

Panasonic

AG-CX10 / HC-X2000 / HC-X1500
Product Information



*The mics shown in product photos are optional.

The Smallest, Lightest 4K 60p Camcorder

The industry's smallest, and lightest* 4K 60p director's camera capable of being carried anywhere for instant, precise shooting.



Road Map

2016

2017

2018

2019

2020

2021~



2016/8

HC-X1/AG-UX170



2014/10

HC-X1000/AG-FC100



2016/9

HC-PV100/AG-AC30

Palm Type Entry Model 1/3.1-inch BSI Sensor/ 20x Optical Zoom/ 29.5mm



2013/10

HC-MDH2/AG-AC8

1/4.5-inch 1MOS/ 21x/ 28mm

HC-MDH3



1/3.1-inch BSI Sensor/ 20x Optical Zoom/ 29.5mm



2020/3

AG-CX10/AG-CX98



1/2.5-inch BSI Sensor/ 24x Optical Zoom/ 25mm



2020/3

HC-X2000/AG-CX8



1/2.5-inch BSI Sensor/ 24x Optical Zoom/ 25mm



2020/3 (2020/5 in India)

HC-X1500*/AG-CX7**

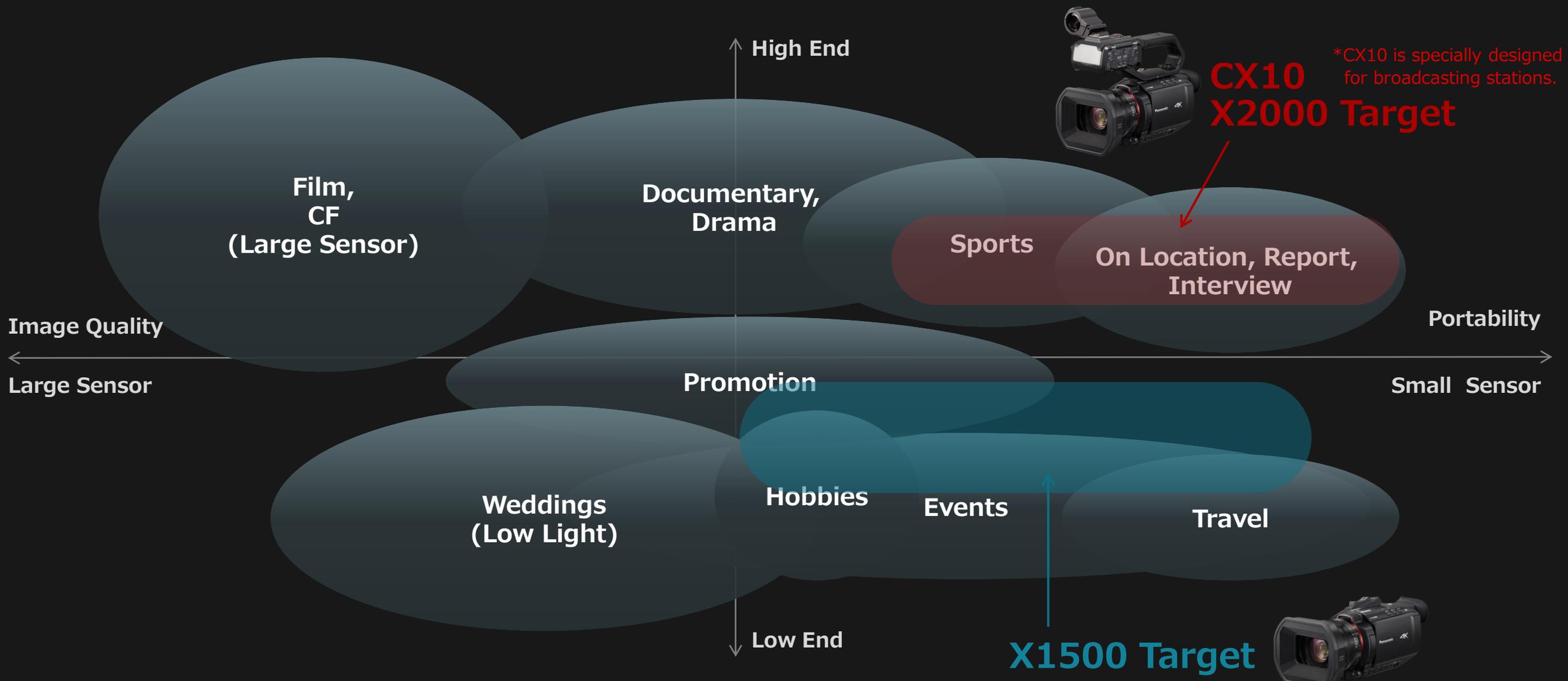


1/2.5-inch BSI Sensor/ 24x Optical Zoom/ 25mm

*VW-HU1 is optional.

**VW-HU1 is included for India.

Target Markets



Target User

CX10/X2000: One Man Crew Director

*CX10 is specially designed for broadcasting stations.



Use Case:

- On Location
- Report
- Events
- Interviews
- Sports

Compact and Light 4K60p Director's Camcorder

High-Precision AF with Face Detection

25mm Wide-Angle

5-AXIS HYBRID O.I.S.

Optical 24x Zoom

Long Life Battery

3G SDI Output

X1500: High-Amateur, VLOGGER

*The mic and handle unit shown in product photo is optional.



Use Case:

- Hobbies
- Travel
- Events
- Family

Compact and Light 4K60p Director's Camcorder

High-Precision AF with Face Detection

25mm Wide-Angle

5-AXIS HYBRID O.I.S.

Optical 24x Zoom

Long Life Battery

Product Overview

4K 60p Camera Condensed into the Industry's Smallest* Body.

* For a camcorder with an integrated lens capable of 4K 60p recording (as of January 6th, 2020. Panasonic research).

While excelling in mobility, portability and immediacy, the camera supports 4K 60p recording. It is condensed into a compact body while considering the weight balance of the advanced functions when shooting.



While compact in size ... Provides the industry's longest continuous recording time: **4.5h** (4K 60p/200 Mbps)

Comparison by volume: **60%**



Heat-Dispersing Design

CX10

X2000

X1500

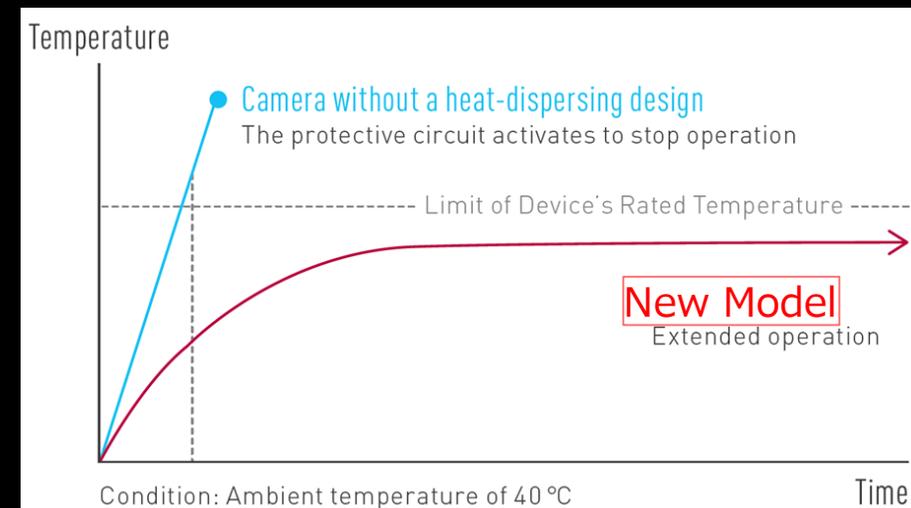
Including a newly developed heat-dispersing fan achieves 4K 60p compactness.



A newly developed, thin fan helps to reduce body size and achieves 4K 60p compactness.

A camcorder capable of 4K 60p 10-bit recording achieves the industry's lightest* weight of approx. 1.5 kg (all incl.) and low power consumption of approx. 15.5 W (LCD ON).

* For a camcorder with an integrated lens capable of 4K 60p recording (as of January 6th, 2020. Panasonic research).



The Industry's Smallest, and Lightest* 4K 60p Director's Camcorder



1

4K 60p with High Mobility and Operability

Industry Lightest* 1.5kg Body, Lowest 15.5W Power Consumption, High Operability Layout Design, Easy Detachable Handle

2

Optical 24x Zoom and Fast Face Detection AF

Wide 25mm (4K/FHD), iZoom 48x (FHD)/32x (4K), 4K High Precision AF, Face Detection AF/AE, 5-Axis HYBRID O.I.S. (UHD/FHD)

3

Pro Quality 4K Shooting with New Engine

1/2.5-type 8.29M MOS Sensor, 422 10 bit: 4K 30p/25p, FHD 60p, 4K 60p 420 10bit (HEVC), P2 MXF

*As a camcorder with 4K 60p 10bit Recording. **A license is required.

Recording Format

Lens

Sensor / Engine



AVCHD Progressive

MP4 MOV P2 MXF **NEW**



24x Optical Zoom

32x i.ZOOM

25mm Wide Angle **NEW**

1/2.5-inch 8.29M MOS **NEW**

VENUS Engine **NEW**

(UHD) (UHD/FHD)



Face Detection AF/AE **NEW**

5-AXIS HYBRID O.I.S. **NEW**

4K HIGH PRECISION AF **NEW**

ND Filter **NEW**

Two Manual Rings **NEW**

HEVC 10bit Rec **NEW**

4K 60p (MOV/MP4) **NEW**

420-10bit (4K/60P) 422-10bit (4K/30P) **NEW**

120fps Super Slow **NEW**

Cine Style File Name **NEW**

LED Light **NEW**

2 x XLR IN **NEW**

24bit PCM AUDIO **NEW**

Double SD Card Slot **NEW**

3G SDI Output **NEW**

NDI | HX **NEW**

Live Streaming (RTSP/RTMP/RTMPS) **NEW**

Ethernet **NEW**

Built-in Wi-Fi **NEW**

IR Shooting* **NEW**

*The commercially available IR light is needed separately.

The Industry's Smallest, and Lightest* 4K 60p Director's Camcorder



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*As a camcorder with 4K 60p 10bit Recording.

Recording Format

4K AVCHD Progressive MP4 MOV

Lens

LEICA DICOMAR 24x Optical Zoom 32x i.ZOOM 25mm Wide Angle (UHD) (UHD/FHD)

Sensor / Engine

1/2.5-inch 8.29M MOS **VENUS Engine**

DOLBY AUDIO SDXC I HDMI Wi-Fi CERTIFIED

- Face Detection AF/AE
- 5-AXIS HYBRID O.I.S.
- 4K HIGH PRECISION AF
- ND Filter
- Two Manual Rings
- HEVC 10bit Rec
- 4K 60p (MOV/MP4)
- 420-10bit (4K/60P) 422-10bit (4K/30P)
- 120fps Super Slow
- Cine Style File Name
- LED Light
- 2 x XLR IN
- 24bit PCM AUDIO
- Double SD Card Slot
- 3G SDI Output
- NDI | HX
- Live Streaming (RTSP/RTMP/RTMPS)
- Ethernet
- Built-in Wi-Fi
- IR Shooting*

*The commercially available IR light is needed separately.

