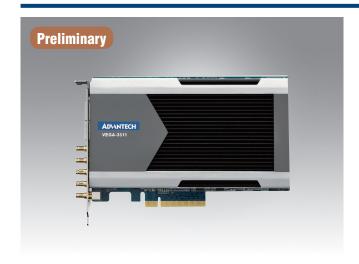
# **VEGA-3311**

## 4K HEVC Broadcast Video Encoding/ Decoding Card



#### **Features**

- 1-ch 4Kp60 or 4-ch 1080p60 real-time 4:2:2 10-bit HEVC, AVC & MPEG-2 encode & decode
- AIMS roadmap support including SMPTE 2022-5/-6/-7 & VSF TR-03/-04 w/ AES67 audio & SMPTE 2059 sync
- Optional TICO or Sony LLVC compression
- 4K video capture over built-in, 4-ch SDI-3G or 1-ch SDI-12G, 1x mini-HDMI 2.0 input and 1x mini-HDMI 2.0 output (VEGA-3311-S)
- 4K video capture over built-in, 4-ch SDI-3G or 1-ch SDI-12G and 2x 10GbE (VEGA-3311-I)
- Simple-to-use API and example code for FFmpeg and GStreamer multimedia frameworks

#### Introduction

VEGA-3311 enables HEVC, AVC, MPEG2 real-time 1-ch 4K UltraHD (2160p60) and 4-ch FHD (1080p60) encode and decode. It is particularly relevant for 4K UltraHD transmission which requires a much higher stream capacity.

VEGA-3311 is tailored for professional media processing and are capable of performing professional grade 4Kp60 Main10 profile HEVC encoding and decoding at less than 35W power consumption. The VEGA-3311 adapter additionally features 4K video capture over built-in 4-ch SDI-3G or 1-ch SDI-12G or mini-HDMI2.0 video inputs for acquisition-based encoding and 4-ch SDI-3G video outputs for acquisition-based decoding in contribution workflows. VEGA-3311 can also support low latency transmission of uncompressed or lightly compressed video over standard IP networks according to industry agreed standards. This card feature a simple-to-use API and example code for FFmpeg and GStreamer multimedia frameworks to streamline product development and their integration into existing applications.

### **Specification**

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			Resolution (x1ch)	3840x2160 /1920x1080 / 1280x720 /720x480
			Resolution (Multi-channel more than x2ch)	1920x1080 /1280x720 /720x480
			Frame rate/Scan mode	60p/59.94p/50p/30p/29.97p/25p/24p / 59.94i/50i
			Bit depth	8, 10 bits
			8-bit encoding from 10-bit raw data	Supported
			Chroma Sampling	4:2:0 / 4:2:2
			Rate control	CBR / VBR / Capped VBR
		H.265/HEVC	GOP length	One Picture (Lonly) / 0.5sec / 1 sec
			GOP structure	I picture only / IPPP /IBB/IBBB/IBBBBBB (Hierarchical GOP:supported) / Closed GOP/Open GOP / Temporal ID on/of for hierarchical GOP / Scene change / Adaptive GOP
			CPB delay control	3s, 1s, 0.5s
			Filter	Fixed strength
			Low latency	5,6 frame (with IPPPP)
			Ultra low-latency	< 1 frame
			Resolution (x1ch)	3840x2160 /1920x1080 / 1280x720 /720x480
			Resolution (Multi-channel more than x2ch)	1920x1080 /1280x720 /720x480
			Frame rate/Scan mode	60p/59.94p/50p/30p/29.97p/25p/24p / 59.94i/50i
Live Video Input - SDI-3G/SDI-12G	Video Encoding		Bit depth	8, 10 bits
SDI-36/SDI-126	, coo and any		8-bit encoding from 10-bit raw data	Supported
			Chroma Sampling	4:2:0 / 4:2:2
		H.264/AVC	Rate control	CBR / VBR / Capped VBR
			GOP length	One Picture (I only) / 0.5sec / 1 sec
			GOP structure	I picture only / IPPP /IBB/IBBB / Closed GOP/Open GOP / Scene change / Adaptive GOP
