SONY

PMW-EX1R

A Compact Full-HD Camcorder with SxS PRO Solid State Recording and 1/2-inch Exmor sensors

XDCAM EX - New Generation Solid State Recording System

The PMW-EX1R is the successor to the multiple award-winning EX1 and further extends the capabilities of the XDCAM EX family with great new features such as DVCAM recording, Cache Recording, Picture Inversion and a host of additional refinements. The EX1R is the ideal solution for customers such as broadcasters, independent videographers and film makers who need exceptional HD picture quality and state-of-the-art workflow from a compact and affordable handheld camcorder.

Sony's XDCAM EX professional product range is designed to exploit the ultimate high performance of SxS memory cards. It combines a proven, non-linear XDCAM workflow with the only Full HD resolution sensor system available in a compact camcorder. This advanced imaging system consists of three ½-inch type Exmor™ CMOS sensors, each with an effective pixel count of 1920x1080, to produce images in full HD resolution. In addition, there's a purpose-built Fujinon Professional HD 14x zoom lens and a unique dual focus ring mechanism.

The EX1R supports multiple frame rate recording such as 59.94i, 50i, and native 23.98P and 25P as well as being 1080i/720P switchable. There is also a choice of a 35Mb/s High Quality mode, 25Mb/s HDV 1080i compatible mode and 25Mb/s Standard Definition DVCAM recording. Twin memory card slots support up to 280 minutes HD recording time using two 32GB SxS PRO memory cards.

XDCAM EX is a focus of continual innovation and development, from IT-friendly MP4 file recording and advanced creative features, through to accessories such as SxS-1 low cost media and an adaptor enabling the use of high-speed Memory Sticks™.

All XDCAM EX Camcorders come supplied with a 2-year PrimeSupport contract which offers unique extra services and benefits for added peace of mind.

Features

1/2-inch type Three Exmor™ CMOS Sensors

The PMW-EX1R is equipped with three newly developed 1/2-inch type Exmor™ CMOS Sensors, each with an effective pixel count of 1920 (H) x 1080 (V), which delivers excellent picture performance with full HD resolution. This 1/2-inch type image sensor, using Sony's advanced accumulated sensor technologies, allows the camcorder to provide an excellent sensitivity of F10, a remarkable signal-to-noise ratio of 54 dB, and a high horizontal resolution of 1000 TV lines*. In addition, this large 1/2-inch type image sensor can capture images with a shallower depth of field than smaller-size image sensors, giving users more creative freedom of expression. What's more, the Exmor CMOS sensor is a unique design that deploys an A/D converter to each column of pixels, resulting in a much lower clock speed than conventional CMOS sensors. This makes it possible to greatly reduce power consumption of the camcorder.*In 1920 x 1080/59.94i mode

1920 x 1080 HD Recording Using the "MPEG-2 Long GOP" Codec

The PMW-EX1R camcorder records 1920 x 1080 Full HD images using the "MPEG-2 Long GOP" codec, which conforms to the MPEG-2 MP@HL compression standard. "MPEG-2 Long GOP" is a mature codec - also adopted by the XDCAM HD and HDV 1080i series of products - which enables users to record stunning-quality HD video and audio with highly efficient, reliable data compression

New Selectable Recording Modes including DVCAM Recording

The PMW-EX1R camcorder offers a choice of bit rates - either 35 Mb/s (HQ mode) or 25 Mb/s (SP mode) - depending on the desired picture quality and recording time. The HQ mode supports 1920 x 1080, 1440 x 1080 and 1280 x 720 resolutions. The 1440 x 1080 mode is new to the PMW-EX1R ensuring native integration of XDCAM EX footage into a XDCAM HD Professional Disc workflow. By supporting 1440 x 1080, 35Mb/s recording, material can be utilised with no transcode, just a re-wrap to MXF for NLE and archiving.

