WHITEPAPER

EOS C300 Mark III

EOS C300 MARK III
SUPER 35MM
DIGITAL CINEMA CAMERA

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Abstract

At IBC 2019 Canon introduced the EOS C500 Mark II camera – a 5.9K full-frame acquisition system. NAB 2020 was to have seen the arrival of an important sibling acquisition system – the 4K Super 35mm EOS C300 Mark III. The cameras share the same physical body and all of the compact extension units discussed in this paper. But there are distinct differences between their image origination and capture systems as outlined in the following:

EOS C300 Mark III

- S35mm 4K image sensor
- 4K @120P RAW on-board capture

- 4K / 2K @120P XF-AVC Intra record
- 4K / 2K @120P XF-AVC Long GOP record
  (YCbCr 4:2:2 @ 10-bit)

- 2K @180P (crop) XF-AVC Intra
- 2K @180P (crop) XF-AVC LongGOP
  (YCbCr 4:2:2 @ 10-bit)

EOS C500 Mark II

- Full Frame 5.9K image sensor
- 5.9K @60P RAW on-board capture

- 4K (FF) @60P XF-AVC Intra and LongGOP
- 4K S35 (crop) @60P XF-AVC Intra and LongGOP

- 2K (FF) @120P XF-AVC Intra
- 2K S16 @120P (crop) XF-AVC Intra

The close timing of these camera's respective debut is a reflection of Canon's recognition that there are two important global production constituencies – one, being the huge and long-established Super 35mm community, and two, the still relatively new but growing large-format / full-frame following.

The EOS C300 Mark III supports flexible options in 4K acquisition – including on-board recording of RAW 4K @ 120 fps and recording of 4K @120 fps using the XF-AVC codec.

The camera also pays particular attention to the origination and recording of 2K DCI and 1080P HD with HDR and WCG at very high quality – assured by downsampling from a 4K origination. These formats are considered by many of the world's broadcasters to represent an important first transition from BT.709-based HDTV to UHD services.

The EOS C500 Mark II, on the other hand, pays special attention to the origination of 4K DCI and 4K UHD with HDR and WCG at very high quality – assured by downsampling from a 5.9K origination. That same 5.9K can be recorded RAW.

Expandability is a central premise of the EOS C300 Mark III and EOS C500 Mark II cameras. Multiple recommendations and suggestions were made to Canon based on the past ten year's experiences with the various cameras systems within the Cinema EOS system, and these two new cameras reflect the incorporation of the majority of those inputs. The EOS C300 Mark III also facilitates user interchangeable mounts – between PL, Standard EF, and EF Cinema Lock.

With a compact base model weighing only 3.9 lbs. this powerful integrated Cinema RAW Light recording capability significantly extends high-end production options – offering interesting possibilities in moviemaking and episodic television. That basic lightweight camera offers imaging empowerment to single operator shooting, while also facilitating dexterous operation within gimbals, and support of shooting flexibility from drones. Two important new imaging assists are incorporated within the EOS C300 Mark III camera – one, being 5-axis electronic image stabilization (EIS), and the second is electronic diffraction compensation.

1.0 INTRODUCTION

The Cinema EOS product family was first announced in September 2011 and was followed in September 2012 with the 4K EOS C500 camera. The second-generation EOS C300 Mark II made its debut in 2015. The EOS C200 and 200B made their formal debut at Cinegear 2017 – being the first Cinema EOS cameras to incorporate on-board RAW recording. Full Frame EOS C700 and EOS C500 Mark II followed.

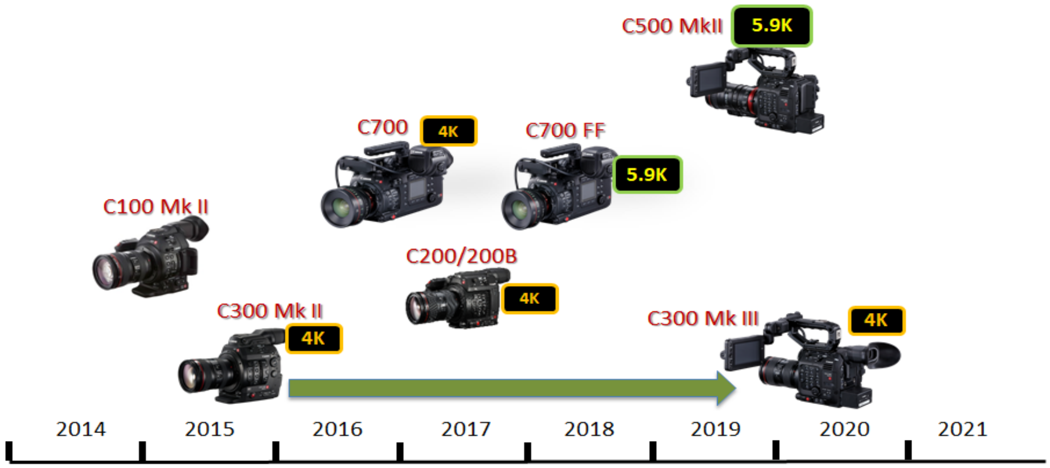


Figure 1 *Summarizing the current Cinema EOS camera family*

2.0 IMAGING DUALITY – EOS C300 MARK III JOINS EOS C500 MARK II

The EOS C500 Mark II is directed at the growing global production community seeking to leverage the unique imaging attributes of full-frame acquisition. The new EOS C300 Mark III is intended for that other substantial global constituency who favor, and remain invested in, the Super 35mm image format.

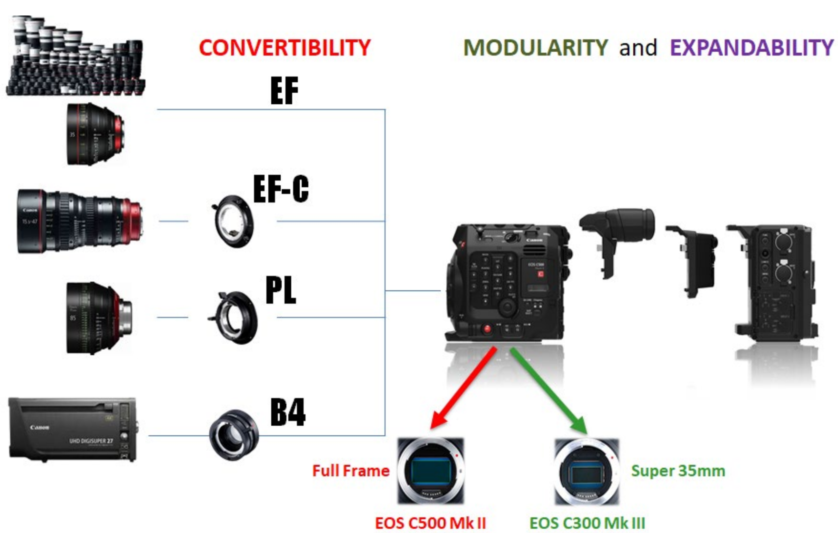


Figure 2 *EOS C300 Mark III and the EOS C500 Mark II share all system components except their image sensor*

Over the decade since the introduction of the cinema EOS lens-camera families a vast worldwide experience was gained – in documentary, wildlife, sports, news magazine shows, independent filmmaking, corporate and government, and increasingly, in episodic television, commercial production, and higher budget moviemaking. A significant accumulation of global inputs and suggestions from the countless users of the EOS C300 Mark II, C200, and C700/700 FF helped frame a new strategy – one that recognized increasing adoption of 4K and higher resolutions to ensure the shelf life of high-end program masters, while also acknowledging an increasing focus among broadcasters on 1080P/HDR/WCG for high end television production.

The supportive duality of the EOS C300 Mark III and EOS C500 Mark II recognizes the multiplicity of shooting configurations associated with such program capture. Lens flexibility, system configurability, and system connectivity – were all constant themes in the multiple discussions Canon had with many global creative practitioners – and these two cameras embody them all.

3.0 EOS C300 MARK III – WITH SUPER 35mm IMAGE SENSOR

The EOS C300 Mark III shares the same physical Base Unit as the EOS C500 Mark II. But, its imaging system is different – it is a 4K Super 35mm image sensor. It originates 4K DCI (4096 x 2160) or the alternative 4K UHD (3840 x 2160) – with the associated active image dimensions shown in Figure 3.

The Super 35mm CMOS image sensor was specially developed by Canon to offer an important extension to dynamic range. The technologies underlying this Dual Gain Output (DGO) image sensor are explained in the next section.

Figure 3 *Showing the total photosite count for the Super 35mm image sensor in the new EOS C300 Mark III and the sensor active image dimensions for 4K DCI and 4K UHD*

4.0 DUAL GAIN OUTPUT (DGO) IMAGE SENSOR

4.1 Legacy of the Dual Photodiode within Each Photosite

The original C300 (debuted in 2011) employed a totally new Super 35mm CMOS image sensor that Canon developed specifically for digital motion imaging. Among numerous design strategies was an innovative new photosite design that employed two separate photodiodes – each being 6.4 x 3.2 micrometers. For simplicity this novel design is referred to as Dual Pixel CMOS Image Sensor. The smaller individual photodiode supports a faster readout which in turn facilitates a greater efficiency in emptying the accumulated charge from each (the two charges are summed following readout and A/D conversion) [1]. The photodiode was also designed as a higher density N-type which elevates the number of saturation electrons. The net effect of these strategies is an elevation of the overall dynamic range of each photosite. This has been maintained in all of the Cinema EOS image sensors to date.

Some six years later Canon exploited the dual photodiodes in a second innovation – one that mobilized the dual photodiodes to create two separate images that facilitated a phase detection system that indicates the degree of defocusing. Allied with a sophisticated algorithmic data processing system the now well-established *Dual Pixel CMOS Auto Focus* system was born.

Now, three years later, the two photodiodes are being additionally deployed in a new and innovative way. While each photodiode has a structure that inherently expands dynamic range, that is now being augmented with additional processing to add a further extension of their respective dynamic ranges. This is termed the Dual Gain Output (DGO) system – allowing the image sensor to further extend into the deep shadowed areas of a given scene while simultaneously preserving all of the highlight information.

It is important to note that the three separate deployments of the two photodiodes all operate independently of each other.

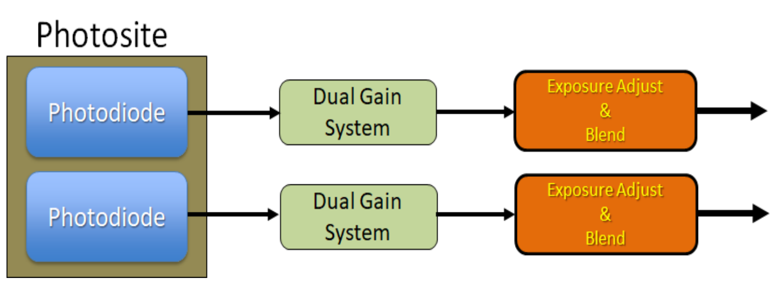


Figure 4 *Principle of the Dual Gain Output (DGO) system that protects highlights and extends low light range*

An additional processing strategy is implemented on each of the two photodiode outputs – in the form of application of two separate gain settings of the narrow bandwidth analog column amplifier.

Saturation Prioritizing Gain Setting

In Figure 5 the separate noise sources encountered in the readout process are listed. Of special significance is the disposition of these noise sources on either side of the column amplifier. The very narrow bandwidth of the column amplifier itself ensures that its thermal noise contribution is minimized even when its gain is elevated. Figure 5 summarizes the total noise at the output for the normal x1 gain setting – this is termed the *Saturation prioritizing gain* setting. The priority here is to recover the digital representation of the full dynamic range signal output from the image sensor – paying particular attention to protecting the scene highlight detail.

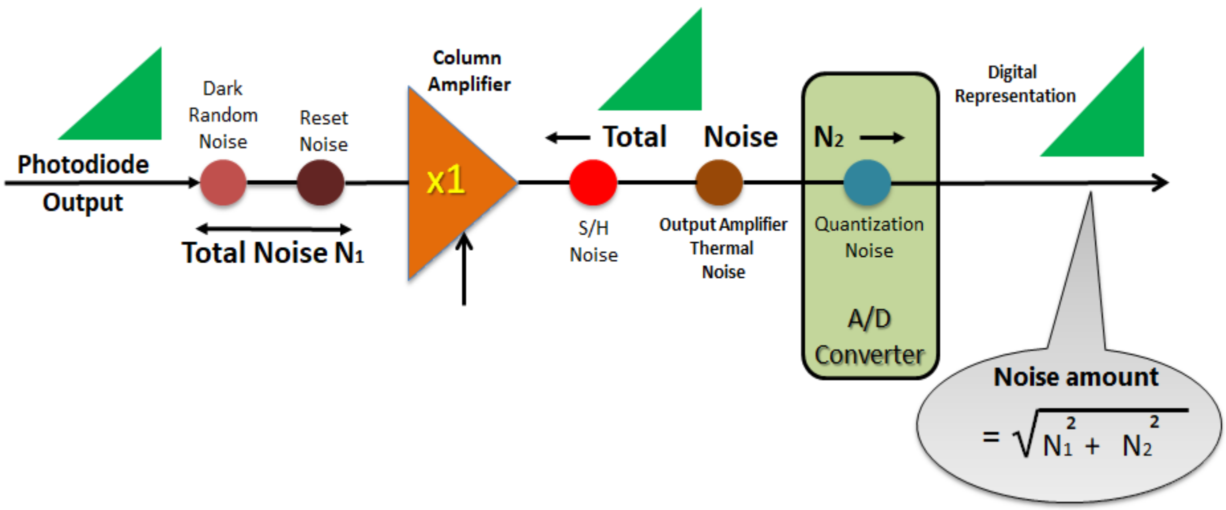


Figure 5 *Showing the final noise output for a gain setting of 1x in the column amplifier*

Noise Prioritizing Gain Setting

Figure 6 shows the final noise output when two sequential signal level adjustments are made – one, being an elevation of the column amplifier to a high gain setting xG — followed by an attenuation of both signal and noise by a factor of xG in the digital domain. The noise sources following the column amplifier are not amplified. In a sense, the high gain elevation allows the signal to effectively "step over" the N2 noise sources. This is termed the *Noise prioritizing gain* setting. The high signal levels may be clipped in the A/D converter (or even in the column amplifier) – but this is of no consequence as those highlights are protected in the separate Saturation Prioritization mode. It will be noted that the final lower output noise level speaks to the priority to recover the shadowed lower levels of the signal with enhanced signal to noise performance.

