

UHD Single-Master HDR-SDR Production

Graphics Production

UHD HDR-SDR Single-Master Live Production Method

This eBook will evolve as we document the complete workflow.

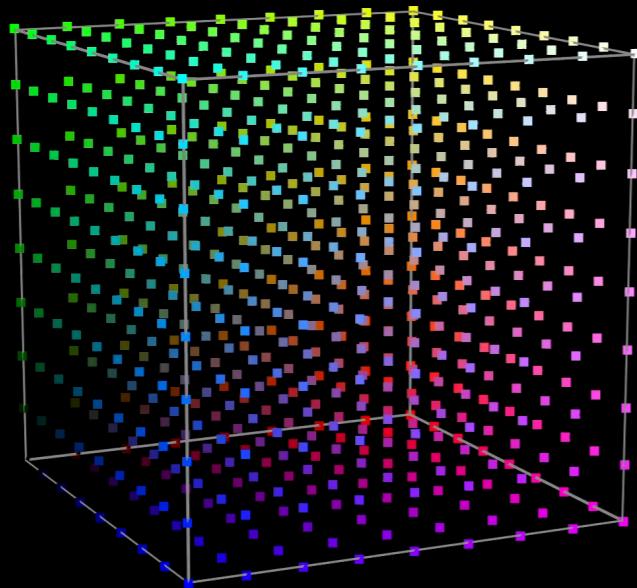
Lesson Three will review Graphics Workflows.

It is provided as a reference for production teams.

Apple Book Store Link is here:

<http://books.apple.com/us/book/id6443519839>

Lesson 3



HDR-SDR Graphics

**Creating graphics
for UHD
broadcasting**

Full vs Narrow Range

- Software Configuration
- Identifying image formats using ICC Profiles with CICP signaling

Full vs Narrow Signal Ranges

Full Range

- RGB is typically Full Range
- Code Range 0-100%
 - 8-bit = 0-255
 - 10-bit = 0-1023
 - 12-bit = 0-4095

Color and light can range only extends from 0-100% signal range.

0 to 100% signal is mapped to code values the entire code range (see chart on next page)

Full Range provides additional steps between 0-100% in order to reduce banding artifacts if 8bit coding is subsequently mapped to a higher bit depth in “narrow range”.

Narrow Range

- YCbCr is typically Narrow Range
- Code Range 0-100%
 - 8-bit = 16-235
 - 10-bit = 64-940
 - 12-bit = 0-3760

Color and light can range can go beyond 100% to 109% signal level to provide additional light and color range.

Additional color range can go below 0% to provide additional color range

Narrow range has only 219 digital code values per component (which might increase the chances of banding in 8-bit