			CPB delay control	1s. 0.5s
			Filter	De-blocking filter / Fixed strength
			Low latency	5,6 frame (with IPPPP)
			Resolution (x1ch)	1920x1080 / 1280x720 /720x480
			Resolution (Multi-channel more than x2ch)	1920x1080 /1280x720 /720x480
			Frame rate/Scan mode	30p/29.97p/25p/24p / 59.94i/50i
			Bit depth	8 bits
		MPEG-2	Chroma Sampling	4:2:0
			Rate control	CBR
			GOP length	One Picture (Lonly) / 0.5sec / 1 sec
			GOP structure	I picture only / IPPP /IBB / Closed GOP/Open GOP / Scene change / Adaptive GOP

# **Specifications (Cont.)**

			Resolution (x1ch)	3840x2160 /1920x1080 / 1280x720 /720x480
			Frame rate/Scan mode	60p/59.94p/50p/30p/29.97p/25p/24p / 59.94i/50i
		H.265/HEVC	Bit depth	8 / 10 bits
			Chroma Sampling	4:2:0 / 4:2:2
			Resolution (x1ch)	3840x2160 /1920x1080 / 1280x720 /720x480
	Video Deceding	LL 264/AV/C	Frame rate/Scan mode	60p/59.94p/50p/30p/29.97p/25p/24p / 59.94i/50i
	Video Decoding	H.264/AVC	Bit depth	8. 10 bits
			Chroma Sampling	4:2:0 / 4:2:2
Live Video Input			Resolution (x1ch)	1920x1080 / 1280x720 /720x480
Live Video Input -				
SDI-3G/SDI-12G		MPEG-2	Frame rate/Scan mode	30p/29.97p/25p/24p / 59.94i/50i
		WII Ed E	Bit depth	8 bits
			Chroma Sampling	4:2:0
	Audio Encoding	Control	Single ch	Supported
	Audio Decoding	Control	Single ch	Supported
	Video Capture	Control	Pixel Format	NV12 / YV12 / I420 / P010 / NV16 / YV16 / YUY2/P210
	Viueo Gapture	Control		
			Sample Frequency	48KHz / 96KHz
	Audio Capture	Control	Sampling Depth	16 bit
			Channel Layouts	8-ch / 16-ch
			Resolution (x1ch)	3840x2160 /1920x1080 / 1280x720 /720x480
			Frame rate/Scan mode	60p/59.94p/50p/30p/29.97p/25p/24p / 59.94i/50i
			Bit depth	8, 10 bits
			8-bit encoding from 10-bit raw data	Supported
			Chroma Sampling	4:2:0 / 4:2:2
			Rate control	CBR / VBR / Capped VBR
		LL COS (LISTA)	GOP length	One Picture (Lonly) / 0.5sec / 1 sec
		H.265/HEVC	dor longin	I picture only / IPPP /IBB/IBBB/IBBBBBB (Hierarchical
			GOP structure	GOP:supported) / Closed GOP/Open GOP / Temporal ID on/off
			GOP structure	for hierarchical GOP / Scene change / Adaptive GOP
			ODD datas a satural	
			CPB delay control	3s, 1s, 0.5s
			Filter	Fixed strength
			Low latency	5,6 frame (with IPPPP)
			Ultra low-latency	<1 frame
			Resolution (x1ch)	3840x2160 /1920x1080 / 1280x720 /720x480
			Frame rate/Scan mode	60p/59.94p/50p/30p/29.97p/25p/24p / 59.94i/50i
	Video Encoding	H.264/AVC	Bit depth	8, 10 bits
			8-bit encoding from 10-bit raw data	Supported
Live Video Input			Chroma Sampling	4:2:0 / 4:2:2
- mini-HDMI			Rate control	CBR / VBR / Capped VBR
(VEGA-3311-S)			GOP length	One Picture (I only) / 0.5sec / 1 sec
			GOP structure	I picture only / IPPP /IBB/IBBB / Closed GOP/Open GOP /
			doi structuro	Scene change / Adaptive GOP
			CPB delay control	1s, 0.5s
			Filter	De-blocking filter / Fixed strength
			Low latency	5,6 frame (with IPPPP)
			Resolution (x1ch)	1920x1080 / 1280x720 /720x480
			Hesolution (Vicil)	
			F	
			Frame rate/Scan mode	30p/29.97p/25p/24p / 59.94i/50i
			Bit depth	30p/29.97p/25p/24p / 59.94i/50i 8 bits