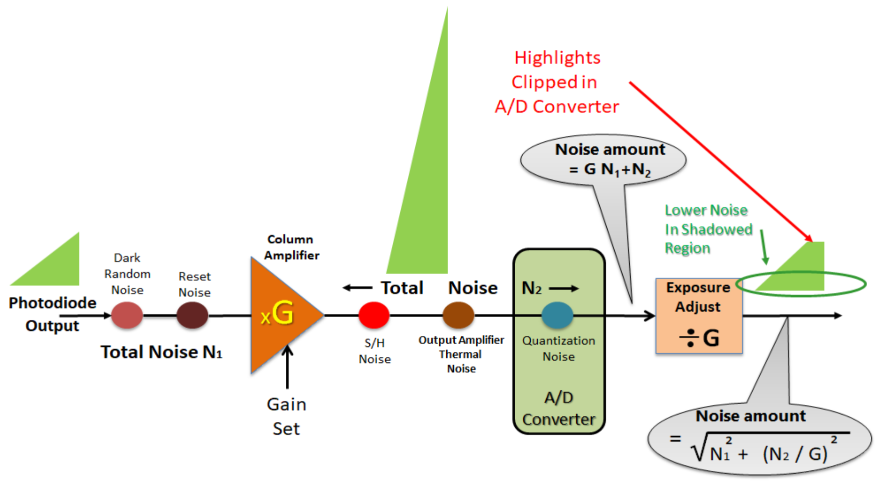


Figure 6 *Final noise level when the amplifier gain set is Gx and is followed by a gain reduction of G times*

This dual gain system is implemented by a time multiplex system that applies the two separate gains in sequence and the subsequent exposure adjustments in synchronism with them. The output video signal is fed into a frame store and is then blended with the similarly processed signal from the second photodiode.

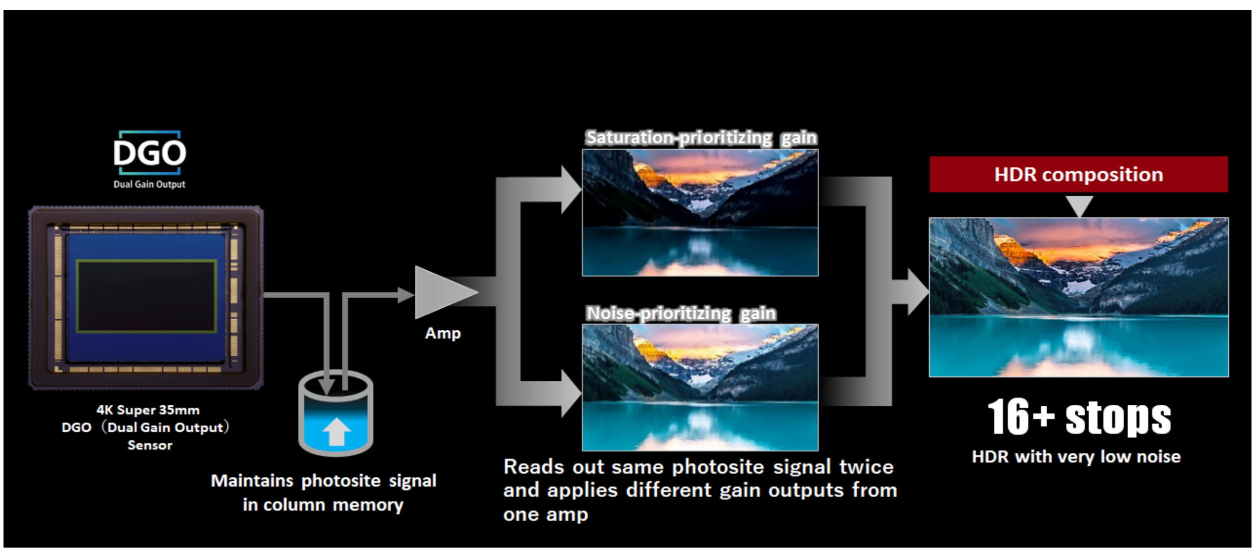


Figure 7 *Simplistic representation of the two images that are ultimately blended to achieve the desired extension in dynamic range*

It is important to note that the dual gain output (DGO) process operates on a singular photodiode output signal so there is absolute simultaneity of the effect of the two gain setting in the final output representation. Thus, there are zero temporal side effects.

5.0 WORKS WITH A RANGE OF CINEMA LENS FORMATS

The EOS C300 Mark III can be used with a range of cinematography lenses – that include full-frame Super 35mm prime lenses, Super 35mm and Super 16mm zoom lenses, and even 2/3-inch broadcast zoom lenses (using Canon B4 mount to PL / EF optical adaptors) – as shown in Figure 8.

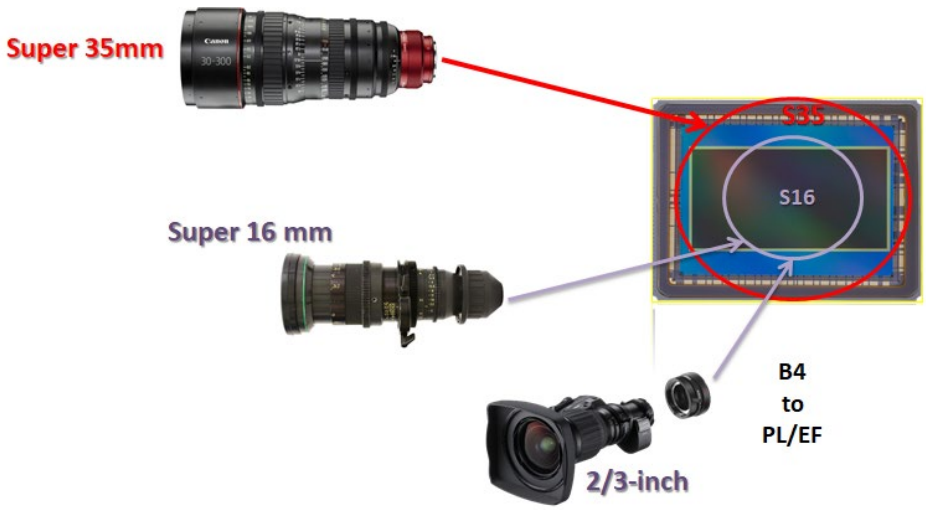


Figure 8 *The Super 35mm EOS C300 Mark III can use S35 / S16mm cine formats and also broadcast lenses*

When used with a Super 35mm cine lens the EOS C300 Mark III has a menu selection that switches Image Sensor Readout modes between the following:

1. 4K (either DCI or UHD)
2. 2K (either DCI or HD)
3. Anamorphic modes – including **2 x** and **1.3 x**

Depending upon the lens image format size that is selected the Image Sensor Readout menu selection will deliver the appropriate digital production format – selected as either native 4K DCI or 4K UHD or cropped 2K DCI or full HD. Figure 9 shows the 4K and 2K DCI formats.

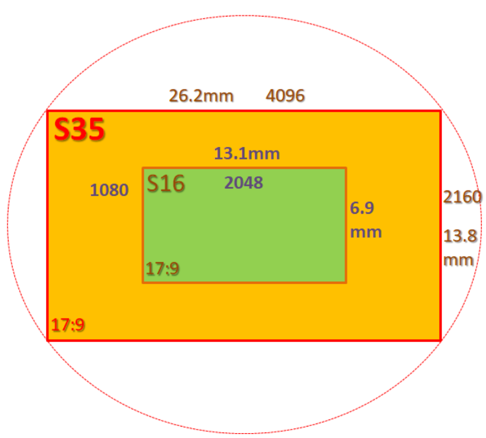


Figure 9 *Showing the native 4K image format with Super 35mm lens and the cropped 2K / HD with a Super 16mm lens*

6.0 ANAMORPHIC SHOOTING

The EOS C300 Mark III camera supports anamorphic shooting – offering a choice of 2x or 1.3x horizontal squeeze. For the 2x anamorphic many directors and cinematographers prefer to capture a slightly wider compressed image – favoring the use of a 4:3 (or 1.33:1) image capture rather than the 6:5 (1.195 : 1) aspect ratio that defines a precise 2 x squeeze on a 2.39 : 1 (2.39 / 2 = 1.195) image format. This practice allows some image margin on either side that will accommodate small repositioning within the postproduction work. This anamorphic choice entails an effective input image to the lens having an aspect ratio of 1.33 x 2 = 2.66 : 1 as shown in Figure 10. The sensor sampling is 6.22 megapixel.

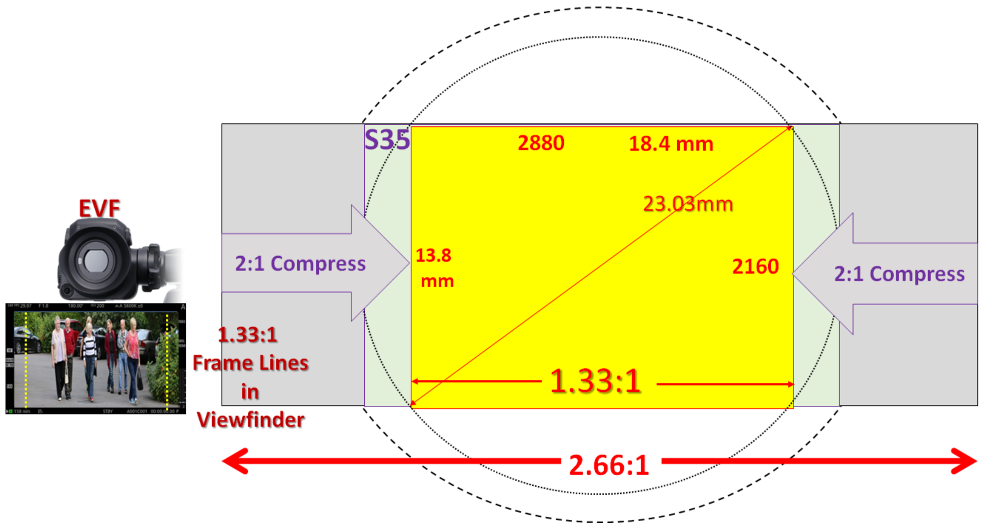


Figure 10 *Showing the photosite sampling of the active image (in yellow) for 2x anamorphic squeeze*

The 1.3x compression anamorphic lens was developed to accommodate the wider 1.896 : 1 (17:9) aspect ratio specified by DCI for digital cinema cameras. The squeezed image that is sampled and recorded is very close to that DCI aspect ratio (2.39 / 1.3 = 1.84 : 1). The sensor sampling is 8.6 megapixels.

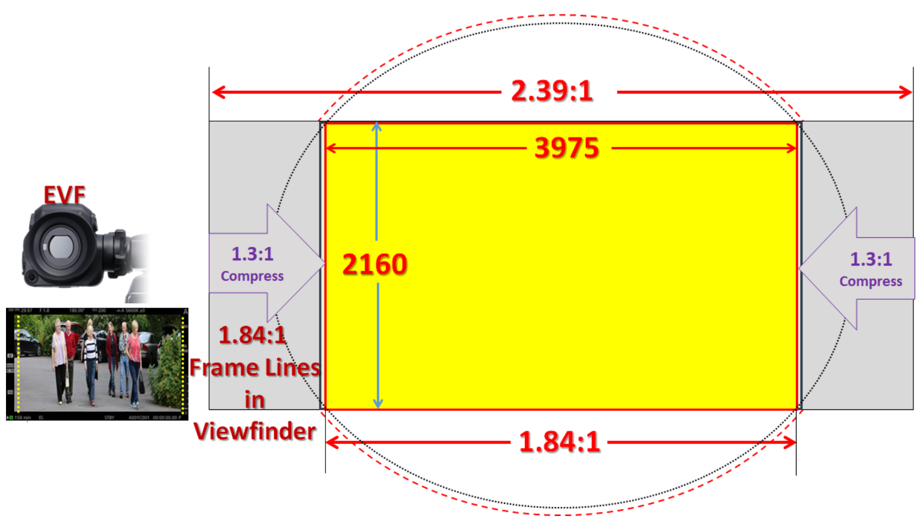


Figure 11 *Showing the photosite sampling of the active image (in yellow) for 1.3x anamorphic squeeze*

7.0 EOC C300 Mark III – THE BASE MODEL

The compact nature of the Base Model of EOS 300 Mark III is shown in Figure 12.

Figure 12 *Showing the front and rear of the Base Model EOS C300 Mark III*

A central design goal was to achieve a basic motion imaging capture system that was very lightweight and compact while supporting on-board RAW 4K and 2K recording. The system would alternatively support XF-AVC recording of the 4K DCI / UHD and the 2K / HD production formats.

Figure 13 *Showing the dimensions of the Base Model of EOS C300 Mark III*

The EOS C300 Mark III maintains precisely the same optical axis as both the EOS C700 and the EOS C200.

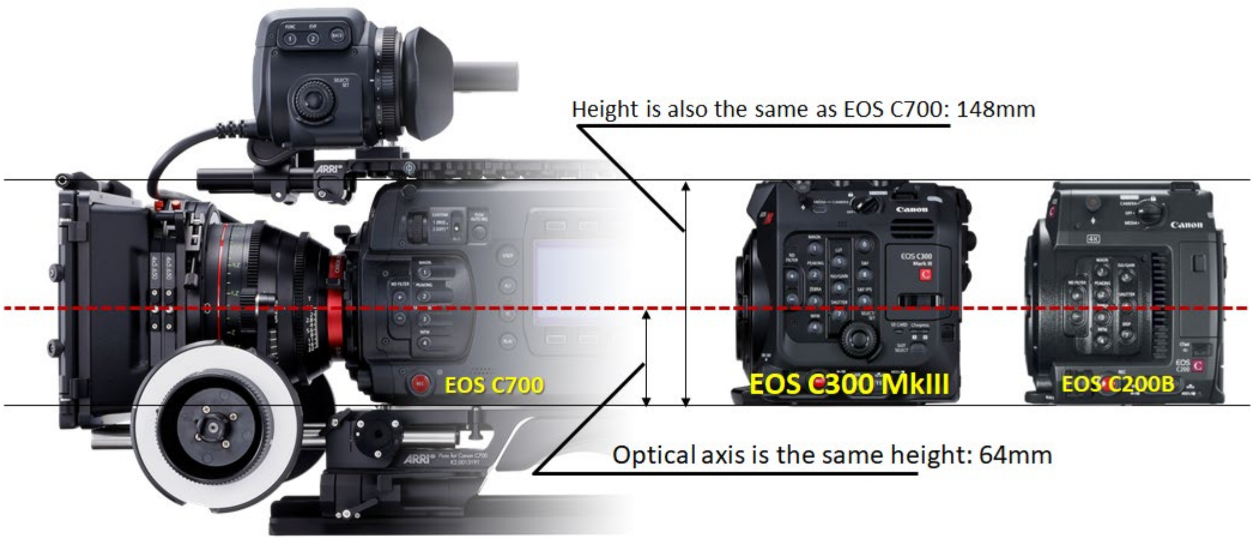
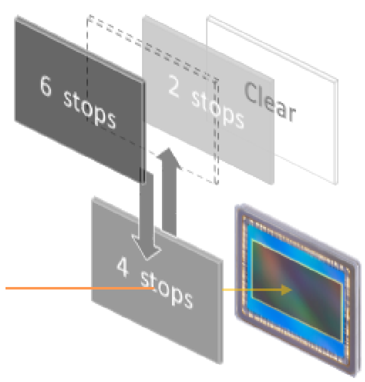


Figure 14 *The aligned optical axis of the three Cinema EOS cameras facilitates accessory sharing*

7.1 Motorized Internal 10-Stop ND System

The EOS C300 Mark III features an internal motorized ND unit whose simple construction makes for easy maintenance and which is durable. Two modes support selection of Clear / 2 / 4 / 6 / 8 / 10 stops. This range enables imaging using more shallow depth of field and bokeh effects even in bright sunlight.