The Industry's Smallest, and Lightest* 4K 60p Camcorder

The Handle Unit can be used as an optional accessory.



1

4K 60p with High Mobility and Operability

Industry Lightest* 1.2kg Body, Lowest 14.4W Power Consumption, High Operability Layout Design

2

Optical 24x Zoom and Fast Face Detection AF

Wide 25mm (4K/FHD), iZoom 48x (FHD)/32x (4K), 4K High Precision AF, Face Detection AF/AE, 5-Axis HYBRID O.I.S. (UHD/FHD)

3

Pro Quality 4K Shooting with New Engine

1/2.5-type 8.29M MOS Sensor, 422 10 bit: 4K 30p/25p, FHD 60p, 4K 60p 420 10bit (HEVC)

*As a camcorder with 4K 60p 10bit Recording.

Recording Format



Lens



Sensor / Engine



Face Detection AF/AE (NEW)	5-AXIS HYBRID O.I.S. (NEW)	4K HIGH PRECISION AF (NEW)	ND Filter (NEW)	Two Manual Rings (NEW)	HEVC 10bit Rec (NEW)	4K 60p (MOV/MP4) (NEW)	420-10bit (4K/60P) 422-10bit (4K/30P) (NEW)	120fps Super Slow (NEW)	Cine Style File Name (NEW)
LED Light*	2 x XLR IN*	24bit PCM AUDIO (NEW)	Double SD Card Slot	3G SDI Output	NDI HX	Live Streaming (RTSP/RTMP/RTMPS) (NEW)	Ethernet	Built-in Wi-Fi	IR Shooting**

*The optional handle unit is needed.

**The commercially available IR light is needed separately.

Easily Detachable Handle Unit with XLR Input and LED Light



Target:

- High amateurs requiring quality sound recording
- High amateurs who want to shoot at low angles
- Directors/producers not requiring SDI

1

Two XLR Inputs for High Sound Quality

Mic/Mic +48V/Line Selectors

2

LED Light for Unforeseen Situations

Dimming Function with Light Volume Knob

3

Easily Detachable Design for Smart Operation

Single-Screw Locking Mechanism

2ch XLR IN

LED Light with
Dimming and Diffuser

One Hand
Detachable Handle

Tally LED

REC S/S

ZOOM Lever

Cold Shoe/
Mounting Hole

Microphone
Holder

Comparison Chart

	AG-CX10 / AG-CX98	HC-X2000 / AG-CX8	AG-CX7 (India)	HC-X1500	Remarks
					
Timing	2020/3	2020/3	2020/5	2020/3	Varies Depending on the Region
Handle Unit	○	○	○	← Option (VW-HU1)	
XLR Input x 2	○	○	○	← Option (VW-HU1)	
LED Light	○	○	○	← Option (VW-HU1)	Light Intensity Also Adjustable
SDI Out	○	○	← -	-	3G/HD
P2 MXF	○	← -	-	-	UHS-I U3 Supported
microP2 card Support	○	← -	-	-	Compatible to 100 Mbps
Ethernet	○	← -	-	-	Terminal Shape Common with micro-AB
NDI HX Compatible	○	← -	-	-	Switcher Connection
USB micro-AB⇔ Host(Type-A) Conversion Cable Included	○	← -	-	-	
USB HOST(Type-A)⇔ LAN Conversion Adaptor Included	○	← -	-	-	

Comparison Chart against HC-X1000

	HC-X2000	HC-X1000
Size (W x H x D)	129x159x257mm	160x170x315mm
Weight (Body Only / All incl.)	About 900g/1,500g	About 1,550g※/1,780g ※Hood & eyecup incl.
Resolution	UHD60p/200Mbps, FHD/200Mbps	C4K24p/100Mbps, UHD60p/150Mbps, FHD/200Mbps
Sensor(Effective)	1/2.5" (1/2.5")	1/2.3" (1/3.1")
Pixels(Effective)	8.57M (8.29M)	18.91M (8.85M at 4K/8.29M at UHD)
Lens	Optical 24x (i.ZOOM 48x(FHD) F1.8-4.0 25.0-600mm	Optical 20x (iA zoom 40x(FHD)) F1.8-3.6 30.8-626mm(UHD)
Wide-angle	25.0mm(UHD) 25.0mm(FHD)	29.5mm (C4K) 30.8mm (UHD/60p)
OIS	Hybrid OIS Ball/5-axis (UHD/FHD)	5-axis Hybrid OIS+(FHD)/Power OIS (UHD)
AF	4K High Precision AF / Face Detection AF	Intelligent AF
Recording Format	MOV (LPCM), MP4 (AAC), AVCHD (Dolby Audio)	MOV (LPCM), MP4 (LPCM), MP4 (AAC), AVCHD (Dolby Digital)
Data Compression	4K60p 4:2:0-10bit(HEVC), 4K30p 4:2:2-10bit	4K60p 4:2:0-8bit
Super Slow	120fps (FHD)	-
Minimum Illumination	1.5Lx (Super Gain: 30dB, Shutter 1/30) *Target	4Lx (Super Gain: 30dB, Shutter 1/30)
Wi-Fi / NFC	○(2.4GHz) / -	○ (2.4GHz) / ○
Live Streaming	○(RTSP/RTP/RTMP/RTMPS)	-
Card slot	SD (UHS-I) x2	SD (UHS-I) x2
SDI OUT/HDMI OUT	○BNC(3G)/○(Type A)	x/○(Type A)
AV OUT	-	Pin jack x 3
Microphone/Audio IN	Stereo/XLR x2	Stereo/XLR x2
Headphone	Stereo mini (Φ3.5)	Stereo mini (Φ3.5)
Remote	Super mini (Φ2.5)	Zoom S/S (Φ2.5) + FOCUS/IRIS (Φ3.5)
USB HOST/DEVICE	x /○ (Micro-AB)	○ (TypeA) /○ (Micro-B)
LCD/View Finder	3.5"(2.76M) /0.24" (1.56 M) *Simultaneous Display	3.5" (1.15M) / 0.45" (1.22 M)
Manual Ring	2 Rings (+ 1 Dial)	3 Rings
LED Light	○ (w/Dimming, Diffuser)	-
Battery Life	4h35m (HEVC UHD/60p 10bit 200Mbps, LCD Monitor)	4h15m (MP4 UHD/60p 150Mbps, LCD Monitor)
Smartphone Application	HC ROP	Image App
Remarks	Removable Handle Unit	

Main Parts and Control



XLR In x 2

Audio Input Selector

Line/Mic/+48V Selector

Audio Level

Touch Panel
2,760K dots
3.5-inch LCD

ND Filter Switch

USB

Wired Remote

Focus Ring

Zoom/Iris Ring

Jog Dial

Iris Button

Shutter Button

Intelligent Auto/
Manual Switch

LED Light
ON/OFF

Light
Volume

Sub Zoom
Switch

Zoom
Switch

User
Button 5

LED
Video Light

24x Zoom Lens
(F1.8 25-600mm)

User Button 1

User Button 2

OIS /User
Button 3

SD Slot x 2

White
Balance

AE Level/
User Button 4

Featuring Optical Performance for Precise Shooting

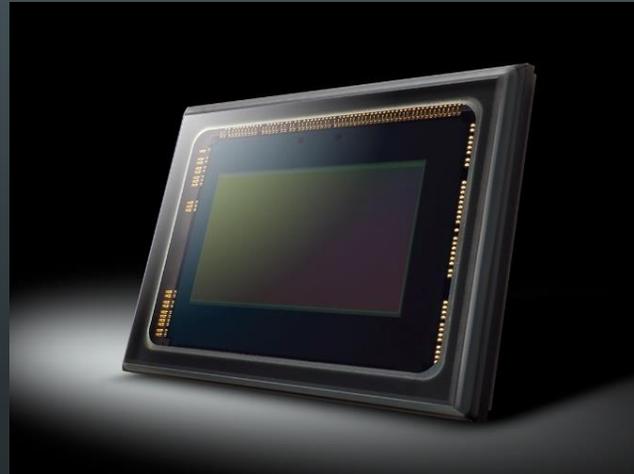
High-Quality Core Technology

LEICA Dicomar Lens



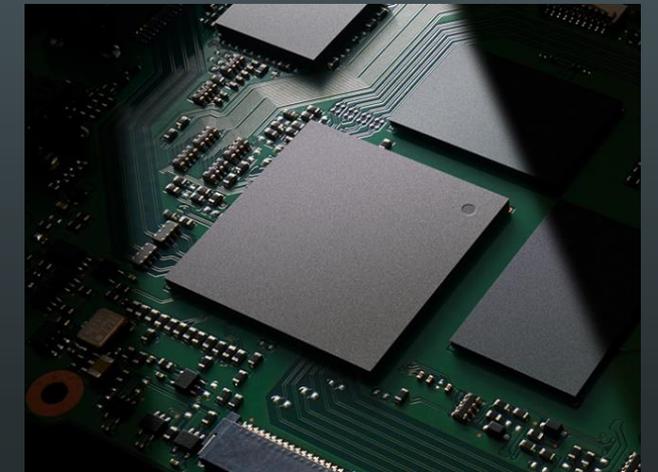
- This high-performance lens has passed the stringent inspection standards of Leica Camera AG for aspects such as resolution and contrast.
- In addition to rendering sharp, crisp images, it produces the distinctive nuances and subtle shading that Leica lenses are renowned for.

1/2.5-type (1/2.5-inch) Sensor



- Increasing the readout speed has made it possible to handle large-volume 4K data at a fast 60 fps/50 fps.
- This suppresses the rolling shutter distortion that often occurs when shooting moving subjects.

