

Technologies Explained – XF100-series 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.

Both models in the XF100-series capture twice the colour detail of camcorders which use 4:2:0 sampling, and combined with Canon's powerful DIGIC DV III processor and CMOS sensor, offer unrivalled image quality for camcorders in this category.

MXF file format

The XF105 and XF100 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 both XF100-series models. The most popular non linear editors (NLEs) can read the new MXF files from the XF105 and XF100, including:

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

There are many valid definitions for how MXF files hold video and audio information. Both XF100-series models 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 HD Video Lens

The camcorders feature a new lens design, founded on Canon's decades of video lens development experience. The lenses on both the XF105 and XF100 models have been custom-designed to ensure the best possible HD performance, while also offering the size and weight required for mobile use.

Featuring 12 elements, including two double-sided aspherical lenses, the XF100-series' high-performance lens offers exceptional resolution and effective control of fringing. Canon's unique build-quality provides outstanding performance throughout the 10x zoom range, from wide-angle to telephoto, and the lens also offers excellent light gathering abilities, with an $f/1.8 - f/2.8$ aperture range available. The lens' integrated digital tele-converter function also allows users to capture distant subjects by instantly extending the focal length of the lens by 1.5, 3 or 6 times.

Optical Image Stabilizer Systems

The lens mechanism in the XF100-series incorporates sophisticated optical image stabilisation, designed specifically to stabilise the captured image when a 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.
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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

Both XF100-series models feature a Bayer-filtered single CMOS imaging sensor, with 2.07 effective Megapixels for native 1920x1080 Full HD video capture. Adapted from the 3CMOS sensor system featured in the market-leading XF300 series, the XF105 and XF100's sensors deliver outstanding colour reproduction, stable gamma and AE control, smoother gradation of subject skin tones, and high detail retention in shadows and light conditions as low as 4 lux – providing excellent performance in a range of shooting conditions.

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.

Canon XF Utility software

Canon XF Utility software is supplied with both the XF105 and XF100, 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.