ND Filter Combinations

	ND 1	ND 2	ND 3	Clear	Total
Normal mode	-	-	-	Clear	0 Stops
	-	-	2 Stops	-	2 Stops
	-	4 Stops	-	-	4 Stops
	6 Stops	-	-	-	6 Stops
Extension mode	6 Stops	-	2 Stops	-	8 Stops
	6 Stops	4 Stops	-	-	10 Stops

Extension mode: 8 / 10-Stops

Normal Mode enables the following filters: 0 / 2 / 4 / 6-Stop.

The Extension Mode offers: 8 / 10-Stops by using a “glass + glass” combination.

NOTE: Focus may have to be re-adjusted in this Extension mode

Figure 15 *Showing the simple methodology for selection of a wide range of ND filtering*

8.0 CONNECTIVITY OF BASE MODEL EOS C300 MARK III

The Base Model of the EOS C300 Mark III is well-endowed with critical connectivity that supports a range of single operator style shooting. Prominent among these is the ability to connect the uncompressed 4K video to an external recorder or to an on-set 4K reference display using a single cable – via the 12G SDI interface or the HDMI interface.

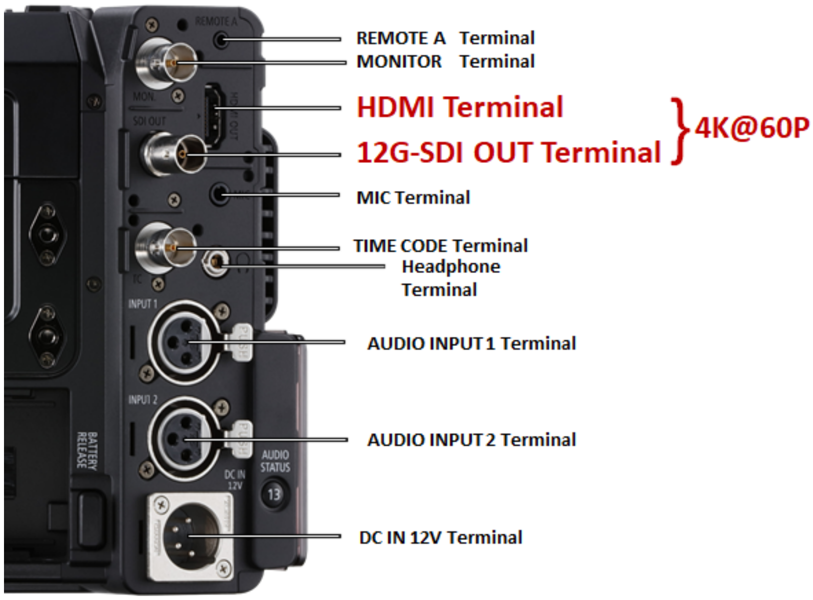


Figure 16 *Showing the Connectivity options in the Base Model*

Figure 17 *EOS C300 Mark III features 12G-SDI and HDMI terminals supporting transfer of uncompressed 4K*

9.0 FUNCTIONALITY OF THE BASE MODEL EOS C300 MARK III

Base Model EOS C300 Mark III camera delivers impressive functionality supporting specialized shooting situations – such as gimbal mount or remote drone shooting – that include internal RAW recording.

Figure 18 *Illustrating two of many specialized shooting applications that can capitalize on the lightweight compact Base Model*

The EOS C300 Mark III camera has a broad array of accessories supplied with the basic camera – a small selection of which are shown in Figure 19 (supplied with the camera). Those accessories support configuration of a handheld camera that is tailored for single operator shooting – seen on the right.

Figure 19 *Showing the selection from the supplied accessories with the EOS C300 Mark III camera that are supplied with the camera and that configure a compact single operator acquisition system*

10.0 EXPANSION UNITS – FOR EOS C300 MARK III

Three optional Expansion Units can be separately purchased – that offer a range of flexible options in system configurability. All three attach to the rear of the Base Model camera – sharing a single common connector and mounting screws as shown on the right in Figure 20.

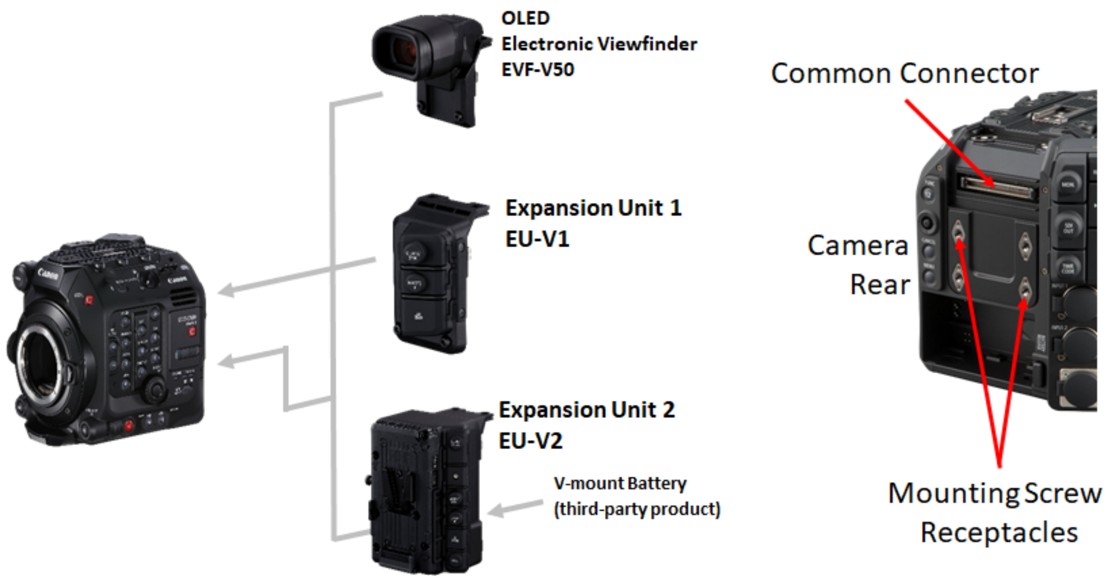


Figure 20 *Showing the three Expansion Units that facilitate different configurations to address multiple shooting styles*

The simplest of the three Expansion Units is the OLED EVF and it helps configure a basic Run & Gun system.

Figure 21 *Attaching the tilting OLED EVF to the camera rear supports a flexible single operator system*

11.0 EXPANSION UNIT 1 – for EOS C300 MARK III BASE MODEL

The very compact Expansion Unit 1 adds further connectivity that configures the camera for remote control and for multi-camera shooting.

Figure 22 *Expansion Unit 1 attaches in the same manner as the optional OLED EVF – as shown in the image on the right (circled in red) mounted to the camera rear*

Expansion Unit 1 broadens the connectivity of the EOS C300 Mark III camera while still maintaining a compact physical system as shown in Figure 23. Genlock, Remote Video Control, and IP Streaming functionalities are added to the Base Model.

Input Signals	Output Signals	Other Signals
GENLOCK (BNC)	SYNC (using same BNC)	ETHERNET (RJ45 supporting 1000BASE-T)
REMOTE B (Round 8-pin jack – for RS-422)		

Figure 23 *Connectivity that Expansion Unit 1 adds to the Base Model EOS C300 Mark III – image on the right shows a fully configured camera with that Expansion Unit mounted*

12.0 EXPANSION UNIT 2 – for EOS C300 MARK III BASE MODEL

The alternative Expansion Unit 2 adds important additional connectivity that configures the EOS C300 Mark III camera for fully-systemized cinematography. It uses the same camera body connector as Expansion Unit 1 and the OLED EVF.

Figure 24 *The Expansion Unit 2 attaches in the same manner as the Expansion Unit 1 OLED EVF*

Input Signals	Output Signals	Other Signals
AUDIO INPUT 3/4 (XLR 3-pin jack) For MIC 600 ohm and -60 dBu For LINE 10K ohm and +4 dBu		**ETHERNET** (RJ45 supporting 1000BASE-T)
GENLOCK (BNC)	**SYNC** (using same BNC)	**LENS** (Round 12-pin jack)
	DC 24V @ 2A (Fischer 3-pin)	
REMOTE B (Round 8-pin jack – for RS-422)	**D-TAP**	

Figure 25 *Outlining the connectivity that Expansion Unit 2 adds to the Base Model camera*

Figure 26 *Showing the EOS C300 Mark III with the Expansion Unit 2 mounted – and supporting a third party V-mount large capacity battery*

Figure 27 *The EOS C300 Mark III camera with Expansion Unit 2 – configured for A-Camera Operation*

13.0 USER INTERCHANGEABLE LENS MOUNTS ON EOS C300 MARK III

Further flanking a design strategy to produce a camera system that is highly configurable, Canon responded to the urgings of many throughout the years in which the Cinema EOS system was steadily rolling out, by making user interchangeable mounts a centerpiece of the design of EOS C300 Mark III camera. Three distinct professional mount kits are available: The Canon EF mount, the Canon EF Cinema Lock mount EF-C), and the long-established PL mount. Optional Canon adapter lens attachments MO-4E (EF-mount) /MO-4P (PL-mount) also supports mounting of a B4-mount 2/3-inch broadcast lens.

Figure 28 *A choice of three established mounts are available and can be changed by the end user*

Only four M3 screws are required to implement the change out to the alternative mounts. Selections from the included shim sets can be added for precision adjustment of the flange back.

Figure 29 *Showing the simplicity of exchanging between the three mounts*

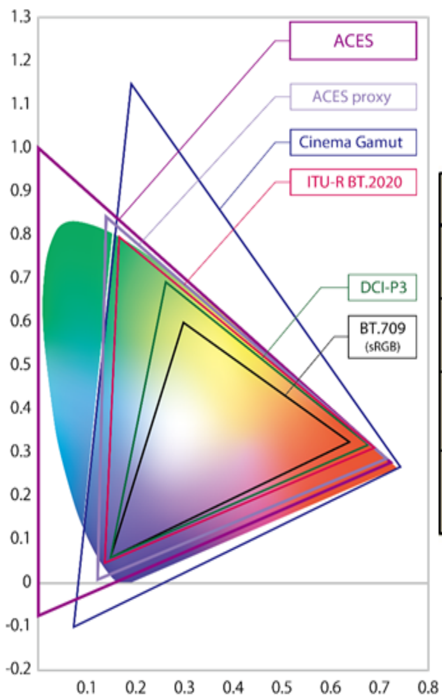
14.0 HIGH DYNAMIC RANGE (HDR) AND WIDE COLOR GAMUT (WCG)

For HDR imaging the EOS C300 Mark III offers an OETF selection of Canon Log2 or Canon Log3 [1]. Canon Log2 supports a 16+ Stop dynamic range and Canon Log3 supports a 14 Stop range. In terms of HDR recording the camera further supports the two standardized HDR systems – the Hybrid Log Gamma (HLG) and the Perceptual Quantization (PQ) system [2] – who's respective primary attributes are summarized in Table 1. This choice is available in the menu system when XF-AVC recording mode is selected, and entails a transformation from the camera's selected native OETF to the appropriate HDR transfer function. Both HLG and PQ are compliant with the latest HDR operational guideline ITU-R BT. 2408 [3] and ITU-R BT.2390 [4].

The camera also offers a selection of standardized color gamuts including BT.709, DCI-P3, and the Wide Color Gamut (WCG) BT. 2020 [5]. In addition, it supports the Canon-developed Cinema Gamut [6] – an ultra-wide color gamut specifically tailored for moviemaking.

When capturing its RAW data the EOS C300 Mark III uses a proprietary Color Gamut, and an OETF that ensures maximum digital coding regardless of the ISO setting. When Canon's Cinema RAW Light is processed, the data can be conformed to a range of OETF curves (Canon Log 2, Canon Log3, and ITU-R BT.709), while color gamuts (ITU-R BT.2020, Canon Cinema Gamut, DCI P3, ITU-R BT.709) can be applied.

TABLE 1 HDR systems and Color Gamuts in EOS C300 Mark III



HLG	High Dynamic Range	PQ
System Optimized for Live Broadcast Television Production	Application	System Optimized for Pre-recorded Movie and Television Production
Scene Referred (OETF Specified in BT.2100)	System Design Premise	Display Referred (EOTF is Specified in BT.2100)
OETF is Compatible with SDR and HDR Displays	Feature	Underlying Perceptual Quantization is based upon Human Visual System
< 18 Stops for 2000 nit system	Theoretical Maximum Dynamic Range **[7]**	< 28 Stops for full 10,000 nit system

14.1 Management of Simultaneous HDR and SDR Capture

The EOS C300 Mark III can capture on-board an HDR reproduction of a given scene while simultaneously capturing the SDR version on an external recorder via the SDI interface.

When optimally exposing for an HDR video image, choices on the level of the related reference diffuse white vary depending upon the nature of the scene and aesthetic decisions made on-set. The EOS C300 Mark III internally derives an SDR version of that HDR video (which is recorded on-board to the CFexpress cards) and this is fed out via the SDI interface for connection to an external SDR recorder. Preparatory to that dual recording an SDR gain setting can be menu selected to adjust the SDR gain difference versus HDR – chosen from a range between -7.5dB and +7.5dB.

Two distinct situations are illustrated in Figures 30 and 31. The first situation is where a bright outdoor scene is accurately exposed for on-board HDR recording. The derived SDR will be reflective of that exposure and will appear overexposed. Decreasing the gain restores proper exposure of that SDR video and then the two parallel recordings can be initiated.

Figure 30 *Accurate HDR exposure of a bright outdoor scene will require a decrease in gain to properly set the effective exposure of the associated SDR video being simultaneously recorded*

An alternative situation might be a low illumination within an indoor setting (Fig. 31) and when this is correctly exposed for on-board HDR recording the associated SDR derivative will appear underexposed. A gain increase is implemented to restore correct exposure, and the two are simultaneously recorded.

Figure 31 *Accurate HDR exposure of a lower illuminated indoor scene will require an increase in gain to properly set the effective exposure of the associated SDR video being simultaneously recorded*

14.2 On-Board and External Recording Options for HDR/SDR/4K/2K

The EOS C300 Mark III camera offers a variety of options in terms of on-board recording while simultaneously supporting external uncompressed recording. In the case of external recording either the 12G-SDI or the HDMI interface may be used.

