

## Microsemi SmartFusion®2 SoC FPGA and IGLOO®2 FPGA



Infrared Camera

Head-up Display

Medical Imaging

Digital Signage

Drone Camera

Human Machine Interface

Machine Vision

Driver Assistance System

# Imaging and Video Solution with Microsemi FPGAs and SoCs

Microsemi provides a complete, easy-to-use development environment for designing low-power and secure video processing applications. The solution comprises of an IP suite with modular IP, a field programmable gate array (FPGA) mezzanine card (FMC) for the SmartFusion2 Advanced Development Kit, and a software GUI.

## Key Features

- Modular IP suite
- Support for parallel, MIPI CSI-2, and HiSPi sensor interfaces
- Display interface for 7:1 LVDS
- Audio-processing
- Low-power, security, and reliability
- Easy-to-use software GUI for real-time audio and video configuration

## Solution Overview

### Hardware

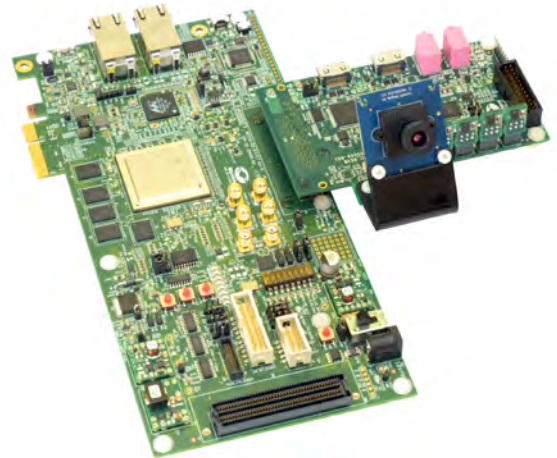
- Imaging and video FMC daughter card with camera module options
- SmartFusion2 Advanced Development Kit<sup>1</sup>

### IP Suite

- Imaging and video processing IP cores in Libero<sup>®</sup> SoC<sup>2</sup>:
  - Sensor interface – Parallel, MIPI CSI-2, and HiSPi
  - Bayer conversion
  - Color-space conversion
  - Image-edge detection
  - Video scaler
  - Alpha blending and overlay
  - Image sharpening filter
  - Image de-noising filter
  - Display pattern generation
  - Display enhancements
  - Display control (LVDS and Parallel RGB-HDMI)
- Obfuscated IPs and reference design (provided for free)
- Source code in Verilog (licensing fee required)

### Software GUI

- Enables video and audio configurations
- GUI communicates with IP blocks through SmartFusion2 ARM<sup>®</sup> Cortex<sup>®</sup>-M3 processor
- Supports the following demos:
  - Camera sensor to display
  - Image edge detection



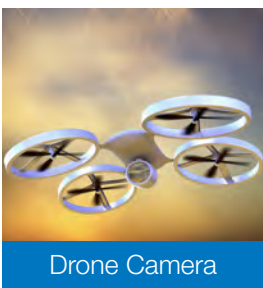
Imaging and video FMC and SmartFusion2 Advanced Development Kit

Name	Version
Peripherals	
Processors	
SC/Tamper	
Solutions-MotorControl	
Solutions-Video	
Alpha Blending	1.0.0
Bayer Interpolation	1.0.0
Display Controller	1.0.0
Image Edge Detection	1.0.0
Image Enhancement	1.0.0
Image Sharpen	1.0.0
LVDS 7:1 Receiver	1.0.0
LVDS 7:1 Transmitter	1.0.0
RGB To YCbCr	1.0.0
SF2 DDR Memory Arbiter	1.0.0
Scaler	1.0.0
Test Pattern Generator	1.0.0
YCbCr to RGB	1.0.0
Tamper	