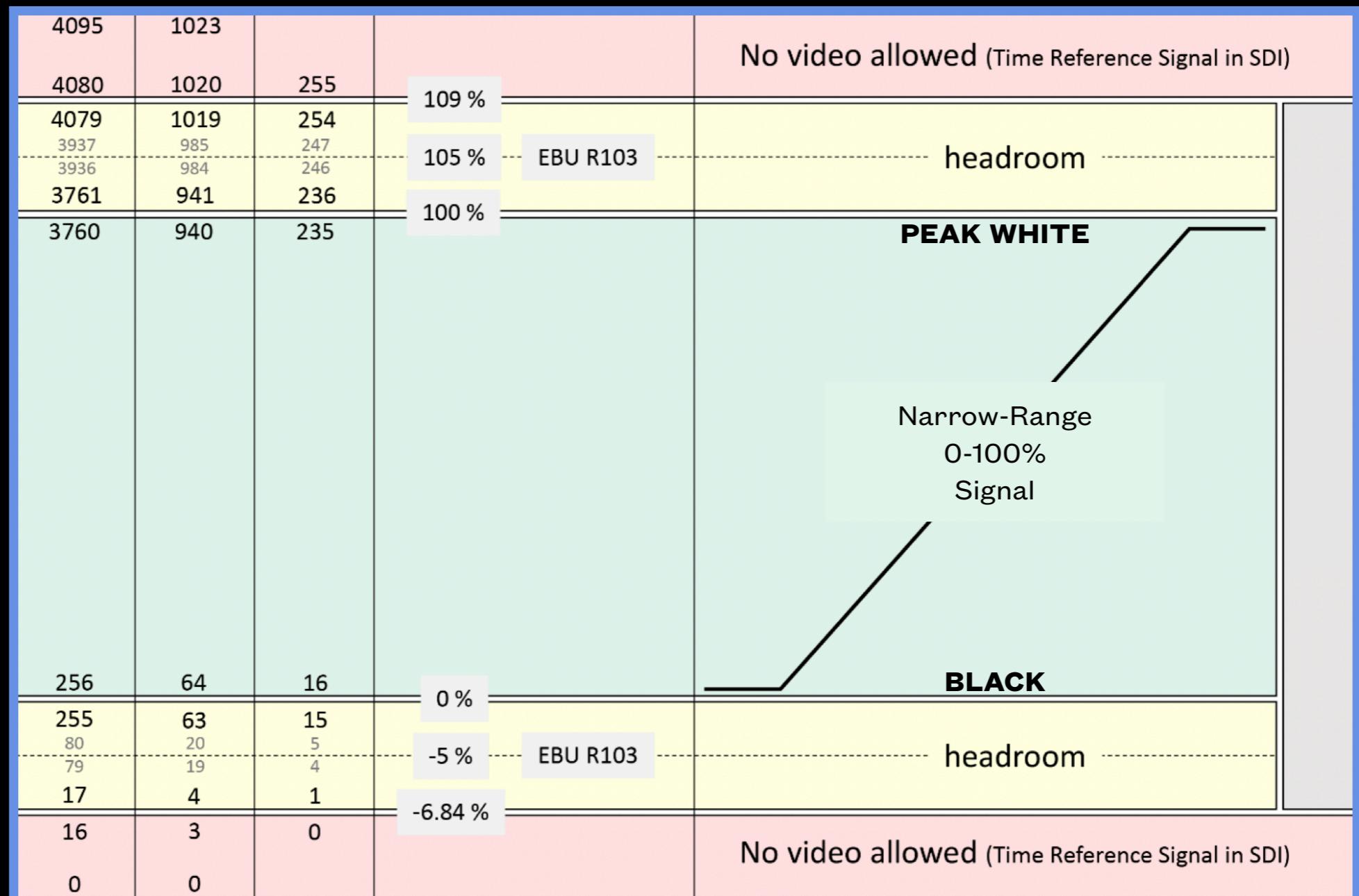
Acronyms include SMPTE Range, Legal Range, Nominal Video Range.