The SP mode supports 1440 x 1080 resolution at 25 Mb/s, which provides compatibility with HDV 1080i products.Footage recorded in this SP mode can be seamlessly integrated into HDV-compatible editing systems by transferring the stream from the camcorder via the i.LINK™ (HDV™) interface.

The PMW-EX1R also supports 25Mb/s DVCAM recording in either PAL or NTSC modes, again providing seamless integration into existing DVCAM workflows offering ultimate flexibility worldwide.

Robust Nonlinear Recording Media, "SxS PRO" & "SxS-1"- For Greater Efficiency, Affordability, and Reliability

The XDCAM EX series adopts high-speed SxS PRO and SxS-1 memory cards for its recording media, developed specifically for professional content creation applications with a number of key features:

1. Compatible with ExpressCard/34 interface slot which is common on modern Windows PCs and Macs

2. Uses PCI Express interface and achieves an extremely high "read" speed of 800 Mb/s*

3. Large storage capacity: SBP-16 (16 GB) and SBP-32 (32 GB) memory cards are available. One SBP-16 (16 GB) memory card is supplied with the PMW-EX1R

4. Can record up to 140 minutes of HD video and audio (using one 32-GB memory card)

5. Compact size: approx. 75 × 34 × 5 mm (excluding the projecting parts) - half the size of the older PC Card standard

6. Low power consumption

7. Highly reliable: can resist shocks (up to 1500 G) and vibrations (up to 15 G)

8. Affordability: SxS-1 media (introduced in late 2009) provides users with a lower cost alternative to SxS PRO media that offers the same high performance, but with an estimated 5-year life span when recording at full capacity once per day. Users can check the card life on their PMW-EX1R and PMW-350 camcorders and even see an alarm when the data rewriting limit is reached.

*This data-transfer speed is a theoretical value. Actual data-transfer speed depends on the file type and the performance of the PC.

Sony and SanDisk Corporation jointly developed SxS PRO for professional content creation applications. SxS-1 was developed by Sony.

Long Recording Time

Utilising a mature and highly efficient compression format together with high performance SxS memory cards, the PMW-EX1R can record superb quality HD images for an exceptional 140 minutes* on a single 32GB SxS card. As the PMW-EX1R features two memory card slots, this recording time is easily increased to 280 minutes (with two 32GB cards) and when recording across two cards, the transition is seamless without any frame loss. This feature makes the PMW-EX1R an ideal camcorder for a wide variety of content production applications, including wedding and event videography, that require a long recording time.*When recording in HQ (35 Mb/s) mode, recording time may be more than the above specified figure depending on the actual bit rate that is adopted during VBR encoding.

Multiple-format Recording - 1080/720, PAL/NTSC and Interlace/Progressive Switchable Operation

The PMW-EX1R camcorder offers a wide array of recording formats for multiple content creation applications. In HD mode, scanning is switchable between 1920 x 1080, 1280 x 720, and 1440 x 1080 resolutions. Frame rate is also selectable from interlace and progressive - 59.94i, 50i, 29.97P, 25P, and native 23.98P*.

In addition, 59.94P and 50P progressive recording is available in 1280 x 720 mode.

In SD mode, both 50/60i and 25P/30P modes are supported.

*In 1440 x 1080/23.98P (SP) mode, images are handled as 23.98P and recorded as 59.94i signals through means of 2-3 pull-down.

High-quality Uncompressed Audio Recording

In addition to SD/HD video recording, high-quality audio is an equally significant feature in the XDCAM EX system. The PMW-EX1R camcorder records and plays back high-quality, two-channel 16-bit, 48-kHz linear PCM uncompressed audio.

Built-in Stereo Microphone and Two-channel Audio Input

The PMW-EX1R has a built-in stereo microphone and two XLR audio input connectors for connecting professional microphones or feeding an external-line audio source.

