SONY

XAVC H

WHITE PAPER — V1.0 (JUN 2024)

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INTRODUCTION

The H.264/AVC technology has predominantly been used in HDTV distribution systems such as Blu-ray, digital broadcasting (terrestrial/cable/satellite), and web browsers. Initial standardization documents date back to year 2003, it has been extended over the years to cover much more than HDTV distribution standards.

Sony was one of the active members of the JVT (Joint Video Team) that completed the standard, and has made significant efforts in establishing the AVCHD format and expanding the levels/profiles of H.264.

The extension of the H.264 standard coincide with rapid developments in high-resolution/high-frame rate imaging technologies (sensors, displays), and in high speed storage technology. A high performance yet efficient compression technology such as H.264 plays a critical role in encoding the vast amount of imaging data generated by modern sensors into a modest file size, so that those images can be recorded on affordable memory cards, and edited/viewed on computers/editing software packages that are readily available.

In response to increasing demand especially for 4K and 10bit capability in content creation, Sony has developed the new **XAVC** recording format that delivers workflow efficiency and optimized image quality.

16 bit	**RAW**	**X-OCN**
10 bit	XAVC	HDCAM SR
8 bit	AVCHD	MPEG HD422

This format with an industry standard MXF wrapper was adopted by PMW-F55 and F5 cameras for the first time, that were introduced to the market in 2012. Sony has also launched an open license program for other manufacturers in the broadcast and production industry to develop their own high quality products.

In addition, MP4 wrapping format was also introduced in 2013, branded as **XAVC S** to serve the consumer market. Since the HDR-AX1 Handycam, the XAVC S format has been adopted by a wide range of cameras – from Action Cam to Alpha cameras.

In 2020, the ILCE-7SM3 Alpha camera adopted the **XAVC HS** recording format for the first time. This format uses the new H.265/HEVC encoding with MP4 wrapper to achieve twice

the compression efficiency of H.264/AVC encoding, for superior image quality and smaller file sizes.

Three years later in 2023, Sony has introduced the new BURANO, the latest addition to CineAlta camera lineup. It supports the new **XAVC H** recording format using H.265/HEVC encoding with MXF wrapper, Intra-frame coding at up to 1200Mbps for 8K30p image quality and long GOP for file size saving. This enables even greater data saving and faster post-production workflow.

XAVC FORMAT OVERVIEW

Chroma sample 4:2:2/Bit depth 10bit

			MXF Container		MP4 Container	
			XAVC H		XAVC HS	
		Resolution	Intra	Long	Intra	Long
HEVC/H.265	DCI 8K	8192x4320	4:2:2/10bit	—	—	—
	8K	7680x4320	4:2:2/10bit	4:2:2/10bit	—	4:2:2/10bit 4:2:0/8bit 4:2:0/10bit
	4K	3840x2160	—	—	—	4:2:2/10bit 4:2:0/8bit 4:2:0/10bit
	Proxy	1920x1080	—	4:2:0/8bit 4:2:0/10bit	—	4:2:0/8bit 4:2:0/10bit
			XAVC		XAVC S	
		Resolution	Intra	Long	Intra	Long
AVC/H.264	DCI 4K	4096x2160	4:2:2/10bit	—	4:2:2/10bit	—
	4K	3840x2160	4:2:2/10bit	4:2:0/8bit 4:2:2/10bit	4:2:2/10bit	4:2:2/10bit 4:2:0/8bit
	DCI 2K	2048x1080	4:2:2/10bit	—	—	—
	FHD	1920x1080	4:2:2/10bit	4:2:2/10bit	4:2:2/10bit	4:2:2/10bit 4:2:0/8bit
	HD	1440x1080	4:2:0/10bit	—	—	4:2:0/8bit
	HD	1280x720	4:2:2/10bit	4:2:2/10bit	4:2:2/10bit	4:2:2/10bit 4:2:0/8bit
	Proxy	1920x1080 or smaller	—	4:2:0/8bit	—	4:2:0/8bit

More colors

With XAVC you can future-proof your work. It supports 8 and 10-bit color depth as well as 4:2:2 and 4:2:0 color sampling and wide color gamut, providing excellent headroom for color correction and grading. XAVC also supports HDR (High Dynamic Range) shooting.

High quality material

Shoot in any resolution you like. XAVC has been designed to support all current popular AV media resolutions, including 4K and HD. In addition, XAVC supports 8K with the latest XAVC H format adopted by BURANO CineAlta camera. XAVC also supports up to 96kHz/24bit audio.

