Technologies Explained – LEGRIA HF R series

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Canon HD Camera System

To assure the best image quality from its HD camcorders, Canon designs and manufactures three critical imaging components itself, namely: genuine Canon HD Video Lenses, HD CMOS sensors, and high performance DIGIC DV image processors.

Each of these components is unique and designed to integrate seamlessly with the others. This gives Canon camcorders a significant performance advantage in HD imaging.

Canon HD CMOS sensor

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 resulted in the HD CMOS sensors used throughout Canon's HD camcorder range, from the HF R series to the 8.0MP, 1/2.6" CMOS sensor found in the flagship LEGRIA HF S series.

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 data. With CMOS, it is also possible to integrate other circuitry onto the imaging chip itself – leading to more efficient designs. Every Canon HD CMOS image sensor incorporates on-chip noise reduction and pixel amplification. In addition, CMOS consumes less power than CCD sensors, reducing heat and noise output 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.

With Canon CMOS, thanks to the use of a Bayer pattern RGB primary colour filter, video images are also characterised by excellent colour reproduction and high resolution.

Instant AF

All of the HD camcorders in Canon's 2010 range feature its Instant AF system. As HD movies are captured at very high resolution, an extremely accurate auto focus system is essential – at high resolution, even slight focus errors are readily apparent.

Conventional TV AF systems are slow to react to significant changes in subject distance and can often be confused by high frequency background patterns. Canon's Instant AF therefore combines a high-speed External AF sensor and an accurate TV AF sensor – the former quickly detects the range of the subject; the latter then performs the super-fine focusing necessary.

DIGIC DV III

DIGIC DV III was first launched within Canon camcorders in 2009. Evolved from the DIGIC DV II processor, originally developed for XL H1 to handle the increased data rate and requirements of HD, DIGIC DV III has been optimised to process even more data and provide more user-friendly features. High speed processing of Full HD data requires about 5x more handling capacity than Standard Definition video.

As it handles the enormous amount of data involved in Canon HD imaging, DIGIC DV III employs a unique noise reduction system. The resulting video benefits from excellent colour reproduction and a wide tonal range. DIGIC DV III also supports the expanded gamut of xvYCC Colour Space (x.v.Color) and boasts a 25% increase in dynamic range compared with DIGIC DV II.

As a core Canon technology, DIGIC DV III provides split path processing of separate video and photo signals in a single camcorder. Video and still images have different colour requirements: by processing the signals differently, each can be maximised for output. The result is rich and vibrant colours that are faithful to the original shooting subject, whether seen on a television screen or printed as a photograph.

DIGIC DV III is also the driving force behind many Canon camcorder features such as Face Detection Technology and Smart Auto (see below).

Canon Face Detection Technology

Powered by DIGIC DV III, Canon Face Detection Technology is capable of detecting up to 35 individual faces in a single frame, optimising shooting settings for each. Up to nine faces can be highlighted – one can be selected by the user as a main reference point.

Sophisticated Face Select and Track technology – similar to that found in Canon digital compact cameras – ensures that the chosen face remains selected for as long as possible, even if it is moving.

Face Detection Technology is comprised of two main components. First, Face Detection AE (Auto Exposure) harnesses the power of DIGIC DV III to quickly achieve correct exposure. Then, Face Detection AF (Auto Focus) employs Canon's Instant AF system – which uses two AF systems to offer a unique combination of speed and accuracy – to track faces and ensure that they are always correctly focused. Canon's Face Detection system responds exceptionally quickly and smoothly – even when faces are framed against backgrounds that are significantly darker or lighter than the subject.

Face Detection also makes playback easier. With Face Jump and Face Timeline, captured faces are displayed as thumbnails in the playback menu on the LCD screen. As users search through the footage they have already recorded, they can quickly spot which person they have captured.

Smart Auto

First introduced in Canon's range of digital compact cameras, Smart Auto has been optimised for Canon HD camcorders. Intelligent Scene Detection Technology identifies the type of shot based on multiple variables such as number of faces, distance to the main subject, brightness, colour and movement, backlight conditions and type of sky. Up to 31 different scene types can be recognised without user input.

When the shooting situation has been determined, the camcorder automatically adjusts variables such as white balance, aperture, shutter speed and sensitivity to achieve the best possible result. An icon on the LCD shows the user the type of scene that has been detected, as follows:

		Human subjects		Macro	Other subjects
		Moving	Static		
Backlight	Blue sky				
	Vivid				
	Bright				
Regular	Blue sky				
	Vivid				
	Bright				
	Dark				
Night scene			-----		
Sunset			-----		
Spotlight			-----		

Canon's unique Instant AF system and Face Detection Technology complement Smart Auto to ensure that friends and family always look their best.

Optical Image Stabilizer Systems

Designed specifically to improve shake-reduction while filming wide shots such as landscapes, large groups and panoramas, Canon's Dynamic Optical Image Stabilizer (OIS) system rapidly and accurately re-aligns lens elements. This feature allows active users to consistently achieve smooth footage, whether walking, climbing or just trying to follow the action.

Powered Optical Image Stabilizer is an extra-powerful stabilisation function designed for use at maximum zoom, where camera shake is at its most obvious. Switched on and off by the user via a dedicated button, this function cannot be used whilst panning due to the powerful shake correction it provides.

Video Snapshot

Video Snapshot mode, designed to make it easy to create video montages without a PC, has been enhanced in all of Canon's HD camcorders launching in 2010. When Video Snapshot mode is enabled, users can choose to record a 2-, 4- or 8-second clip

every time the Record button is pressed. In addition, video snapshots can be captured during playback of pre-recorded video already stored on the camcorder. Whilst recording in Video Snapshot mode, a blue bar counts down around the edge of the LCD display so the user can easily see how long is left in each short segment.

After shooting, the user can review a series of 'snapshot clips' by selecting them and creating a playlist to make a simple multi-shot movie. The playlist can then be played back with a musical soundtrack. Music from the user's own collection can be uploaded using the supplied Music Transfer Utility (WAV format only) or an MP3 player can be connected to a camcorder with mic input, to provide music during playback.

To make it easier to share, the user can create one file from the video playlist and soundtrack within the camera, without the need for a PC[1]. The movie file is automatically converted from Full HD to a Standard Definition, MPEG2 file – a more suitable format for sharing online or on DVD.

Easy Web Upload

Canon's Easy Web Upload feature is designed to make it easier to upload video content to YouTube™. Clips are selected by the user in-camcorder, which converts them internally to Standard Definition (SD) files[1].

Upon connection of the camcorder to a PC, the supplied PIXELA ImageMixer™ software automatically detects and displays the selected clips in a dedicated pop-up window. Users are able to store their YouTube™ login details, allowing them to simply enter the clip information and upload their videos more easily than ever.

Relay Recording

In 2010, it will no longer be necessary for HD camcorder users to manually select the type of recording media that they wish to use (ie. built-in memory or SDHC card). If the built-in memory becomes full, recording will automatically continue on an SDHC card (if present). No intervention from the user is required.

Pre REC

Pre REC mode ensures that users can record action even before they start shooting. A buffer captures the three seconds of footage prior to the record function being activated, ensuring no action will be missed.

[1] Models with internal memory only