



Platform for Safety Critical Applications (PSCA)



Single Source for DDC-I Deos + T2081/T1042 + E9171



Through a unique collaboration with DDC-I, CoreAVI offers an industry first, a complete off-the-shelf safety certifiable COTS embedded solution. Known as a Platform for Safety Critical Application (PSCA), it dramatically lowers the risks and accelerates the development of certifiable systems. Through PSCA Solutions, CoreAVI is the single source for all of the components required including a Deos RTOS development environment, boot, Board Support Package (BSP), integrated graphics/video drivers, and the COTS-D hardware IP solution for the [NXP® T2081/T1042 Single Board Computer](#) and the [GPM0002 AMD Embedded Radeon™ E9171 GPU](#). All software elements come with COTS DO-178C/ED-12C certification evidence for DAL A while all hardware components come with COTS DO-254/ED-80 certification evidence to support IDAL A needs. By providing all components through a single source, this solution lowers risk, lowers cost, and shortens schedules for safety certifiable avionics mission computers and cockpit display systems.

The T2081/T1042 is supported by DDC-I's Deos safety critical time and space partitioned DO-178C/ED-12C certifiable Real Time Operating System (RTOS). Deos is a proven software environment that is certified and deployed on thousands of avionics displays in air transport and business jets. The RTOS goes beyond time and space partitioning by providing dynamic linking at run-time and a Data Distribution Service (DDS). These features permit application binaries (and the PSCA's RTOS and GPU libraries) to be reused without any changes, even if the system is reconfigured for new aircraft or as new functions are added (or removed). Deos offers exceptional processing performance through a number of other unique features such as slack scheduling and cache partitioning that result in lower worst-case execution times and jitter while also allowing up to 100% processor utilization. The PSCA development environment is a complete package that includes IDE, compiler/debugger, profilers, and DO-330 qualified configuration and code coverage tools – and is supported by leading third party software tool and modeling suppliers.

Deos is certifiable to DO-178C/ED-12C DAL A, including support for multi-core processing as detailed in the CAST 32A and CRI papers. Applications created in a single core PSCA system may be easily integrated in binary form allowing customers to leverage the DO-178C/ED-12C verification evidence from prior certifications unchanged, in a PSCA multicore configuration. Ethernet is standard while optional libraries include ARINC 615, 653, 664, UDP, POSIX, and a high speed journaling file system that is suitable for high bandwidth applications such as synthetic vision. Deos is also aligned with the Future Airborne Capability Environment (FACE), supporting the safety base profile.

This PSCA Solution includes:

- NXP T2081/T1042 3U VPX Single Board Computer (SBC) COTS-D Design IP and DO-254/ED-80 certification evidence
- GPM0002 AMD Embedded Radeon E9171 GPU XMC Module COTS-D Design IP and DO-254/ED-80 certification evidence
- Safety critical DDC-I Deos Board Support Package (BSP) with DO-178C/ED-12C certification evidence
- DDC-I Deos RTOS development environment with DO-178C/ED-12C certification evidence
- OpenGL®, Vulkan®, and video driver libraries with DO-178C/ED-12C certification evidence



Graphics Acceleration Processor

Graphics acceleration and interface expansion is achieved through the COTS-D GPM0002 E9171 XMC module which 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 T2081/T1042 + E9171 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

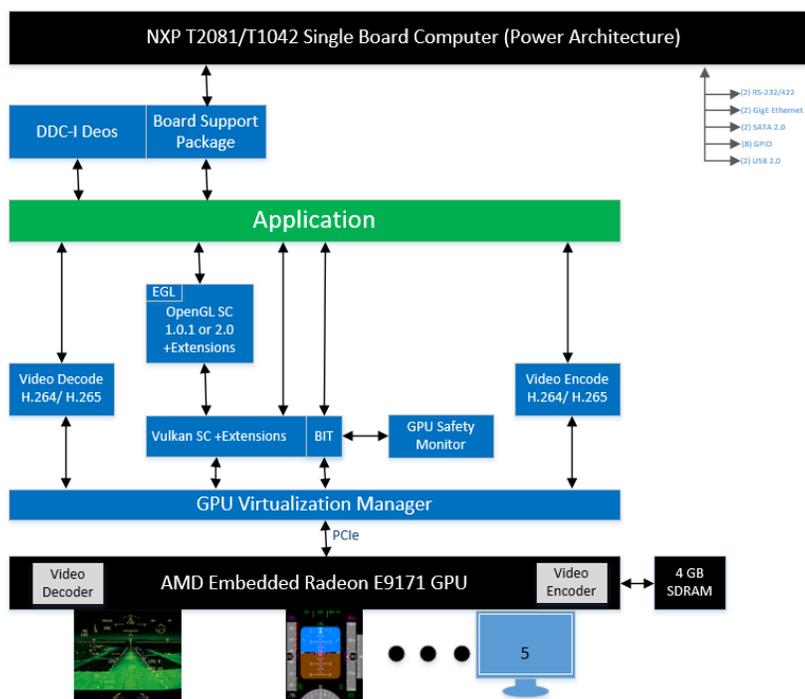


Figure 1: T2081/T1042 + E9171 PSCA Solution Overview