IT Friendly

With the XDCAM EX series, recordings are made as data files in the "MP4" format, which is widely used in a number of recent electronic portable devices and has been standardised by ISO. For SD recording, industry accepted .AVI type-2 files has been adopted. The file-based recording allows material to be handled with great flexibility in an IT-based environment - easily available for copying, transferring, sharing, and archiving. All these operations are accomplished without any "digitising" process required. File-based data copying allows for degradation-free dubbing of AV content, which can be performed easily on a PC or Mac. The file-based recording system also allows for material to be viewed directly on a PC or Mac - simply by inserting the SxS memory card into the ExpressCard slot, or by linking the device to the PMW-EX1R via an USB2 connection. This works in just the same way as a PC or Mac reading files on an external drive. The file-based operation can dramatically improve the efficiency and quality of professional video applications.

Immediate Recording Start and No Overwriting Footage

By virtue of recording on flash memory card, the PMW-EX1R can start recording virtually the instant the camcorder is turned on. Moreover, the PMW-EX1R system automatically records on an empty area of the card - there's no danger of overwriting existing content. This is extremely convenient, as camera operators do not have to worry about accidentally recording over good takes, and they don't have to search through footage for the correct position to start the next recording. In short, it means the camera is always ready for the next shot!

Instant-access Thumbnail Search with "Expand" Function

Each time a recording is started and stopped on the PMW-EX1R camcorder, the video and audio signals are recorded as one clip. During playback, users can cue-up to the next or previous clip simply by pressing the 'Next' or 'Previous' button, as you would do on a CD or DVD player. Furthermore, thumbnails are automatically generated for each clip as a visual reference, allowing operators to cue-up to a desired scene simply by guiding the cursor to a thumbnail and pressing the 'Play' button. For further convenience, the 'Expand' function allows one selected clip in the Thumbnail display to be divided into 12 even-time intervals, each with their own thumbnail identifier. This is useful if you want to quickly search for a particular scene within a lengthy clip.

Wide-angle Fujinon 14x Zoom Lens

The PMW-EX1R is equipped with a superb Fujinon 14x zoom lens specifically designed for the PMW-EX1R to offer optimum picture performance. It offers a wide angle of view of 5.8 mm (equivalent to 31.4 mm on a 35 mm lens), and many other convenient features for diverse shooting situations.

Unique Focus Operation - Professional Manual Focus and Auto Focus

The lens adopts a newly developed and unique focus ring mechanism, which offers two types of manual focus, plus an auto focus operation. The PMW-EX1R camcorder is equipped with two independent focus wheel mechanisms, which can be switched by sliding the focus ring itself back and forth.

When the focus ring is in the front position, the lens works in the same way as a typical auto focus lens on a handheld camcorder. In this case, either manual or auto focus mode can be selected by the AF/MF switch on the lens. On the other hand, when the focus ring is set to the back position, the lens has an absolute focus position, and works in the same way as interchangeable-lens cameras, which professional users are familiar with.

New Image Inversion Function

When a cine-style lens or a stills camera lens is attached to the camcorder with a DOF (Depth of Field) adaptor, the image is usually rotated by 180 degrees. The Image Inversion function normalises the image for easy picture monitoring. This will

also negate the need to flip the image in post-production.

Three Independent Rings

In addition to the unique focus ring, the PMW-EX1R camcorder is equipped with independent rings for zoom and iris adjustment. These are located adjacent to the focus ring, in the same layout as is common on shoulder-type camcorders. This gives users a high level of operational comfort and control.

AF Assist

The AF (Auto Focus) Assist function enables operators to manually change focus positions using the focus ring during AF mode. This means that AF reference focus positions can be shifted to manually changed positions.

MF Assist

The MF (Manual Focus) Assist function helps to precisely focus on the target subject when shooting in MF mode. When the MF Assist is turned on, auto focus is momentarily activated and finely focuses on the subject closest to the focal point of the lens at that time.

One-push Auto Iris

A One-push Auto Iris button has been added to the lens of the PMW-EX1R, allowing the user to go into Auto Iris mode only when this button is pushed. This is a feature seen on broadcast lenses and is used as a reference for camera operators when adjusting the iris settings.

