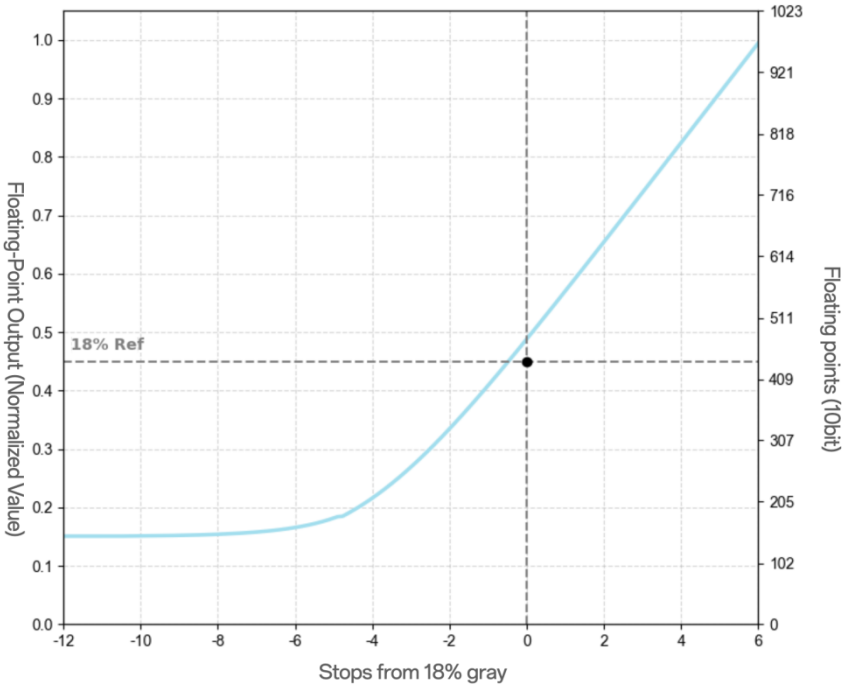

Figure 2: O-Log2 curve plotted against exposure stops relative to 18% gray

The camera's auto-exposure maps the 18% scene reflectance to an O-Log2 encoded value of 0.486829841 (approximately 499/1023).

Scene reflection	Linear Signal	Encoded Signal (Log Signal)	
		Normalized Float	10-bit Integer, Full Range
0%	0	0.18418888	189
18%	0.177773433	0.486829841	499
39%	0.38964844	0.58015879	594
1600%	1	1	1023

Table 1: O-Log2 Encoded Signal with Scene Reflection

2.1 Encoding Function

The encoding function is implemented inside the camera and converts linear scene reflection values to the output data captured by the camera. The conversion is given by the following equation:

$$P = f(R) = \begin{cases} \gamma \cdot \log_2(R + \beta) + \delta & \text{,if } R \geq Rt \\ c \cdot (R - R0)^2 & \text{,if } R0 \leq R < Rt \\ 0 & \text{,if } R < R0 \end{cases}$$

with

$$R0 = -0.05641088$$

$$Rt = 0.006$$

$$c = 47.28711236$$

$$\beta = 0.00964052$$

$$\gamma = 0.08550479$$

$$\delta = 0.69336945$$

2.2 Decoding Function

The decoding function can be applied to the captured footage in order to recover the linear scene reflection signal. The decoding function is given by the following equation:

$$R = f^{-1}(P) =$$

$$\begin{cases} 2^{((P-\delta)/\gamma)} - \beta & \text{if } P \geq Pt \\ R0 + \sqrt{\frac{P}{c}} & \text{if } 0 \leq P < Pt \\ R0 & \text{if } P < 0 \end{cases}$$

where

$$Pt = c \cdot (Rt - R0)^2$$

$$R0 = -0.05641088$$

$$Rt = 0.006$$

$$c = 47.28711236$$

$$\beta = 0.00964052$$

$$\gamma = 0.08550479$$

$$\delta = 0.69336945$$

3 Color Space

The color space describes how colors are represented. O-Log2 uses RGB primaries and color space conversion matrices as defined in the ITU-R BT.2020-2 specification. The white point is set to the D65 illuminant. All chromaticity values are specified using the CIE 1931 2° Standard Observer Colorimetry.

CIE Chromaticity Coordinates		
	X	Y
Red primary (R)	0.708	0.292
Green primary (G)	0.170	0.797
Blue primary (B)	0.131	0.046
White point (D65)	0.3127	0.3290

The conversion between the RGB and luminance-chrominance $Y'C'_BC'_R$ representation is governed by the following formulae:

$$Y = 0.2627 * R + 0.6780 * G + 0.0593 * B$$

$$C_b = (B - Y) / 1.8814$$

$$C_r = (R - Y) / 1.4746$$