		MPEC 2		30p/29.97p/25p/24p / 59.94i/50i
		MPEG-2	Bit depth	30p/29.97p/25p/24p / 59.94i/50i 8 bits
		MPEG-2	Bit depth Chroma Sampling Rate control	30p/29.97p/25p/24p / 59.94i/50i 8 bits 4:2:0 CBR
		MPEG-2	Bit depth Chroma Sampling Rate control GOP length	30p/29.97p/25p/24p / 59.94i/50i 8 bits 4:2:0 CBR One Picture (I only) / 0.5sec / 1 sec
		MPEG-2	Bit depth Chroma Sampling Rate control	30p/29.97p/25p/24p / 59.94i/50i 8 bits 4:2:0 CBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP / IBB / Closed GOP/Open GOP / Scene
	Audio Facadiae		Bit depth Chroma Sampling Rate control GOP length GOP structure	30p/29.97p/25p/24p / 59.94i/50i 8 bits 4:2:0 CBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP /IBB / Closed GOP/Open GOP / Scene change / Adaptive GOP
	Audio Encoding	Control	Bit depth Chroma Sampling Rate control GOP length GOP structure Single ch	30p/29.97p/25p/24p / 59.94i/50i 8 bits 4:2:0 CBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP /IBB / Closed GOP/Open GOP / Scene change / Adaptive GOP Supported
	Audio Encoding Video Capture		Bit depth Chroma Sampling Rate control GOP length GOP structure Single ch Pixel Format	30p/29.97p/25p/24p / 59.94i/50i 8 bits 4:2:0 CBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP /IBB / Closed GOP/Open GOP / Scene change / Adaptive GOP Supported NV12 / YV12 / I420 / P010 / NV16 / YV16 / YUY2 / P210
		Control	Bit depth Chroma Sampling Rate control GOP length GOP structure Single ch	30p/29.97p/25p/24p / 59.94i/50i 8 bits 4:2:0 CBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP /IBB / Closed GOP/Open GOP / Scene change / Adaptive GOP Supported
	Video Capture	Control Control	Bit depth Chroma Sampling Rate control GOP length GOP structure Single ch Pixel Format Sample Frequency	30p/29.97p/25p/24p / 59.94i/50i 8 bits 4:2:0 CBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP /IBB / Closed GOP/Open GOP / Scene change / Adaptive GOP Supported NV12 / YV12 / I420 / P010 / NV16 / YV16 / YUY2 / P210 48KHz / 96KHz
		Control	Bit depth Chroma Sampling Rate control GOP length GOP structure Single ch Pixel Format Sample Frequency Sampling Depth	30p/29.97p/25p/24p / 59.94i/50i 8 bits 4:2:0 CBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP /IBB / Closed GOP/Open GOP / Scene change / Adaptive GOP Supported NV12 / YV12 / I420 / P010 / NV16 / YV16 / YUY2 / P210 48KHz / 96KHz 16 bit
	Video Capture	Control Control	Bit depth Chroma Sampling Rate control GOP length GOP structure Single ch Pixel Format Sample Frequency Sampling Depth Channel Layouts	30p/29.97p/25p/24p / 59.94i/50i 8 bits 4:2:0 CBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP /IBB / Closed GOP/Open GOP / Scene change / Adaptive GOP Supported NV12 / YV12 / I420 / P010 / NV16 / YV16 / YUY2 / P210 48KHz / 96KHz 16 bit 8-ch / 16-ch
	Video Capture	Control Control	Bit depth Chroma Sampling Rate control GOP length GOP structure Single ch Pixel Format Sample Frequency Sampling Depth Channel Layouts Resolution (x1ch)	30p/29.97p/25p/24p / 59.94i/50i 8 bits 4:2:0 CBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP /IBB / Closed GOP/Open GOP / Scene change / Adaptive GOP Supported NV12 / YV12 / I420 / P010 / NV16 / YV16 / YUY2 / P210 48KHz / 96KHz 16 bit 8-ch / 16-ch 3840x2160 /1920x1080 / 1280x720 /720x480