Expanded Focus

At the touch of a button, the centre of the screen on the LCD monitor and viewfinder can be magnified to about twice normal size, making it easier to confirm focus settings during manual focusing.

Selectable Peaking

The Peaking function can help operators to adjust the camera's focus more accurately by altering the way pictures are displayed on the LCD monitor and viewfinder. It can enhance the outline of the image, which the camera focuses on most, and change its colour to make it more visible. Enhance levels can be selected from a choice of "HIGH", "MIDDLE", and "LOW", and the outline colour from "RED", "WHITE", "YELLOW", and "BLUE".

Optical Image Stabiliser

To minimize the blurring effect caused by hand-shake, the new lens incorporates an optical image stabiliser function that provides highly stable images.

23.98P Native Recording

XDCAM EX compact camcorders are the first to be part of the legendary Sony CineAlta™ family. The PMW-EX1R offers native 23.98P* recording which, in combination with advanced creative features such as selectable gamma curves, makes this camcorder ideal for cinema production.*In 1440 x 1080/23.98P (SP) mode, images are handled as 23.98P and recorded as 59.94i signals through means of 2-3 pull-down.

Slow & Quick Motion Function

The PMW-EX1R offers a powerful Slow & Quick Motion function - commonly known as 'over-cranking' and 'under-cranking' in film shooting - that enables users to create unique 'looks' or special effects with slow- and fast-motion images. The PMW-EX1R can capture images at frame rates selectable from 1 fps (frame per second) to 60 fps in 720P mode and from 1 fps to 30 fps in 1080P mode, in increments of 1 fps. For example, when viewed at 23.98P, images captured at 60 fps will appear 2.5 times slower than normal. Conversely, images captured at four fps will appear six times faster than normal. With the Slow & Quick Motion function of this camcorder, images are recorded natively without interpolating the frames. This means the quality of the slow- and fast-motion images is extremely high and incomparable to those created in the editing process. In addition, these slow- and quick-motion images can be played back immediately after shooting, without using any converters or processing on non-linear editing systems.

New One-push S&Q Switch

A new S&Q (Slow & Quick Motion) button has been added to the exterior of the camcorder. This allows the user to switch quickly between Normal mode and S&Q mode. In S&Q mode, a blue LED on the button lights up. When the switch is pressed, S&Q mode is activated, and the recording format and frame rate are instantly changed to the conditions previously set via the menu.

Slow Shutter Function

The PMW-EX1R camcorder offers a Slow Shutter function for capturing clear images in low-light environments. This allows the shutter speed to be extended to a maximum of 64 frames. The Slow

Shutter function not only increases camera sensitivity but also produces a special blurring effect when shooting a moving object, for enhanced shooting creativity. The shutter speed is selectable from 2-, 3-, 4-, 5-, 6-, 7-, 8-, 16-, 32-, and 64--frame periods.

Selectable Gamma Curves

The PMW-EX1R camcorder offers a wide variety of gamma curves to flexibly handle contrast and give a specific 'look' to an image. In addition to four types of standard gamma curves, the PMW-EX1R provides four types of CINE Gamma (CINE 1, 2, 3, and 4), which are identical to those of other CineAlta™ camcorders. Operators can select the best-suited pre-set gamma curve, depending on scenes.

New Cache Recording Function

Once enabled, Cache Recording continuously streams audio and video through the camcorder's internal memory. Once the Record button is pushed, the content buffered in the camcorder's memory is recorded onto the memory media at the start of the recording clip. The caching period can be adjusted by menu setting up to 15 seconds, so in a situation such as monitoring a developing situation, Cache Record enables capturing an event up to 15 seconds before the record button is pressed. When in Cache Recording mode, an indicator on the inside panel lights up.

Interval Recording Function

The PMW-EX1R camcorder offers an Interval Recording function that records signals at pre-determined intervals. This is convenient for shooting over long periods of time, and also when creating pictures with special effects of extremely quick motion.