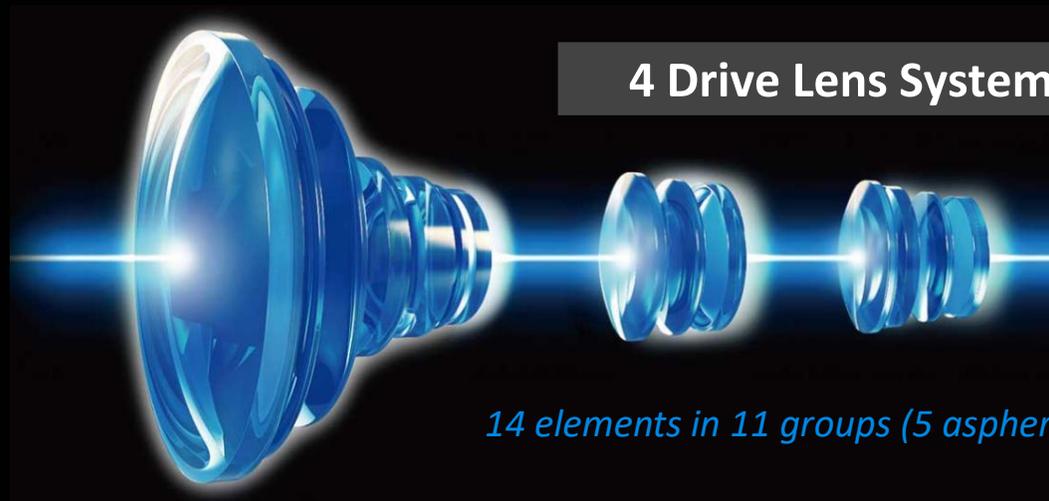
Venus Engine



- The Venus Engine, which contains technologies accumulated with LUMIX, is newly incorporated in camcorders.
- This high-speed LSI processes the massive volume of 4K data quickly and accurately while reducing noise.
- 4:2:2 10-bit

24x Optical Zoom and Wide-Angle 25mm* with LEICA Dicomar Lens

*35mm camera equivalent



Small Palm Semi-pro Camcorder's
Highest Zoom
(Except interchangeable lens camcorder)

Optical **24x** zoom

F1.8 – F4.0

1/2.5-inch BSI Sensor

Small Palm Semi-pro Camcorder's
Widest Angle
(Except interchangeable lens camcorder)

25mm Wide Angle NEW
(UHD/FHD)

4K High Precision AF NEW

**Two Manual Rings
& One Dial**

New Image Stabilizer

Hybrid o.i.s.

Ball o.i.s.

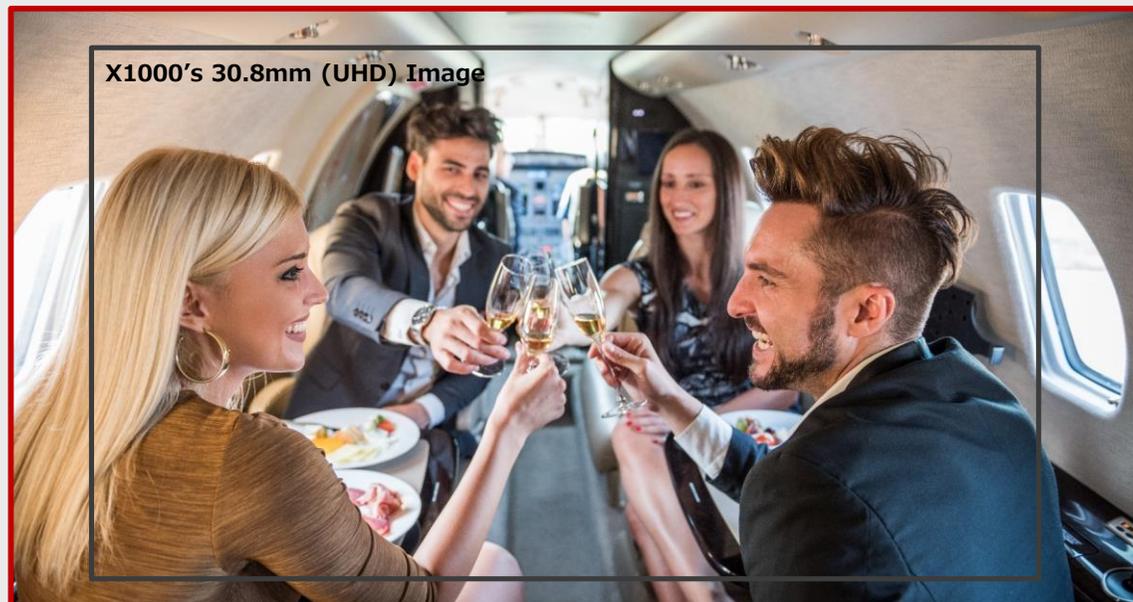
5-Axis HYBRID o.i.s.

Internal ND Filter

Optical 24x Zoom and Wide-Angle 25mm with LEICA Dicomar Lens

Wide-Angle 25mm*1

25mm Angle Image (UHD/FHD, aspect ratio 16:9)



* Picture simulated

The integrated lens boasts the industry's widest angle of 25 mm at the wide-angle setting. It enables wide-angle shooting with little distortion, without the use of a wide conversion lens and also allows video recording/production in narrow spaces.

*1 35 mm film equivalent

Optical 24x Zoom



24x Optical Zoom

Covers the range of wide angle 25.0mm to ultra-telephoto 600mm at UHD/FHD. (35mm film camera equivalent)

i.ZOOM 48x (FHD) / 32x (UHD)

You can zoom to a maximum of approximately 48x FHD (32x UHD) while maintaining the beauty of high-definition image quality.

Two Manual Rings and ND Filter

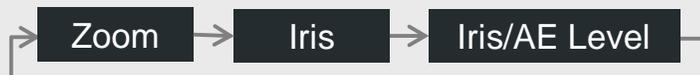
Two Manual Rings



- Manual Ring response has been improved from conventional models.* *HC-X1
- The zoom speed can be varied by applying pressure to the zoom seesaw switch on the body.
- Operation of the zoom lever attached to the Handle Unit maintains a constant zoom speed, which can be set in 7 steps from the menu.
- The ring size is changed from front to back for easy operation.

Note: The Iris is allocated to the Manual Ring only when the Manual Iris is equipped.

Switching of the rear ring operation by user button



ND Filter

High-resolution Image



Slow Shutter Speed



- ND filters are built into the lens to suppress the amount of incident light.
- The filters can be selected (1/4, 1/16, 1/64, or OFF) to match the shooting environment.
- This is convenient, for example, when you want to shoot at a slow shutter speed in bright daylight. Also, when opening the aperture, you can attain high resolution and a shallow depth of field.

Use is simplified by placing the ND Filter next to the Manual Rings.



Focus

Zoom or Iris

Jog Dial

Rear Ring	Jog Dial
ZOOM	IRIS function added
IRIS	--
IRIS/AE Level*	--

* IRIS operates only during Manual Iris. For Auto Iris, AE Level operation is in effect.

4K High-Precision AF — High-Speed, High-Precision AF Technology in 4K —

High AF performance is achieved in spite of the difficulty of 4K shooting compared with Full-HD.

Speed



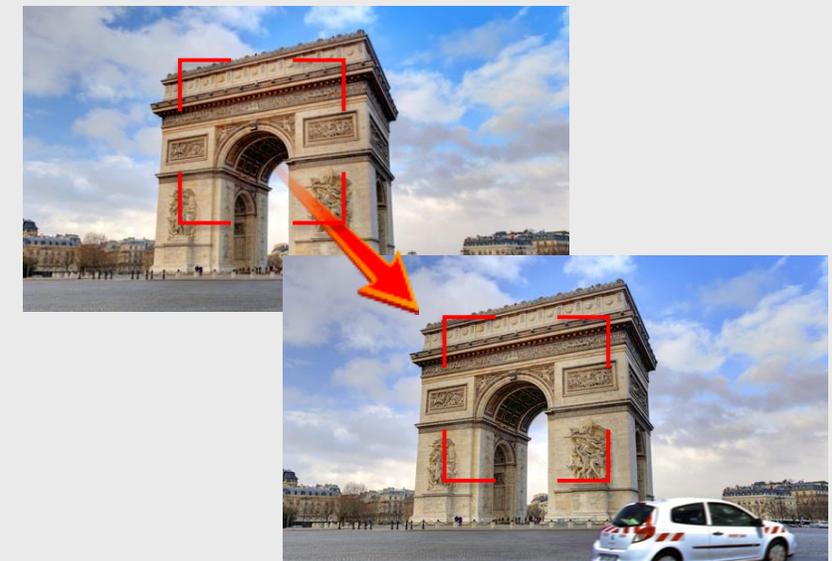
Even when a subject suddenly enters the frame, it is instantly focused.

Tracking Performance



The subject's movement is also tracked.

Stability



The subject stays in focus even when there are some obstacles passing through.

Note: The focusing frames do not appear actually.

Panasonic AF performance is accurate and speedy even in severe 4K recording situations.

Focus Assist Functions

A Wide Variety of Focus Assist Functions Support Quick and Accurate Manual Focusing

■ Face Detection AF/AE Using Color



Provided with Face Detection to precisely capture subjects on-site free from out of focus problems and insufficient exposure. Also, by adding color recognition, tracking subjects is improved, without interruption, when the face moves to either side.

■ Area Function

Auto Focus is easily possible with just a touch on the LCD panel. You can also change this to Auto Iris and Brightness Display on the screen.

● Y Get

Measures brightness at the center and displays numerical data.



Focus/Iris/Y Get/Focus+Iris/
Focus+Y Get

■ Focus Assist

When the Focus Assist button is pressed during manual focusing:

● Expand

Visibility can be enhanced by expanding the display of any desired part of the screen.*

* The part to be expanded is designated by touching the screen.

● Peaking

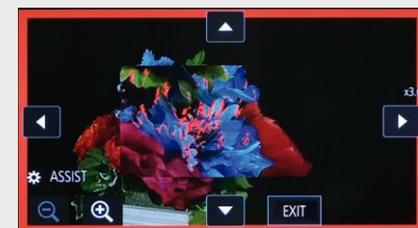
The contours of subjects in focus are colored for display emphasis.

● Expand and Peaking

Expand and Peaking can be used in combination.

● One-Push AF

This function temporarily activates Auto Focus when shooting in Manual mode.



Peaking

HYBRID O.I.S.

5-Axis Hybrid O.I.S. (UHD/FHD)



In both UHD/FHD modes, in addition to Optical Image Stabilization (OIS), Electronic Image Stabilization operates to detect and correct handshake in the 5-axis direction, including rotational blurring. This provides powerful correction in unstable situations, such as low-angle and high-angle shooting.

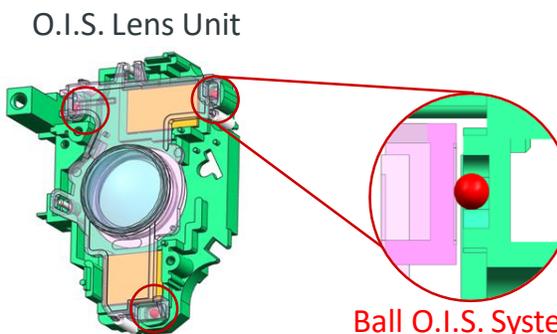
There are three modes to choose from:

- NORMAL (standard)
- STABLE (effective for fixed-frame shooting)
- PAN/TILT (effective in panning and tilting)



➤ Ball O.I.S. System

Wear of the drive section is reduced, especially improving the correction of small-amplitude blurring.



