

VIM3006 3U VPX Video Capture and Conversion

DO-254/ED-80 Certifiable Video I/O Module IP

FEATURES AND BENEFITS

- Part of the COTS-D family of safety certifiable modules
- Two independent video capture inputs:
 - HD-SDI (SMPTE 292) or ARINC 818-2
- Six independent outputs:
 - Four HD-SDI (SMPTE 292) or ARINC 818-2
 - Two Single-Link DVI
- Single conduction-cooled rugged module 3U VITA 65 (OpenVX™) solution for harsh environments
- Complete hardware solution with data package to support certification to RTCA DO-254/EUROCAE ED-80 under A(M)C 20-152A
- Provision of all IP (except FPGA source design) and data to enable manufacture, support, and repair of the module
- Availability of a certifiable driver with data package to support DAL A certification to RTCA DO-178C/EUROCAE ED-12C



INTRODUCTION

The VIM3006 is a 3U VPX video capture and conversion module that builds upon the processing power of the CoreAVI GPMX002 XMC AMD E9171 mezzanine with low-latency video I/O flexibility to meet system-level needs.

The VIM3006 Technical Data Package provides all the data needed to support, maintain, modify, manufacture, and repair the hardware IP.

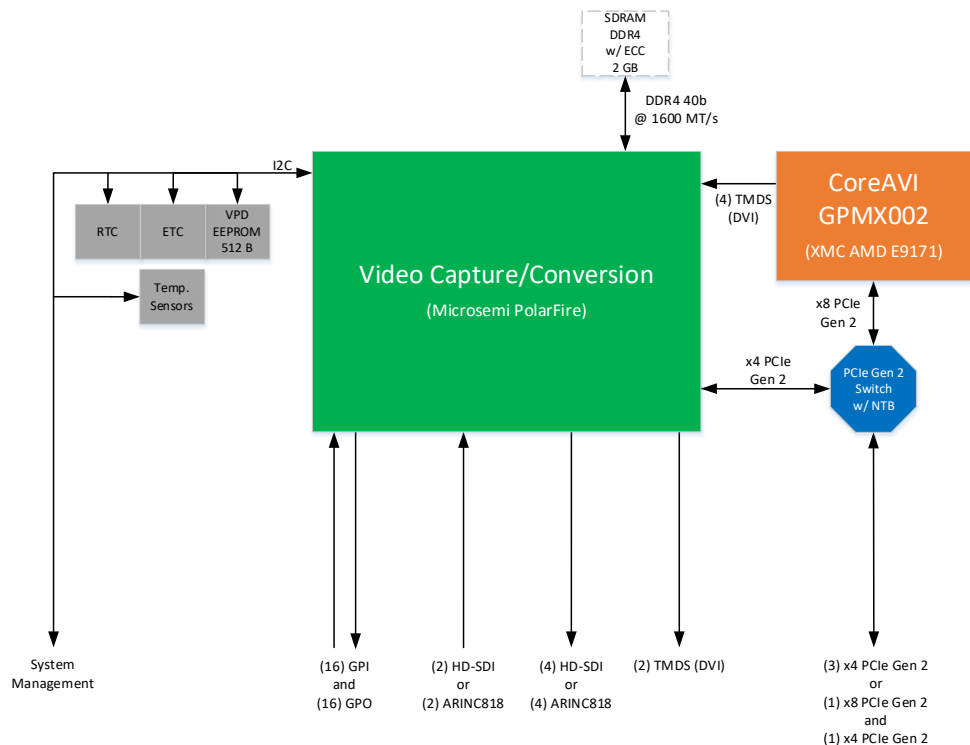


Figure 1: VIM3006 Block Diagram

In addition, the VIM3006 certification evidence package provides all the necessary data to support DO-254/ED-80 hardware certification under the guidance of A(M)C 20-152A for DAL C system requirements. Contact CoreAVI for a higher DAL level.

The VIM3006 is also supported by safety-critical drivers to support video conversion FPGA as well as the GPMX002 (VkCore[®] SC). Both drivers are supported by DO-178C/ED-12C software certification up to level A. The available lifecycle data kits support FAA, EASA, and other certification authority needs.

VIDEO CAPTURE

Two independent video input channels capture the HD-SDI (SMPTE 292) or ARINC 818-2 video streams. The video capture functionality integrates with CoreAVI's video capture API, included with VkCore SC drivers, to provide a low latency video capture path directly into GPU memory.

GRAPHICS CONVERSION

Four independent display output channels convert the TMDS (DVI) channels from the GPMX002 installed on the VITA 61 XMC 2.0 site to either HD-SDI (SMPTE 292) or ARINC 818-2 outputs.

MEMORY

The VIM3006 supports the option of a 2 GB DDR4-1600 private memory supporting single-error correction and double-error detection (SECCDED) EEC modes to support video capture. The SDRAM interface is 40 bits wide: 32 bits plus 8 bits for ECC.