When recording 4K on-board using the XF-AVC Intra codec an uncompressed 4K or 2K version can be externally recorded. Conversely, if recording 2K on-board then only a 2K uncompressed version can be externally recorded.

When recording HDR on-board either that same HDR or the derived SDR may be externally recorded. If SDR is being recorded on board only that same SDR can be externally recorded.

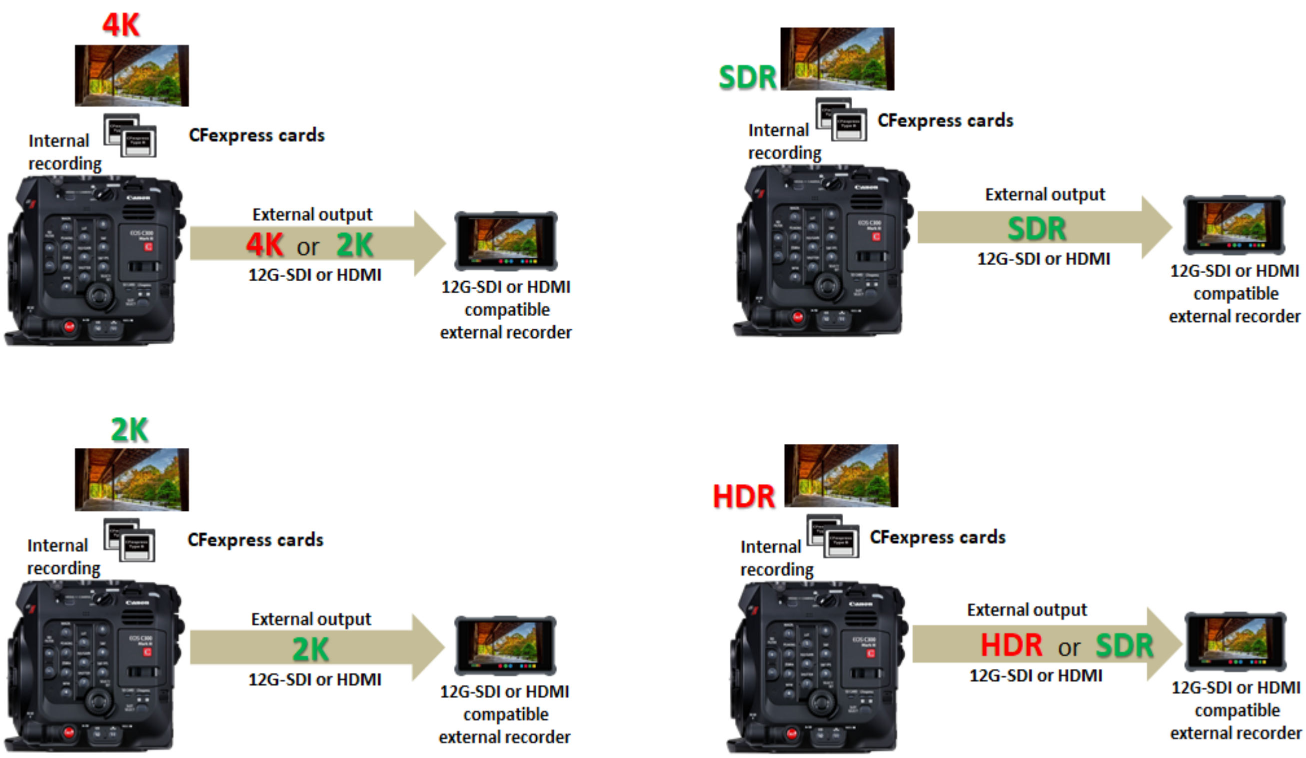


Figure 32 *Allowable combinations of on-board and external recording of HDR / SDR and 4K / 2K*

15.0 NEW SHOOTING ASSISTS THAT ENHANCE FINAL IMAGERY

The EOS C300 Mark III camera embodies novel built-in innovations that either extend image quality itself or add robust protection of the integrity of the high-resolution 4K image. These include:

15.1 Electronic Image Stabilization – that implements 5-axis stabilization when the camera is used with lenses that have no inherent IS – or three-axis control when used with lenses that do have built-in IS (where the lens implements the other two axes of stabilization)

15.2 Diffraction Correction – borrowing from years of technical refinements in Canon professional DSLR, this innovative correction has now been optimized for motion imaging – specifically, the 5.9K downsampled to 4K video – and it compensates for the effects of diffraction when lens aperture is turned down

15.3 Enhanced Dual Pixel CMOS Auto Focus

15.4 Extended range of the alternative Focus Guide

15.5 Recreation of manual focus control as used by professional directors of photography

15.1 Electronic Image Stabilization (EIS)

A first for the Cinema EOS camera family – the EOS C300 Mark III embodies Electronic Image Stabilization (EIS). The camera system offers five-axis correction when coupled to a lens that has no internal image stabilization – the axes are identified in Figure 34. When operating with a lens that does have internal IS the lens manages the Yaw and Pitch compensation while the camera deals with the Roll and Horizontal/ Vertical (X/Y) movements. Central to the EIS system is creation of an active image frame (green area in Figure 33) that is smaller than the full 4K active image itself (approximately 3.7K). The essence of the correction strategy is to move that frame under software control in a manner that counters the image shift created by the external vibrations and restore the image to its central position.

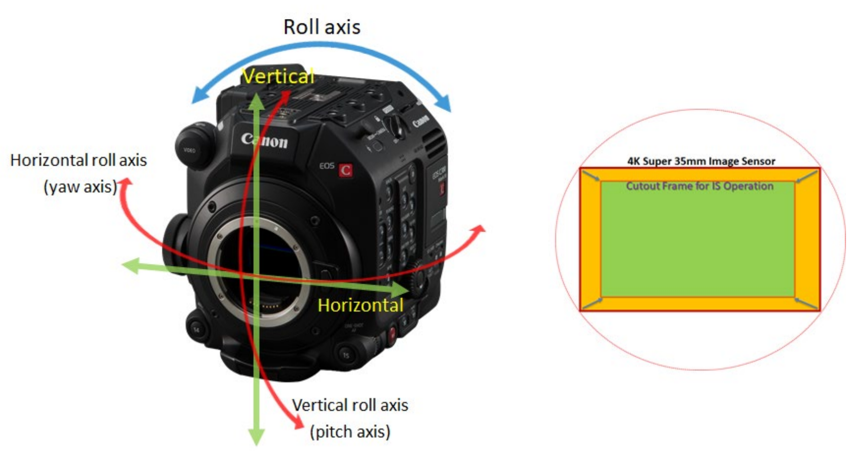


Figure 33 *The EOS C300 Mark III incorporates five-axis Electric Image Stabilization (EIS)*

A gyroscopic sensor mounted within the body of the camera reports on angular rates along reference axes. This data is reported to the DigicDV7 processor that make high-speed calculations that in turn create the appropriate instruction to reposition the selected active image area.

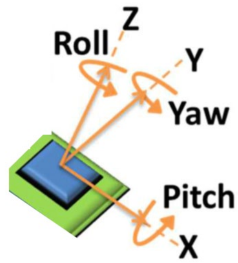


Figure 34 *Gyro sensor mounted in the camera sends information on movements in three axes*

The EIS controlling system is based on motion vectors in the image that aid in the decisions for repositioning the active image area. The correcting action itself is an effective "pan and scan" within the full image sensor raster that repositions the image back to its correct central location.

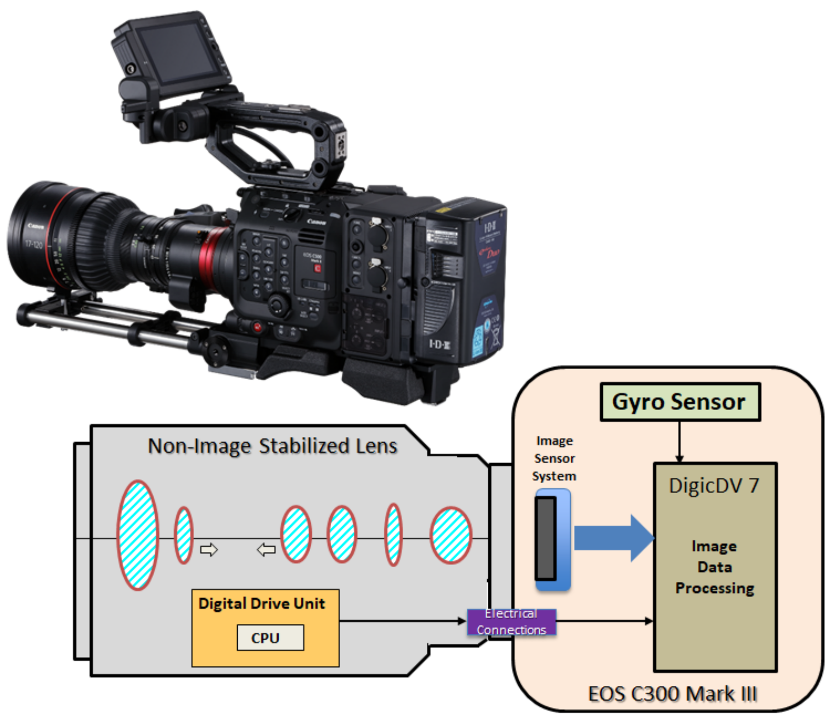


Figure 35 *EOS C300 Mark III operating with a non-IS cine lens – where the camera corrects all five axes*

The EIS system only operates when recording in XF-AVC – it does not function when recording Cinema RAW Light. If recording 4K the image sensor is engaged and the reduced sampling structure shown in Figure 33 is initiated. This does lower the image sharpness somewhat when it is resampled to 4K for recording. However, it is still large so a degree of the Oversampling 4K Processing ensures a very high quality image stabilized 2K.

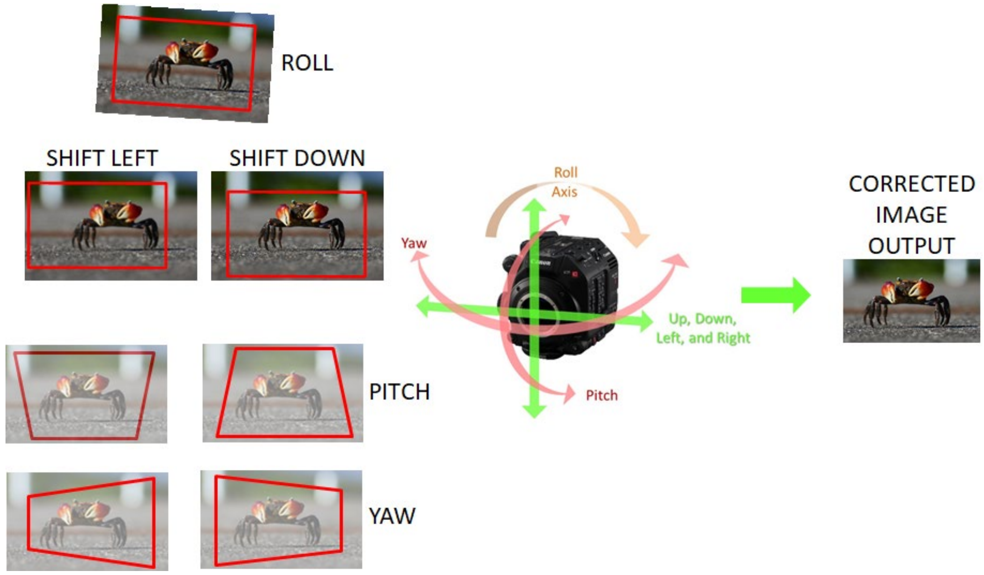


Figure 36 *Showing examples of the image shifts caused by a disturbance in each of the five axes*

The detection of Pitch and Yaw is more complex than the three planar movements (Roll, Shift up/down, and Shift Left/Right) shown in Figure 36. They entail sensing the loss of sharpness and an alteration to image perspective – in the vertical direction associated with a Pitch movement, and in the horizontal direction for the Yaw movement.

Figure 37 shows the camera operating with a lens that has built-in image stabilization. In this case the lens takes over total management of corrections for the Pitch and Yaw disturbances. The camera continues to correct for the Roll, Horizontal, and Vertical.

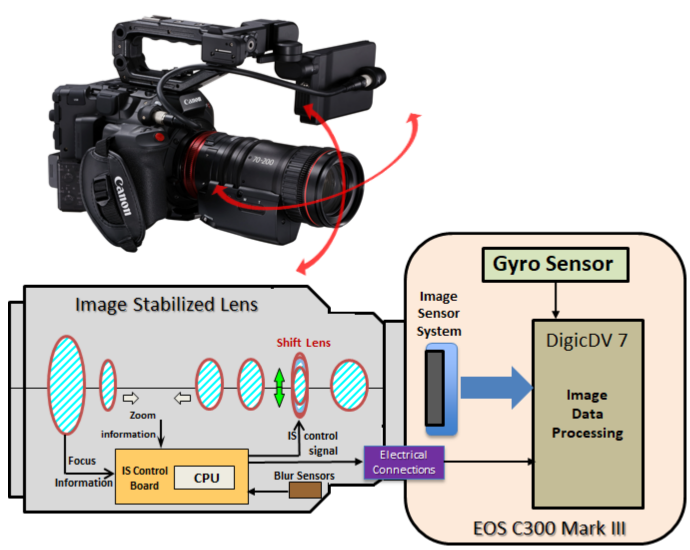


Figure 37 *Showing the EOS C300 Mark III with the image stabilized lens CN-E70-200mm*

15.2 Diffraction Correction System

There are two inescapable optical limitations to the sharpness of the video image originated in any lens-camera system. One is in the lens itself – the optical phenomenon of diffraction – that sees a progressive lowering of optical MTF as the lens aperture is stopped down. In Figure 38 this is shown for an ideal lens (one having no aberrations) – and it applies to all lenses. The second is the roll-off in the optical pre-filtering that must be deployed to counter the aliasing associated with the image sensor sampling – shown as the hypothetical purple curve in Figure 38 – that defines the optical Nyquist frequency of 80 LP/mm (2160/2 vertical samples divided by the vertical image height of 13.8mm).

