Platforms for Safety Critical Applications (PSCA)

Single Source for Complete
Safety Critical Stack for Embedded Systems

CoreAVI's Platforms for Safety Critical Applications (PSCAs) offer an industry first; a complete off-the-shelf safety certifiable COTS embedded platform solution. PSCAs dramatically lower the risks and accelerate the development of certifiable systems. Through PSCA solutions, CoreAVI is the single source for the complete, integrated stack of all components required for a safety critical system, including an RTOS development environment, boot, Board Support Package (BSP), integrated graphics/video drivers, and the COTS-D hardware IP solution for our COTS-D SBCs and E9171-based graphics modules. All software and hardware elements come with their respective DO-178C/ED-12C or DO-254/ED-80 certification evidence to support DAL A. By providing the entire stack through a single source, PSCAs lower risk, lower cost, and shorten schedules for safety certifiable avionics mission computers and cockpit display systems.
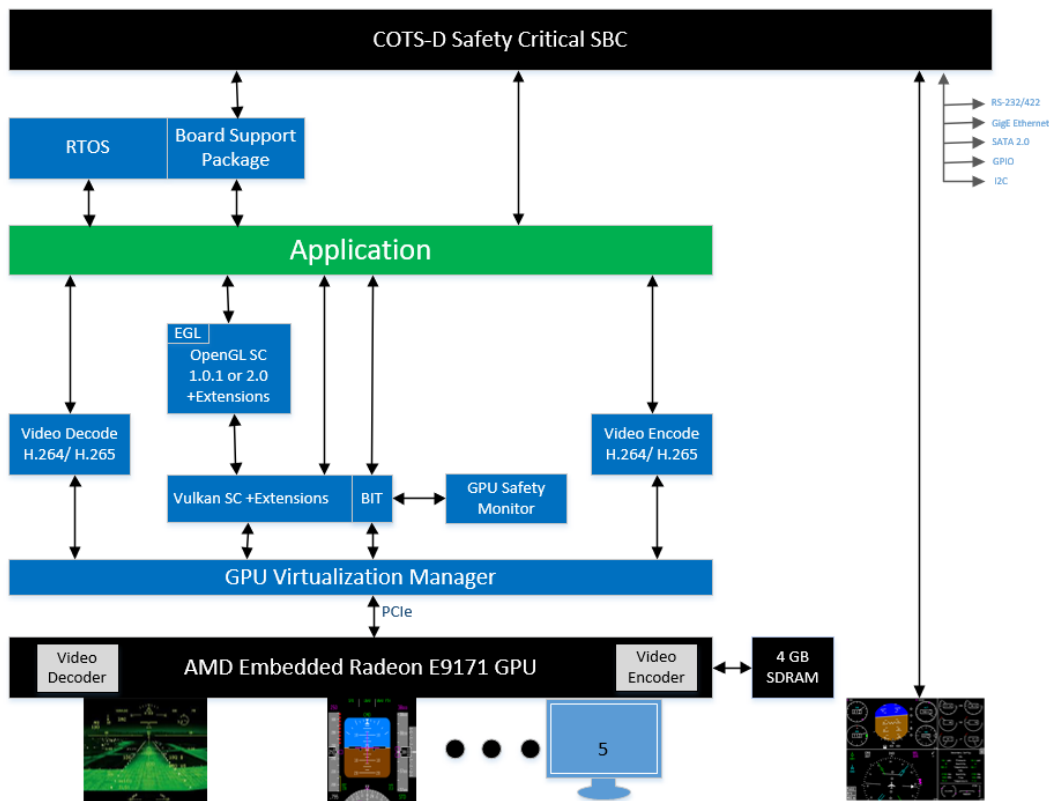

Figure 1: COTS-D SBC + E9171 PSCA Solution Overview

PSCA solutions include the following integrated components:

- 3U VPX Single Board Computer (SBC) COTS-D Design IP and DO-254/ED-80 certification evidence

- XMC (GPMX002) AMD Embedded Radeon E9171 GPM COTS-D Design IP and DO-254/ED-80 certification evidence

- Board Support Package (BSP) for DO-178C/ED-12C certifiable Real Time Operating Systems (RTOS) (such as Wind River® VxWorks® 653, DDC-I Deos®, SYSGO PikeOS®, and more) with DO-178C/ED-12C certification evidence

- RTOS development environment with DO-178C/ED-12C certification evidence

- Vulkan®-based VkCore® SC graphics and compute driver, VkCoreGL® SC OpenGL® SC application libraries, and video driver libraries with DO-178C/ED-12C certification evidence

GRAPHICS ACCELERATION PROCESSOR

Graphics acceleration and interface expansion is achieved though the COTS-D GPMX002 E9171 XMC module that can be installed directly onto the SBC. The AMD Embedded Radeon E9171 is the latest Embedded Radeon GPU from AMD offering twice the dedicated video memory and more than 2x the performance of the previous generation E8860 in a similar power envelope and driving up to five simultaneous displays. The E9171 also upgrades the previous generation GPU H.264 video decode and encode to full 4K at 60 Hz resolution, and adds High Efficiency Video Coding (HEVC), H.265. Figure 1 details the elements of the PSCA solution. The colour blue indicates all items that are part of CoreAVI's complete certifiable solution.

The GPU is supported with VkCoreGL SC1 OpenGL SC 1.0.1 and VkCoreGL SC2 OpenGL SC 2.0 driver libraries on top of Vulkan, all with COTS certification evidence to support DO-178C/ED-12C DAL A certifications. This architecture enables the quick, low risk porting of existing applications with the ability to accelerate and add new system functionality through the Vulkan interface to the GPU hardware. CoreAVI's VkCoreGL SC1 OpenGL driver libraries are FACE-aligned, supporting their safety critical profile including the EXT_EGL_Compositor extension. The GPU may be used by multiple applications using CoreAVI's HyperCore™ GPU virtualization manager module.

Many systems have safety requirements to prevent the display of Hazardously Misleading Information. The E9171 is supported by CoreAVI's TrueCore™ GPU safety monitor to detect situations within the GPU that may cause Hazardously Misleading Information.

Video decoding of H.264 and H.265 video streams into OpenGL textures is supported by CoreAVI's DO-178C/ED-12C DAL A certifiable DecodeCore® driver library.

Video encoding of frame buffers, displayed data, and SBC hosted video to H.264 and H.265 streams is supported with CoreAVI's DO-178C/ED-12C DAL A certifiable EncodeCore® driver library.

Contact CoreAVI for more information: sales@coreavi.com