	Video Capture	Control Control	Bit depth Chroma Sampling Rate control GOP length GOP structure Single ch Pixel Format Sample Frequency Sampling Depth Channel Layouts Resolution (x1ch) Resolution (Multi-channel more than x2ch)	30p/29.97p/25p/24p / 59.94i/50i 8 bits 4:2:0 CBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP /IBB / Closed GOP/Open GOP / Scene change / Adaptive GOP Supported NV12 / YV12 / I420 / P010 / NV16 / YV16 / YUY2 / P210 48KHz / 96KHz 16 bit 8-ch / 16-ch 3840x2160 /1920x1080 / 1280x720 /720x480 1920x1080 /1280x720 /720x480
	Video Capture	Control Control	Bit depth Chroma Sampling Rate control GOP length GOP structure Single ch Pixel Format Sample Frequency Sampling Depth Channel Layouts Resolution (x1ch) Resolution (Multi-channel more than x2ch) Frame rate/Scan mode	30p/29.97p/25p/24p / 59.94i/50i 8 bits 4:2:0 CBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP /IBB / Closed GOP/Open GOP / Scene change / Adaptive GOP Supported NV12 / YV12 / I420 / P010 / NV16 / YV16 / YUY2 / P210 48KHz / 96KHz 16 bit 8-ch / 16-ch 3840x2160 /1920x1080 / 1280x720 /720x480 1920x1080 /1280x720 /720x480 60p/59.94p/50p/30p/29.97p/25p/24p / 59.94i/50i
	Video Capture	Control Control	Bit depth Chroma Sampling Rate control GOP length GOP structure Single ch Pixel Format Sample Frequency Sampling Depth Channel Layouts Resolution (x1ch) Resolution (Multi-channel more than x2ch)	30p/29.97p/25p/24p / 59.94i/50i 8 bits 4:2:0 CBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP /IBB / Closed GOP/Open GOP / Scene change / Adaptive GOP Supported NV12 / YV12 / I420 / P010 / NV16 / YV16 / YUY2 / P210 48KHz / 96KHz 16 bit 8-ch / 16-ch 3840x2160 /1920x1080 / 1280x720 /720x480 1920x1080 /1280x720 /720x480
	Video Capture	Control Control	Bit depth Chroma Sampling Rate control GOP length GOP structure Single ch Pixel Format Sample Frequency Sampling Depth Channel Layouts Resolution (x1ch) Resolution (Multi-channel more than x2ch) Frame rate/Scan mode Bit depth	30p/29.97p/25p/24p / 59.94i/50i 8 bits 4:2:0 CBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP /IBB / Closed GOP/Open GOP / Scene change / Adaptive GOP Supported NV12 / YV12 / I420 / P010 / NV16 / YV16 / YUY2 / P210 48KHz / 96KHz 16 bit 8-ch / 16-ch 3840x2160 /1920x1080 / 1280x720 /720x480 1920x1080 /1280x720 /720x480 60p/59.94p/50p/30p/29.97p/25p/24p / 59.94i/50i 8, 10 bits
	Video Capture	Control Control	Bit depth Chroma Sampling Rate control GOP length GOP structure Single ch Pixel Format Sample Frequency Sampling Depth Channel Layouts Resolution (x1ch) Resolution (Multi-channel more than x2ch) Frame rate/Scan mode Bit depth 8-bit encoding from 10-bit raw data	30p/29.97p/25p/24p / 59.94i/50i 8 bits 4:2:0 CBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP /IBB / Closed GOP/Open GOP / Scene change / Adaptive GOP Supported NV12 / YV12 / I420 / P010 / NV16 / YV16 / YUY2 / P210 48KHz / 96KHz 16 bit 8-ch / 16-ch 3840x2160 /1920x1080 / 1280x720 /720x480 1920x1080 /1280x720 /720x480 60p/59.94p/50p/30p/29.97p/25p/24p / 59.94i/50i 8, 10 bits Supported