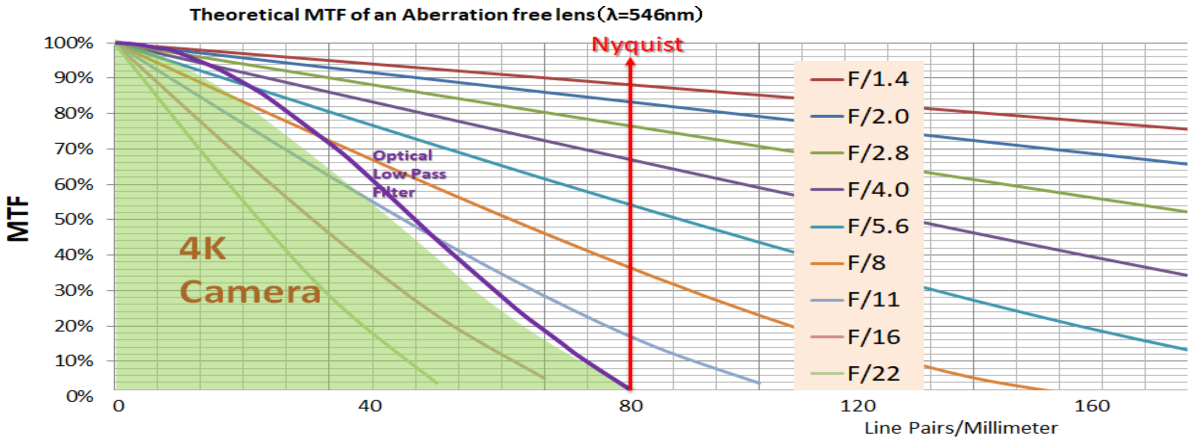


Figure 38 *Summarizing the diffraction action in an ideal lens when mounted on a 4K camera Super 35mm camera (80 LP/mm Nyquist limit) having a hypothetical optical low pass filter*

The Diffraction Correction system within the EOS C300 Mark III camera processor implements real-time compensation for diffraction and for the optical pre-filtering. A correction circuit under control of a recovery filter data base within the DIGIC DV7 implements this compensation. The design of that data base – outlined in Figure 39 – is based upon an assessment of the textural image deterioration as the light passes through the lens aperture followed by the camera pre-filtering. That entailed an analysis of the behaviour of the point spread function of light beams passing through that system which was converted into a mathematical function – termed the optical transfer functions (OTF). This modelling incorporates the alterations to the point spread function as the lens aperture ranges from fully open to fully closed. An inverse function was then created and this formed the basis of the recovery filter data base that would control the correction circuit (in realtime as the lens aperture is operated) to return the video image quality to close to the state associated with wide open aperture setting.

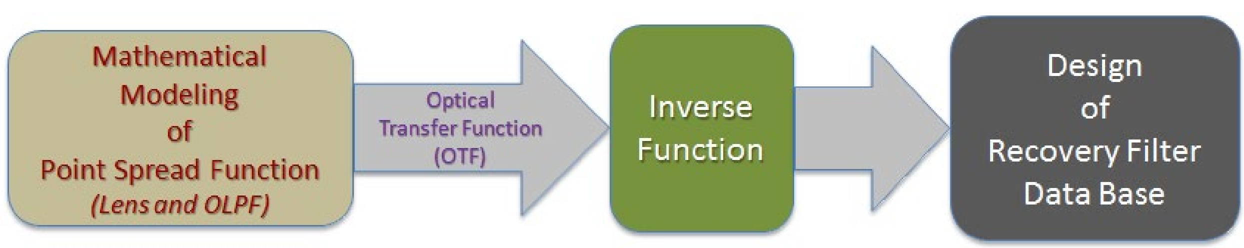


Figure 39 *Principle of the technology underlying the creation of the recovery filter data base used to control the Diffraction Correction system*

For the compensation of diffraction only the lens aperture settings are required – see Figure 40. **Note:** Diffraction correction does not operate on RAW video – only on the XF-AVC recording of 4K DCI / UHD and / 2K / HD video. The lens data base is also separately processed to implement correction for lateral chromatic aberration and for peripheral illumination. Because both of these impairments vary with the zoom/focus/iris settings of the lens, their control data are also reported to the processor which makes appropriate dynamic corrections in synchronism with the operational adjustments of the lens.

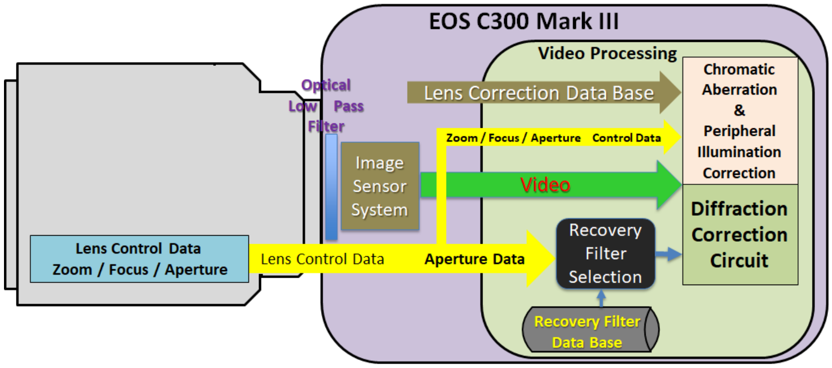


Figure 40 *Showing the stored data files on lens aberrations and the real-time lens operational controls communication across to the video processor within the EOS C300 Mark III camera*

It should be noted that the diffraction correction is not a traditional video sharpening process – but rather it is a restoration based upon reported predictability. It manifests itself by restoring a good deal of the subtle image textural information that is lost by diffraction and pre-filtering – as suggested in Figure 41.

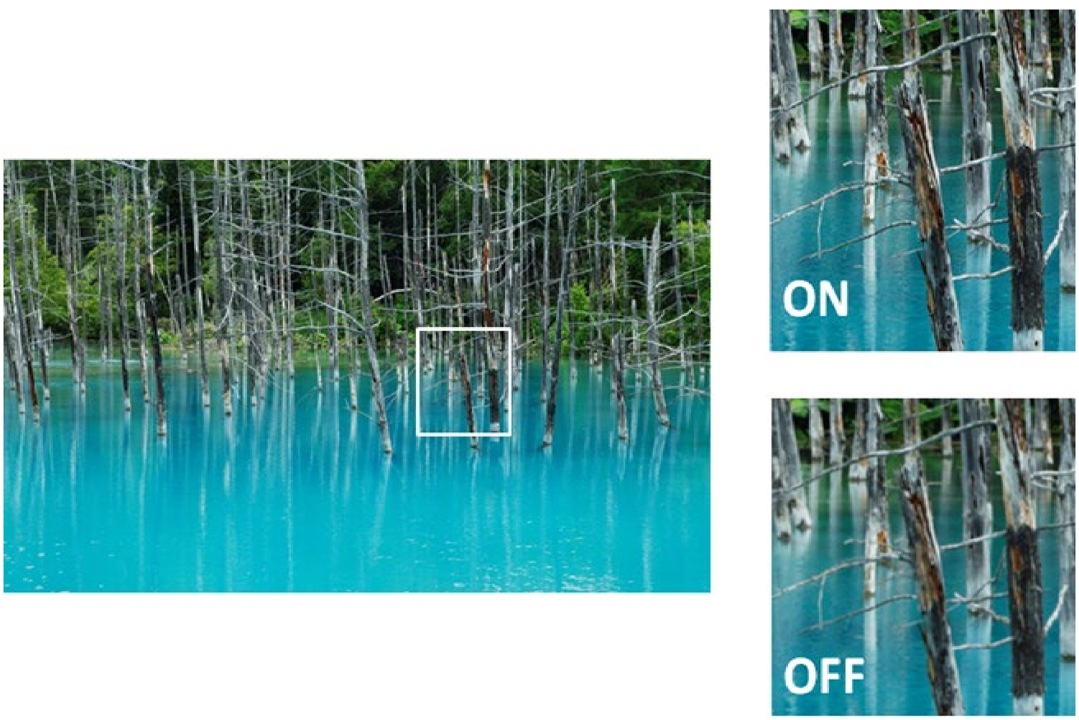


Figure 41 *Illustrating how the correction of diffraction restores textural detail to the image*

15.3 Dual Pixel CMOS Auto Focus System

The EOS C300 Mark III embodies a powerful auto focus system where the sensing of sharp focus takes place within the image sensor photosite itself. Dual photodiodes within each individual photosite create two separate images A and B that facilitate a phase detection system indicating the degree of defocusing. Both A and B data streams are fed to a processing system that makes all of the decision-making and data manipulation associated with the Auto Focus system.

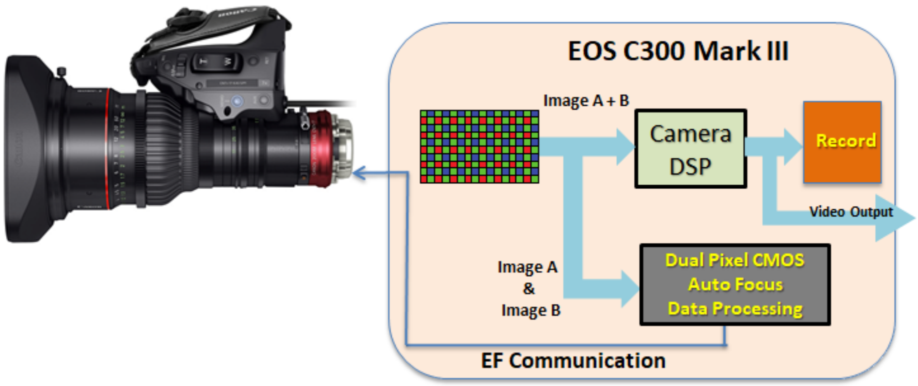


Figure 42 *Showing the separate processing of the dual pixel data from the image sensor for Auto Focus*

EOS C300 Mark III offers high-speed One-Push AF and Continuous AF within a horizontal and vertical range encompassing 80% of total image area. It provides highly accurate Face Detection AF. Sensitivity has been improved and new operational modes added based on extensive user recommendations. Also, DPAF can now be used in 24, 30, 48, 60, and 120fps in all recording formats and crop modes with Face Detection being available in 24, 30, and 60fps.

Figure 43 *Using the LCD Monitor LM-V2, with touch panel support, focusing becomes even more intuitive, with the capability to choose the subject for focusing with a touch of the finger*

15.4 Focus Guide System

For the cinematographer who prefers the creative option of manual focus operation, the dual pixel system can alternatively be switched from the Auto Focus control loop (encompassing the lens focus control) to an open loop system that utilizes the Dual Pixel CMOS AF data processing to instead transfer precision signaling in the camera viewfinder. This signaling indicates the required rotation direction – with arrows as shown in Figure 44 – when starting from a distinctly defocused image to achieve sharp focus, and confirmation when precise focus is achieved (arrows switch to green). In the EOS C300 Mark III the useable display f-number with Dual Pixel Focus Guide has been extended from ~F/11 to ~F/13.

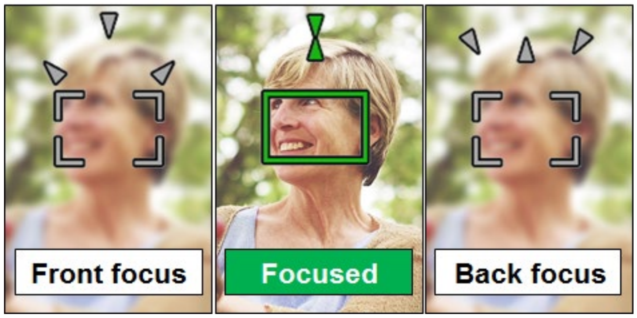


Figure 44 *Principle of the Focus Guide system – where manual actuation of the lens focus control is detected within the image sensor and the data processing signals focusing directions in the viewfinder*

15.5 Augmented Focus Control

Canon conducted studies with a number of high profile DoPs with respect to their creative manipulation of manual control of focus. While diverse in their manipulation, there were common attributes in terms of their respective control of the speed of focus control. This was carefully studied by Canon and has been simulated and incorporated into the electronic control of lens focus when in the Auto Focus mode. This empowers recreation of more natural and smoother control of focus

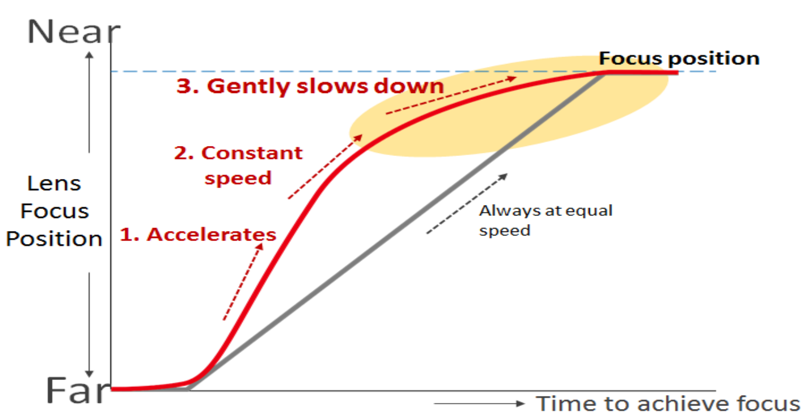


Figure 45 *Showing the basic principle of the augmented AF focus control*

16.0 EOS C300 MARK III – ON-BOARD RECORDING OPTIONS

The EOS C300 Mark III supports three distinct on-board recording file formats – shown below in Figure 46.

Figure 46 *EOS C300 Mark III offers a choice of three high-performance on-board recording codecs*

The three codecs facilitate the following On-Board recording options:

1. 4K Cinema RAW Light and 2K Cinema RAW Light – to two CFexpress cards
2. 4K DCI or 4K UHD digital formats with XF-AVC Intra or LongGOP codec – to two CFexpress cards
3. 2K DCI or 1080P HD digital formats with XF-AVC Intra or LongGOP codec – to two CFexpress cards
4. Proxy video recording using XF-AVC LongGOP – to an SD card (UHS-II)

17.0 RECORDING MEDIA FOR EOS C300 MARK III

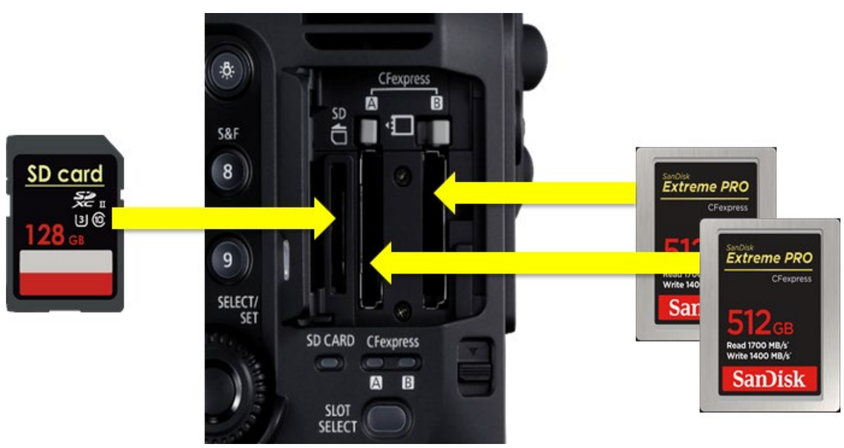


Figure 47 *Two CFexpress 2.0 cards record the 4K Cinema RAW Light or the 4K XF-AVC file formats and an SD card records the Proxy video*

Anticipating the unceasing demands for high-density data storage, the CompactFlash Association has developed the new CFexpress memory card – this was announced in early 2019 [8]. Final standardization of these cards by CFA is anticipated before year's end. Just as SD cards are available in miniSD, microSD, and SD, the CFexpress 2.0 will feature three distinct physical card sizes – Type A, Type B, and Type C. The EOS C300 Mark III uses the Type B memory card.