Ball O.I.S. System

Panasonic

High-Quality Recording with Versatile Recording Modes

New Venus Engine

The Venus Engine, which contains technologies accumulated with LUMIX, is newly incorporated in camcorders.

**4K
60P**

Smooth, High-resolution

3,840 x 2,160	59.94p 50.00p	150Mbps	LongGOP 4:2:0 8bit MOV
		200Mbps	HEVC LongGOP 4:2:0 10bit MOV
		100Mbps	HEVC LongGOP 4:2:0 10bit MP4

**4:2:2 10-bit
Internal Rec**

(Except for 4K 60p recording)

Rich Color Profiling

3,840 x 2,160	29.97p etc.	150Mbps	4:2:2 10bit LongGOP MOV
1,920 x 1,080	59.94p etc.	200Mbps	4:2:2 10bit All-Intra MOV

**200Mbps
HEVC 4:2:0 10-bit**

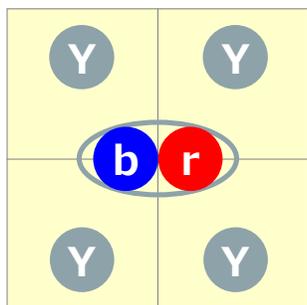
High Affinity

3,840 x 2,160	59.94p 50.00p	200Mbps	4:2:0 10bit HEVC
			LongGOP MOV

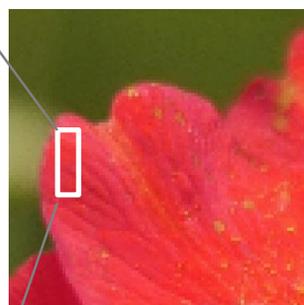
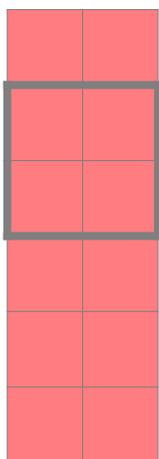
4:2:2 10-bit

4:2:2 Color Subsampling

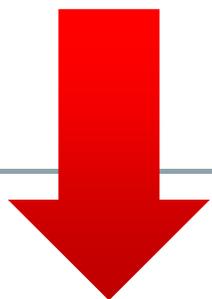
4:2:0



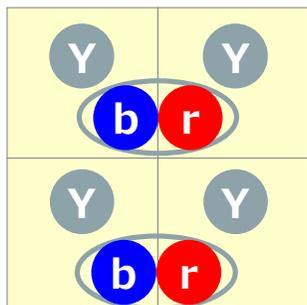
Color information on 2 lines



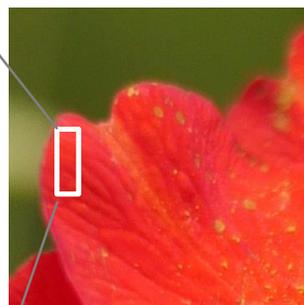
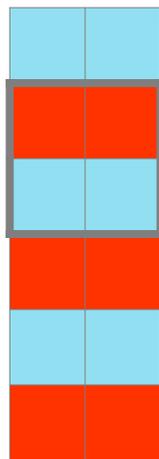
Color is mixed



2 Times Information
4:2:2



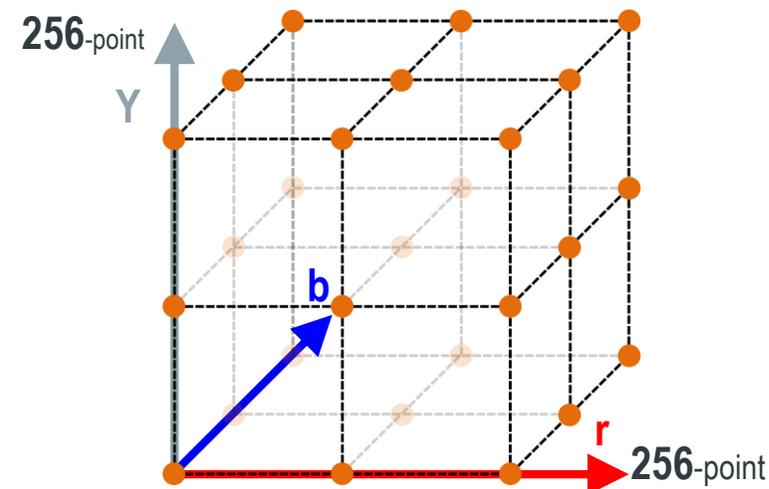
Color information on each line



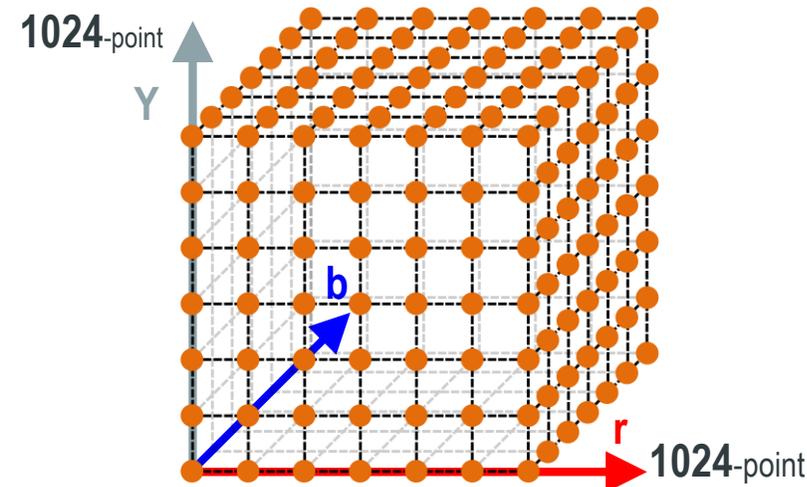
Rich gradation

10-bit Color Depth

8bit



64 Times Information
10-bit



High Resolution with Natural Texture

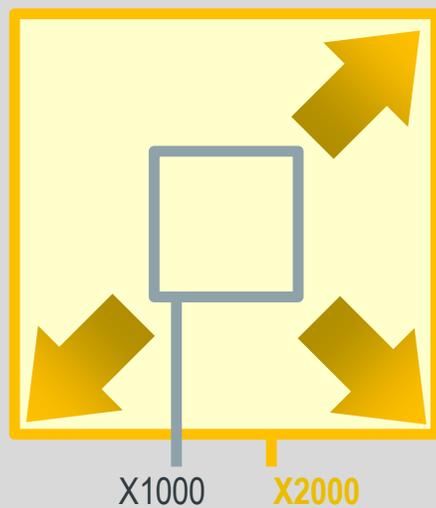
Multipixel Luminance Generation & Intelligent Detail Processing & New Sensor with No Low Pass Filter

It Reproduces Subjects in Detail to Achieve Higher Resolution

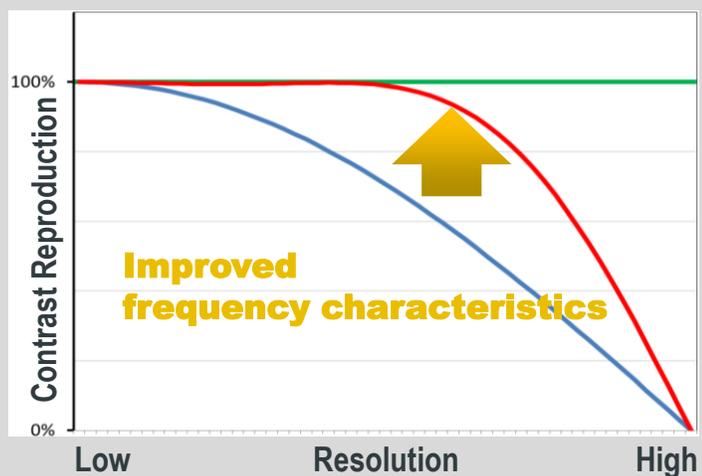
Multipixel Luminance Generation

Reference of a 9 times wider range of pixel information improves frequency characteristics compared to conventional demosaic processing.

9 Times Area



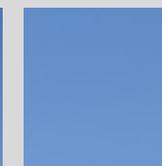
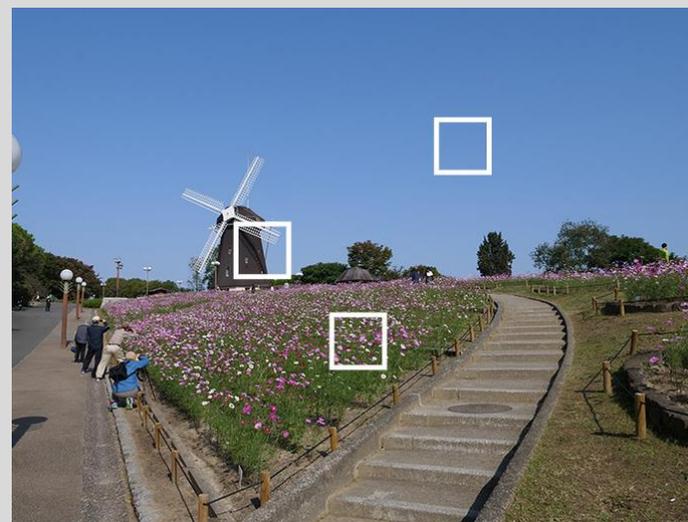
- Conventional Processing - New Processing



Details Are Emphasized While Suppressing Unnatural Edges

Intelligent Detail Processing

This separates the subject into flat, detailed, or edged areas by analyzing the characteristics of the subject for each pixel to control the edge emphasis.



Flat Area
No emphasis



Detailed Area
Edge emphasis



Edge Area
Suppressing unnatural edges

High-Quality Recording with Versatile Recording Modes



4:2:0 10-bit (4K/60P), 4:2:2 10-bit (4K/30P)

- With 4:2:2 10-bit sampling, LongGOP (150 Mbps) can acquire a maximum 29.98p/25p UHD and a maximum 59.97p/50p FHD.
- High-efficiency codec: Maximum 200 Mbps (4K 59.94p)/150Mbps(4K 29.97p)

HEVC 4:2:0 10-bit

- Featuring a high-efficiency new codec HEVC (4:2:0 10-bit)
- Smooth reproduction is possible with software such as a free VLC Media Player or QuickTime Player.*
- * Depending on the built-in storage or memory environment, video images may not be smoothly reproduced.

MOV files with excellent compatibility and control are used

- The same file system with the Professional Handheld Camcorder AG-CX350 will automatically create filenames 20 characters in length for easy control of clips. Conventional AVCHD acquisition is also supported.