Frame Recording Function

Frame Recording is a special feature of the PMW-EX1R camcorder that is especially useful for stop-motion/clay animation shooting. Using this function, images for pre-determined frames are recorded every time the Record button is pressed.

Shutter Angle Settings

In addition to the electronic shutter speed controls, the PMW-EX1R also has a "shutter angle" control - which is familiar to film users. By setting the shutter speed to "angle", the PMW-EX1R automatically operates with the proper exposure time, determined by the selected frame rate and the shutter angle.

Picture Profile™ Feature

The Picture Profile feature allows camera operators to easily call up customised picture-tonal settings to suit particular shooting conditions, rather than having to readjust the camera each time - giving users greater operational efficiency. Up to six different picture-tonal settings such as the parameters of matrix, colour correction, detail, gamma and knee can be saved in the memory. These settings are displayed on the LCD monitor at the touch of a button.

Depth-of-field Indicator

A Depth-of-field Indicator can be displayed on the LCD monitor and viewfinder to help camera operators easily recognise the depth-of-field of a scene, and thereby produce their desired images.

Brightness-level Display

The average brightness level of the centre of a frame can be displayed on the LCD monitor and viewfinder as a percentage. This is useful when a waveform monitor is not available for shooting.

Histogram Indicator

The Histogram Indicator can be displayed on the LCD monitor and viewfinder, allowing operators to easily evaluate the distribution of brightness on currently captured images. This enables proper exposure control of iris, gain and gamma.

3.5-inch* Hybrid Colour LCD Screen

The PMW-EX1R is equipped with a newly developed, large, easy-to-view, colour LCD screen with a high resolution of 1920 x 480 pixels. The LCD screen is located in an easy viewing position on top of the camera and can be flexibly rotated according to shooting angles - which is convenient when using it as a viewfinder. When not in use, it folds underneath the housing for the built-in stereo microphone. The LCD Screen can also be used to instantly review recorded footage, as well as access the camera's set-up menus and view thumbnail display status indications such as audio meters, depth-of-field indicators, and the remaining memory and battery time. What's more, the Hybrid LCD screen - which comprises transmissive and reflective panels - offers clear viewing even in bright sunlight.*Viewable area measured diagonally.

New Easy-to-see Colour LCD Viewfinder

The PMW-EX1R comes equipped with a new 0.54-inch* colour LCD viewfinder, which displays high-resolution colour pictures of approximately

1,226,000 pixels in a wide-screen aspect ratio of 16:9, which simplifies focusing. Operators can switch between Colour and Monochrome Display modes, according to their preference. * Viewable area measured diagonally.

Rotary Grip

The grip of the PMW-EX1R can rotate 90 degrees, which allows camera operators to flexibly adjust the angle of the grip. This gives users greater comfort during low-angle and high-angle shooting. In addition, the shape of this grip has been improved compared to the EX1 so as to better fit the user's hand.

Four Assignable Buttons

Frequently used functions can be programmed onto four assignable buttons, allowing operators to make rapid changes when working in the field. These can be functions such as ATW, Freeze Mix, Rec Review, Expanded Focus, Depth-of-field and more.

On-handle Zoom Switch and REC Start/ Stop Button

In order to facilitate zoom control and recording operation during low-angle shooting, an additional zoom switch and record start/stop button are located on the carrying handle. The PMW-EX1R has a new zoom transition menu which allows camera operators to select 'soft' for smoother start/stop operation of the on handle zoom.

Shot Transition™ Function

The Shot Transition function allows for smooth automatic scene transitions. The operator can program start and end settings for zoom, focus, and white balance into the A/B buttons and, by pressing the start button, a smooth transition will take place according to the set time. It works by automatically calculating the intermediate values during the scene transition. The start of this function can be synchronized with the camera's REC start function.

The transition progress can be checked using an indicator displayed on the LCD monitor. In addition, a start timer function is also available for the Shot Transition function, helping to prevent operators from missing a shot. This function is very useful when complex camera settings are required during the scene transition - for example, when shooting subjects moving from the background to the foreground of a scene.