Furthermore, the VIM3006 supports the option of using an EEPROM to hold product information (product identification, serial number, etc.) to provide electronic configuration management.

CONNECTIVITY

There are two PCIe Gen 2 connectivity configuration options. The first option is three interfaces of four lanes each—one upstream and two downstream interfaces for graphics and video options. The second option—the preferred option for GPU Compute use cases—is one eight-lane upstream interface and one four-lane downstream interface. Options are set up via bootstrap configuration set during manufacturing.

SYSTEM MANAGEMENT

The system management interface provides access to the EEPROM, temperature sensor, BIT functionalities, frozen image detection, and additional safety monitoring functions.

INPUTS

INTERFACE TYPE	CHARACTERISTIC
HD-SDI (SMPTE 292)	Up to two: 1280x720p30, 1280x720p50, 1280x720p59.94, 1280x720p60, 1920x1080i60, 1920x1080i59.94, 1920x1080i50, 1920x1080p24, 1920x1080p25, 1920x1080p30
ARINC 818-2	Up to two: 1280x720p30, 1280x720p50, 1280x720p59.94, 1280x720p60, 1920x1080i60, 1920x1080i59.94, 1920x1080i50, 1920x1080p24, 1920x1080p25, 1920x1080p30, 1920x1080p60
General Purpose Input (GPI)	LVC MOS 3.3

Table 1: Input Interface Characteristics

OUTPUTS

INTERFACE TYPE	CHARACTERISTIC
Single-link TMDS (DVI) - Loopback copy of GPU TMDS D and E	Up to two: maximum resolution of 1920 x 1200 @ 60 Hz (maximum pixel rate: 165 MP/s) ¹
HD-SDI (SMPTE 292) - Conversions from GPU TMDS B, C, D and E	Up to four: 1280x720p30, 1280x720p50, 1280x720p59.94, 1280x720p60, 1920x1080i60, 1920x1080i59.94, 1920x1080i50, 1920x1080p24, 1920x1080p25, 1920x1080p30 ²
ARINC 818-2 (without E/O physical layer) - Conversions from GPU TMDS B, C, D and E	Up to four: 1280x720p30, 1280x720p50, 1280x720p59.94, 1280x720p60, 1920x1080i60, 1920x1080i59.94, 1920x1080i50, 1920x1080p24, 1920x1080p25, 1920x1080p30, 1920x1080p60 ²
General Purpose Output (GPO)	LVC MOS 3.3

Table 2: Output Interface Characteristics

Notes

1. Control signals, Hot Plug Detect are not supported.
2. Alternative standards on request.

VITA 65 (OPENVPX) PROFILES

The following OpenVPX profiles are supported:

- MOD3-PER-2F-16.3.1-2/3 (slot profile SLT3-PER-2F-14.3.1)
- MOD3-PER-1F-16.3.2-1/2 (slot profile SLT3-PER-1F-14.3.2)
- MOD3-PER-1U-16.3.3-1/2 (slot profile SLT3-PER-1U-14.3.3)

SAFETY AND SECURITY FEATURES

The VIM3006 provides a suite of safety monitors to support safety requirements, for example, temperature and voltage monitors. There are two temperature monitors—one on each card edge—and both are under application control.

There are also additional monitors for detecting a frozen image, video timing check, and video CRC.

SOFTWARE

The driver to initialize and provide control over the video capture and formatting is available for VxWorks ARINC653 2.5.0.2 and VxWorks ARINC653 Helix (contact CoreAVI for additional support). The driver integrates with the CoreAVI Video Capture API, which is part of the VkCore SC driver, to provide a completely integrated solution for low latency video capture into a GPU for immediate use by an application.

SPECIFICATIONS

The VIM3006 is designed to run from the +12V/+3.3V with a maximum typical current as set out in the following table (excludes GPMX002 mezzanine requirements).

VOLTAGE	TYPICAL CURRENT (AMPS)
+12 V	1.47
-12 V	Not Used
+5 V	<0.5 ¹
+3.3 V	2.00
+12 V Auxiliary	Not used
-12 V Auxiliary	Not used
+3.3 V Auxiliary	0.42

Table 3: Voltage Specifications

Note

1. +5 V only used for maintenance interfaces. No current under normal operating conditions.

The VIM3006 dimensions are per VITA 46/IEEE 1101.2 and VITA 48.2 for a 0.85" pitch 3U conduction-cooled module. The weight is less than 340 g (with a cooling frame and without mezzanine). Environmental specifications are set up in the following table.

PARAMETER	VALUE
Storage Temperature	-55 to 105° C
Operating Temperature	-40 to 70° C ¹
Random Vibration (all axes)	0.1 g3/Hz (maximum) from 5 to 3000 Hz for high-performance aircraft (~12 RMS)
Shock—half Sine/Sawtooth (all axes)	40 g/11 ms
Operating Maximum Altitude	60,000 feet ²
Relative Humidity—Operating (non-condensing)	0-95% ³
Air Discharge Electrostatic Pulse Immunity	15,000 V
Comply with Flammability Requirements	DO-160G, section 26.6

Table 4: Environmental Specifications

Notes

1. Operating card edge temperature.
2. The module is not intended for installation in non-pressurized and non-controlled temperature locations on an aircraft.
3. 95% with acrylic conformal coating. Although untested, 100% could be achieved with urethane or silicone conformal coating.

