

## Technologies Explained – New XF Camcorders

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### **MPEG-2, 4:2:2, 50Mbps codec**

Most widely-used camcorder recording formats use compression to reduce the bit-rate and file size of full HD video to more manageable levels. MPEG-2 is a professional compression format widely supported by hardware and software manufacturers. It is also less hardware-intensive than the AVCHD compression format.

MPEG-2 compression takes advantage of the redundancy between successive frames of video, which often contain similar picture information, even when the image has moved slightly from one frame to the next.

Sampling at 4:2:2 takes advantage of limitations in the human visual system to avoid transmission of unnecessary colour information. The human eye is more sensitive to black and white detail than colour. The 4:2:2 ratio refers to the ratio between black and white and colour. 4:2:2 sampling is especially useful where advanced video processing, such as compositing and colour correction, is required.

XF305 and XF300 capture twice the colour detail of camcorders which use 4:2:0 sampling, and combined with Canon's powerful DIGIC DV III processor and 3CMOS sensor array, offer unrivalled image quality for camcorders of their category.

### **MXF file format**

The Canon XF305 and XF300 record Material eXchange Format (MXF) files. MXF is an open source, international standard which defines the container format for exchanging video and audio content in network systems. The standard is published and MXF is now widely used. Canon has adopted MXF as a "wrapper" for MPEG-2 4:2:2 encoded video stream and linear PCM audio captured by the XF305 and XF300. In order to ensure that the most popular non linear editors (NLEs) can read the new MXF files from the XF305 and XF300, plugins have been developed for the following packages prior to launch:

- Apple – Final Cut Pro
- Adobe – Premier
- AVID – Media Composer
- Grass Valley - Edius

There are many combinations of valid definitions for how MXF files hold video and audio information. XF305 and XF300 use the OP1a template, which is one of the most widely supported versions of MXF, storing one video stream and two audio streams together with camera and user metadata.

Metadata stored in the MXF wrapper can contain information from the user and the camera that defines the image content and where and how it was captured. This helps with retrieval of media assets from archive and large content libraries.

### Canon L-series HD Video Lens

The camcorders feature a new lens design, founded on Canon's decades of video lens development experience. The aim has been to ensure the best possible HD performance while keeping the size and weight appropriate to a handheld camcorder.

The lens features a range of optical technologies designed and produced by Canon, each of which confers specific benefits. Hi-UD (high index, ultra low dispersion) glass helps to prevent chromatic aberration (CA) and reduce overall lens size; UD (ultra low dispersion) elements reduce CA further, particularly at the telephoto end of the zoom; UA (ultra high refractive index aspherical) elements reduce size and weight even more and in combination with standard aspherical elements help to high achieve ultra-high resolution. Overall, the new lens contains 17 lens elements in 14 groups, including five aspherical surfaces, and remains remarkably compact given its tremendous light-gathering capability (f1.6 – f2.8 over the 18x zoom range).

To ensure long term durability, the lens has a metal iris (six-leaf) and three glass ND filters. It also incorporates a refined optical image stabilisation system.

Together these features ensure performance that sets a new benchmark for this product sector.

### Optical Image Stabilizer Systems

The lens mechanism in XF305 and XF300 incorporates sophisticated optical image stabilisation, designed specifically to stabilise the captured image when the camera is hand supported or used on-the-move. Movement detection is performed by angular speed sensors and vector detection of image movement occurs via the image sensors. The combination of the two results in refined compensation for camera shake.

Canon's advanced OIS has three modes of operation:

Dynamic	The degree of angular correction is varied according to zoom position. This mode provides the maximum suppression of operator shake at the wide end of the zoom range and is designed to reduce the effects most commonly noted when walking whilst shooting.
Standard	Provides a constant angle of stabilisation throughout the zoom range for maximum flexibility of operation.
Powered	Designed to counteract vibration when at the telephoto end of operation.

## Canon Full HD CMOS

Today, after years of development and refinement, Canon possesses unrivalled expertise in the design and manufacture of CMOS imaging sensors. In 2006, Canon's investment in in-house R&D resulted in the introduction of its first CMOS sensor designed for HD video capture.

Continual refinement of this industry-leading technology has allowed Canon to develop a new 1/3 type 3CMOS image sensor system. Each sensor features 2.07 effective megapixels (horizontal 1920 pixels x vertical 1080 pixels) through which to capture Full HD video. Each sensor captures one of the three primary colours to provide exceptional colour accuracy, wide dynamic range and low noise.

Compared with traditional CCD sensors, CMOS brings numerous advantages to HD imaging. It makes multi-channel readout of pixel sites possible, enabling much faster processing of high definition (HD) data. With CMOS, it is also possible to integrate other circuitry onto the imaging chip itself – leading to more efficient designs. Every Canon Full HD CMOS image sensor incorporates on-chip noise reduction and pixel amplification. In addition, CMOS consumes less power than CCD sensors, reducing heat generation and extending battery life. Plus, unlike CCD devices, CMOS sensors do not suffer from vertical smearing caused by single pixel overflow – visible when bright points of light are in the frame.

Each of the new CMOS sensors is read-out at twice the normal speed, reducing the visible skew that can occur when capturing fast moving subjects\*.

## **Canon XF Utility software**

Canon XF Utility software is supplied with the XF305 and XF300, allowing users to manage the video they have shot. Clips are identified by thumbnail images and can be previewed at the correct speed, even if recorded in fast or slow mode. The captured metadata can also be reviewed and edited. Chosen clips can then be copied and archived. Versions of XF Utility are supplied for both Windows and Mac.

\*(not applicable to 1080 progressive modes)