Summary

Smart Embedded Vision is opening up new possibilities for implementing systems that rely on visual data to make decisions across a broad spectrum of applications. Drones, machine vision, thermal imaging, gaming, video surveillance, robotics, Advanced Driver Assistance Systems (ADAS), machine learning and HMI all rely on cameras and displays that demand low power while supporting high-speed interfaces as well as security in data, and in design so that IP is protected. The inherent parallel processing and high-speed I/O capabilities of FPGAs makes them ideal processing platforms for delivering the high data throughputs needed for both high-resolution imaging and machine learning algorithms.

Microchip provides FPGA imaging and video solutions to enable the evaluation of multiple protocols and the development of a host of image and video processing applications. As a best-in-class imaging and video platform, Microchip’s solutions come with a complete ecosystem, including comprehensive application-specific hardware, optimized intellectual property suite for image processing, sample reference designs, demonstration designs and collateral.

Microchip’s award-winning PolarFire™ FPGAs are ideal for mid-bandwidth (4K/2K) imaging/video applications due to their rich memory and digital signal processor (DSP) resources in addition to offering up to 50 percent lower power than competing static random-access memory (SRAM)-based devices. The solution is also supported by Microchip’s SmartFusion®2 that integrates a 166 MHz Arm® Cortex®-M3 processor and IGLOO®2. Both these families are optimal for low resolution applications with embedded Flash, PCIe Gen2 support, highest I/O density, Flash security and exceptional reliability.

Target Applications

- Machine learning
- Automotive
- Surveillance
- Machine vision
- Drone imaging
- Medical imaging
Extensive Demonstrative Designs
- Picture-in-picture with two cameras
- Edge detection
- Alpha blending, brightness, contrast, color balance ISP
- 4K resolution with third-party HDMI2.0 IP

Hardware Development Platforms
PolarFire Video and Imaging Kit
- 300K LE PolarFire FPGA in an FCG1152 package
- Sony dual camera sensor for stereo vision applications
- MIPI CSI2-RX @ 1.0 Gbps
- MIPI CSI2-TX @ 800 Mbps
- 4GB DDR4 @ 1.6 GBps
- HDMI 2.0 (4K @ 60fps), HDMI 1.4 (UHD @ 60fps)
- 3G/HD SDI, DSI, CSI-2 TX connector

SmartFusion2 Advanced Development Kit
- SmartFusion2 SoC FPGA 150K LE M2S150TS-1FCG1152
- MIPI CSI-2 sensor FMC: VIDEO-DC-MIPI
- Parallel sensor FMC: VIDEO-DC-PRL

Comprehensive IP Suite
The IP suite supports PolarFire, SmartFusion2, IGLOO2 and radiation-tolerant RTG4 product families.
- Sensor interface—MIPI CSI-2, Parallel
- Bayer conversion
- Color-space conversion
- Image-edge detection
- Display control (LVDS and parallel RGB-HDMI)
- Source code in Verilog and VHDL* (requires licensing fee)

Available from our partners: HDMI2.0, HDCP 2.2, Display Port 1.4, SLVS, H.264, JPEG 2000, JPEG and JPEG-LS compression and CODEC cores.

*Verilog is only supported on source code for the SmartFusion2/IGLOO2 based solution.

Intuitive Software GUI
Enables Video and Audio Configurations
- Source selectable picture-in-picture menu
- Alpha blending and overlay
- Image edge detection and enhancements - color balance, brightness, contrast

Which Device Family Best Suits Your Imaging Application?

<table>
<thead>
<tr>
<th>Feature</th>
<th>PolarFire™</th>
<th>SmartFusion2/IGLOO²</th>
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<tbody>
<tr>
<td>Performance</td>
<td><a href="mailto:Tranceivers@12.7G">Tranceivers@12.7G</a>, <a href="mailto:DDR4@1.6G">DDR4@1.6G</a>, CSI-2 <a href="mailto:Rx@1.0G">Rx@1.0G</a>, <a href="mailto:LVDS@1.6G">LVDS@1.6G</a>, 1657 GMAC/s Max DSP Performance</td>
<td>Transceivers@5G, DDR2/3@0.667G, <a href="mailto:LVDS@0.7G">LVDS@0.7G</a></td>
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<tr>
<td>Resolution</td>
<td>Up to 4K (3840 x 2160)</td>
<td>Up to HD (1280 x 720)</td>
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<tr>
<td>Protocol Support</td>
<td>MIPI CSI-2 (Rx, Tx), HDMI 2.0, 3G SDI, DSI</td>
<td>MIPI CSI-2 (Rx), HDMI 1.4</td>
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<tr>
<td>Speed and Frame Rate</td>
<td>MIPI: Rx at 4.8 Gbps (4 x 1.0 Gbps), TX at 3.2 Gbps (4x 800 Mbps)</td>
<td>MIPI: Rx only up to 700 Mbps, HS mode only</td>
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<tr>
<td></td>
<td>4K @ 30 fps</td>
<td>HD @ 30 fps</td>
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Ordering Information

<table>
<thead>
<tr>
<th>Microchip Video and Imaging Solution</th>
<th>Product Order Code</th>
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<tbody>
<tr>
<td>PolarFire™ Video Kit</td>
<td>MPF300-VIDEO-KIT</td>
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<tr>
<td>SmartFusion2 Advanced Development Kit</td>
<td>M2S150-DEV-KIT</td>
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<tr>
<td>Imaging and Video card with MIPI CSI-2 sensor module</td>
<td>VIDEO-DC-MIPI</td>
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<tr>
<td>Imaging and Video card with parallel sensor module</td>
<td>VIDEO-DC-PRL</td>
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<tr>
<td>Imaging and Video IP Suite RTL source</td>
<td>VDSOLCores-RM and VDSOLCores-RMFL</td>
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For more information on the solution visit https://www.microsemi.com/product-directory/technology/3861-imaging#software-and-ip
Send you queries and comments to imaging@microsemi.com