Filename
example:

B 0 0 2 C 0 1 0 _ 1 7 0 9 1 8 _ E 1 2 5 .MOV

Camera index

Card number

Clip number

Date

Hash tag (automatically generated from the camera serial number)

4K 60p 4:2:2 10-bit HDMI output to external recorder

Recording Format

	Recording Mode	Recording Size	Color Sampling	Bit Depth	Bit Rate	System Frequency								Sound		
						59.94p	50p	29.97p	25p	23.98p	59.94i	50i	Codec	Ch	Bit Rate/1ch	
MOV	UHD	422 LongGOP 150M	3840x2160	4:2:2	10 bit	150M VBR			✓	✓	✓			24bit LPCM	2	1152k
		HEVC LongGOP 200M	3840x2160	4:2:0	10 bit	200M VBR	✓	✓						24bit LPCM	2	1152k
		HEVC LongGOP 150M	3840x2160	4:2:0	10 bit	150M VBR			✓	✓	✓			24bit LPCM	2	1152k
		420 LongGOP 150M	3840x2160	4:2:0	8 bit	150M VBR	✓	✓						24bit LPCM	2	1152k
		420 LongGOP 100M	3840x2160	4:2:0	8 bit	100M VBR			✓	✓	✓			24bit LPCM	2	1152k
	FHD	422 ALL-I 200M	1920x1080	4:2:2	10 bit	200M VBR	✓	✓						24bit LPCM	2	1152k
		422 ALL-I 100M	1920x1080	4:2:2	10 bit	100M VBR			✓	✓	✓	✓	✓	24bit LPCM	2	1152k
		422 LongGOP 100M	1920x1080	4:2:2	10 bit	100M VBR	✓	✓						24bit LPCM	2	1152k
422 LongGOP 50M		1920x1080	4:2:2	10 bit	50M VBR			✓	✓	✓	✓	✓	24bit LPCM	2	1152k	
MP4	UHD	HEVC LongGOP 100M	3840x2160	4:2:0	10 bit	100M VBR	✓	✓						16bit AAC	2	768k
		HEVC LongGOP 72M	3840x2160	4:2:0	10 bit	72M VBR			✓	✓	✓			16bit AAC	2	768k
		420 LongGOP 72M	3840x2160	4:2:0	8 bit	72M VBR			✓	✓	✓			16bit AAC	2	768k
	FHD	420 LongGOP 50M	1920x1080	4:2:0	8 bit	50M VBR	✓	✓			✓			16bit AAC	2	768k
AVCHD	FHD	PS	1920x1080	4:2:0	8 bit	25M (59.94P)	✓	✓						Dolby Audio	2	768k
		PH	1920x1080	4:2:0	8 bit	21M (59.94i)					✓	✓	✓	Dolby Audio	2	768k
		HA	1920x1080	4:2:0	8 bit	17M (59.94i)						✓	✓	Dolby Audio	2	768k
	HD	PM	1280x720	4:2:0	8 bit	8M (59.94P)	✓	✓						Dolby Audio	2	768k

Also Supports Broadcasting Station Formats

Future Update

Summer of 2020 (Target)

	OFFICIAL NAME	SHORT NAME (FOR OSD MENU)	PIXELS	COLOR SAMPLE	BIT DEPTH	BIT RATE	FILE FORMAT	VFR* *Progressive Mode Only	SYSTEM FREQUENCY								AUDIO			
									59.94p	50p	29.97p	25p	24p	23.98p	59.94i	50i	Codec	Ch	Bit Rate /1ch	
HD	AVC-Intra100	AVC-I100	1920x1080	4:2:2	10 bit	100M (59.94i)	MXF (OP-AT0M)									✓	✓	24 bit LPCM	4	1152 k
			1280x720	4:2:2	10 bit	100M (59.94P)	MXF (OP-AT0M)		✓	✓										
	AVC-Intra50	AVC-I50	1440x1080	4:2:0	10 bit	50M (59.94i)	MXF (OP-AT0M)								✓	✓	24 bit LPCM	4	1152 k	
			1280x720	4:2:0	10 bit	50M (59.94P)	MXF (OP-AT0M)		✓	✓										
	AVC-LongG50	AVC-G50	1920x1080	4:2:2	10 bit	50M VBR (59.94i)	MXF (OP1b)								✓	✓	24 bit LPCM	4*	1152 k	
			1280x720	4:2:2	10 bit	50M VBR (59.94P)	MXF (OP1b)		✓	✓										
	AVC-LongG25	AVC-G25	1920x1080	4:2:2	10 bit	25M VBR (59.94i)	MXF (OP1b)		✓	✓					✓	✓	24 bit LPCM	4*	1152 k	
			1280x720	4:2:2	10 bit	25M VBR	MXF (OP1b)		✓	✓										

* Audio format: LPCM 4 channel (audio recording: 2 channel only), 24 bit, 48 kHz

Super Slow-motion Recording



Super Slow 120/100fps (FHD, MOV)

HD mode achieves a super-slow motion effect with a maximum 120 fps (59.94 Hz) or 100 fps (50 Hz). It supports high-quality 10-bit recording in FHD mode. The image area is not cropped even at high frame rates.

	System Frequency		
	59.94Hz		50.00Hz
Recording Mode	1080/29.97p (30)	1080/23.98p (24)	1080/25p (25)
Super Slow fps	120 (4x)	120 (5x)	100 (4x)

AF/MF during Super Slow Shooting

Because high-speed AF and MF continue to operate precisely even super-slow shooting of fast-moving subjects, you can enjoy slow-motion video with minimal errors.

Professional Camera Image Adjustment Functions

Camera Image Adjustment Functions of Broadcast Grade

Provided with professional camera image adjustment functions including the 16-axis independent color correction function similar to the one in a broadcast video camera as well as detail, skin detail, chroma level, chroma phase, master pedestal, gamma and knee setting functions.

■ 8-Mode Gamma

Gamma can be selected from seven modes, including two Cine-Like modes developed based on VariCam know-how. Desired gradation can be achieved to suit specific video production needs.



HD NORM



CINE-LIKE D

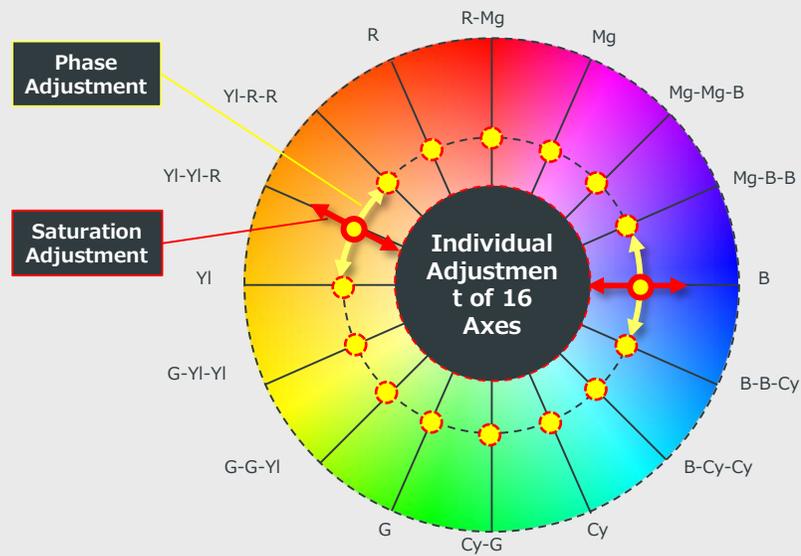
HD	This is a video Gamma characteristic for HD (High Definition). This Gamma complies with the standards defined by ARIB, EBU, SMPTE, etc. Use this for the purpose of normal HD shooting.
SD	Gain is increased for dark areas more than HD Gamma. This Gamma curve can be used for shooting in SD mode, or for HD shooting that needs the same Gamma as used in SD shooting.
FILMLIKE 1	Compared with HD Gamma, this has the characteristics by which the gradation of the highlights can be reproduced better. Using this Gamma curve which gently slopes for the low-brightness area makes the picture look calm. Contrast becomes sharper and the gradation expression of the middle- and high-brightness areas (face, etc.) is extended.
FILMLIKE 2	This has the characteristics by which the gradation of the highlights can be reproduced better than FILMLIKE1.
FILMLIKE 3	This has the characteristics by which the gradation of the highlights can be reproduced better than FILMLIKE2.
CINE-LIKE D	Film-use cine Gamma characteristics. This Gamma gives priority to the Dynamic Range and maintains the gradation that ranges evenly from low to high level. It creates a unique look which is sometimes used as an artistic effect.
CINE-LIKE V	Video-use cine Gamma characteristics. This is a Gamma curve to make a movie-like picture using a video camera. It creates a picture prioritized on contrast compared to normal video mode recording.
STILL-LIKE	Gamma setting to simulate images captured with DSLM.

Professional Camera Image Adjustment Functions

Camera Image Adjustment Functions of Broadcast Grade

■ 16-Axis Independent Color Correction Function

Each of the 16 image phases can be adjusted individually. This enables color matching of multiple cameras under the same lighting conditions as well as creative image rendering.



Before correction



After correction

■ Soft Skin

Makes skin colors appear softly and beautifully. Especially effective when recording the person up close.



OFF



ON

■ Master Detail

Adjusts the overall degree of contour enhancement.



Weak



Strong

■ Other Professional Video Adjustment Functions

- Chroma level, chroma phase, color temperature, master pedestal
- Knee point setting

Professional Camera Image Adjustment Functions

Camera Image Adjustment Functions of Broadcast Grade

■ Scene Files

Six files preset with picture quality settings are provided as Scene Files.

- 1: Standard
- 2: Shooting under fluorescent lights
- 3: Enhanced gradation of luminance in low-light scenes
- 4: STILL-LIKE setting
- 5: CINE-LIKE contrast
- 6: CINE-LIKE dynamic range

You can change any of the settings as desired and store one set as a Custom File in the camcorder, and up to eight sets on an SD memory card.

Menu Items Settable in Scene File

Master detail	Sets the level of the detail effect of the whole part.
Detail coring	Sets the level of signal (including noise) that does not activate the detail effect.
Soft skin	Makes skin colors appear softly and beautifully. Especially effective when recording the person up close.
V detail level	Sets the intensity of the detail level in the vertical direction.
RB gain control setting	R GAIN AWB PRE/B GAIN AWB PRE/R GAIN AWB A/B GAIN AWB A/R GAIN AWB B/B GAIN AWB B/AWB A GAIN OFFSET/AWB B GAIN OFFSET
Chroma level	Sets the chroma level of P _R and P _B signals.

