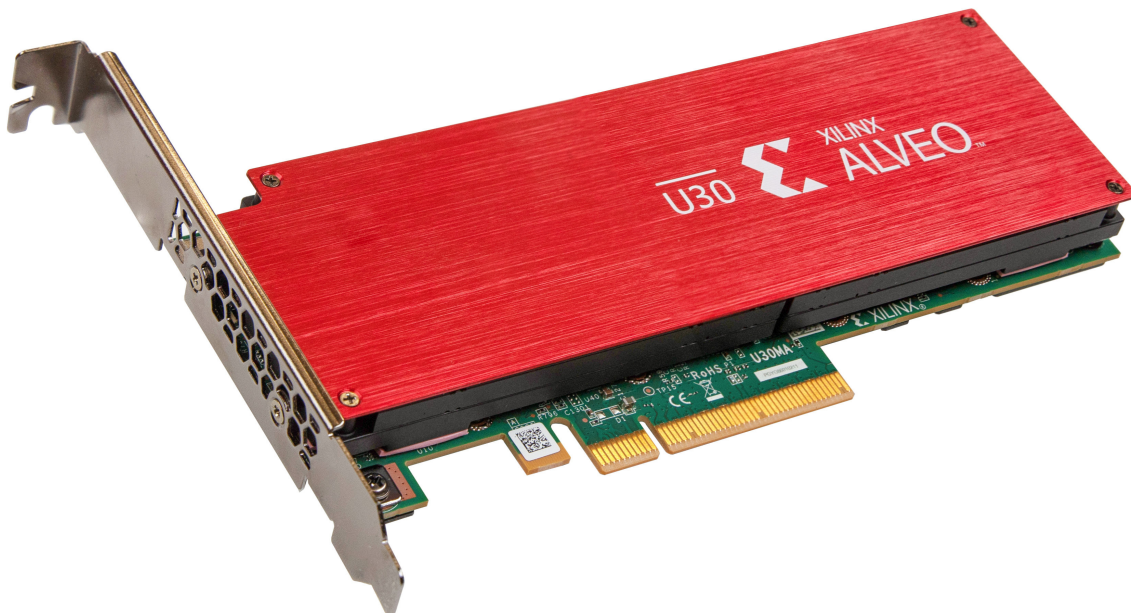


Summary

The Xilinx® Alveo™ U30 video accelerator card, shown in the following figure, is a single slot, half height, half length passively-cooled card. It targets multi-stream transcoding video applications, capable of decoding, scaling, and encoding up to eight 1080p60 streams. The U30 card provides superb power and cost performance for such video applications.

Figure 1: Alveo U30 Data Center Accelerator Card



See the [Alveo U30 Data Center Accelerator Card Installation Guide \(UG1425\)](#) to install this card.

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Alveo Product Details

Table 1: Alveo U30 Video Accelerator Card Product Details

Specification ^{1, 2}	A-U30 PQ Card	
PCIe Lanes	Primary	Secondary
	0–3	4–7
Total thermal design power	25W	
Thermal cooling solution	Passive	
Weight	347g	
Form factor	Half height, half length, single slot	
Application processing unit (APU) ³	Quad-core Arm® Cortex™-A53 MPCore with CoreSight™; NEON & Single/Double Precision Floating Point; 32 KB/32 KB L1 Cache, 1 MB L2 Cache	
Real-Time processing unit (RPU)	Dual-core Arm Cortex-R5F with CoreSight; Single/Double Precision Floating Point; 32 KB/32 KB L1 Cache, and TCM	
Embedded and external memory	256 KB On-Chip Memory with ECC; External 4 GB DDR-2400 with ECC; Single external 1 Gb configuration Quad SPI per each XCU30; two XCU30s per card	
General processing unit (GPU)	Arm Mali™-400 MP2; 64 KB L2 Cache	
Video encoder/decoder unit (VCU)	Simultaneous encode and decode of H.264 and H.265	
PCIe Interfaces	Gen3 x8 (2x Gen3 x4) (2 per card with bifurcation)	
Look-up tables (LUTs)	230K (460K)	
Registers	460K (920K)	
DSP slices	1,728 (3,456)	
Max. Dist. RAM	6.2 Mb (12.4 Mb)	
36 Kb block RAM	312/11 Mb (624/22 Mb)	
288 Kb UltraRAMs	96/27 Mb (192/54 Mb)	
GTH transceivers	8	
Qualified for deployment	Yes	