	Type A	Type B	Type C
Dimension	20mm x 28mm x 2.8mm	38.5mm x 29.8mm x 3.8mm	54mm x 74mm x 4.8mm
PCIe® Interface	Gen3, 1 lane	Gen3, 2 lanes	Gen3, 4 lanes
Stack	NVMe™ 1.3	NVMe™ 1.3	NVMe™ 1.3
Maximum Theoretical Performance	1000MB/s	2000MB/s	4000MB/s

Figure 48 *The newly standardized CFexpress 2.0 memory cards come in three sizes and associated specs*

Five companies have already announced CFexpress cards: Apacer, Delkin, Lexar, ProGrade Digital, and SanDisk. Three Type B cards have so far appeared in the marketplace – and one is shown in Figure 49.

Figure 49 *Showing the first of the CFexpress cards formally tested and approved for the EOS C300 Mark III*

18.0 ON-BOARD RECORDING

Preparation of the 2K Video for On-board Recording:

Given the current enthusiastic international support for 1080P 2K / HD with HDR / WCG the EOS C300 Mark III pays particular attention to the preparation of the RGB video component set prior to recording. The camera implements a special ***"Over Sampling 4K Processing"*** – a processing algorithm that effectively mobilizes the significant resolution of the 4K sensor to produce outstanding image quality for 2K DCI / HD recording. This process starts with a unique parallel readout process within the 4K image sensor that separately extracts the four individual components – including the two spatially offset green components (green having twice as many spatial samples as the red and blue components). This approach totally avoids any of the reconstruction errors inevitably associated with algorithmic debayering and this forms the basis for a clean artifact-free final recorded image.

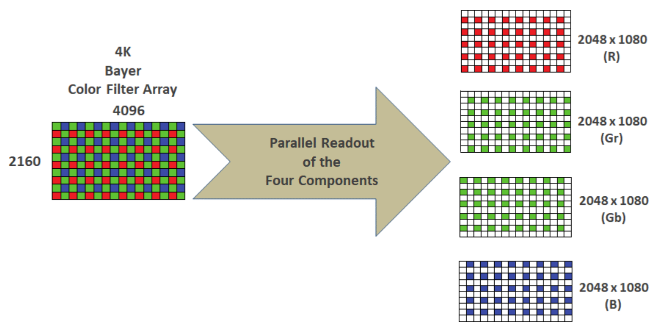


Figure 50 *C300 Mark III image sensor directly reads out four parallel components from the 4K Bayer image sensor*

The extracted four RGrGbB components are separately interpolated – using a new and improved interpolation algorithm – to form three 4K frames as shown in Figure 51. The three RGB frames are then processed – entailing a new refined sharpening system that enhances edge detail.

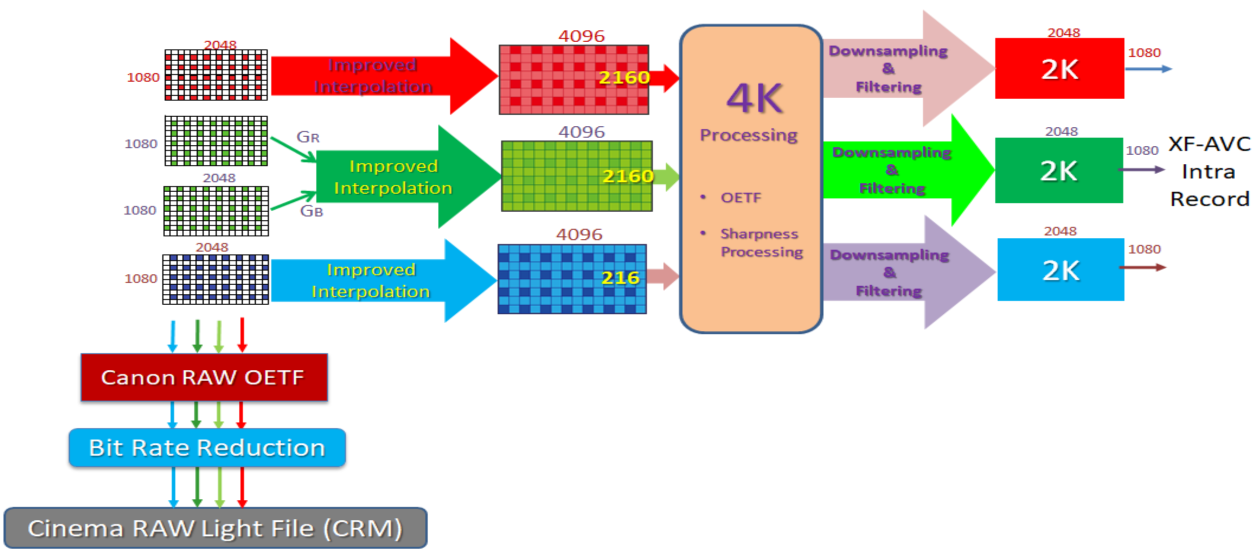


Figure 51 *Three RGB frames each having a digital sampling structure of 4096 (H) x 2160 (V) are created*

A sophisticated bit rate reduction process is applied to these 4K RGB components and then the Cinema RAW Light file is constructed – see Figure 51.

The second critically important step in the overall process is the downsampling of these three processed 4K components to the standardized 2K (selectable as DCI or UHD) components. The downsampling process produces a set of 2K RGB baseband components that have been spatially separated from their respective 1st order sideband signals (which remain centered at 4320 TVL/ph). That same downsampling also elevates the MTF profiles of the RGB components compared to those of natively originated 2K.

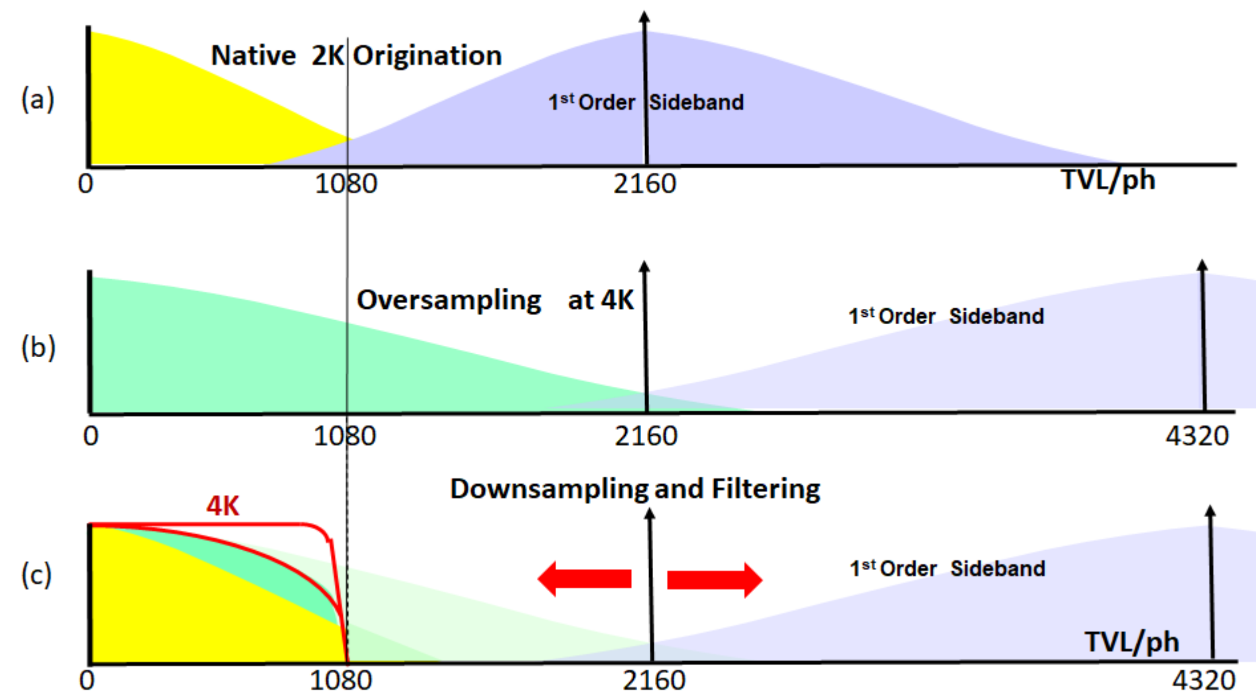


Figure 52 *Comparing the management of the 1st order sideband of the 4K system versus a native 4K system and showing the added MTF (in green) over native 2K*

This all-important opening of spectral space allows implementation of sophisticated filtering that protects that elevated baseband 2K MTF profile while eliminating aliasing.

19.0 ON-BOARD RAW RECORDING

The integrity of the RAW signal is protected by eliminating video processes like the Linear Matrix that defines a particular color gamut, and employing a special RAW OETF that optimizes the digital coding over the entire transfer curve for all ISO settings [1].

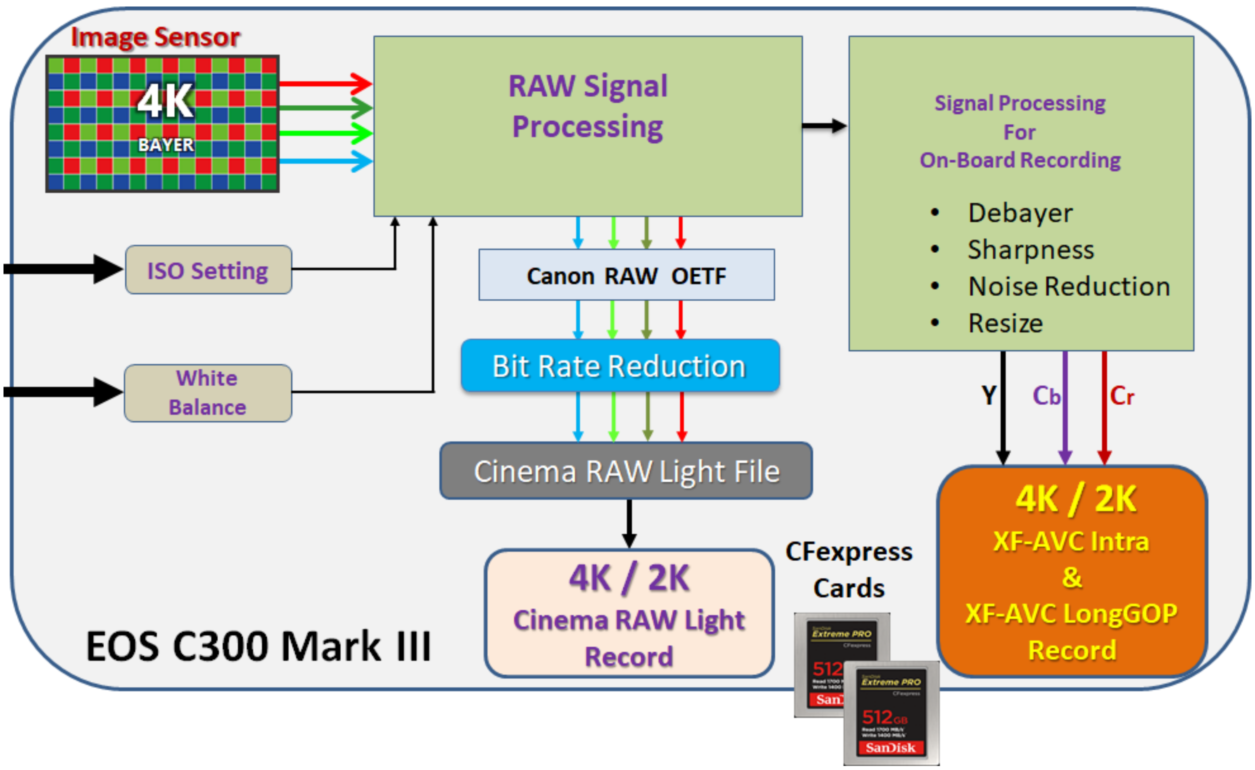


Figure 53 *Showing the preparation of the Cinema RAW Light data file and the separately processed XF-AVC*

TABLE 2 RAW Recording Options in EOS C300 Mark III

Format	Resolution	Color Sampling	Data Rate	Bit Depth	Max Frame Rate (fps)	Recording Media CFexpress Recording Durations 512GB	Slow & Fast
4K RAW	4096 x 2160	RGB Bayer RAW	1Gbps	10-bit 12-bit	59.94P / 50P 23.98P/24P/25P/29.97P	64min	12-120fps (No Audio)
2K RAW (Crop)	2048 x 1080	RGB Bayer RAW	250Mbs	10-bit 12-bit	59.94P / 50P 23.98P/24P/25P/29.97P	256min	12-180fps (No Audio)

DGO is effective up to and including 60 fps

20.0 ON-BOARD RECORDING IN XF-AVC INTRA and LongGOP

Canon **XF-AVC** codec records the following production format options:

1. 4K DCI or UHD formats – YCbCr 4:2:2@10-bit – using XF-AVC Intra codec up to 120 fps
2. 4K DCI or UHD formats – YCbCr 4:2:2@10-bit – using XF-AVC LongGOP up to 120 fps
3. 2K DCI or full HD formats downsampled from 4K – YCbCr 4:2:2@10-bit – using XF-AVC Intra codec – up to 120 fps
4. 2K DCI or full HD formats downsampled from 4K – YCbCr 4:2:2@10-bit – using XF-AVC LongGOP codec – up to 120 fps
5. 2K DCI or full HD cropped from 4K – YCbCr 4:2:2@10-bit using either the XF-AVC Intra or LongGOP codec – up to 180 fps

20.1 Image Sensor Capture Mode for 4K / UHD / 2K / HD Recording

Using a Super 35mm lens and with the EOS C300 Mark III camera capture mode set for 4K the specific video format for recording is selected from a choice of 4K or UHD, 2K or HD. The chosen format is internally formulated via the 4K Oversampling Process and is recorded to the CFexpress card using the XF-AVC Intra codec. Table 3 summarizes the digital video format choices and their associated recording data rates (which vary with the chosen frame rate) and recording durations.