	Video Capture	Control Control	Bit depth Chroma Sampling Rate control GOP length GOP structure Single ch Pixel Format Sample Frequency Sampling Depth Channel Layouts Resolution (M1ch) Resolution (Multi-channel more than x2ch) Frame rate/Scan mode Bit depth 8-bit encoding from 10-bit raw data Chroma Sampling	30p/29.97p/25p/24p / 59.94i/50i 8 bits 4:2:0 CBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP /IBB / Closed GOP/Open GOP / Scene change / Adaptive GOP Supported NV12 / YV12 / I420 / P010 / NV16 / YV16 / YUY2 / P210 48KHz / 96KHz 16 bit 8-ch / 16-ch 3840x2160 /1920x1080 / 1280x720 /720x480 1920x1080 /1280x720 /720x480 60p/59.94p/50p/30p/29.97p/25p/24p / 59.94i/50i 8, 10 bits Supported 4:2:0 / 4:2:2
File Based Video	Video Capture  Audio Capture	Control Control	Bit depth Chroma Sampling Rate control GOP length GOP structure Single ch Pixel Format Sample Frequency Sampling Depth Channel Layouts Resolution (x1ch) Resolution (Multi-channel more than x2ch) Frame rate/Scan mode Bit depth 8-bit encoding from 10-bit raw data Chroma Sampling Rate control	30p/29.97p/25p/24p / 59.94i/50i 8 bits 4:2:0 CBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP /IBB / Closed GOP/Open GOP / Scene change / Adaptive GOP Supported NV12 / YV12 / I420 / P010 / NV16 / YV16 / YUY2 / P210 48KHz / 96KHz 16 bit 8-ch / 16-ch 3840x2160 /1920x1080 / 1280x720 /720x480 1920x1080 /1280x720 /720x480 60p/59.94p/50p/30p/29.97p/25p/24p / 59.94i/50i 8, 10 bits Supported 4:2:0 / 4:2:2 CBR / VBR / Capped VBR
File Based Video	Video Capture	Control Control	Bit depth Chroma Sampling Rate control GOP length GOP structure Single ch Pixel Format Sample Frequency Sampling Depth Channel Layouts Resolution (M1ch) Resolution (Multi-channel more than x2ch) Frame rate/Scan mode Bit depth 8-bit encoding from 10-bit raw data Chroma Sampling	30p/29.97p/25p/24p / 59.94i/50i 8 bits 4:2:0 CBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP /IBB / Closed GOP/Open GOP / Scene change / Adaptive GOP Supported NV12 / YV12 / I420 / P010 / NV16 / YV16 / YUY2 / P210 48KHz / 96KHz 16 bit 8-ch / 16-ch 3840x2160 /1920x1080 / 1280x720 /720x480 1920x1080 /1280x720 /720x480 60p/59.94p/50p/30p/29.97p/25p/24p / 59.94i/50i 8, 10 bits Supported 4:2:0 / 4:2:2
File Based Video Input (PCI Express)	Video Capture  Audio Capture	Control Control	Bit depth Chroma Sampling Rate control GOP length GOP structure Single ch Pixel Format Sample Frequency Sampling Depth Channel Layouts Resolution (x1ch) Resolution (Multi-channel more than x2ch) Frame rate/Scan mode Bit depth 8-bit encoding from 10-bit raw data Chroma Sampling Rate control	30p/29.97p/25p/24p / 59.94i/50i 8 bits 4:2:0 CBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP /IBB / Closed GOP/Open GOP / Scene change / Adaptive GOP Supported NV12 / YV12 / I420 / P010 / NV16 / YV16 / YUY2 / P210 48KHz / 96KHz 16 bit 8-ch / 16-ch 3840x2160 /1920x1080 / 1280x720 /720x480 1920x1080 /1280x720 /720x480 60p/59.94p/50p/30p/29.97p/25p/24p / 59.94i/50i 8, 10 bits Supported 4:2:0 / 4:2:2 CBR / VBR / Capped VBR