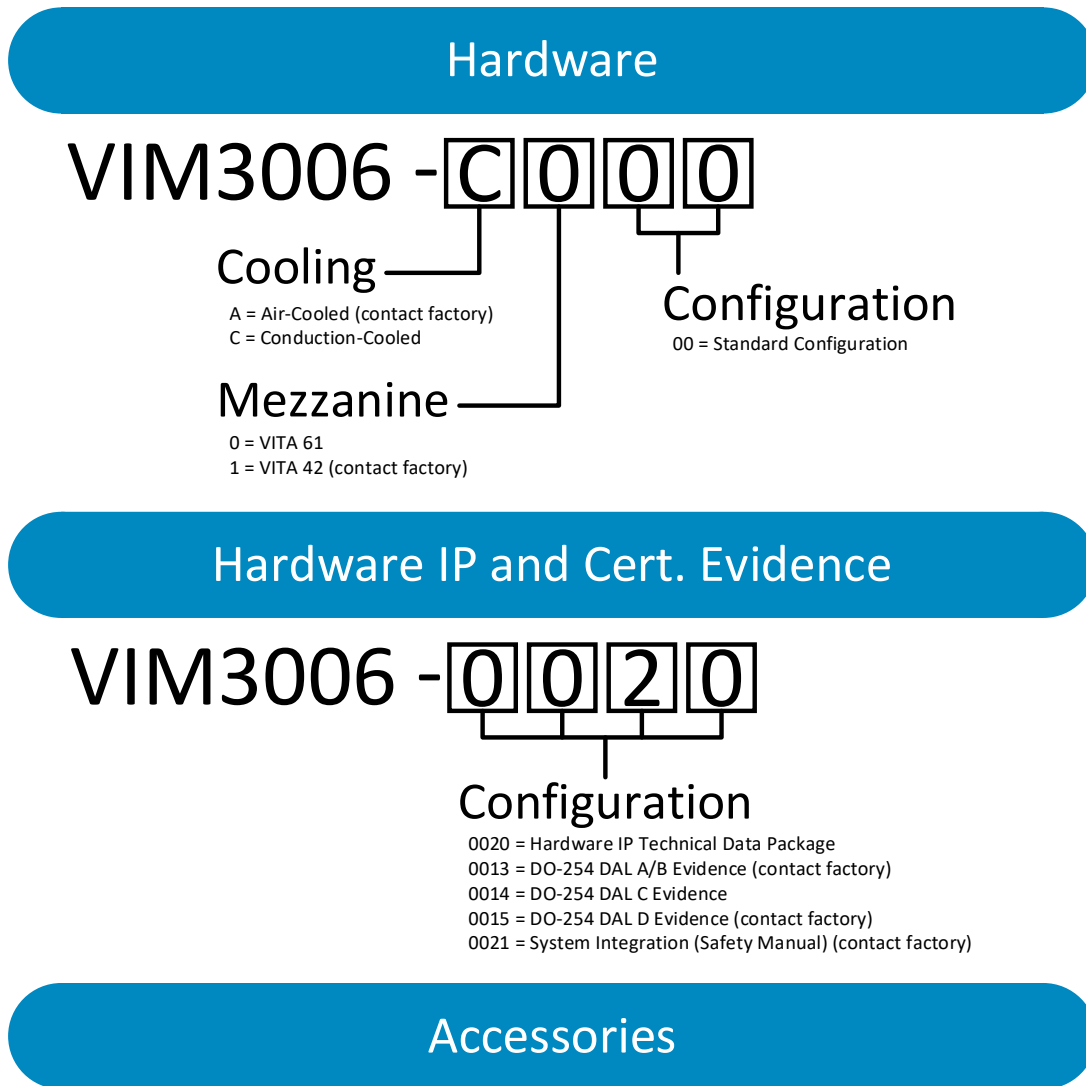
REAR TRANSMISSION MODULE (RTM)

For development purposes, a Rear Transition Module (RTM) is available to plug into the backside of the backplane in the same slot as the VIM3006. The RTM provides access to the VIM3006 I/O through SFP+ cages for ARINC 818-2 E/O converters, SMB connectors for HD-SDI, and mini-HDMI connector for TMDS (DVI).

Contact Sales@CoreAVI.com for more information.

ORDERING

The following graphic provides the ordering information for the VIM3006 3U VPX module products available from CoreAVI.



RTM3006-1000: RTM, SDI (2 in, 4 out), 2 mini-HDMI, 4 SFP+, 16 GPI/O, JTAG, I2C, USB.

Figure 2: VIM3006 Ordering Information

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