TABLE 3 Recording of YCbCr 4:2:2 4K / UHD or 1080-line 2K/HD (S35 Sensor Mode)

Format	Resolution	Color Sampling & Bit Depth	Data Rate	Max Frame Rate (fps)	File Format	Recording Media CFexpress Recording Durations 512GB	Slow & Fast (No Audio)
XF-AVC S35 Sensor Mode Intra	**4K** (4096 x 2160) or UHD (3840x2160)	4:2:2 10bit 4:2:2 10bit	810 410	59.94P / 50P 23.98P/24P/25P/29.97P	MXF	79min 156min	12-120fps 12-120fps
	2K (2048x1080) or **HD** (1920x1080)	4:2:2 10bit 4:2:2 10bit	310 160	59.94P / 50P 23.98P/24P/25P/29.97P		207min 401min	12-120fps 12-120fps
XF-AVC S35 Sensor Mode LongGoP	4K (4096 x 2160) or UHD (3840x2160)	4:2:2 10bit 4:2:2 10bit	260 160	59.94P / 50P 23.98P/24P/25P/29.97P		246min 401min	12-120fps 12-120fps
	2K (2048x1080) or **HD** (1920x1080)	4:2:2 10bit 4:2:2 10bit 4:2:2 10bit	50 50 50	59.94P / 50P 23.98P/24P/25P/29.97P 59.94i/50i		1284min 1284min 1284min	12-120fps 12-120fps -
	HD (1280x720)	4:2:2 10bit	24	59.94P / 50P		2675min	-

20.2 *Super 16mm Crop Mode*

When a Super 16mm lens is used the camera should be switched to the Super 16mm Crop Mode and the desired video format – from the choice of 2K DCI or HD formats—should then be selected for recording in the XF-AVC codec according to the options shown in TABLE 4.

TABLE 4 Recording of 2K / HD for the Super 16mm Crop Mode

Format	Resolution	Color Sampling & Bit Depth	Data Rate	Max Frame Rate (fps)	File Format	Recording Media CFexpress Recording Durations 512GB	Slow & Fast (No Audio)
XF-AVC S16 Sensor Mode (Cropped) Intra	**2K** (2048x1080) or **HD** (1920x1080)	4:2:2 10bit 4:2:2 10bit	310 160	59.94P / 50P 23.98P/24P/25P/29.97P	MXF	207min 401min	12-180fps 12-180fps
XF-AVC S16 Sensor Mode LongGoP	**2K** (2048x1080) or **HD** (1920x1080)	4:2:2 10bit 4:2:2 10bit 4:2:2 10bit	50 50 50	59.94P / 50P 23.98P/24P/25P/29.97P/ 59.94i / 50i		1284min 1284min 1284min	12-180fps 12-180fps -
	HD (1280x720)	4:2:2 10bit	24	59.94P / 50P		2675min	-

20.3 2K DCI / HD Super 35mm / 16mm YCbCr 4:2:0 8-bit XF-AVC LongGOP

When a Super 35mm lens, or a Super 16mm lens (or a 2/3-inch broadcast lens with the B4 mount adapters – MO-4E for EF-mount /MO-4P for PL-mount) are used on EOS C300 Mark III the camera is set to formulate a choice between 2K or HD video formats which in turn are recorded according to the specifications shown in TABLE 5.

Table 5 YCbCr 4:2:0 8-bit XF-AVC LongGOP Recording

Format	Resolution	Color Sampling & Bit Depth	Data Rate	Max Frame Rate (fps)	File Format	Recording Media SD Card Recording Durations 64GB	 Recording Durations 128GB	Slow & Fast (No Audio)
XF-AVC S35 Sensor Mode Long-GoP	**2K** (2048x1080) or **HD** (1920x1080)	4:2:0 8bit 4:2:0 8bit	35 24	59.94P / 50P 23.98P/24P/25P/29.97P	MXF	240 min 350 min	485 min 705 min	12-180fps 12-180fps
	HD (1280x720)	4:2:0 8bit	17	59.94P / 50P		495 min	995 min	-
XF-AVC S16 Sensor Mode (Cropped) Long-GoP	**2K** (2048x1080) or **HD** (1920x1080)	4:2:0 8bit 4:2:0 8bit	35 24	59.94P / 50P 23.98P/24P/25P/29.97P		240 min 350 min	485 min 705 min	12-180fps 12-180fps
	HD (1280x720)	4:2:0 8bit	17	59.94P / 50P		495 min	995 min	-

21.0 SLOW AND FAST MOTION

TABLE 6 Note: Yellow Colored boxes are the Dual Pixel CMOS Auto Focus supported frames

Sensor mode	Frame Rate	Shooting Frame Rate																							
Super 35	59.94p	15	30	44	48	52	56	**60**	90	120															
	29.97p	15	22	24	26	28	**30**	32	36	40	44	48	52	56	60	90	120								
	23.98p	12	16	18	20	22	**24**	26	28	30	32	36	40	44	48	52	56	60	72	96	120				
	24.00p	12	16	18	20	22	**24**	26	28	30	32	36	40	44	48	52	56	60	72	96	120				
	50.00p	15	25	34	38	42	46	**50**	54	58	60	75	100	120											
	25.00p	15	17	19	21	23	**25**	26	28	30	34	38	42	46	50	54	58	60	75	100	120				
Super 16	59.94p	15	30	44	48	52	56	**60**	90	120	150	180													
	29.97p	12	15	22	24	26	28	**30**	32	36	40	44	48	52	56	60	90	120	150	180					
	23.98p	12	16	18	20	22	**24**	26	28	30	32	36	40	44	48	52	56	60	72	96	120	144	168	180	
	24.00p	12	16	18	20	22	**24**	26	28	30	32	36	40	44	48	52	56	60	72	96	120	144	168	180	
	50.00p	15	25	34	38	42	46	**50**	54	58	60	75	100	120	150	175	180								
	25.00p	15	17	19	21	23	**25**	26	28	30	34	38	42	46	50	54	58	60	75	100	120	125	150	175	180

Digital Format	Frame Rate	Slow / Fast Motion Rates
3840 x 2160 (150 Mbps)	59.94P 29.97P 23.98P	x2, x4, x10, x20, x60, x120, x600, x1200 x 0.5 x 0.8
1920 x 1080 (35 Mbps) 1920 x 1080 (17 Mbps)	59.94P 29.97P 23.98P	x0.5, x2, x4, x10, x20, x60, x120, x600, x1200 x0.25, x0.5 x0.2, x0.4, x0.8
1280 x 720 (8 Mbps) 1280 x 720 (4 Mbps)	59.94P 29.97P	x2, x4, x10, x20, x60, x120, x600, x1200 x0.5

Figure 54 *A new direct access to the Slow / Fast Motion mode offered by a dedicated button*

22.0 AUDIO RECORDING

The EOS C300 Mark III supports four channels of LPCM 24-bit / 48 kHz audio inputs. Two channels from the mic jack (1 input) in the body, and the internal monaural mic (1 input). Two channels of LINE audio input is supported from the main camera XLR input terminals – termed Inputs 1 and 2. These two inputs will support standardized AES / EBU digital inputs.

Using the EU-V2 Expansion Unit extends recording of analog audio sources via the four separate INPUT terminals – see Figure 55. Inputs can be selected from these options – and their respective specifications are shown in Table 7.

One example of the potential of this audio system flexibility is suggested in Figure 55. Two channels of audio signal are recorded from the boom pole microphone and the reporter's hand microphone. Two channels of ambient sound can also be recorded from the stereo microphone attached to the camera when using the Expansion Unit 2.

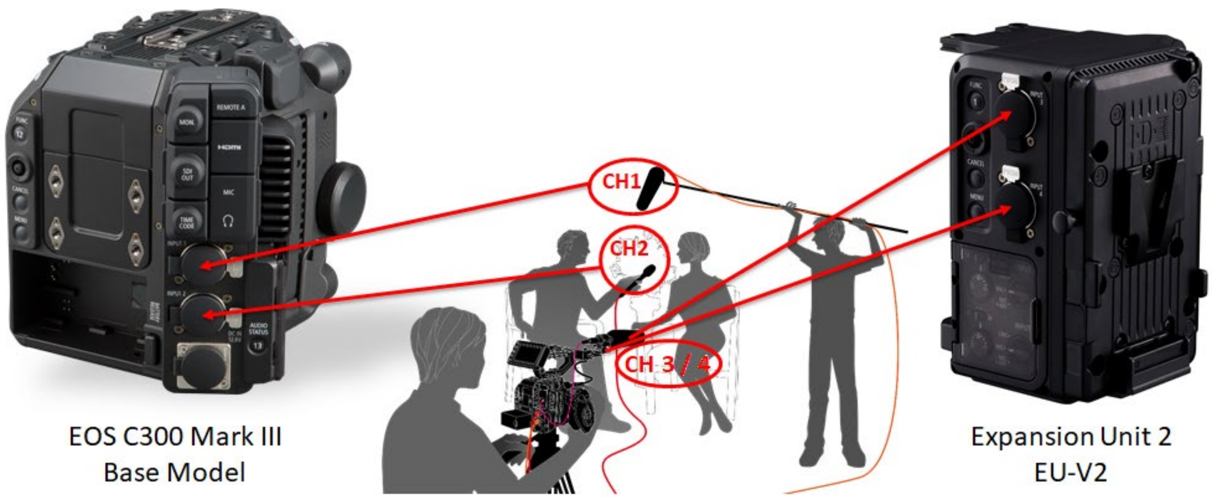
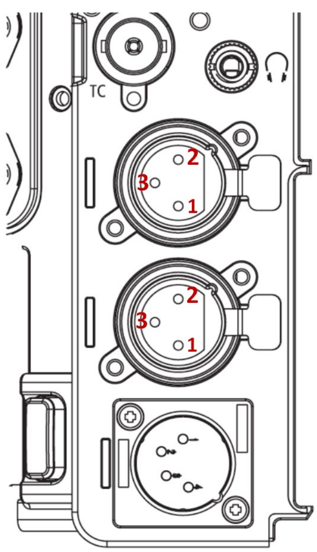


Figure 55 *Expansion Unit 2 extends the camera's capability to four channels of independently controlled analog audio*

TABLE 7 SPECIFICATIONS RELATING TO ALL OF THE AUDIO INTERFACES OF C300 MARK III AND EU-V2

EOS C300 Mark III	Terminal	Input Impedance	Sensitivity	ATT	Standard	Supply Voltage
Camera Body INPUT 1 and 2	XLR 3-pin jack (Balanced)					
MICROPHONE	1 Shield 2 Hot 3 Cold	600 Ohm	-60 dBu	20 dB		48V DC
LINE		10K Ohm	+4 dBu			
AES/EBU		110 Ohm			AES3 48 kHz 24-bit 2-Channel	
MIC Jack	Ø 3.5mm Stereo mini-jack Unbalanced	1.5K Ohm	-65 dBV	20 dB		2.4 V DC
Extension Unit 2 INPUT 3 and 4	XLR 3-pin jack (Balanced)					
MICROPHONE	1 Shield 2 Hot 3 Cold	600 Ohm	-60 dBu	20 dB		
LINE		10K Ohm	+4 dBu			



23.0 VIDEO CONNECTIVITY – OUTPUT SIGNAL FORMATS

Three key video output terminals on the EOS C300 Mark III are central to supporting the many possible system configurations – the 12G-SDI, the HDMI, and the MONITOR out. TABLE 8 lists these in relation to the specific sensor readout mode that has been selected.

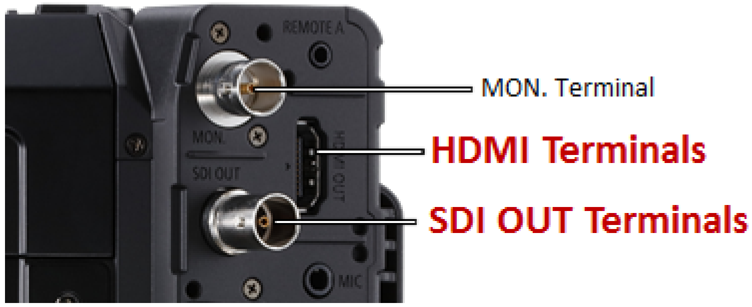


TABLE 8 UNCOMPRESSED OUTPUT VIDEO FORMATS DURING EACH CAPTURE MODE

Sensor mode	CFexpress recording (x2)				12G-SDI output YCC422 10 bit	HDMI output* YCC422 10 bit	MON. output* YCC422 10 bit
	Format		Signal	Resolution	Resolution	Resolution	Resolution
Super35	Cinema RAW Light		RAW 12 / 10 bit	4K DCI	4096 x 2160p	4096 x 2160p / 1920 x 1080p 1920 x 1080i / 1280 x 720p	2048 x 1080p / 1920 x 1080p 1920 x 1080i / 1280 x 720p
	XF-AVC	All-I LongGOP	YCC422 10 bit	4K DCI			
				4K UHD	3840 x 2160p	3840 x 2160p / 1920 x 1080p 1920 x 1080i / 1280 x 720p	1920 x 1080p / 1920 x 1080i 1280 x 720p
				2K DCI	2048 x 1080p	1920 x 1080p / 1920 x 1080i 1280 x 720p	2048 x 1080p / 1920 x 1080p 1920 x 1080i / 1280 x 720p
				FHD	1920 x 1080p		1920 x 1080p / 1920 x 1080i 1280 x 720p
				FHD interlace	1920 x 1080i	1920 x 1080i	1920 x 1080i
				HD	1280 x 720p	1280 x 720p / 1920 x 1080i	1280 x 720p / 1920 x 1080i
Super16	Cinema RAW Light		RAW 12 /10 bit	2K DCI	2048 x 1080p	1920 x 1080p / 1920 x 1080i 1280 x 720p	2048 x 1080p / 1920 x 1080p 1920 x 1080i / 1280 x 720p
	XF-AVC	All-I LongGOP	YCC422 10 bit	2K DCI			
				FHD	1920 x 1080p		1920 x 1080p / 1920 x 1080i 1280 x 720p
				FHD interlaced	1920 x 1080i	1920 x 1080i	1920 x 1080i
				HD	1280 x 720p	1280 x 720p / 1920 x 1080i	1280 x 720p / 1920 x 1080i

*HDMI terminal and MON. terminal cannot output simultaneously

*HDMI terminal and MON. terminal cannot output simultaneously

24.0 OUTPUT VIEWING LUTS

For video verification and simple editing – gradation and color gamut can be corrected using a Preset Viewing LUT for each output. Relevant outputs are MON., HDMI, SDI OUT, and VIDEO terminal/EVF-V50 – see Figure 56. LUTs affect not only images but also assistive display such as zebra, as well as UI elements

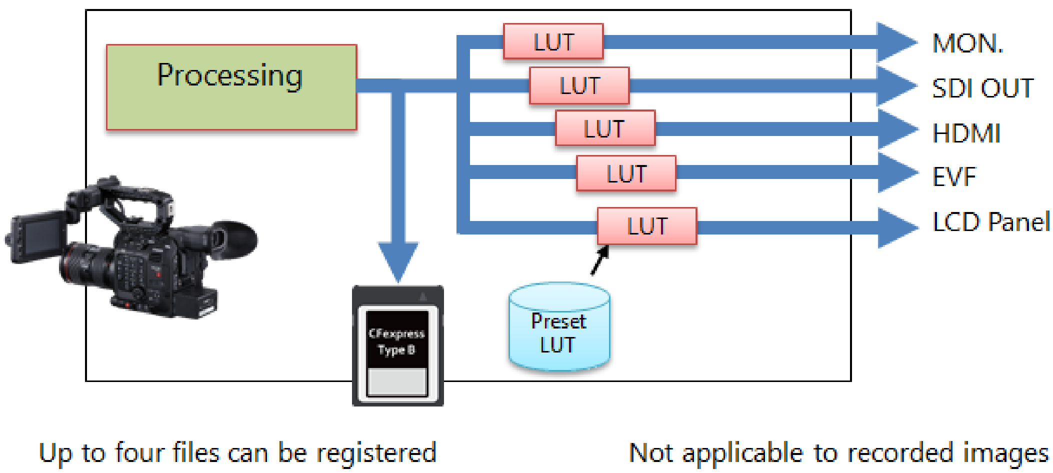


Figure 56 *Showing the preset LUTs*

User LUTs can also be created – via the chosen system (DaVinci Resolve, and .cube) – as shown in Figure 57 – and then be loaded via an SD card and separately stored as shown.