	Video Capture  Audio Capture	Control Control	Bit depth Chroma Sampling Rate control GOP length GOP structure Single ch Pixel Format Sample Frequency Sampling Depth Channel Layouts Resolution (x1ch) Resolution (Multi-channel more than x2ch) Frame rate/Scan mode Bit depth 8-bit encoding from 10-bit raw data Chroma Sampling Rate control	30p/29.97p/25p/24p / 59.94i/50i 8 bits 4:2:0 CBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP /IBB / Closed GOP/Open GOP / Scene change / Adaptive GOP Supported NV12 / YV12 / I420 / P010 / NV16 / YV16 / YUY2 / P210 48KHz / 96KHz 16 bit 8-ch / 16-ch 3840x2160 /1920x1080 / 1280x720 /720x480 1920x1080 /1280x720 /720x480 60p/59.94p/50p/30p/29.97p/25p/24p / 59.94i/50i 8, 10 bits Supported 4:2:0 / 4:2:2 CBR / VBR / Capped VBR One Picture (I only) / 0.5sec / 1 sec
	Video Capture  Audio Capture	Control Control	Bit depth Chroma Sampling Rate control GOP length GOP structure Single ch Pixel Format Sample Frequency Sampling Depth Channel Layouts Resolution (x1ch) Resolution (Multi-channel more than x2ch) Frame rate/Scan mode Bit depth 8-bit encoding from 10-bit raw data Chroma Sampling Rate control GOP length	30p/29.97p/25p/24p / 59.94i/50i 8 bits 4:2:0 CBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP /IBB / Closed GOP/Open GOP / Scene change / Adaptive GOP Supported NV12 / YV12 / I420 / P010 / NV16 / YV16 / YUY2 / P210 48KHz / 96KHz 16 bit 8-ch / 16-ch 3840x2160 /1920x1080 / 1280x720 /720x480 1920x1080 / 1280x720 /720x480 60p/59.94p/50p/30p/29.97p/25p/24p / 59.94i/50i 8, 10 bits Supported 4:2:0 / 4:2:2 CBR / VBR / Capped VBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP / IBB/IBBB/IBBBBBBB (Hierarchical GOP:supported) / Closed GOP/Open GOP / Temporal ID on/off
	Video Capture  Audio Capture	Control Control	Bit depth Chroma Sampling Rate control GOP length GOP structure Single ch Pixel Format Sample Frequency Sampling Depth Channel Layouts Resolution (x1ch) Resolution (Multi-channel more than x2ch) Frame rate/Scan mode Bit depth 8-bit encoding from 10-bit raw data Chroma Sampling Rate control GOP length GOP structure	30p/29.97p/25p/24p / 59.94i/50i 8 bits 4:2:0 CBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP /IBB / Closed GOP/Open GOP / Scene change / Adaptive GOP Supported NV12 / YV12 / I420 / P010 / NV16 / YV16 / YUY2 / P210 48KHz / 96KHz 16 bit 8-ch / 16-ch 3840x2160 /1920x1080 / 1280x720 /720x480 1920x1080 /1280x720 /720x480 60p/59.94p/50p/30p/29.97p/25p/24p / 59.94i/50i 8, 10 bits Supported 4:2:0 / 4:2:2 CBR / VBR / Capped VBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP / IBB/IBBB/IBBBBBBB (Hierarchical GOP:supported) / Closed GOP/Open GOP / Temporal ID on/off for hierarchical GOP / Scene change / Adaptive GOP