Image/Video Signal Ranges

Full Range



Narrow Signal Range



RGB
TIFF/PNG

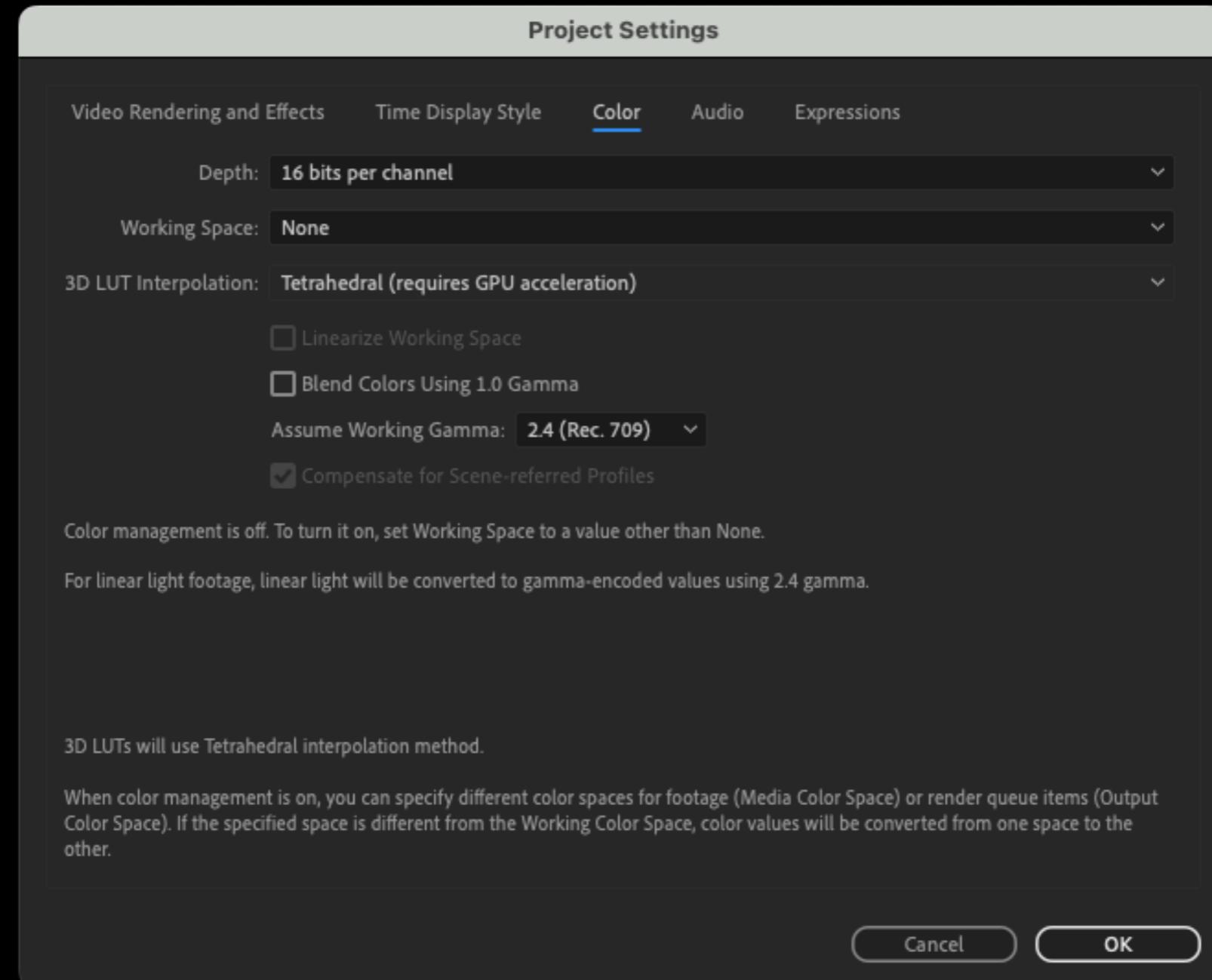
YCbCr
QuickTime/MXF: ProRes, DNxHD-HDR, xAVC
Baseband: SDI, ST 2110