Chroma phase	Finely adjusts the chroma phase of the P _R signal and P _B signal.
Matrix	Selects the matrix table to display the color for shooting.
Color correction setting	Finely adjusts the chroma phase of the P _R signal and P _B signal.
Master pedestal	Sets the master pedestal.
Gamma mode	Selects the gamma mode (detail is on slide 33 8 gamma mode)
Black gamma	Sets the gamma curves of dark areas.
Knee mode	Sets the knee operation mode.
Knee point	Sets the knee point position in 0.5% steps.
Knee slope	Sets the knee inclination.
DRS	Sets the level of the detail effect of the whole part.
DRS effect	Sets the level of signal (including noise) that does not activate the detail effect.
Auto iris level	Enables/disables the auto iris level function. If functions are assigned to the USER buttons, [ON]/[OFF] can be switched using the USER button operations.
Auto iris level effect	Adjusts the brightness in the auto iris mode. Increase the value to brighten, and decrease the value to darken the convergence of auto iris.
NR control	Sets noise reduction level. Effect becomes stronger when value is increased, and image aliasing could be seen in exchange for that.

IR (Infrared) Shooting in Dark Places



- The IR Cut Filter can be turned ON/OFF (allocated on the User button).
- When the filter is turned OFF, commercially available IR lights* can be used for shooting in dark places.

*Recommended: 850-nm wavelength light

*With IR cut filter ON, shutter OFF, iris AUTO fixed.

■ Change IR Rec Color



Two Color (White and Green)

Use Case:

Unlighted nightscapes, animals in nature, and event sites before the lights are turned on.

48kHz/24-bit High Resolution PCM Audio Recording



Others

- OSD level meter
- Headphone output (3.5-mm-diameter stereo mini-jack)

2 x XLR Audio Input **CX10** **X2000** X1500



- 2 x XLR input
- Switchable 48-V phantom power supply/MIC/LINE
- In MOV/P2 MXF* mode, 24-bit linear PCM recording delivers high resolution sound quality
- Volume control dial enables 2 channels control

* CX10 only

Professional Functions and Designs

Built-in LED Video Light

CX10

X2000

X1500

Equipped with a Convenient, Bright LED Light. Lighting Can Be Immediately Adjusted by Dial Operation.



ON/OFF switching is quick and easy.

Lighting can be easily adjusted on the spot to prevent glare when the subject you are shooting is a person.



	Specifications
Average illumination with diffusion filter (1.0m)	Approx. 70 lux
Color temperature	Approx. 4600K
Irradiation angle	Approx. 30°

Long Life Battery

Large-Capacity Battery Options

Battery Pack



VW-VBD58*

5800mAh (42Wh)



AG-VBR59

5900mAh (43Wh)

Battery Charger



Dual
charger

AG-BRD50

Quick charger for VBR series battery



No. 1
in Class**

Designed so the battery doesn't protrude.

Battery Model No.	Voltage/Capacity (Minimum Value)	Charging Time	Continuously Recordable Time
AG-VBR59 (Included/Sold optionally)	7.28V 5900mAh 43Wh	5h 30min.	Approx. 4h 35min. hours (estimated)
VW-VBD58 (Sold optionally)	7.2V 5800mAh 42Wh	5h 30min.	Approx. 4h 30min. hours (estimated)

*Production is scheduled to end in April 20th 2020. Sale of stock only.

** For a camcorder with an integrated lens capable of 4K 60p recording (as of January 6th, 2020. Panasonic research).

Easily Detachable Handle

CX10

X2000

X1500

Detachable, One-touch Handle Can Be Immediately Removed.



Joint is strong and rigid, mounted with a single screw.

No need for a terminal protection cover.

- Handle
The cover-shaped resin protects the terminals.
- Body
Protected by a built-in spring-type cover.

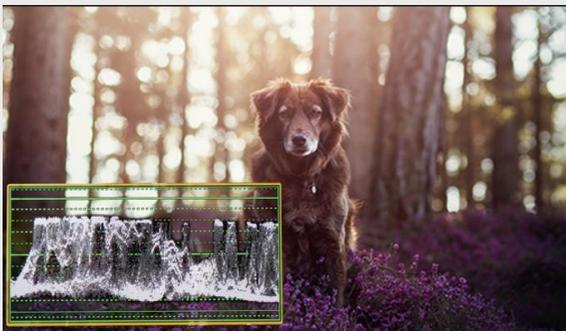
Professional Assist Functions

Waveform Monitor Display/Vector Scope

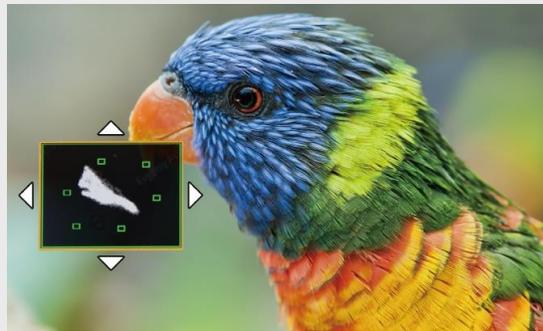
WAVE (Waveform) and VECTOR (Vector scope) can be easily displayed on a sub screen of the LCD monitor. Indication can be switched to WFM, Vector, or Off.

- **Waveform Monitor (WFM)** displays the signals being recorded as visual wave data for determining correct exposure when needing to comply with a precise broadcast specification.
- **Vector Scope** allows you to check the color phase and saturation, and adjust the white balance accordingly.

Waveform



Vector scope



Zebra Pattern

- Supports new, simultaneous Zebra 1 and Zebra 2 indications with varying threshold levels.
- For example, parts with blown out highlights, and parts at risk of blown out highlights can be checked on the same screen.
- Effective for measuring skin tones by setting upper and lower limits of brightness and displaying zebra patterns in that range.

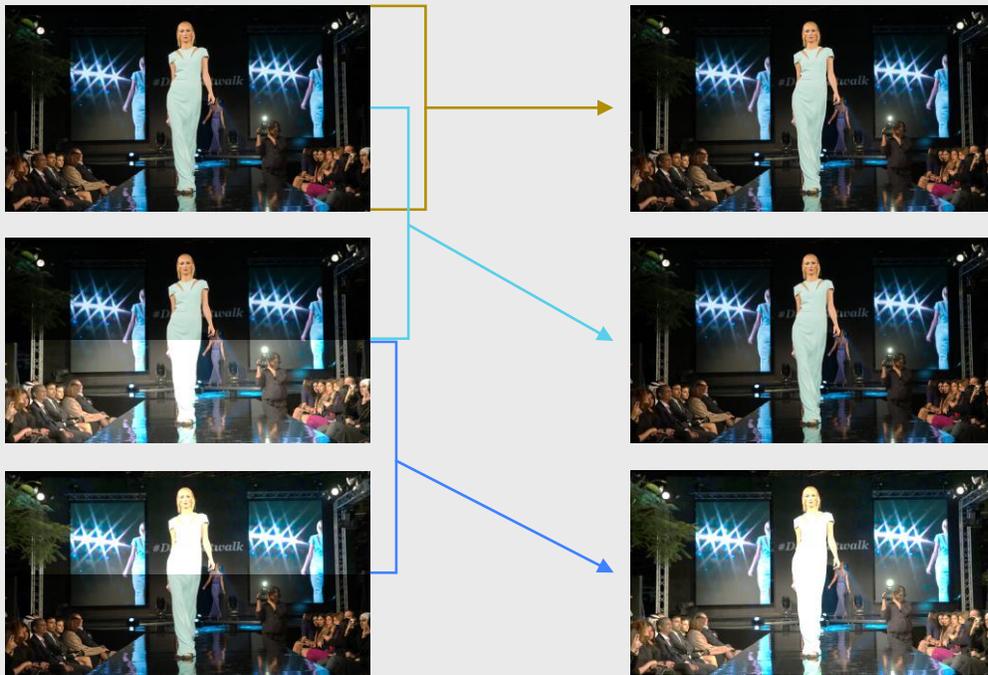


When setting ① = 80% or more, and ② = 100% or more.

Professional Assist Functions

Flash Band Correction

- High-precision flash band detection and correction software is equipped to resolve the flash band phenomenon that is unique to MOS sensors in which the screen brightness is split top and bottom by flashes.
- A frame with a full-screen flash is generated from the pair of frames in which the flash band occurred and the frames before them to resolve the unnatural effect.



Luminance Level Adjustment

- In 10-bit recording modes, you can select 0-1023, 64-940, or 64-1023.
- When producing the 16-235/16-255 video standard gradation at the 8-bit brightness level, editing can be performed with matching brightness levels.
- When creating images that combine photos and videos, editing can be performed with matching brightness levels.



Marker (Y Level)

Level Gauge

- Allows camera tilt to be checked by an on screen display on the LCD monitor.
- This makes it easy to keep the camera level even during handheld, low-angle, and high-angle shooting.



Professional Assist Functions

Cable Holding Clamp

- Equipped with a cable clamp on the hand belt.
- Prevents the cable from catching on something when shooting and pulling out a terminal to interrupt live streaming.



Save/Restore Camera Setting

- Allows you to save your camera's setup information to a file on the SD card.
- This is helpful when you need the same settings for later use, or among multiple cameras and users.

Shockless Auto White Balance

- A smooth transition occurs when switching White Balance modes.
- This is effective, for example, when moving from outdoors to indoors.
- Equipped with an ATW (Auto Tracking White Balance) function.

Lens Cover

- Protects lens while moving to your shoot location.



Lens Cover Open/
Close Switch



Operating Ease That Quickly Meets
Professional Demands

Simultaneous Display on a 3.5-inch (2,760K-dot) LCD Monitor and EVF

The Monitor Can Be Constantly Displayed Even When Viewing the EVF.

3.5-inch LCD with Touch Operation

- Approx. 2,760K-dot monitor with nearly twice the resolution of conventional models.
- RGB pixel structure is used to achieve high legibility even in bright sunlight.
- Electrostatic touch panel improves operation when selecting menu items. Focusing is also quickly done by simply touching the subject on the screen.
- Because simultaneous output of the LCD and EVF is possible, the image is constantly displayed on the LCD monitor regardless of whether the EVF is being viewed.
- Selfie-shooting Mode
Operational icons are displayed on the touch panel even when the LCD monitor is rotated 180 degrees, so you can shoot while confirming facial expressions and the angle of view.



Tiltable Viewfinder with Eyecup

The 1,555K-dot-equivalent color viewfinder can be tilted for added convenience.



Double SD Memory Card Slot

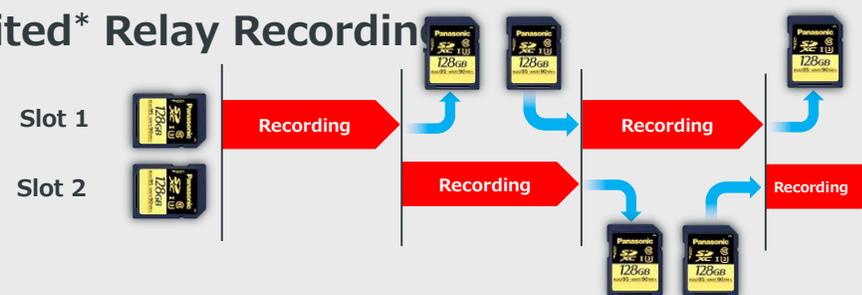
Double SD Memory Card Slot Boosts Recording Reliability

Double SD card slots are provided. This enables unlimited* relay recording by simply changing SD cards, and also allows the use of various recording systems to ensure high recording reliability.