Flexible and efficient

Choose between post-production-friendly Intra-Frame and file-size-saving Long GOP recording, depending on what you're shooting. XAVC also offers proxy sub-stream and various metadata for flexible post-production.

Wide range of products

Choose from a wide range of XAVC camcorders, such as ENG camcorder from shoulder style Z750 to palm style Z90, and Cinema Line camera from VENICE to FX30 to provide the combination of features and flexibility required.

Capture dramatic moments

Many XAVC camera and camcorder models can shoot high frame rate images. For example, the high-end cinema camera VENICE supports up to 120 fps 4K, while the versatile FX9 supports up to 180 fps Full HD. The mainstream FX6 supports up to 240 fps Full HD.

KEY FEATURES OF XAVC H

- Empowering high-quality 8K workflow in MXF HEVC format
- High operability with affordable bitrates
- Enhanced decode performance on Intel platforms
- Industry-wide adoption with full third-party support

Empowering high-quality 8K workflow in MXF HEVC format

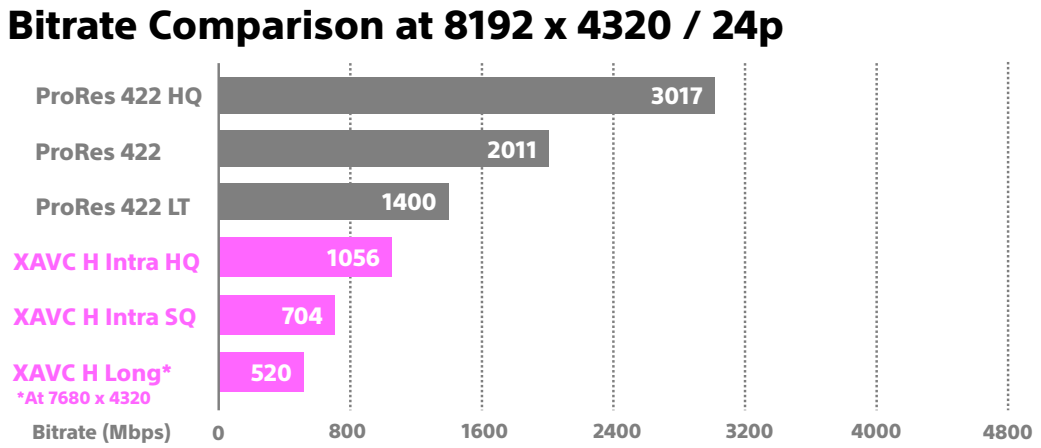
XAVC H, the latest addition to the XAVC family, introduces support for 8K Intra recording in the MXF HEVC format. XAVC H offers a seamless transition for handling high-quality 8K content using the familiar workflow of traditional XAVC. Additionally, XAVC H supports the metadata used in XAVC, ensuring compatibility and efficient post-production and distribution of 8K content. This empowers content creators to push the boundaries of their creativity and deliver stunning visuals in the highest resolution.

High operability with affordable bitrates

XAVC H offers three recording modes: Intra HQ, Intra SQ, and Long.

