VkCore® Functional Safety Suite for Arm Mali-G78AE GPU

Safety Critical Software Stack for ISO 26262 Graphics and Compute Systems

FEATURES AND BENEFITS

- Integrated VkCore® SC
  - Configurable with VkCoreGL® SC2 or VkCoreGL SC1
  - Configurable to support Green Hills® Software INTEGRITY 11, QNX, and other RTOS
- Library options to add compute, video processing
- Library options to support achieving fault metrics
- CertCore™ 26262 Accredited Safety Assessment Certificate(s)
- Safety Manual
- FMEA for the combination of Mali-G78AE and VkCore SC driver

INTRODUCTION

CoreAVI's VkCore Functional Safety Suite for the Arm Mali-G78AE Graphics Processing Unit (GPU) is a packaged Safety Element out of Context (SEooC) implementation of industry standard graphics drivers and libraries developed to meet ISO 26262 ASIL D. The suite provides CoreAVI's VkCore SC (Vulkan) driver based on Khronos' Vulkan® SC 1.0 API, and either VkCoreGL SC2 (OpenGL SC 2.0) or VkCoreGL SC1 (OpenGL SC 1.0) library for the Mali-G78AE GPU. VkCore SC includes a GPU manager, and compositing and video capture support APIs, while VkCoreGL SC1/SC2 includes Khronos-defined EGL and the EGL compositing extension. Please refer to the individual product briefs for details and included extensions.
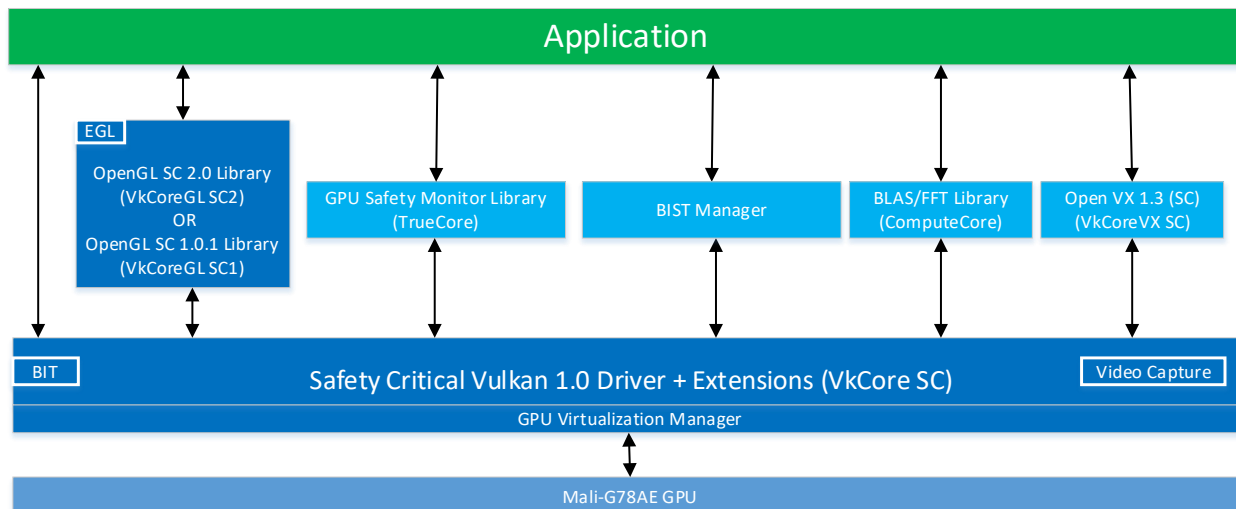

Figure 1: VkCore Functional Safety Suite Architecture

In addition to the software and user manuals, the Functional Safety Suite comes with a CertCore 26262 ISO 26262 Accredited Safety Assessment Certificate, safety manual, and a Failure Modes and Effects Analysis (FMEA) report for the Mali-G78AE. In addition to ISO 26262 certification, IEC 61508 and derivative functional safety standards are also supported. Contact CoreAVI sales for more information.

For existing OpenGL ES 2.x and OpenGL ES 2.x applications, there is a transition guide for porting to OpenGL SC 2.0.

CONFIGURATION OPTIONS

There are two sets of configuration options: one to select an OpenGL library, and one to select the execution model (RTOS).

The OpenGL library can be VkCoreGL SC2 (OpenGL SC 2.0), VkCoreGL SC1 (OpenGL SC 1.0), or none (using VkCore SC direct).

Both RTOS and bare metal execution models are supported. The VkCore Functional Safety Suite is configurable to support several RTOS options including QNX and Green Hills Software INTEGRITY 11 and others. Contact CoreAVI sales for additional RTOS support.

LIBRARY OPTIONS

Several software libraries can be added to the VkCore Functional Safety Suite. Each comes with a safety manual and a CertCore 26262 Accredited Safety Assessment Certificate.

For applications requiring compute or video processing, CoreAVI offers a ComputeCore™ library providing Basic Linear Algebra Subprograms (BLAS) & Fast Fourier Transforms (FFTs), and VkCoreVX™ SC providing an implementation of the Khronos safety critical OpenVX™ library.

To support achieving Single Point Fault Metric (SPFM), CoreAVI provides the TrueCore™ GPU safety monitor Built-In-Test (BIT) library and BIST driver supporting the execution and result gathering for Built-In-Self-Test (BIST) functionality implemented in the silicon integration.

Please refer to the individual product briefs for details.

DEVELOPMENT INTERFACE AGREEMENT

The intent of a Development Interface Agreement (DIA) is to define the responsibilities of the customer and supplier in facilitating the development of a functional safety system. In custom developments, the DIA is a key document executed between customers and suppliers early in the process of developing both the system and the CoreAVI drivers and libraries. As the CoreAVI software is a Commercial-Off-The-Shelf (COTS) SEooC product, an ISO 26262 DIA is not required. Please refer requests for custom DIAs to CoreAVI Sales. The following sections highlight key points of the standard DIA.

Requirements Transfer

The VkCore Functional Safety Suite software is developed as a Safety Element out of Context (SEooC). Detailed safety requirements were not available from lead customers during development; therefore, the safety requirements used were based on CoreAVI analysis of target safety applications and industry standard safety critical APIs. CoreAVI is willing to

discuss acceptance of new customer safety requirements for future designs. Please contact CoreAVI Sales for further information.

Availability of Safety Documentation

The following table lists the safety documentation for the library.

DELIVERABLE	CONTENTS	AVAILABILITY	DELIVERY
Safety Manual	Documents usage, assumptions, issues, etc. of SEooC to put the SEooC into a safety context (application)	NDA Material	TBD

Table 1: Safety Documentation Available

Support

CoreAVI provides integration, performance optimization, and design consulting services.

External Product Audits

CoreAVI works with TUV Rheinland® for an external audit of functional safety suite software to ISO 26262 standards.

Contact Sales@CoreAVI.com for more information.