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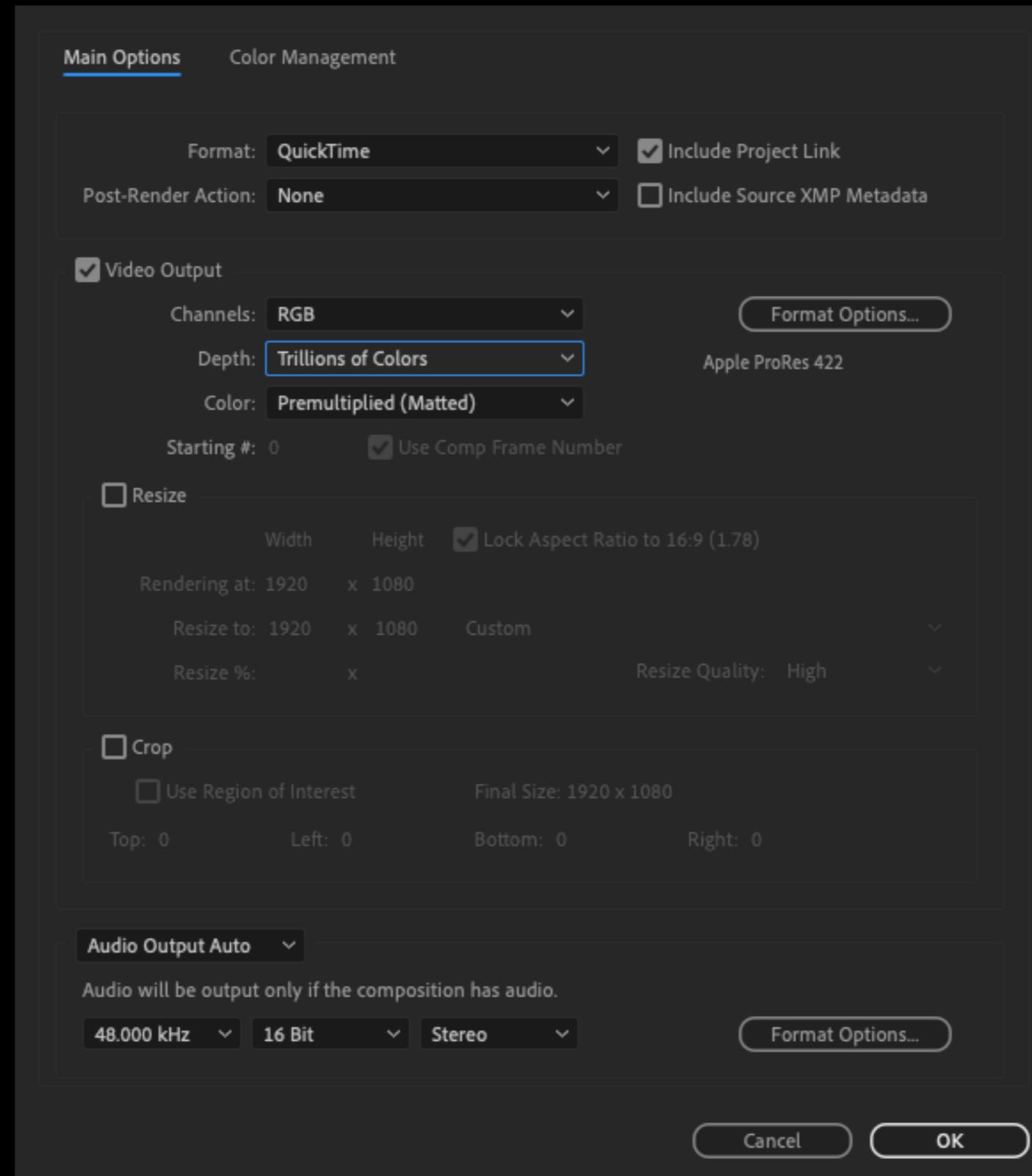
SDR BT.709