Notes:

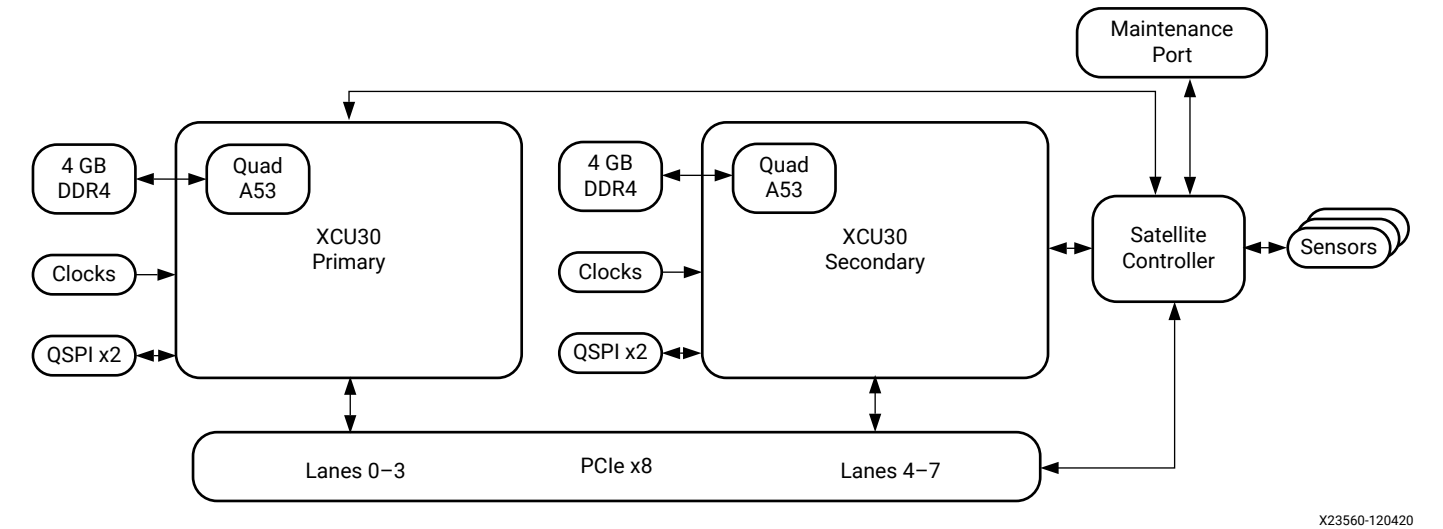
- 1. Each XCU30 device contains a full processing system with access to its own external memory subsystem.
- 2. Per device (per card).
- 3. The XCU30 device does not support cryptographic cores for AES-GCM, SHA-3/384, and RSA, or Arm v8 cryptographic extensions.

Card Specifications

Block Diagram

The following block diagram shows the components within an Alveo U30 video accelerator card.

Figure 2: U30 Block Diagram



PCIe Connector/Data Rates

The Alveo U30 accelerator card is compliant to the PCI Express Base Specification v3.1 supporting up to 8.0 GT/s (Gen3) data rates. The PCI Express finger, supports 8 lanes (x8), but those 8 lanes are bifurcated into two x4 PCIe interfaces. Each x4 interface goes to each of the XCU30 FPGAs. Servers will need to support bifurcation and have bifurcation enabled for the slot the U30 board is inserted into take advantage of both devices.

Table 2: PCI Express 8-Lane Data Transfer Rate Performance

PCI Express Generation	Performance
Gen 1	2.5 GigaTransfers per second (GT/s)
Gen 2	5.0 GT/s
Gen 3	8.0 GT/s

Satellite Controller

A TI MSP432 satellite controller resides on the U30 card to control and monitor voltages, currents and temperatures. The host server board management controller (BMC) can interact with the satellite controller to monitor and control U30 cards through out-of-band communication. Xilinx supports the PLDM protocol over MCTP over SMBUS, complying with DMTF standards. Refer to the *Alveo Out-of-Band Management Specification for Server BMC User Guide* ([UG1363](#)) for more information. When used with the Xilinx provided platform, you can easily monitor for any abnormal operating conditions and react accordingly. If you are not using the platform, Xilinx provides a Card Management Solution IP allowing you to quickly develop and interact with the satellite controller from the FPGA. See the *Card Management Solution Subsystem Product Guide* ([PG348](#)) for more information.