ATW & Hold Function

The ATW (Auto Tracing White Balance) function of the PMW-EX1R automatically adjusts the camera's colour temperature according to changes in the lighting conditions. This function is useful when recording outside for long periods, and the lighting changes gradually over time. The PMW-EX1R also has a new ATW Hold function, which allows the operator to hold auto tracing at a desired colour balance via an assignable switch.

Long Operating Time

With the supplied BP-U30 battery attached, the PMW-EX1R can record continuously for approximately two hours, while the optional BP-U60 battery extends the operating time to approximately four hours.

Wide Array of Interfaces

The PMW-EX1R camcorder comes equipped with a wide range of interfaces optimised for a variety of operational needs. These include an HD-SDI output, down-converted SD-SDI output, i.LINK (HDV/DV) input/output, USB2 and analogue composite/component output. There is also a HDMI output (Type A) that allows the user to show the picture on a consumer display or professional monitor equipped with an HDMI input. Non-compressed video and two channels of audio can be output. When HDMI output is selected, other outputs are not available.

New IR Remote Control On Rear

The PMW-EX1R has a new IR remote control receptor on the rear of its handle. This allows the user to control the PMW-EX1R with a Remote Commander both from the front and rear of the camcorder.

Additional Aspect Markers For Cinematic Operation

The PMW-EX1R benefits from the addition of several new aspect markers such as 1.66:1, 1.85:1, 2.35:1, and 2.4:1 for more convenient cinematic operation.

Other Features

1 Built-in ND filter wheel: 1: Clear, 2: 1/8ND, 3: 1/64ND

2 Selectable gain: -3, 0, 3, 6, 9, 12, 18 dB

3 High-speed picture search: x4, x15

4 Freeze Mix function

5 Skin-tone Detail control

6 Low-key saturation

Additional Information

Only SxS PRO and SxS-1 are guaranteed for use with XDCAM EX Camcorders. Sony HX Series Memory Stick are supported with MEAD-MS01 Adaptor for certain functions (please see accessory page for details). USB based memory cards might work with the XDCAM EX range in some cases, but Sony does not guarantee that all the functions will operate. The performance of USB based memory cards can vary.

Benefits

The PMW-EX1R demonstrates the evolution of the XDCAM EX concept offering yet further innovation in compact camcorder development. Based around the popular hand-held camcorder design, it offers enhanced workflow benefits over existing tape-based camcorders coupled with a superior picture performance over existing pixel-shift HD camcorders, which overall provides camera operators even more flexibility in whatever style of production is chosen.

Professional ½ inch HD Lens

The PMW-EX1R not only features an exceptional ½ inch Fujinon HD lens, but also introduces a uniquely flexible control system designed to appeal to both broadcasters and videographers

1 14x Fujinon Professional HD lens

2 Unique focus operation offering full manual focus with absolute focus operation similar to the lens focus on an interchangeable lens or manual/auto focus operation as per standard handheld cameras

3 AutoFocus Assist ensuring focus position can be altered

4 Manual Focus Assist to ensure optimum focus at all times

5 New One Push Auto Iris button

Superior Picture Performance

Newly developed Exmor™ CMOS processors offer full 1920x1080 resolution:

1 Large ½ inch sensors for excellent sensitivity and depth of field characteristics

2 Full 1920x1080 effective pixels

3 Low power consumption compared to CCD technology

4 1080 / 720 HD switchable and PAL/NTSC switchable for international programme production

Exciting and Creative Recording Modes

XDCAM EX compact camcorders are the first to carry the legendary CineAlta™ brand, which represents optimisation for feature film production and specifically support for 23.98P recording capability - the standard frame rate for feature film production. Alongside this, there are a myriad of creative recording modes available including:

1 Slow and Quick motion offers a range of frame rates produced within the camera and available for instant set-up and review in the field

