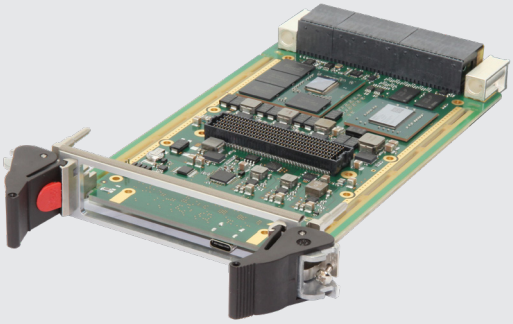
IC-GRA-VPX3a

3U VPX GPU board with on-board FPGA

- *3U VPX*
- *AMD Radeon™ E9171 GPU/GPGPU*
- *PCIe interfaces to GPU (x8) and FPGA (x4)*
- *2 direct DisplayPort++ video outputs*
- *3 video outputs via the on-board mezzanine module (option)*
- *Frame grabber capability*



Overview

The **IC-GRA-VPX3a** is not only a 3U VPX Graphics Card (GPU) but also a Computing Card (GPGPU) and a Frame Grabber. Equipped with an AMD graphics processor coupled to a Xilinx UltraScale™ FPGA, this board meets the performance and functionalities needed in today's MIL-AERO applications.

Description

Leveraging the AMD Radeon™ E9171 GPGPU 1.2 TFLOPS computing capabilities, the **IC-GRA-VPX3a** offers state-performance while maintaining the Thermal Design Power (TDP) at less than 40 watts.

The AMD embedded Radeon™ E9171 takes advantage of the Polaris architecture and brings a range of improvements in the 14nm technology microchip compared to earlier GPU generations. With 8 CUs and 4GB video memory, this power efficient and advanced 3D graphics engine supports Microsoft® DirectX® 12 technology for superior graphics rendering.

In addition, its dedicated Unified Video Decoder (UVD) and 4K HEVC/H.265 Video Encoding acceleration enables High Definition decode of H.264, VC-1, MPEG4, MPEG2 and MVC compressed video streams.

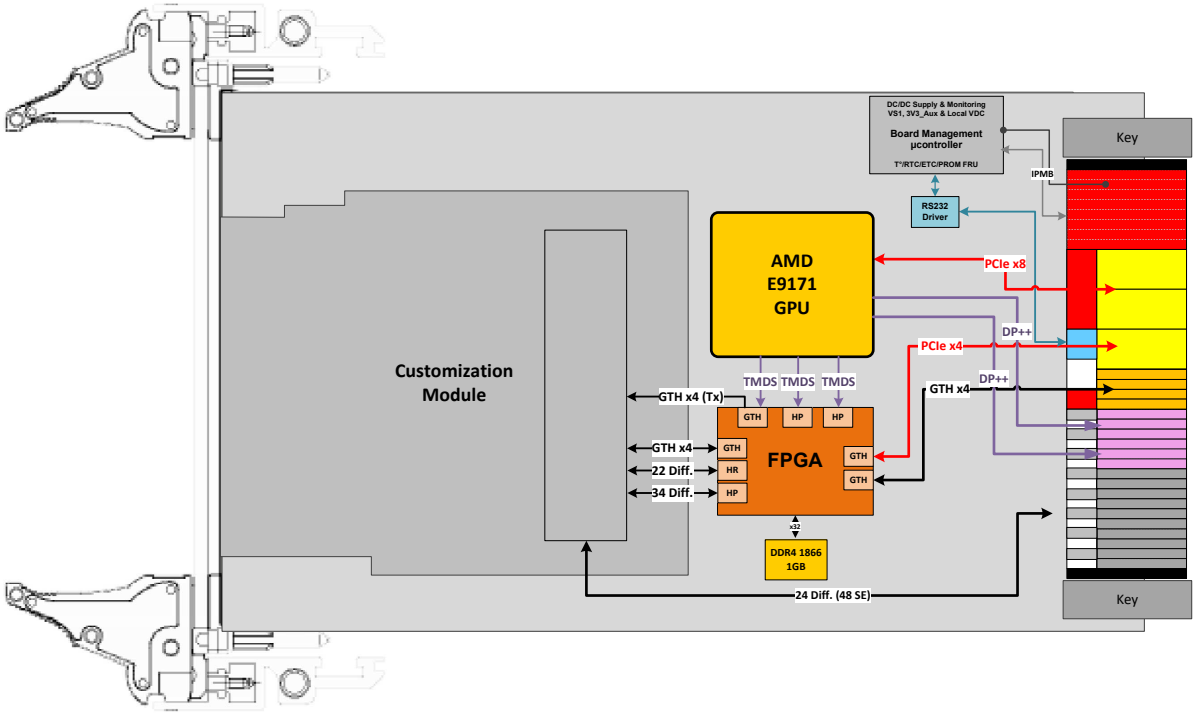
The AMD multi-display controllers deliver up to 36-bpp (bits per pixel) throughout the display pipes allowing the **IC-GRA-VPX3a** to offer up to five video outputs (2 direct DisplayPort™ 1.4 interfaces and 3 customizable interfaces thanks to the FPGA and the mezzanine module). The support of OpenGL™4.5 and OpenCL™2.0, as an open standard programming software, makes this 3U VPX module the ideal solution for demanding graphics and video applications in low power environments.

The combination of the on-board Xilinx UltraScale FPGA, GPU and capture module makes the **IC-GRA-VPX3a** extremely scalable so that it can offer multiple solutions in terms of video (ARINC818, STANAG 3350, 3G-SDI) capture and conversion configurations. The **IC-GRA-VPX3a** is able to transfer ultra-high definition over 8Gb/s via 8 PCIe Gen4 lanes.