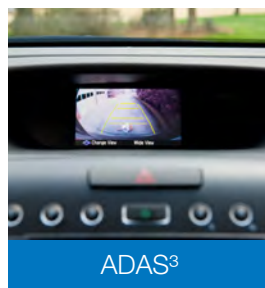
Imaging and Video IP Cores in Libero SoC Catalog



Software GUI for Imaging and Video Kit



Drone Camera



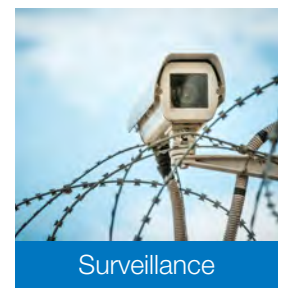
ADAS<sup>3</sup>



Machine Vision



Thermal Imaging



Surveillance

<sup>1</sup> Advanced development kit must be purchased separately; it comes with one-year free platinum license for the Libero System on Chip (SoC) software

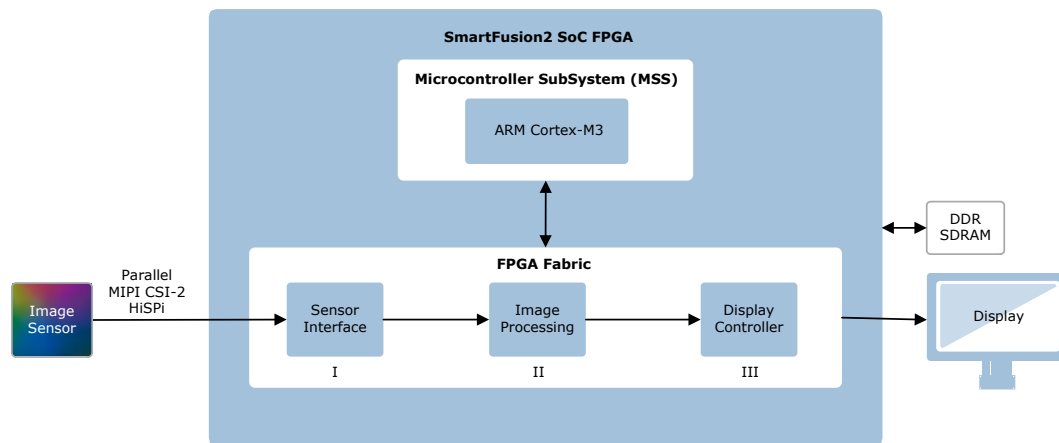
<sup>2</sup> Microsemi Libero SoC is a comprehensive software toolset for designing with Microsemi FPGAs and SoC FPGAs

<sup>3</sup> Advanced Driver Assistance Systems

# Imaging and Video Solution with Microsemi FPGAs and SoCs

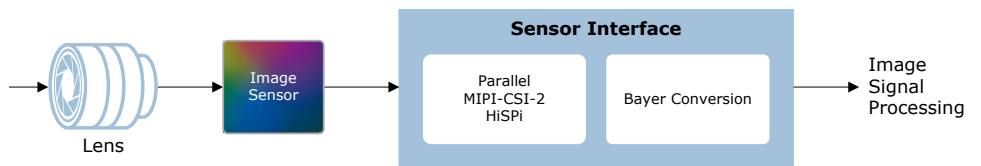
## Camera/Display Signal Chain

Microsemi imaging and video solution provides IP cores and designs which are optimized for SmartFusion2 SoC FPGAs and IGLOO2 FPGAs. These IP cores and designs are production ready, and are used to implement the blocks which are essential to the Camera/Display Signal Chain architecture.