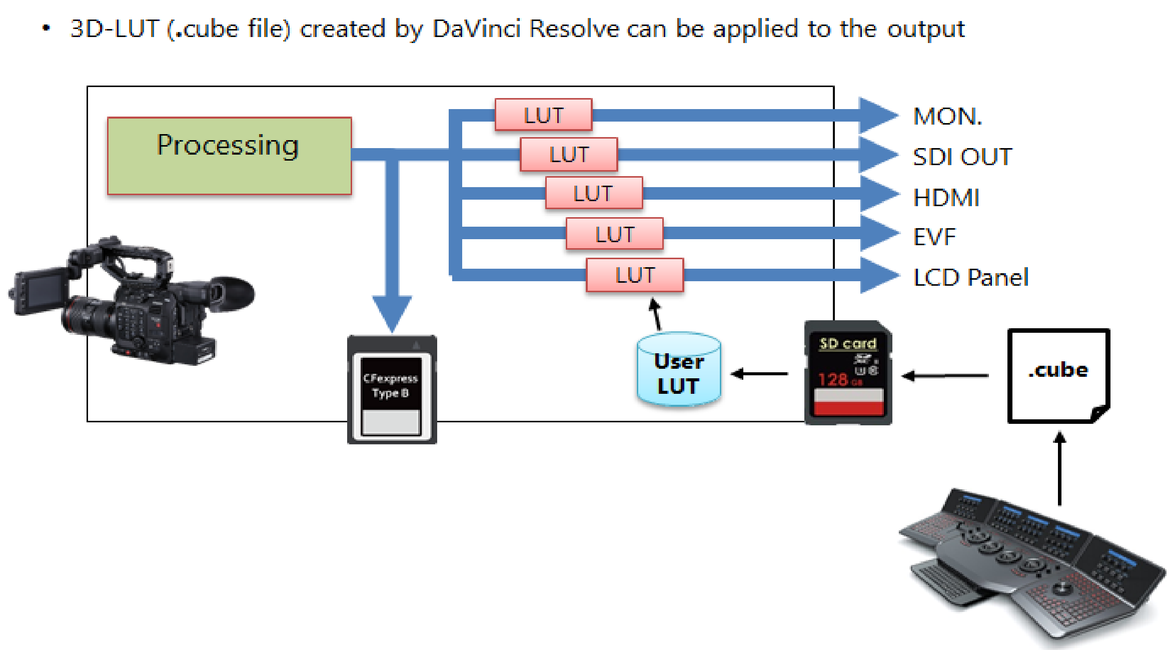


Figure 57 *Individual LUTS can be assigned to each of the camera output interfaces*

For video verification and simple editing, gradation and color gamut can be corrected using a LUT for each Output – per the Table 9 below.   XF-AVC / RAW recording is not affected by application of these LUTs.

TABLE 9 OUTLINING THE INDIVIDUAL LUTs THAT CAN BE APPLIED TO THE OUTPUT SIGNALS

Viewing LUT / Output Destination	BT.709	BT.2020	DCI	ACES proxy	PQ	HLG	HDR 1600%/ 400%	User LUT
SDI OUT (without OSD)	O	O	O	O	O	O	-	O
MONITOR (with OSD)	O	O	O	O	O	O	-	O
HDMI (with OSD)	O	O	O	O	O	O	-	O
VIDEO Terminal (with OSD)	O	-	-	-	-	-	O	O
EVF-V50 (with OSD)	O	-	-	-	-	-	O	O

25.0 REMOTE CONTROL OF EOS C300 Mark III

25.1 Remote video Control Panel

When the EOS C300 Mark III is mounted on a crane or jib-arm all of the basic video functions can be controlled from the RC-V100 remote video panel.

Figure 58 *The RC-V100 video control panel supports remote control of video and also lens zoom, iris, and focus (including the Canon CINE SERVO lenses)*

25.2 Browser Remote Operation

After connecting a network device to the camera via specified 3rd party Wi-Fi adapter the Browser Remote function allows the camera to be remotely operated from a tablet or other terminal – including remote focusing operations. A new accessory unit WFT-E9 connected to the camera supports connection to the wireless network.

Figure 59 *New Wireless File Transmitter (WFT) model WFT-E9a*

The new WFT-E9a has added a new high speed port connection, dual antenna, and faster speeds (up to 270 Mbps) compared to its predecessor.

The selected focusing area can be moved by touch on the tablet. In situations such as shooting from a crane or drone aerial shooting this empowers accurate AF shooting.

Figure 60 *Browser Remote supports the control of the EOS C300 Mark III from a tablet*

25.3 GPS

Separately, the EOS GPS Receiver GP-E2 can also be connected to EOS C300 Mark III (using a USB cable) and provides location and time information that is recorded during shooting.

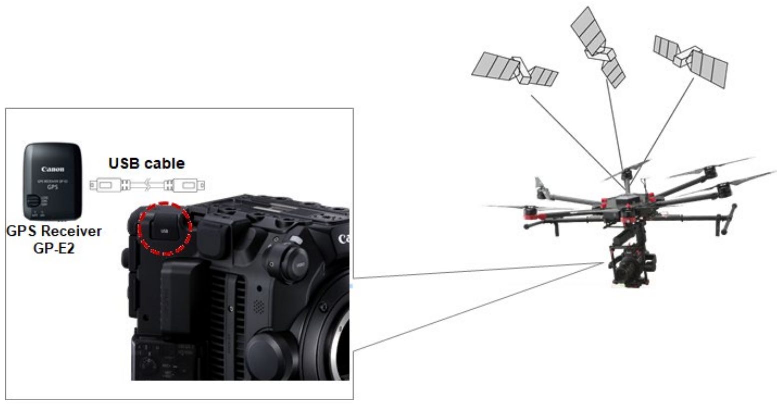
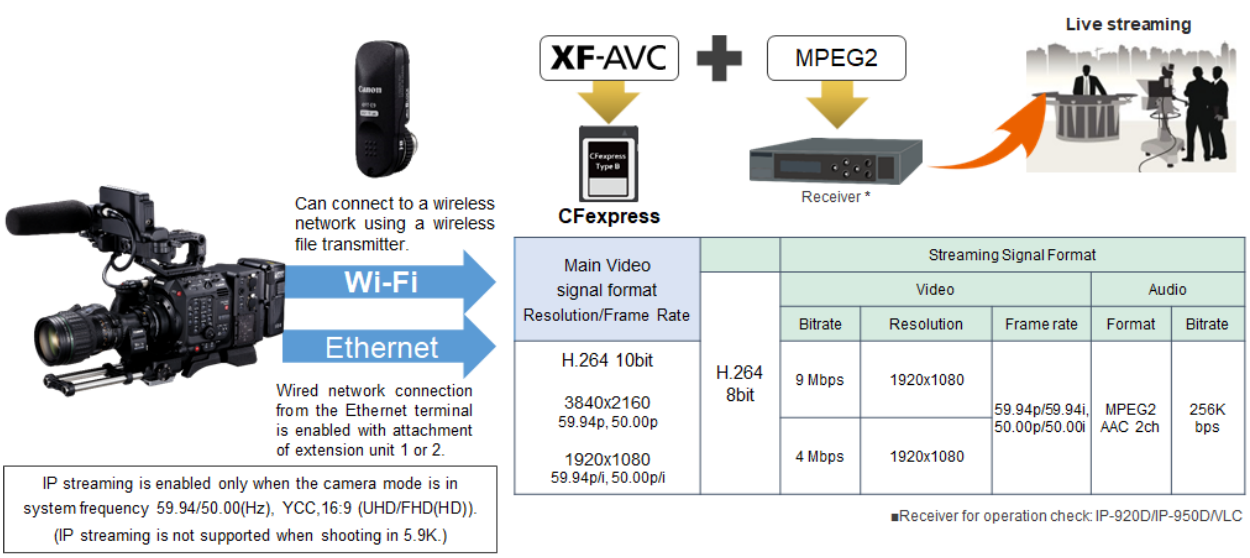


Figure 61 *A GPS receiver can simply connect to the USB port on the EOS C300 Mark III and provide location and time information*

26.0 IP STREAMING

The EOS C300 Mark III supports IP streaming via the Ethernet terminal that is on both Expansion Units 1 and 2. This provides live video streaming in real time during the shooting. When the Main Video is progressive scan both progressive and interlace streaming is possible. If the Main is interlace scan only then only interlace streaming is possible.



Main Video signal format Resolution/Frame Rate		Streaming Signal Format				
		Video			Audio	
		Bitrate	Resolution	Frame rate	Format	Bitrate
H.264 10bit 3840x2160 59.94p, 50.00p 1920x1080 59.94p/i, 50.00p/i	H.264 8bit	9 Mbps	1920x1080	59.94p/59.94i, 50.00p/50.00i	MPEG2 AAC 2ch	256K bps
		4 Mbps	1920x1080			

Figure 62 *The Ethernet connectivity supports streaming of video while the EOS C300 Mark III is recording*

27.0 POWER CONSUMPTION

Two battery sizes are available for the EOS C300 Mark III camera – the BPA-60 and the BPA-30. Using the CG-A10 / CGA-20 battery chargers the times taken for charging are approximately 5 hours for the BPA-60, and approximately 2 hour and 50 minutes for the BPA 30.

Figure 63 The two battery sizes available for the EOS C300 Mark III

The power consumption and continuous recording durations for the two primary modes of recording are shown in the following table:

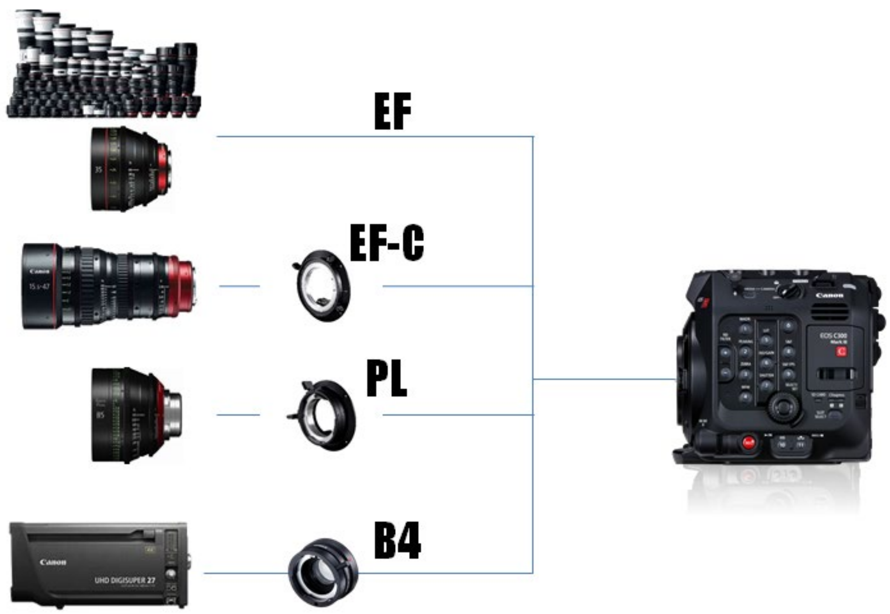
Video Format	Sensor Mode Resolution	Frame Rate (fps)	Power Consumption (Watts)	Continuous Record Duration BP-A30 (3100 mAh)	Continuous Record Duration BP-A60 (6200 mAh)
RAW	Super 35mm (4096 x 2160)	59.94 / 50	34	50 min	115 min
	Super 16mm (2048 x 1080)	59.94 / 50	28	60 min	150 min
XF-AVC	Super 35mm (4096 x 2160)	59.94 / 50	33.4	50 min	125 min
	Super 16mm (2048 x 1080)	59.94 / 50	28	60 min	150 min

DC OUT: 24V 2.0A nominal value (max. output current) via jack Fischer Connectors 3-pin connector

Battery terminal: 14.4 V DC (battery pack),
DC 12–20V (using V-mount battery with EU-V2)
D-TAP terminal D-TAP connector, output: max. 50 W nominal value

28.0 SUMMARY

The EOS C300 Mark III camera design reflects a multiplicity of worldwide recommendations and suggestions from the many users of earlier Cinema EOS cameras. Configurability and expandability are the core underpinnings of its design. Anticipating shooting flexibilities to meet the many disparate system configurations required in movie production, television drama origination, commercial production, sports and HOW production – was a central design imperative. In addition, experiences gained over the past half-decade assigned a priority to better enablement of lens choices. Central to this was facilitating exchangeable lens mounts – as summarized below.



The intricacies and variances in system connectivity required to support single operator acquisition, as well as various degrees of sophistication in systemized cinematography systems spurred development of a novel modular design.

On the video signal side, separate processing innovations in the EOS C200 and EOS C700 cameras became springboards for development of further performance improvements in the EOS C300 Mark III:

1. The new Dual Gain Output (DGO) image sensor extends the camera dynamic range to 16+ Stops (using Canon Log2 OETF) – with specific enhancement to reproduction of image detail in low light portions of a scene

2. The processing of the 4K RGB components were enhanced prior to the Oversampling 4K Processing that is used to create very clean 2K RGB components

3. The recording performance of the on-board Cinema RAW Light (initially introduced in the EOS C200) was extended in the EOS C300 Mark III by improved processing of the RAW signal itself

4. The ability to capture 4K RAW at 10/12-bit on-board the compact 3.8lb. EOS C300 Mark III Base Model offers an innovative B and C camera for high-end productions (single camera operator, or when mounted in a drone, on a crane, or on a motorcycle etc.)

5. Diffraction correction is a new innovation in a digital motion imaging camera that broadens freedoms in lens aperture settings

6. The Electronic Image Stabilization (EIS) system will be a boon to single operator shooting – being especially effective in handheld shooting when the camera operator is also in motion

7. Further improvements to the Dual Pixel CMOS Auto Focus extends the applicability of this function to many challenging shooting scenarios

8. Equally important, the same Dual Pixel technology empowers the alternative Focus Guide to support manual focus operation – by signaling in the viewfinder when precision focus is achieved. That signaling indicates *the direction of manual focus rotation required to seek precise focus on a chosen subject* within a scene (a moveable viewfinder cursor is positioned on that subject). The Focus Guide mode has been improved to operate up to an aperture setting of F/13.0.

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