Maintenance Port

The maintenance port referenced in [Figure 2](#) is for manufacturing bring up use only.

Mechanical Specifications

The U30 card is compliant with the PCIe CEM rev.3.0 Specification as single slot, half height, half length cards.

Table 3: Card Dimensions

Parameter	Dimension
Height	2.71 inch (68.90 mm)
PCB thickness (± 0.13 mm (0.005 inch))	0.062 inch (1.57 mm)
Primary side width	0.570 inch (14.47 mm)
Secondary side width	0.105 inch (2.67 mm)
Length	6.60 inch (167.65 mm)

Thermal Specification

Ambient Conditions

The ambient conditions are detailed in the following sections.

Operating and Storage Temperature Conditions

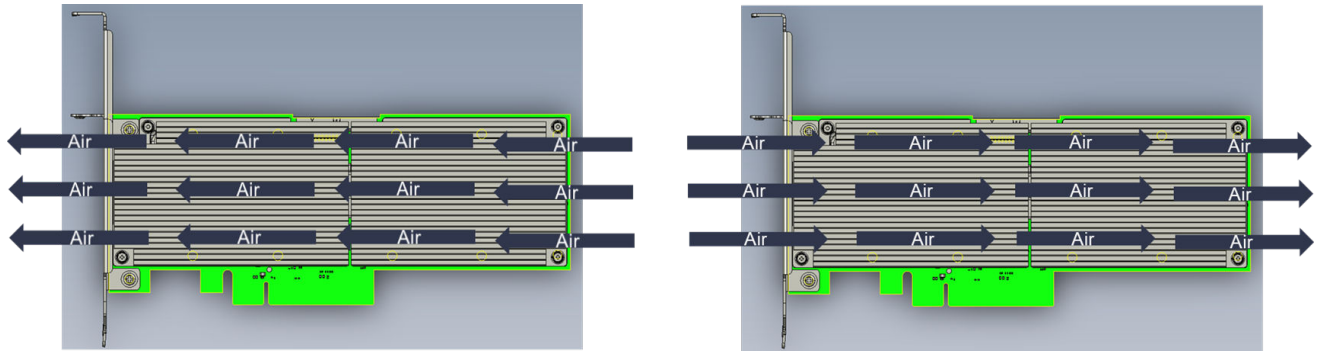
Table 4: Operating and Storage Temperatures and Humidity Conditions

Specification	Condition
Operating temperature	0°C to 55°C
Storage temperature	-40°C to 75°C
Operating humidity, non-condensing	8% to 90%
Storage humidity, non-condensing	5% to 95%
Operating temperature gradient	15°C/hour

Airflow Direction Support

The Alveo U30 passively cooled cards support both front-to-back and back-to-front airflow. Forced airflow is required at all times when the card is powered. The following figure illustrates this supported airflow.

Figure 3: Airflow Direction for Passively Cooled Cards



X23762-031120

Operating Conditions

Inlet Temperature versus Airflow Requirement in Server

The following tables provide the required airflow rate and airflow speed to the U30 card under various operating conditions.

Note: In the following tables, the term *load* refers to the total thermal power dissipation of the card.

Table 5: Specification for the U30 Card at Sea Level with 22-25W Load

Inlet Temperature versus Airflow Requirement of PCIe Card Slot (53.75 mm x 13.96 mm) at Sea Level			
Inlet Temperature to the Card (°C)	Linear Feet per Minute (LFM)	Cubic Feet per Minute (CFM)	Pressure (inwg)
5	100	0.8	0.05
10	100	0.8	0.05
15	110	0.9	0.06
20	110	0.9	0.06
25	120	1.0	0.06
30	130	1.0	0.07
35	150	1.2	0.08
40	170	1.4	0.10
45	200	1.6	0.12
50	250	2.0	0.16
55	300	2.4	0.21

Table 6: Specification for the U30 Card at 1200m above Sea Level with 22-25W Load

Inlet Temperature versus Airflow Requirement of PCIe Card Slot (53.75 mm x 13.96 mm) at 1200m above Sea Level			
Inlet Temperature to the Card (°C)	Linear Feet per Minute (LFM)	Cubic Feet per Minute (CFM)	Pressure (inwg)
5	110	0.9	0.06
10	110	0.9	0.06
15	120	1.0	0.06

Table 6: Specification for the U30 Card at 1200m above Sea Level with 22-25W Load (cont'd)