2 Shutter setting emulates filmic operation

3 Cine Gamma curves offer further filmic options for production

4 Image inversion feature for cine-lens operation with Depth of Field adaptor

5 Frame and Interval recording offers further creative scope for animation and extremely quick motion effects

6 Slow Shutter for clear images in low-light environments

7 Picture Cache mode

8 Standard Definition DVCAM recording mode extends operational flexibility

Enhanced Workflow

Innovative solid state recording with SxS PRO and SxS-1 ExpressCard memory cards offers the following benefits:

1 Compatible with industry-standard ExpressCard interface available on most modern laptops

2 No time lost to tape loading

3 Robust storage media, impervious to shocks and

vibrations

4 Small, high capacity recording media offering over 4 hours of continuous HD content across 2 x 32GB cards.

5 Common interoperability with DVCAM, HDV and XDCAM - so ready to use immediately with most existing NLEs.

6 No need to worry about accidentally overwriting precious content

7 Write and Re-Writable media with no degradation in picture quality

8 Thumbnail images representing key scenes can be browsed and instantly accessed using on-camera colour screen

9 'Essence Mark' key scenes at the touch of a button

10 No frantic fast-forward/rewinding to find the clips you want to review

11 Non-proprietary media manufacture

12 Supplied with Clip Browser Software for viewing and copying clips to HDD, DVD or Blu-ray Disc.

Peace of Mind

All XDCAM EX Camcorders come supplied with a 2-year PrimeSupport contract which offers unique extra services and benefits;

2 years' cover

Free telephone helpdesk support in English, German, French, Italian and Spanish.

Collection and replacement product delivery anywhere in EU, Norway and Switzerland.

Technical Specifications

General

Mass	2.4 kg (5 lb 4 oz) (body) 2.8 kg (6 lb 2 oz) (with lens hood, large eye cup, BP-U30 battery, one SxS PRO memory card)
Dimension (W x H x D)	179 x 199 x 308 mm (7 1/8 x 7 7/8 x 12 1/4 inches) without projection
Power requirements	DC 12 V
Power consumption	Approx. 12.5 W (while recording, EVF On, LCD monitor Off)
Operating temperature	0 °C to 40 °C (32°F to 104 °F)
Storage temperature	-20 °C to +60 °C (-4 °F to +140 °F)
Battery operating time	Approx. 240 min with BP-U60 battery Approx. 120 min with BP-U30 battery
Recording format	Video: MPEG-2 Long GOP HD HQ mode: VBR, maximum bit rate: 35 Mb/s, MPEG-2 MP@HL HD SP mode: CBR, 25 Mb/s, MPEG-2 MP@H-14 SD mode: DVCAM Audio: Linear PCM (2ch, 16-bit, 48-kHz)
Recording frame rate	NTSC area: HD HQ mode: 1920 x 1080/59.94i, 29.97p, 23.98p, 1440 x 1080/59.94i, 29.97p, 23.98p, 1280 x 720/59.94p, 29.97p, 23.98p HD SP mode: 1440 x 1080/59.94i, 23.98p SD mode: 720 x 480/59.94i, 29.97p PAL area: HD HQ mode: 1920 x 1080/50i, 25p, 1440 x 1080/50i, 25p, 1280 x 720/50p, 25p HD SP mode: 1440 x 1080/50i SD mode: 720 x 576/50i, 25p
Recording/Playback time	HQ Mode: Approx. 100 min with SBP-32 (32 GB) memory card* Approx. 50 min with SBP-16 (16 GB) memory card Approx. 25 min with SBP-8 (8 GB) memory card SP/SD Mode: Approx. 140 min with SBP-32 (32 GB) memory card*

	Approx. 70 min with SBP-16 (16 GB) memory card Approx. 35 min with SBP-8 (8 GB) memory card * When recording in HQ (35 Mbps) mode, actual recording times may vary according to the bit rate adopted during VBR encoding.

