



Blackmagicdesign

Developer Information

Blackmagic Micro Studio Camera 4K

RAW SDI Output

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RAW SDI Output

If you would like to perform your own debayering of the image data from Blackmagic Micro Studio Camera 4K, you can use the 'RAW' mode to output bayered sensor data over the SDI output.

This mode packs raw data into the pixels of a regular UltraHD 422 frame size, to enable transmission through a standard SDI output.

The data can be recorded as an uncompressed QuickTime movie using a disk recorder capable of uncompressed 10-bit recording, for example a Blackmagic HyperDeck Studio Pro.

TIP: Camera raw media formats are so named because they capture raw color space data directly from the sensor. Raw image data cannot be displayed visually, and must be debayered or demosaiced to convert the original raw data into image data that can then be used in an image processing pipeline like DaVinci Resolve.

Note that Blackmagic DaVinci Resolve does not support the debayering of raw data from Blackmagic Micro Studio Camera 4K.

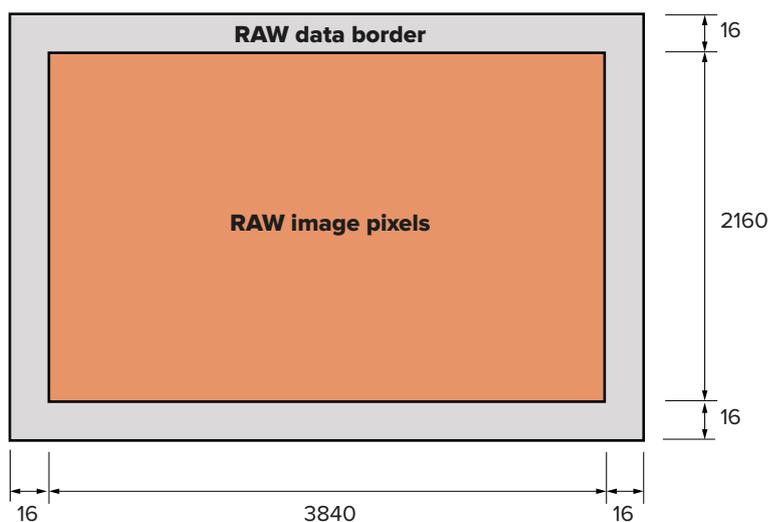
Enabling RAW mode:

- 1 Press menu and select the 'setup' page.
- 2 Navigate to 'RAW SDI Output' and select 'on'.

Resolution and Bit Depth

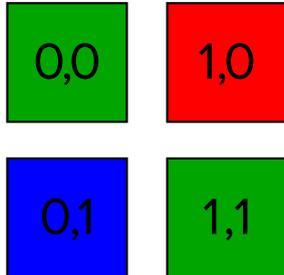
The resolution of the RAW frame is 3872 pixels x 2192 lines, which includes a border that surrounds the image data. Most users discard this border after debayering, as it can contain image artifacts on the outer edges.

The RAW data at pixel number 16 inside the horizontal and vertical corners will therefore correspond with the corner of the Ultra HD frame when the camera is outputting 3840 x 2160 in the non RAW mode. The bit depth of each pixel will be 12 bits.



Bayer Alignment

The bayer pattern of the RAW frame provides information required for debayering the raw data output by Blackmagic Micro Studio Camera 4K. The bayer alignment of the RAW frame is GRBG or green, red, blue, green.



Packing

Packing describes the way in which the raw data is packed or arranged. It is important to understand the way that the data has been packed so that it can be unpacked correctly. The RAW frame will be packed into the active picture area of a standard UHD 422 SDI frame, using the following repeated packing scheme:

| | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|--------------------|---|---|----------------|---|---|---|----------------|---|---|---|
| SDI(0,0) CB | 0 | 1 | RAW (0,0)[7:0] | | | | | | | |
| SDI(0,0)Y | 0 | 1 | RAW(1,0)[3:0] | | | | RAW(0,0)[11:8] | | | |
| SDI(1,0) CR | 0 | 1 | RAW(1,0)[11:4] | | | | | | | |
| SDI(1,0) Y | 0 | 1 | RAW (2,0)[7:0] | | | | | | | |
| SDI(2,0) CB | 0 | 1 | RAW(3,0)[3:0] | | | | RAW(2,0)[11:8] | | | |
| SDI(2,0) Y | 0 | 1 | RAW(3,0)[11:4] | | | | | | | |

Horizontal and vertical blanking will be unchanged from regular SDI output mode.

As shown above, four RAW pixels will be packed into three SDI pixels, so each Ultra HD line will contain $3840 \times 4/3 = 5120$ RAW pixels and the entire RAW frame will be carried in the first 1658 lines of the 2160 active SDI lines. The remainder of the pixels in the SDI frame will be set to 0x100 for both Y and C.

The RAW SDI frame should be captured as uncompressed 422 data and unpacked according to the table above.

Recording the RAW signal

You can record the RAW signal as an uncompressed QuickTime file with Blackmagic HyperDeck Studio Pro or any device capable of 10 bit uncompressed recording or capture.

Unpacking the RAW data:

Once you have a QuickTime recording of the RAW data, you will need to unpack the signal to perform your own debayering of the image data from the sensor.