Inlet Temperature versus Airflow Requirement of PCIe Card Slot (53.75 mm x 13.96 mm) at 1200m above Sea Level			
Inlet Temperature to the Card (°C)	Linear Feet per Minute (LFM)	Cubic Feet per Minute (CFM)	Pressure (inwg)
20	120	1.0	0.06
25	130	1.0	0.07
30	140	1.1	0.08
35	160	1.3	0.09
40	180	1.5	0.10
45	220	1.8	0.14
50	270	2.2	0.18
55	330	2.7	0.24

Regulatory Compliance Statements

FCC Class A Products

Note: These devices are for use with UL Listed Servers or I.T.E.

Safety Compliance

The following safety standards apply to all products listed above.

- UL 60950-1, 2nd Edition, 2014-10-14 (Information Technology Equipment - Safety - Part 1: General Requirements)
- CSA C22.2 No. 60950-1-07, 2nd Edition, 2014-10-14 (Information Technology Equipment - Safety - Part 1: General Requirements)
- EN 60950-1:2006+A11:2009+A1:2012+A12:2011+A2:2013 (European Union)
- IEC 60950-1:2005 (2nd Edition); Am 1:2009 (International)
- EU LVD Directive 2014/35/EU
- IEC 62368-1:2014 (2nd Edition)

EMC Compliance

The following standards apply.

Class A Products

- FCC Part 15 – Radiated & Conducted Emissions (USA)
- CAN ICES-3(A)/NMB-3(A) – Radiated & Conducted Emissions (Canada)
- CISPR 32 – Radiated & Conducted Emissions (International)
- EN55032: 2015 – Radiated & Conducted Emissions (European Union)

- EN55035:2017 – Immunity (European Union)
- EMC Directive 2014/30/EU
- VCCI (Class A)– Radiated & Conducted Emissions (Japan)
- CNS13438 – Radiated & Conducted Emissions (Taiwan)
- CNS 15663 - RoHS (Taiwan)
- AS/NZS CISPR 32 – Radiated and Conducted Emissions (Australia/New Zealand)
- Article 58-2 of Radio Waves Act, Clause 3 (Korea)

Regulatory Compliance Markings

When required, these products are provided with the following Product Certification Markings:

- UL Listed Accessories Mark for the USA and Canada
- CE mark
- FCC markings
- VCCI marking
- Australian C-Tick mark
- Korea MSIP mark
- Taiwan BSMI mark
- German GS mark

FCC Class A User Information

The Class A products listed above comply with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.



IMPORTANT! *This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his or her own expense.*



IMPORTANT! *Cet équipement a été testé et jugé conforme à la Class A digital device, conformément à la règle 15 du standard FCC. Ces limites sont conçues pour fournir des protections contre des interférences nuisibles lorsque l'équipement est utilisé dans un environnement commercial. Cet équipement génère, utilise et peut émettre des énergies de radio-fréquence et, s'il n'est pas installé et utilisé conformément aux instructions, peut nuire aux communications radio. L'exploitation de cet équipement dans une zone résidentielle est susceptible de causer des interférences nuisibles, auquel cas l'utilisateur peut être tenu de prendre des mesures adéquates à ses propres frais.*



WICHTIG! Dieses Gerät wurde getestet und entspricht den Grenzwerten für digitale Geräte der Klasse A gemäß Teil 15 der FCC-Bestimmungen. Diese Grenzwerte bieten einen angemessenen Schutz gegen schädliche Interferenzen, wenn das Gerät in einer gewerblichen Umgebung betrieben wird. Dieses Gerät erzeugt und verwendet Hochfrequenzenergie und kann diese abstrahlen. Wenn es nicht gemäß den Anweisungen installiert und verwendet wird, kann dies Funkstörungen verursachen. Der Betrieb dieses Geräts in einem Wohngebiet kann schädliche Interferenzen verursachen. In diesem Fall muss der Benutzer die Interferenz auf eigene Kosten beheben.



CAUTION! If the device is changed or modified without permission from Xilinx, the user may void his or her authority to operate the equipment.



ATTENTION! Si l'appareil est modifié sans l'autorisation de Xilinx, l'utilisateur peut annuler son habilité à utiliser l'équipement.



VORSICHT! Wenn das Gerät ohne Erlaubnis von Xilinx geändert wird, kann der Benutzer seine Berechtigung zum Betrieb des Geräts verlieren.