For demanding mil-aero VPX systems, the **IC-GRA-VPX3a** is the ideal graphics, GPGPU and video capture solution to run with the Interface concept Intel and ARM-based SBCs.

The **IC-GRA-VPX3a** is available in standard, extended, rugged air and conduction-cooled grades

Block Diagram



Main features

VPX P1 connector

- x8 PCI Express lanes Gen3 to/from GPU
- x4 PCI Express lanes Gen3 to/from FPGA

VPX P2 connector

- 2 DisplayPort™++ interfaces (*) (Dual-Mode DisplayPort™)
  - **DisplayPort™ 1.4** configurable as:
    - up to two 4096 x 2160 px @ 60 Hz refresh rate
    - one 5120 x 2880 px @ 60 Hz refresh rate (both dual or single-cable configuration)

The above ports can also be used with DisplayPort++ to HDMI (or DVI) adapters (active or passive) to allow connection with HDMI or DVI displays, offering thus:

- **HDMI™ 2.0b** (6 Gbit/s)
  - up to two 4096 x 2160 px @ 60 Hz refresh rate, or
- **Dual-link DVI**
  - one 2560 × 1600 px @ 60 Hz refresh rate, or
- **Single-link DVI**
  - up to three 1920 × 1200 @ 60 Hz refresh rate

- 24 differential or 48 loosely coupled single-ended signals to the mezzanine module.

Customisable FMC module

- Mechanically and electrically compatible with the standard VITA57.1
- 24 differential or 48 loosely coupled Single Ended signals from P2 connector
- 4 multi-gigabit lanes + 4 multi-gigabits Tx signals from FPGA GTHs
- 22 differential or 44 loosely-coupled single-ended from/to FPGA High Range Banks (up to 3V3)
- 34 differential or 48 loosely-coupled single-ended from/to FPGA High Performance Banks (up to 1V8)
- Possible connectors on Front Panel

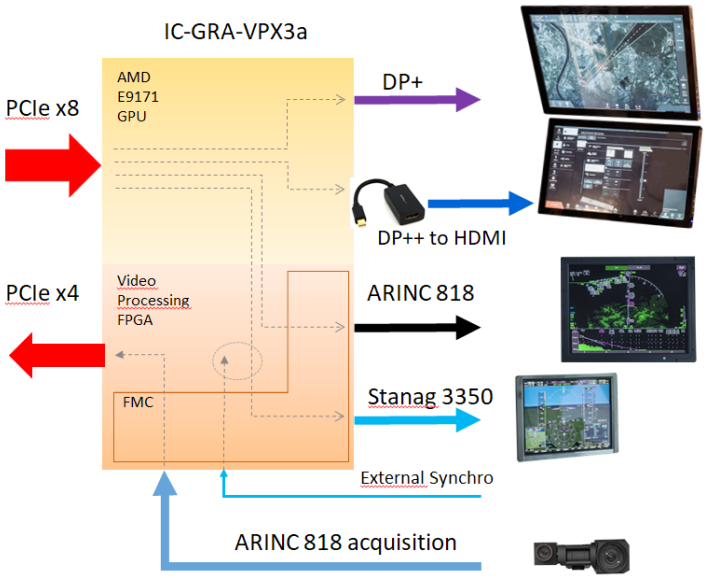
Please consult us for more information about optional customization capabilities.

Graphics processing unit

- AMD embedded Radeon™ E9171 GPU/GPGPU
- 8 Compute Units
- 1.2 TFLOPS
- 4GB on-chip GDDR5 memory (1GHz 128-bit)

Case study

Mission computer CPU



In this case, the mission computer CPU takes advantage of the 2 Display Port interfaces of the 9171 GPU for very high resolution displays (one in DP+ mode, and the second one in HDMI mode via a DP+ to HDMI converter).

In addition, thanks to the logic conversions provided by the FPGA and the electrical adaptations implemented on the custom FMC, the **IC-GRA-VPX3a** also allows:

- to acquire an ARINC 818 flow
- to generate a Stanag 3350 stream synchronized with an external signal for display to a legacy monitor
- to generate an ARINC 818 flow for a remote display

Grades

Criterion	Coating	Operation Temperature	Rec. Airflow	Oper. HR% no cond.	Storage Temperature	Sinusoidal Vibration	Random Vibration	Shock 1/2 Sin. 11ms
Standard	Optional	0 to 55°C	1 .. 2 m/s	5 to 90%	-45 to 85°C	2G [20..2000]Hz	0.002g2 /Hz [10..2000]Hz	20G
Extended	Yes	-20 to 65°C	2 .. 3 m/s	5 to 95%	-45 to 85°C	2G [20..2000]Hz	0.002g2 /Hz [10..2000]Hz	20G
Rugged	Yes	-40 to 75°C or 85° C (*)	2 .. 5 m/s	5 to 95%	-45 to 100°C	5G [20..2000]Hz	0.05g2 /Hz [10..2000]Hz	40G
Conduction-Cooled 71°C	Yes	-40 to 71°C at the thermal interface (*)	-	5 to 95%	-45 to 100°C	5G [20..2000]Hz	0.05g2 /Hz [10..2000]Hz	40G
Conduction-Cooled 85°C	Yes	-40 to 85° C at the thermal interface (*)	-	5 to 95%	-45 to 100°C	5G [20..2000]Hz	0.1g2 /Hz [10..2000]Hz	40G

(*) : Temperature grades are subject to availability according to IC products. Please consult us.

All information contained herein is subject to change without notice.

For more information, please contact:

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