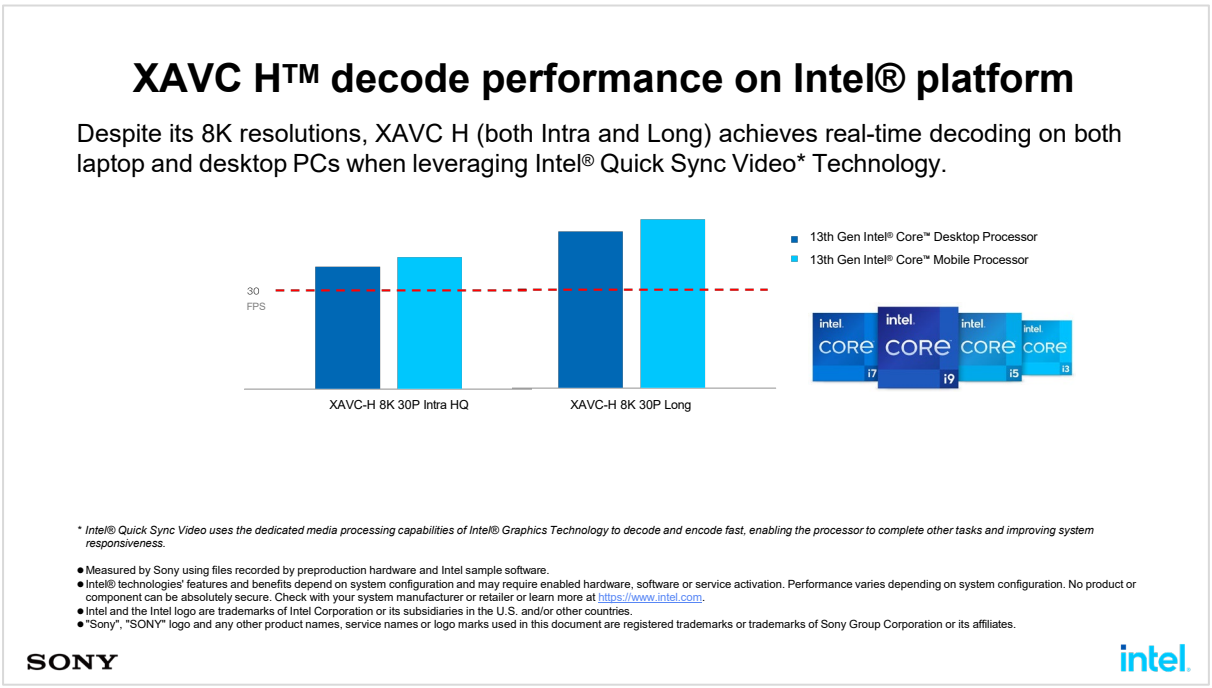
- **Intra HQ:** Ideal for those who prioritize high image quality.
- **Intra SQ:** Balances image quality and file size.
- **Long:** High compression rates for file size saving.

This flexibility allows creators to achieve the best image quality while optimizing their workflow. With XAVC H, creators can capture content without compromising image quality in a decent file size.



Enhanced decode performance on Intel platforms

XAVC H provides high decoding performance when using compatible Intel platforms. While Performance may vary based on the operating environment, real-time playback of 8K 30p has been verified at the processor level.



Industry-wide adoption with full third-party support

Since the launch of XAVC format in 2012, Sony has been offering an open license program to support third-party development. This program includes supply of technical documents and SDK. Over 70 third-party companies already take part in this program to support XAVC on their own products.

For more information, please contact: psg-biz-alliance-agrmnt@sony.com

XAVC H is already supported by leading non-linear editing software and color grading tools such as Adobe Premiere Pro, Apple Final Cut Pro, Avid Media Composer, Blackmagic DaVinci Resolve and Grass Valley EDIUS to name a few. Of course, Sony's Catalyst Browse/Prepare also natively supports XAVC H.

For more details, please refer to another document:

X-OCN / XAVC H Supported Products by Alliance Partners

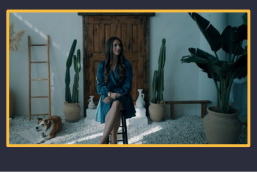
XAVC H SPECIFICATIONS ON BURANO CAMERA

BURANO, the latest addition to Sony's prestigious CineAlta lineup, combines exceptional image quality with high mobility. As the first camera to support XAVC H, BURANO offers the flexibility to choose the optimal recording format, including XAVC, XAVC H and X-OCN (LT), based on specific needs.

Recording formats

X-OCN / XAVC H

8.6K 16:9 Full Frame



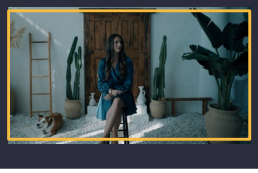
Dimensions
35.9 x 20.2 mm
1.413 x 0.795 Inch

Image Circle
41.19 mm
1.62 in

Codecs

X-OCN	30 fps
8632 x 4856	
XAVC H	30 fps
7680 x 4320	

8.6K 17:9 Full Frame



Dimensions
35.9 x 18.9 mm
1.413 x 0.748 Inch

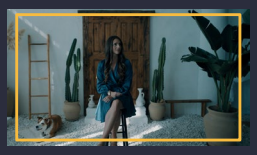
Image Circle
40.57 mm
1.60 in

Codecs

X-OCN	30 fps
8632 x 4552	
XAVC H	30 fps
8192 x 4320	

X-OCN / XAVC

6K 16:9 Full Frame



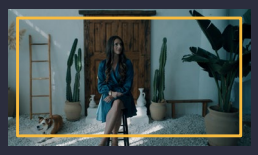
Dimensions
33.6 x 18.9 mm
1.322 x 0.744 Inch