* Maximum file size that can be recorded over multiple SD cards is 96 GB. Recording will not stop even when the data size exceeds 96 GB.

■ Unlimited* Relay Recording



Data is recorded continuously by automatically switching the recording SD card from Slot 1 to Slot 2. By changing the full SD card with a new SD card, images can be recorded continuously for many hours.

■ Simultaneous Recording



Identical data is recorded onto cards in both slots in this highly redundant recording mode.

■ Background Recording

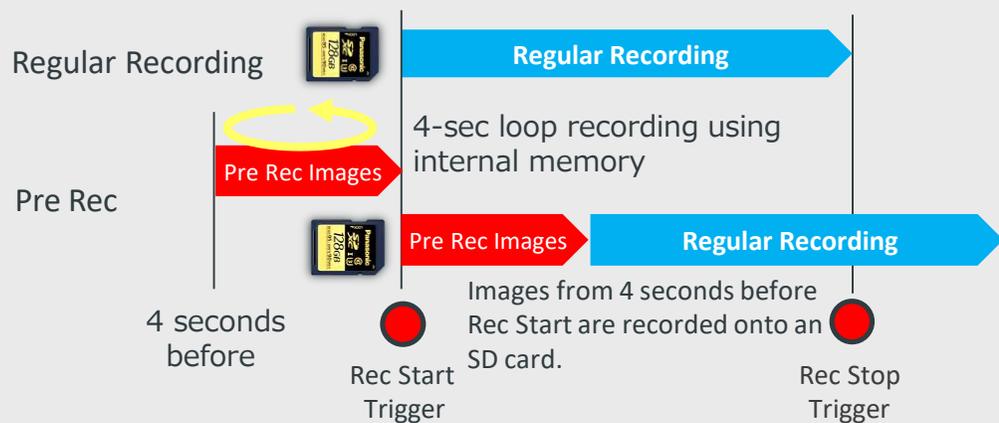


Records ordinary Rec Start/Stop-controlled data in Slot 1, and records all data, even when the camcorder is stopped, in Slot 2.

Other Recording Functions

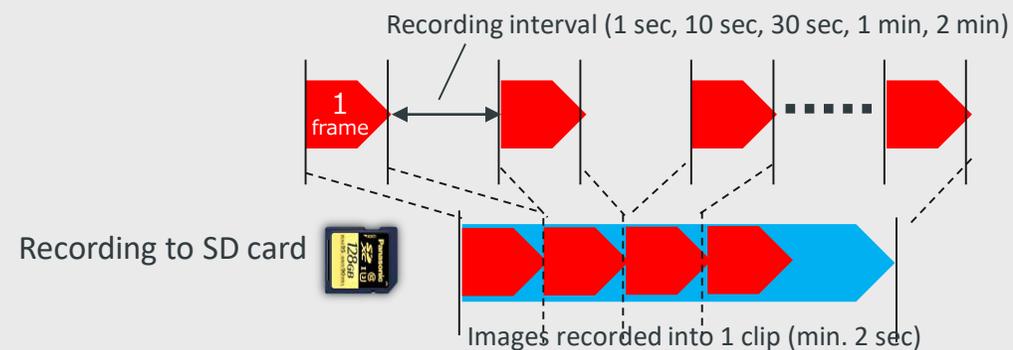
■ Pre Rec

This function constantly caches approximately **4 seconds of video and audio data in MOV/MP4 format**, or approximately **3 seconds in AVCHD format**, prior to Rec Start, so the data can be recovered in case there is a delay in pressing Rec Start.



■ Interval Rec (Time Laps Recording)

Records intermittently based on a set interval time.



■ Timestamp Recording

Records date and time information onto the image.

Professional User interface

■ User Buttons

38 functions can be allocated to the User Buttons. There are a total of 12 User Buttons: five on the body, and seven on the LCD Touch Panel. The O.I.S. and AE LEVEL buttons can also be used as User Buttons.



Versatile Network Functions Expand the User's Workflow

Wireless and Wired Remote Control

Built-in Wi-Fi IEEE802.11b/g/n

- **Wi-Fi functions are available without a Wireless LAN module**

A 2.4-GHz Wi-Fi module is built-in, so there is no need to purchase a separate wireless LAN module. Wi-Fi connection is possible using only the main unit.



iPad (HC ROP)



Wired Remote

Equipped with a REMOTE terminal (2.5 mm super mini jack) for remote operation of iris, focus, zoom and REC start/stop.

* A wired remote controller (commercially available) is required.

- **Operation confirmed controllers**



Libec
ZFC-L



Manfrotto
MVR901ECLA



VariZoom
VZ-STEALTH



VariZoom
VZROCK



REMOTE terminal

Full HD Live Streaming

A Live Streaming Function That Connects Directly to Facebook or YouTube Live

- Supports RTMP (Real Time Messaging Protocol), the protocol used when streaming with Adobe Flash. RTSP/RTP/RTMP/RTMPS-Compatible.
- Supports streaming distribution of RTMP-compatible content, such as live video distribution services. * If RTMP is used, the bit rate is fixed.
- While streaming, recording (MOV) onto SD cards in the camera is also possible.
- Ideal for

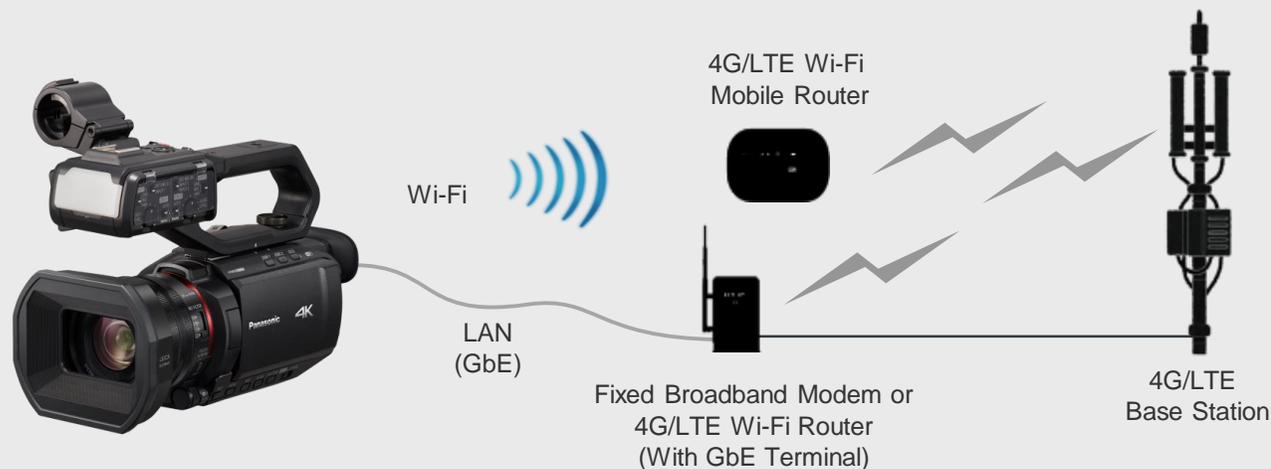
Sports Events



Music Concerts



Breaking News



■ Streaming Formats

Interface	LAN (X10 only)	Wired connection (video streaming, camera control) 100/1000BASE-TX (RJ45)
	Wi-Fi	Wireless connection (video streaming, camera control)
Video streaming *Under consideration		H.264 1920x1080, 1280x720, 640x360, maximum 60fps (60/30, 50/25, 24 fps)
Bit rate *Under consideration		Maximum 24Mbps (FHD/60fps)
Compatible file format		MOV
Video compression method		H.264/MPEG-4 AVC Main Profile, High Profile
Audio compression method		AAC-LC
Network protocol		RTSP/RTP/RTMP/RTMPS
System frequency		59.94Hz (NTSC)/50Hz(PAL)



Live streaming distribution services



Internet

- * See the RTMP setting guide for the set-up method.
- * See the "Connection Confirmed Live Video Services" for information on connection confirmed live video distribution services.
- * P2 Network Setting Software is required to use the RTMP function.
- * If some factor causes services such as Facebook or YouTube to stop and continuous operation is not possible, streaming distribution with this unit may not be possible.

Simple IP Connection: Pre-installed NDI|HX

CX10

X2000

X1500

Note: To use this function, an Activation Key Code provided separately by NewTek Technology is required. A Key Code can be purchased from the following website. http://new.tk/ndi_panasonic

Compatible with the NDI|HX Multi-Camera Live Production System*

- Data transmission and camera control by IP connection is possible without an external converter.
- Using a system comprising the AV-HLC100 Live Production Center and PTZ Integrated Camera HN/UN Series enables seamless live video production, from live events to web distribution.

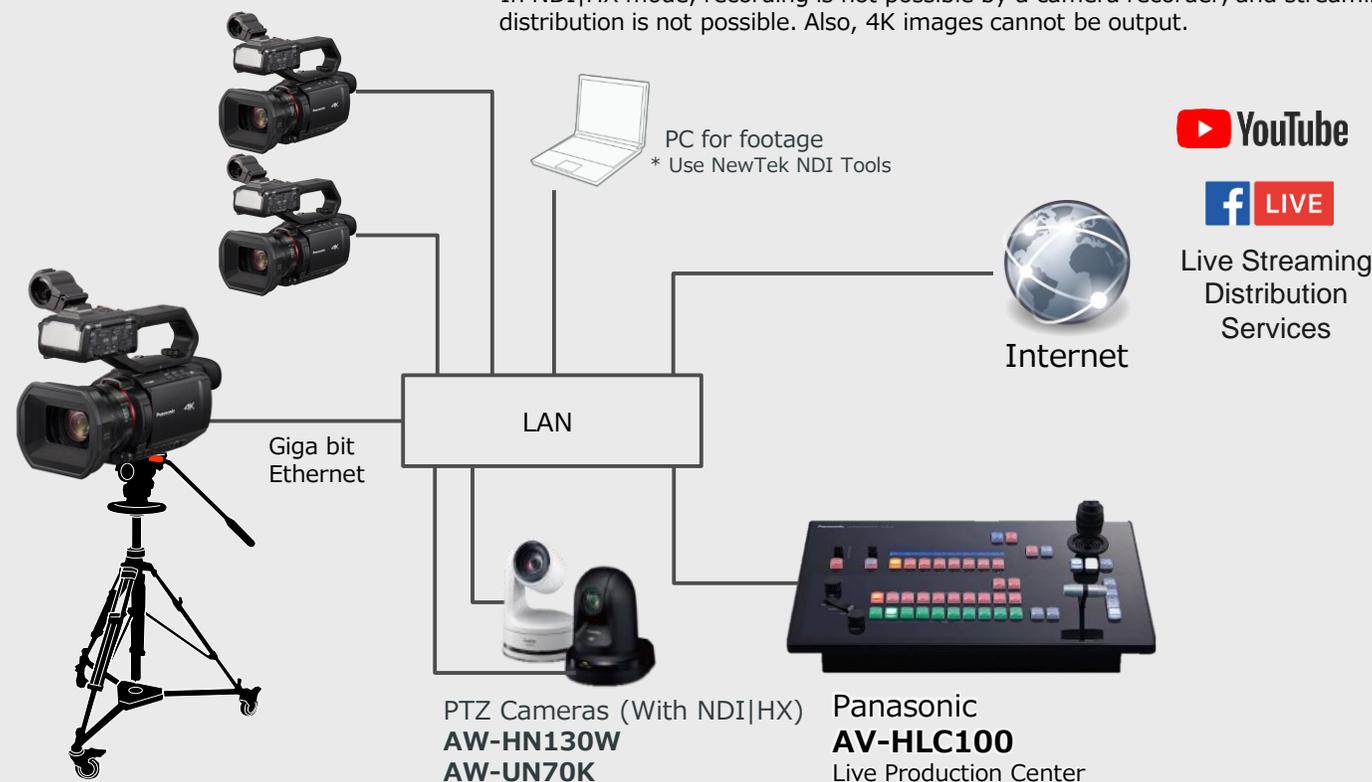
■ NDI|HX Multi-Camera Live Production System