### I. Sensor Interface Block

- Supports multiple sensor interface types
- On-chip programmability of image sensor



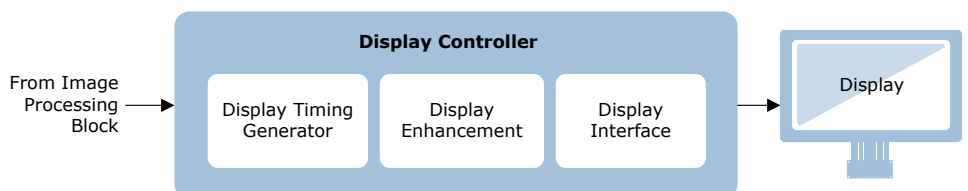
### II. Image Processing Block

- Per-pixel alpha blending (overlay) and global alpha
- 8, 10, 12, and 16 bits-per-color component input and output
- Supports  $3 \times 3$  2D median filtering
- Programmable gain for edge directions



### III. Display Interface Block

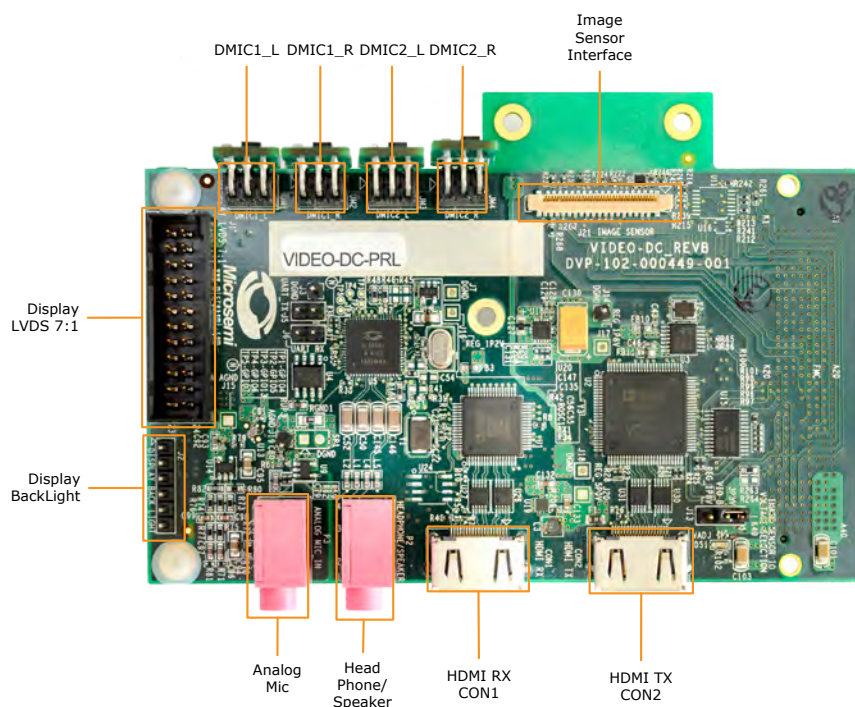
- Supports LVDS 7:1
- LVDS transmit clock automatically aligned to data
- User-configurable display enhancement IP block
- Embedded and separate sync signals
- Supports RGB parallel and YUV (444 and 442 formats)





# Imaging and Video Solution with Microsemi FPGAs and SoCs

## Imaging and Video FMC Card



- Flexible image-sensor interface supporting multiple camera-sensor options to connect to the kit
- On-board LVDS 7:1 connector and HDMI interface for display connectivity
- 100 pin FMC connector for compatibility with upcoming Microsemi FMC-based product kits

Imaging and Video Solution	Ordering Code
Imaging and video card with parallel sensor module	VIDEO-DC-PRL
Imaging and video card with MIPI CSI-2 sensor module	VIDEO-DC-MIPI
Imaging and video card with HiSPi sensor module	VIDEO-DC-HISPI
SmartFusion2 Advanced Development Kit	M2SADV150-ADV-DEV-KIT
Imaging and video IP Suite RTL source	VDSOLCores-RM and VDSOLCores-RMFL

For more information on imaging and video solutions visit: <http://www.microsemi.com/products/fpga-soc/imaging>  
Send your queries and comments to: [imaging@microsemi.com](mailto:imaging@microsemi.com)



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