Image Circle
38.55 mm
1.52 in

Codecs

X-OCN	60 fps
6052 x 3404	
XAVC	60 fps
3840 x 2160	
1920 x 1080	

6K 17:9 Full Frame



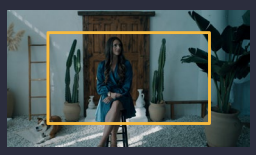
Dimensions
33.6 x 17.7 mm
1.322 x 0.696 Inch

Image Circle
37.98 mm
1.50 in

Codecs

X-OCN	60 fps
6052 x 3192	
XAVC	60 fps
4096 x 2160	

5.8K 16:9 Super 35



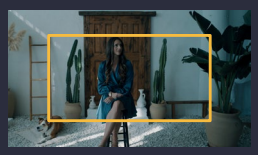
Dimensions
24.0 x 13.5 mm
0.944 x 0.531 Inch

Image Circle
27.54 mm
1.08 in

Codecs

X-OCN	60 fps
5760 x 3240	
XAVC	60 fps
3840 x 2160	
1920 x 1080	

5.8K 17:9 Super 35



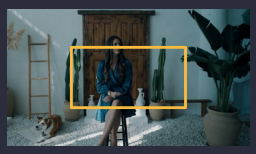
Dimensions
24.0 x 12.6 mm
0.944 x 0.5 Inch

Image Circle
27.11 mm
1.07 in

Codecs

X-OCN	60 fps
5760 x 3036	
XAVC	60 fps
4096 x 2160	

4K 17:9 Super 35



Dimensions
17.0 x 9.0 mm
0.669 x 0.354 Inch

Image Circle
19.24 mm
0.76 in

Codecs

X-OCN	120 fps
4096 x 2160	
XAVC	120 fps
4096 x 2160	

Recommended recording media

Use the Sony CFexpress Type B memory cards listed in “Recommended Recording Media” in the unit. The guaranteed operating conditions will vary depending on the Rec Format and Recording settings.

Recording format		CFexpress Type B (exFAT)		
		Non-VPG	VPG200	VPG400
XAVC H Intra HQ	**8192×4320**	**No**	**No**	**Yes**
	7680×4320	**No**	**No**	**Yes**
XAVC H Intra SQ	**8192×4320**	**No**	**No**	**Yes**
	7680×4320	**No**	**No**	**Yes**
XAVC H Long	**7680×4320**	**No**	**Yes**	**Yes**

Yes: Operation supported
No : Normal operation not guaranteed

	 **CEB-G1920T**	 **CEB-G960T**
Capacity	1920 GB	960 GB
Transfer speed (read)	Up to 1850 MB/s	
Transfer speed (write)	Up to 1750 MB/s	
VPG	VPG400 Certified	

Recording time

The following tables show the recording/playback time when using Sony CFexpress Type B VPG400 960 GB memory cards.

Clip Recording Time in 8K Resolutions

Imager Scan Mode	Frequency	Codec					
		X-OCN (LT)	**XAVC H-I HQ 8192×4320**	**XAVC H-I HQ 7680×4320**	**XAVC H-I SQ 8192×4320**	**XAVC H-I SQ 7680×4320**	**XAVC H-L 7680×4320**
FF 8.6K 17:9	23	74	**130**	–	**194**	–	–
	24	74	**130**	–	**193**	–	–
	25	71	**125**	–	**186**	–	–
	29	59	**104**	–	**155**	–	–
	50	–	–	–	–	–	–
	59	–	–	–	–	–	–
FF 8.6K 16:9	23	69	–	**130**	–	**194**	**239**
	24	–	–	–	–	–	–
	25	66	–	**125**	–	**186**	**239**
	29	55	–	**104**	–	**155**	**238**
	50	–	–	–	–	–	–
	59	–	–	–	–	–	–

Unit: minutes

CONCLUSION

XAVC H is the latest addition to the XAVC family, enabling high-quality 8K workflows in the MXF HEVC format with manageable bitrates and decoding performance. It offers three recording modes: Intra HQ for high image quality, Intra SQ for a balance between quality and file size, and Long for high compression rates. XAVC H is well-supported by major non-linear editing and color grading tools, ensuring a seamless post-production process.

Furthermore, Sony's new BURANO camera, part of the prestigious CineAlta lineup, is the first to support XAVC H, offering flexibility in choosing the optimal recording format, including XAVC, XAVC H, and X-OCN (LT).