	Video Capture  Audio Capture	Control Control	Bit depth Chroma Sampling Rate control GOP length GOP structure  Single ch Pixel Format Sample Frequency Sampling Depth Channel Layouts Resolution (x1ch) Resolution (Multi-channel more than x2ch) Frame rate/Scan mode Bit depth 8-bit encoding from 10-bit raw data Chroma Sampling Rate control GOP length  GOP structure CPB delay control	30p/29.97p/25p/24p / 59.94i/50i 8 bits 4:2:0 CBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP /IBB / Closed GOP/Open GOP / Scene change / Adaptive GOP Supported NV12 / YV12 / I420 / P010 / NV16 / YV16 / YUY2 / P210 48KHz / 96KHz 16 bit 8-ch / 16-ch 3840x2160 /1920x1080 / 1280x720 /720x480 1920x1080 /1280x720 /720x480 60p/59.94p/50p/30p/29.97p/25p/24p / 59.94i/50i 8, 10 bits Supported 4:2:0 / 4:2:2 CBR / VBR / Capped VBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP /IBB/IBBB/IBBBBBB (Hierarchical GOP:supported) / Closed GOP/Open GOP / Temporal ID on/off for hierarchical GOP / Scene change / Adaptive GOP 3s, 1s, 0.5s
	Video Capture  Audio Capture	Control Control	Bit depth Chroma Sampling Rate control GOP length GOP structure  Single ch Pixel Format Sample Frequency Sampling Depth Channel Layouts Resolution (X1ch) Resolution (Multi-channel more than x2ch) Frame rate/Scan mode Bit depth 8-bit encoding from 10-bit raw data Chroma Sampling Rate control GOP length  GOP structure  CPB delay control Filter	30p/29.97p/25p/24p / 59.94i/50i 8 bits 4:2:0 CBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP /IBB / Closed GOP/Open GOP / Scene change / Adaptive GOP Supported NV12 / YV12 / I420 / P010 / NV16 / YV16 / YUY2 / P210 48KHz / 96KHz 16 bit 8-ch / 16-ch 3840x2160 /1920x1080 / 1280x720 /720x480 1920x1080 /1280x720 /720x480 60p/59.94p/50p/30p/29.97p/25p/24p / 59.94i/50i 8, 10 bits Supported 4:2:0 / 4:2:2 CBR / WBR / Capped VBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP /IBB/IBBBBBBB (Hierarchical GOP:supported) / Closed GOP/Open GOP / Temporal ID on/off for hierarchical GOP / Scene change / Adaptive GOP 3s, 1s, 0.5s Fixed strength
	Video Capture  Audio Capture	Control Control	Bit depth Chroma Sampling Rate control GOP length GOP structure  Single ch Pixel Format Sample Frequency Sampling Depth Channel Layouts Resolution (x1ch) Resolution (Multi-channel more than x2ch) Frame rate/Scan mode Bit depth 8-bit encoding from 10-bit raw data Chroma Sampling Rate control GOP length  GOP structure CPB delay control	30p/29.97p/25p/24p / 59.94i/50i 8 bits 4:2:0 CBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP /IBB / Closed GOP/Open GOP / Scene change / Adaptive GOP Supported NV12 / YV12 / I420 / P010 / NV16 / YV16 / YUY2 / P210 48KHz / 96KHz 16 bit 8-ch / 16-ch 3840x2160 /1920x1080 / 1280x720 /720x480 1920x1080 /1280x720 /720x480 60p/59.94p/50p/30p/29.97p/25p/24p / 59.94i/50i 8, 10 bits Supported 4:2:0 / 4:2:2 CBR / VBR / Capped VBR One Picture (I only) / 0.5sec / 1 sec I picture only / IPPP /IBB/IBBB/IBBBBBB (Hierarchical GOP:supported) / Closed GOP/Open GOP / Temporal ID on/off for hierarchical GOP / Scene change / Adaptive GOP 3s, 1s, 0.5s

			Resolution (x1ch)	3840x2160 /1920x1080 / 1280x720 /720x480	
			Resolution (Multi-channel more than x2ch)	1920x1080 /1280x720 /720x480	
