

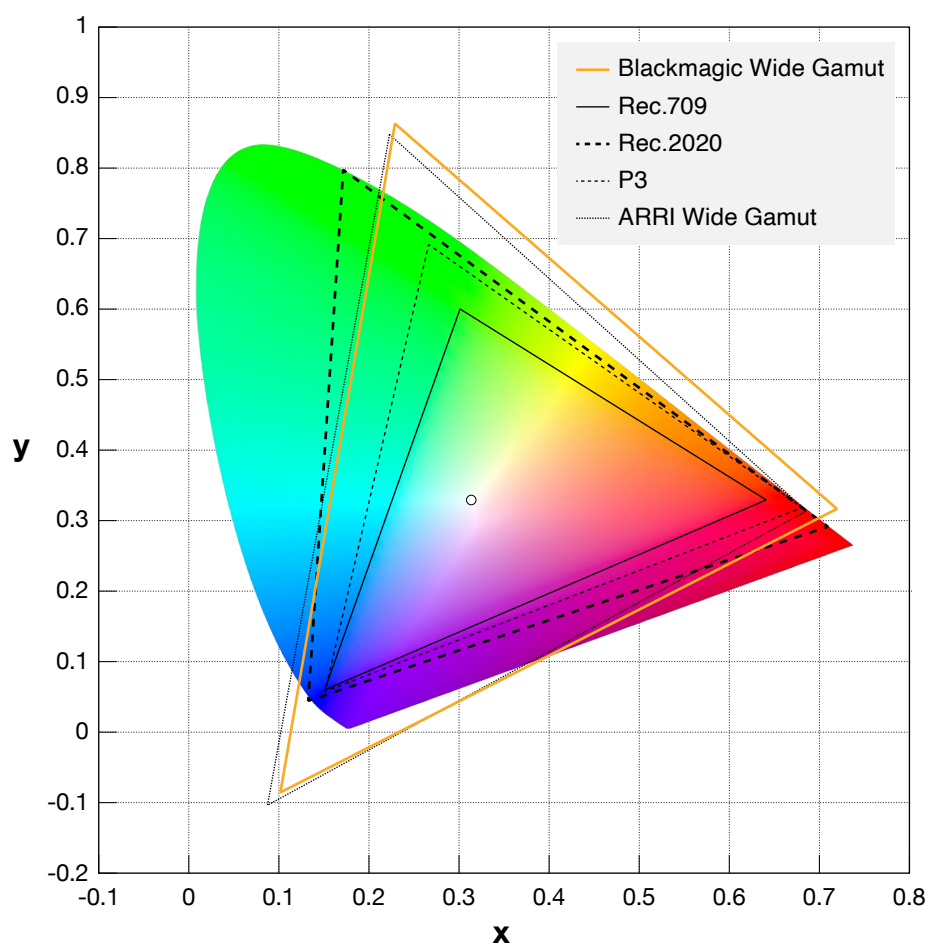
Blackmagic **Generation 5 Color Science**



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Blackmagic Camera Wide Gamut Primaries and White Point

Blackmagic Wide Gamut (CIE xy chromaticity diagram)



Blackmagic Wide Gamut is defined by the following CIE 1931 xy chromaticity coordinates:

	x	y
Red	0.7177215	0.3171181
Green	0.2280410	0.8615690
Blue	0.1005841	-0.0820452
White	0.3127170	0.3290312

The matrices below convert linear Blackmagic Wide Gamut RGB data to/from CIE 1931 XYZ:

Blackmagic Wide Gamut RGB → XYZ matrix		
0.606530	0.220408	0.123479
0.267989	0.832731	−0.100720
−0.029442	−0.086611	1.204861

XYZ → Blackmagic Wide Gamut RGB matrix		
1.866382	−0.518397	−0.234610
−0.600342	1.378149	0.176732
0.002452	0.086400	0.836943

Blackmagic Film Generation 5 (OETF)

Blackmagic Film Generation 5 encodes linear light (i.e. 18% grey is represented by 0.18) and is defined by the parameters below.

Parameters

Parameter	Value
A	0.08692876065491224
B	0.005494072432257808
C	0.5300133392291939
D	8.283605932402494
E	0.09246575342465753
LIN_CUT	0.005

For a linear light value (x) and encoded value (y), and given the above parameters, Blackmagic Film Generation 5 is encoded/decoded using the following equations.

Forward OETF

$$\begin{aligned}
 y &= D \cdot x + E & \text{for } x < \text{LIN_CUT} \\
 y &= A \cdot \log(x+B) + C & \text{for } x \geq \text{LIN_CUT}
 \end{aligned}$$

Inverse OETF

$$\begin{aligned}
 x &= (y - E) / D & \text{for } y < \text{LOG_CUT} \\
 x &= \exp((y - C) / A) - B & \text{for } y \geq \text{LOG_CUT} \\
 \text{where } \text{LOG_CUT} &= D \cdot \text{LIN_CUT} + E
 \end{aligned}$$

Mapping Values

Blackmagic Film Generation 5 encodes 10.27 stops above 18% grey. Middle (18%) grey is mapped to 0.3835616438356165

Input Value	Blackmagic Film Generation 5 Value	10-bit Video Levels
0	0.0924657534246575	145
0.18	0.3835616438356165	400
1	0.5304896249573048	529
10	0.7302219538415439	704
40	0.8506949973834717	809
100	0.9303398518999735	879
222.86	1.0	940

The following diagram shows a plot of the Generation 5 Film curve on a logarithmic scale with the zero reference point for 18% grey.

Blackmagic Film Generation 5 (Log-scale input)