- In addition to fixed-point shooting by PTZ cameras, an CX10 can be added as a handheld camera for movable-point subjects.
- A single LAN cable supports video, audio, and control signals.
- The AV-HLC100 Live Production Center accepts a maximum of 8 NDI and NDI|HX input signals and supports various types of AV output, including a video switcher, audio mixing, 3D effects, and live video streaming.

■ NDI|HX-Compatible Commands

- | | | | |
|--|--|-----------------------------|----------------------------|
| • Tally On/Off Control | • Video over IP Setting Information Acquisition | • Zoom (Speed Control) | • Auto Iris On/Off Control |
| • NDI HX-Compatible Information Acquisition | • Equipment Information Acquisition | • Focus (Speed Control) | • AWB Mode Control |
| • Detailed Model No. Information Acquisition | • License Confirmation (License Key Acquisition) | • Focus (Position Control) | • R Gain Control |
| • Camera Basic Information Acquisition | • License Setting (License Key Passed to Camera) | • Auto Focus On/Off Control | • B Gain Control |
| | | • Iris Position Control | |

* In NDI|HX mode, recording is not possible by a camera recorder, and streaming distribution is not possible. Also, 4K images cannot be output.



NDI|HX

NewTek Technology

- Automatic Detection of Video Footage
- High-efficiency NDI|HX Transmission Supported
- Excellent Low Delay
- PTZ Control, Tally Control Supported

Wireless Control from a Tablet or Smartphone

HC ROP - Remote Operation Panel

- The tablet/smartphone^{*1} with the HC ROP (available for free on App Store or Google Play) can be used for wireless remote control.
- The app can be used to select the camera to control from up to eight cameras.^{*2}



HC ROP



■ Camera control

- i ZOOM/ZOOM/FOCUS
- KNEE (AUTO/MANUAL(MID)/OFF)
- SHUTTER (OFF/MANUAL)
- GAIN
- WB (PRST/A/B/AWB/ABB)
- M.PED
- IRIS (AUTO/MANUAL)
- PAINTING GAIN (R/B)
- TCG (TC/UB display & setting)
- USER button 1-9

■ Other function

- CAM. INFO
- Thumbnail indication
- Media/Battery remain
- LOCK (application disable)
- WARNING Indicator

*1 iPad/iPhone: iOS 11 or later and iPadOS are supported. Android devices: Android 6.0 or later are supported.

*2 The app does not support simultaneous/synchronous control of multiple cameras. Camera switching takes several seconds.

Other Network Features

3G-SDI

CX10

X2000

X1500

■ 3G-SDI for connecting to an External 1080/60p, 1080/50p Recorder



The 3G-SDI output terminal (BNC connector, 5CFV) can be used to transmit FHD 1080/60p, 1080/50p signals through a coaxial cable over a distance of up to 100 m. Panasonic recorders equipped with SDI input can be linked to the Rec Start/Stop function of the AG-CX10/HC-X2000.



AJ-PG50 etc.
Panasonic Professional
HD Recorder

Ethernet (through cable adaptor)

CX10

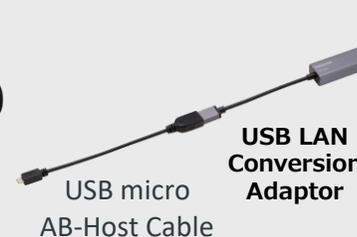
X2000

X1500

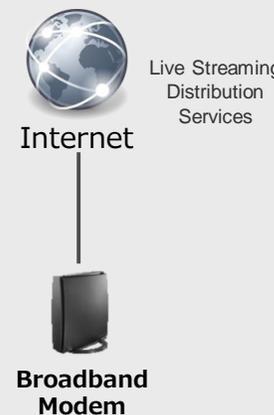
■ USB(micro AB)↔LAN Conversion Adaptor Included*

By simply providing an LAN cable, wired Internet connection is possible. Even in environments with unstable Wi-Fi, stable live distribution can be achieved.

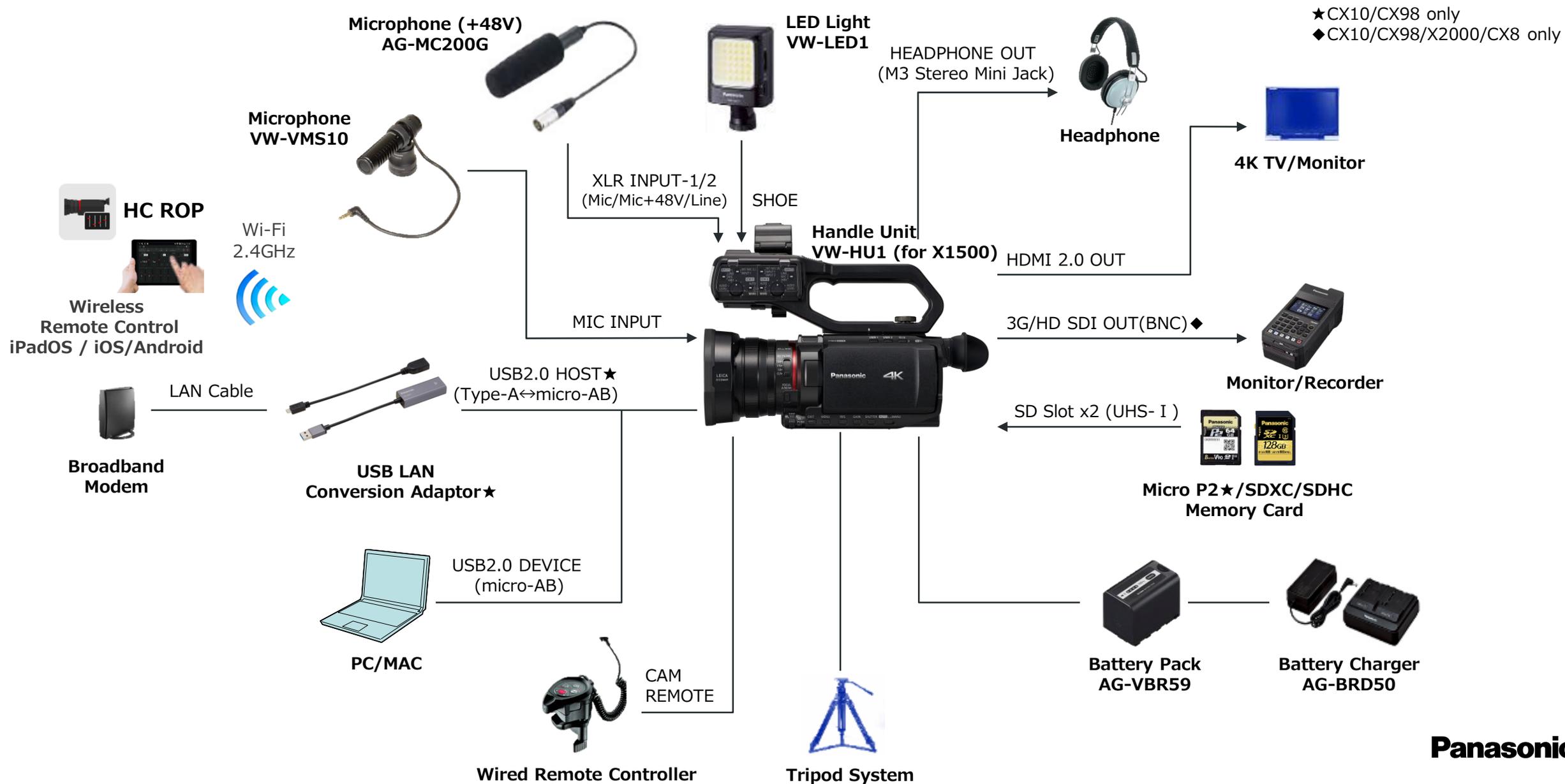
*USB micro AB-Host Cable (included) is necessary for the connection.



USB LAN
Conversion
Adaptor



Professional System Interfaces



Optional Accessories

High Capacity Battery Pack	LED Video Light	Battery Charger	XLR Microphone	Stereo Microphone
<p>AG-VBR59</p>  <p>7.28V 5900mAh</p>	<p>VW-LED1</p> 	<p>AG-BRD50</p> <p>Quick charger for VBR series battery</p>  <p>Dual charger</p>	<p>AG-MC200G</p>  <p>Super-directional / XLR 3-pin</p>	<p>VW-VMS10</p>  <p>Plug-in Power (stereo mini plug)</p> <ul style="list-style-type: none"> • Wind Jammer • Pouch
Handle Unit	SD Memory Card	micro P2 Card	<h2>Standard Accessories</h2> <ul style="list-style-type: none"> • Handle unit (removable)^{*1} • Microphone holder^{*1} • AC adaptor • AC cable • Battery pack (AG-VBR59) • Eye cup • Lens hood • USB micro AB-Host Cable^{*2} • USB-LAN Conversion Adaptor^{*2} <p><small>*1 CX10/CX98/X2000/CX8/CX7 only *2 CX10/CX98 only</small></p>	
<p>VW-HU1</p>  <p>(for X1500)</p>	<p>RP-SDUT64GAK RP-SDUT128AK</p> 	<p>AJ-P2M064BG</p>  <p>(for CX10)</p>		

Thank You