			Frame rate/Scan mode	60p/59.94p/50p/30p/29.97p/25p/24p / 59.94i/50i	
			Bit depth	8, 10 bits	
			8-bit encoding from 10-bit raw data	Supported	
			Chroma Sampling	4:2:0 / 4:2:2	
		H.264/AVC	Rate control	CBR / VBR / Capped VBR	
			GOP length	One Picture (I only) / 0.5sec / 1 sec	
			· ·	I picture only / IPPP /IBB/IBBB / Closed GOP/Open GOP /	
	Video Encoding		GOP structure	Scene change / Adaptive GOP	
			CPB delay control	1s, 0.5s	
			Filter	De-blocking filter / Fixed strength	
			Low latency	5,6 frame (with IPPPP)	
			Resolution (x1ch)	1920x1080 / 1280x720 /720x480	
			Resolution (Multi-channel more than x2ch)	1920x1080 /1280x720 /720x480	
			Frame rate/Scan mode	30p/29.97p/25p/24p / 59.94i/50i	
			Bit depth	8 bits	
File Based Video		MPEG-2	Chroma Sampling	4:2:0	
Input (PCI Express)		WII Ed 2	Rate control	CBR	
input (i oi Expioss)			GOP length	One Picture (Lonly) / 0.5sec / 1 sec	
				I picture only / IPPP /IBB / Closed GOP/Open GOP / Scene	
			GOP structure	change / Adaptive GOP	
	Video Decoding		Resolution (x1ch)	3840x2160 /1920x1080 / 1280x720 /720x480	
	3		Frame rate/Scan mode	60p/59.94p/50p/30p/29.97p/25p/24p / 59.94i/50i	
		H.265/HEVC	Bit depth	8, 10 bits	
			Chroma Sampling	4:2:0 / 4:2:2	
			Resolution (x1ch)	3840x2160 /1920x1080 / 1280x720 /720x480	
			Frame rate/Scan mode	60p/59.94p/50p/30p/29.97p/25p/24p / 59.94i/50i	
		H.264/AVC	Bit depth	8, 10 bits	
			Chroma Sampling	4:2:0 / 4:2:2	
			Resolution (x1ch)	1920x1080 / 1280x720 /720x480	
			Frame rate/Scan mode	30p/29.97p/25p/24p / 59.94i/50i	
		MPEG-2	Bit depth	8 bits	
			Chroma Sampling	4:2:0	
	Audio Encoding	Control	Single ch	Supported	
	Audio Decoding	Control	Single ch	Supported	
	Addio Decoding				
Feature Operating System		Development Kits	Windows Server 2012 & 2012 R2 (64-bit), Windows Server 2008 R2 (64-bit) Linux Kernel 3.13.0 (64-bit) FFmpeg, Microsoft DirectShow		
		Networking Interface	2x 10Gbps Ethernet port (VEGA-3311-I)		
		Forward Error Correction	Level A and Level B FEC (steam basis)		
		Connectors	SFP+ Module		
		Internet protocol	Support IPV4 static IP setting		
		Streaming Protocols	RTSP/RTP/RTCP over UDP		
		Video-over-IP	SMPTE 2022-5/-6/-7 & VSF TR-03/-04 w/ AES67 audio & SMPTE 2059 sync		
			Optional TICO or Sony LLVC compression PClexpressGen3 x8		
DI . 101 1			4x SDI-3Gor 1x SDI-12G		
Physical Characterist	IC	Video Input Interfaces	1x Tri-sync		
		Vidoo inpat intonasco	1x mini-HDMI 2.0 input (VEGA-3311-S)		
			2x 10Gbps Ethernet port (VEGA-3311-I)		
			PCI express Gen3 x8		
		Video Output Interface	4x SDI-3G or 1x SDI-12G		
			1x mini-HDMI 2.0 (VEGA-3311-S)		
		Power Consumption	<35W		
		Dimensions	PCI Express Half Length Full Height 167.65 x 111.15 mm		
		Operating Temperature	-10 to 70 degrees Celsius		
Environmental		Non-operating Temperature	-40 to 85 degrees Celsius		
Environmental					
Environmental		Operating Humidity Non-operating Humidity	50 to 95% (non-condensing) 50 to 95% (non-condensing)		

## Ordering Information

Part number	Description
VFGA-3311F	4Kn60 HEVC Broadcast Video Encoding / Decoding Card (M30)