Lens

Lens mount	N/A
Zoom ratio	14x (optical), servo/manual
Focal length	f = 5.8 mm to 81.2 mm (equivalent to 31.4 mm to 439 mm on 35 mm lens)
Iris	F1.9 to F16 and Close, auto/manual selectable
Focus	AF/MF/Full MF selectable, 800 mm to infinity (MACRO OFF) 50 mm to infinity (MACRO ON, Wide), 735 mm to infinity (MACRO ON, Tele)
Image stabilizer	ON/OFF selectable, shift lens
Filter diameter	M77 mm, pitch 0.75 mm (on lens)

Camera Section

Imaging device	3-chip 1/2-inch type Exmor Full HD CMOS
Effective picture elements	1920 (H) x 1080 (V)
Optical system	F1.6 prism system
Built-in optical filters	OFF: Clear, 1: 1/8ND, 2: 1/64ND
Sensitivity (2000 lx, 89.9% reflectance)	F10 (typical) (1920 x 1080/59.94i mode)
Minimum illumination	0.14 lx (typical) (1920 x 1080/59.94i mode, F1.9, +18 dB gain, with 64--frame accumulation)
S/N ratio	54 dB (Y) (typical)
Horizontal rezolution	1,000 TV lines or more (1920 x 1080i mode)
Shutter speed	1/60 sec to 1/2,000 sec + ECS
Slow Shutter (SLS)	2, 3, 4, 5, 6, 7, 8, 16, 32, and 64-frame accumulation
Slow & Quick Motion function	720p: Selectable from 1 fps to 60 fps as recording frame rate 1080p: Selectable from 1fps to 30 fps as recording frame rate
White balance	Preset (3,200 K), Memory A, Memory B/ATW
Gain	-3, 0, 3, 6, 9, 12, 18 dB, AGC

Inputs/Outputs

Audio input	XLR-type 3-pin (female) (x2), line/mic/mic +48 V selectable
Composite output	Phono jack (x1) via A/V multi connector, NTSC or PAL
S-Video output	N/A
Audio output	Phono jack (CH-1,CH-2) via A/V multi connector
Component output	Mini D (x1) via A/V multi connector
SDI output	BNC (x1), HD-SDI/SD-SDI selectable
i.LINK	IEEE 1394, 4-pin (x1), HDV (HDV 1080i) / DVCAM stream input/output , S400
Timecode input	N/A
Timecode output	N/A
Genlock input	N/A
USB	USB device, Mini-B (x1)
Headphone output	Stereo mini-jack (x1)
Speaker output	Monaural
DC input	DC jack
DC output	N/A
Remote	N/A
Lens remote	12-pin
Mic	N/A
HDMI output	A Type (x1)

Monitoring

Viewfinder	0.452-inch* type colour LCD: 852 (H) x 480 (V), 16:9 * Viewable area measured diagonally.
Built-in LCD monitor	3.5-inch* type colour LCD monitor: approx. 921,000 effective pixels, 640 (H) x 3 (RGB) x 480 (V), 16:9, hybrid type * Viewable area measured diagonally.

Built-in Microphone	Omni-directional stereo electret condenser microphone

Media

Type	ExpressCard/34 slot (x2)

Accessories

Lapel (ECM-series)

ECM-673

Short Shotgun Electret Condenser Microphone.

ECM-674

Electret Condenser Microphone

ECM-678

Electret Condenser Shotgun Microphone

ECM-680S

Shotgun electret condenser microphone

XDCAM

SBAC-US10

SxS Memory Card USB Reader/ Writer

Batteries and Power Supplies

BP-U30

Lithium-ion Battery*

BP-U60

Lithium-ion Battery*

Headphones

MDR-7505

MDR-7505 compact professional headphones

Tripods

VCT-SP1BP

Multi-purpose Camcorder Support System

VCT-SP2BP

Multi-function Camcorder Shoulder Support

Cases

LCS-G1BP

Soft Carry Case

LCS-BP1BP

Soft Carrying Case

SONY

Option Boards and Modules

MEAD-MS01

Adaptor for using Memory Stick™
with XDCAM EX products