Canadian Compliance (Industry Canada)

CAN ICES-3(A)/NMB-3(A)

China RoHS Compliance

- SJ/T 11363-2006, 11364-2006, and GB/T 26572-2011
- RoHS 3 directive 2015/863
- EU 2015/863

VCCI Class A Statement

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VCCI-A

KCC Notice Class A (Republic of Korea Only)

A급 기기
(업무용 방송통신기기)

CLASS A device
(commercial broadcasting
and communication
equipment)

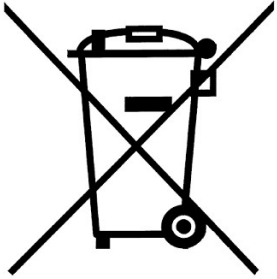
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This device has been approved by EMC registration. Distributors or users pay attention to this point. This device is usually aimed to be used in other area except at home

BSMI Class A Notice (Taiwan)

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此為甲類資訊技術設備，於居住環境中使用時，可能會造成射頻擾動，在此種情況下，使用者會被要求採取某些適當的對策。

EU WEEE Logo**Manufacturer Declaration European Community****Manufacturer Declaration**

Xilinx declares that the equipment described in this document is in conformance with the requirements of the European Council Directive listed below:

- Low Voltage Directive 2014/35/EU
- EMC Directive 2014/30/EU
- RoHS 3 Directive 2011/65/EU, 2015/863

These products follow the provisions of the European Directive 2014/53/EU.

Dette produkt er i overensstemmelse med det europæiske direktiv 2014/53/EU.

Dit product is in navolging van de bepalingen van Europees Directief 2014/53/EU.

Tämä tuote noudattaa EU-direktiivin 2014/53/EU määräyksiä.

Ce produit est conforme aux exigences de la Directive Européenne 2014/53/EU.

Dieses Produkt entspricht den Bestimmungen der Europäischen Richtlinie 2014/53/EU.

Þessi vara stenst reglugerð Evrópska Efnahags Bandalagsins númer 2014/53/EU.

Questo prodotto è conforme alla Direttiva Europea 2014/53/EU.

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Este producto cumple con las normas del Directivo Europeo 2014/53/EU.

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This declaration is based upon compliance of the Class A products listed above to the following standards:

EN 55032 (CISPR 32 Class A) RF Emissions Control.

EN 55024:2010 (CISPR 24) Immunity to Electromagnetic Disturbance.

EN 60950-1:2006/A11:2009A1:2010/A12:2011 Information Technology Equipment- Safety-Part 1: General Requirements.

EN 50581:2012 - Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.



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ATTENTION! *Dans un environnement domestique, les produits de Classe A peuvent causer des interférences radio, auquel cas l'utilisateur peut être tenu de prendre des mesures adéquates.*



VORSICHT! *In einer häuslichen Umgebung können Produkte der Klasse A Funkstörungen verursachen. In diesem Fall muss der Benutzer möglicherweise geeignete Maßnahmen ergreifen.*

Responsible Party

Xilinx, Inc.
2100 Logic Drive, San Jose, CA 95124
United States of America
Phone: (408) 559-7778

References

The following document provides additional information:

1. *Alveo U30 Data Center Accelerator Card Installation Guide* ([UG1425](#))
2. *Alveo Out-of-Band Management Specification for Server BMC User Guide* ([UG1363](#))
3. *Card Management Solution Subsystem Product Guide* ([PG348](#))

Revision History

The following table shows the revision history for this document.

Section	Revision Summary
12/15/2020 Version 1.3	
Summary	Removed 75W maximum power limit from first paragraph.

Section	Revision Summary
Table 1	- Replaced total electrical card load with total thermal design power. - Updated description of Quad SPI in embedded and external memory row.
Figure 2	Moved sensors from maintenance port to satellite controller.
08/11/2020 Version 1.2	
General updates	Updated data sheet layout.
Block Diagram, Satellite Controller, Maintenance Port	Added new topics.
Table 3	Updated all card dimensions.
Table 4	Added row for operating temperature gradient.
Airflow Direction Support	Added introductory text before Figure 3 .
Operating Conditions	Added note after introductory paragraph.
China RoHS Compliance	Added RoHS 3 directive 2015/863.
06/16/2020 Version 1.1	
Table 1	Removed product SKU row.
04/14/2020 Version 1.0	
Initial release.	N/A

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