Settings for After Effects

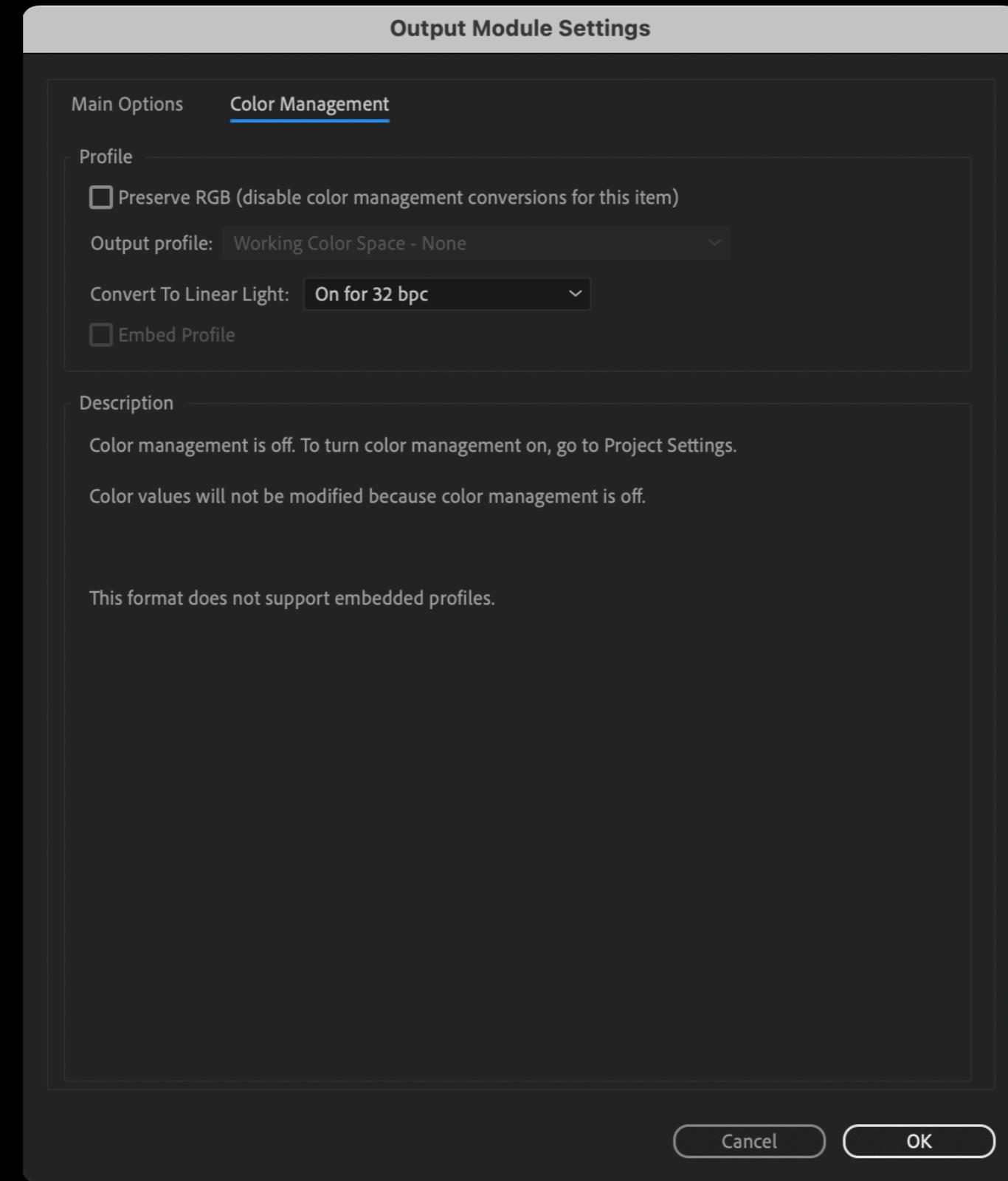
After Effects Project Settings For Broadcast Video



After Effects Color Depth For 10bit Codecs



After Effects Output Module Color Management



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Identifying Image Formats

ICC HDR/SDR tags
allow us to assign “profiles” to
image files

CICP Signaling for identifying image Formats

ICC Profiles: Signaling of High Dynamic Range and Wide Color Gamut

- Specification ICC.1:2022 (Profile version 4.4.0.0)
 - Color Primaries
 - BT.709 = HD Broadcast Color Space
 - BT.2020 = UHD Broadcast Color Space
 - Transfer Characteristics
 - Gamma 2.4 - HD Broadcast Light Mapping
 - HLG¹ - HDR Light Mapping for live production¹
 - PQ² - HDR Light Mapping for live broadcast transmission and the majority of video on demand
 - MatrixCoefficients
 - RGB-to-YCbCr translation: Not required for RGB still graphics
 - VideoFullRangeFlag
 - Identifies signal range: RGB default = 1 (or Full Range)

EXAMPLE: CICP 1-1-0-1 (1=BT.709, 1=Gamma 2.4, 0=RGB(No Matrix), 1=Full Range

- 1 HLG is used for live production in the United States, but not in transmission where PQ is used instead. It is however used in the UK and Japan and some other countries in transmission. It is limited under normalized conditions to 1,000nits. It is a relative image format.
- 2 PQ is used for most HDR transmission to consumer TV's and devices in the United States. It preserves a range all the way up to 10,000nits (10x HLG). It is an absolute, display-referred image format.

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[Github Link](#)

[ICC CICP HDR-SDR Profiles](#)