

# ARGON360

## Real-time video stitching in hardware

- High quality video stitching IP core
- Designed for SoCs for next generation cameras and smartphones
- Ultra-low latency - just 1 frame
- Low power consumption - suitable for battery powered devices
- Gain correction and 6-stage multi-band blending for seamless stitching
- Up to six input cameras/sensors
- Output resolution up to 8192 x 4320 at 30fps
- Equirectangular, cylindrical or rectilinear output modes
- Arbitrary output size, zoom and 3D rotation



360° video is increasingly popular for applications at all levels from consumer to film studio. Stitching of video output from multiple cameras/image sensors is key to creating 360° content. **Argon360** is an IP core designed for use in SoCs for next generation cameras and smartphones offering high quality video stitching in real time. The hardware-based approach offers a compact form factor combined with low power consumption – the perfect solution for battery powered mobile applications. **Argon360** hardware based real-time video stitching allows devices to create high quality 360° panoramic VR videos which can be instantly viewed, streamed in real-time or stored as a single file for later viewing, editing or uploading.

### Real-time ultra-low latency

A fundamental design feature of **Argon360** is that it operates at video frame rate with just one frame of latency between the incoming video from the Image Sensor Processor (ISP) and the outgoing stitched video. The instant availability of high quality stitched content helps to simplify and enrich the user experience, supporting 360° streaming for immersive social media interaction, real-time 360° preview, instant playback of stitched video and immediate availability of immersive content for upload to the Cloud.

### High quality

**Argon360** uses powerful multiband blending techniques and exposure compensation. The stitched panoramic output is continuous, without obviously visible stitch lines while detail is preserved.

### Flexible

**Argon360** technology is designed to be run-time controllable to meet your product needs, so it can handle any arrangement of between one and six sensors. The stitched output can be in equirectangular, cylindrical or rectilinear output modes with a resolution of up to 8192 x 4320 at 30fps. Real-time pan, tilt and zoom is supported. A calibration tool is available to configure **Argon360** for the lens characteristics and sensor geometry of the camera system.

### Low power, low memory bandwidth

**Argon360** is implemented on a hardware platform, so its high level of performance is achieved with very low power consumption. Intermediate data is compressed to reduce SDRAM bandwidth.

### Applications

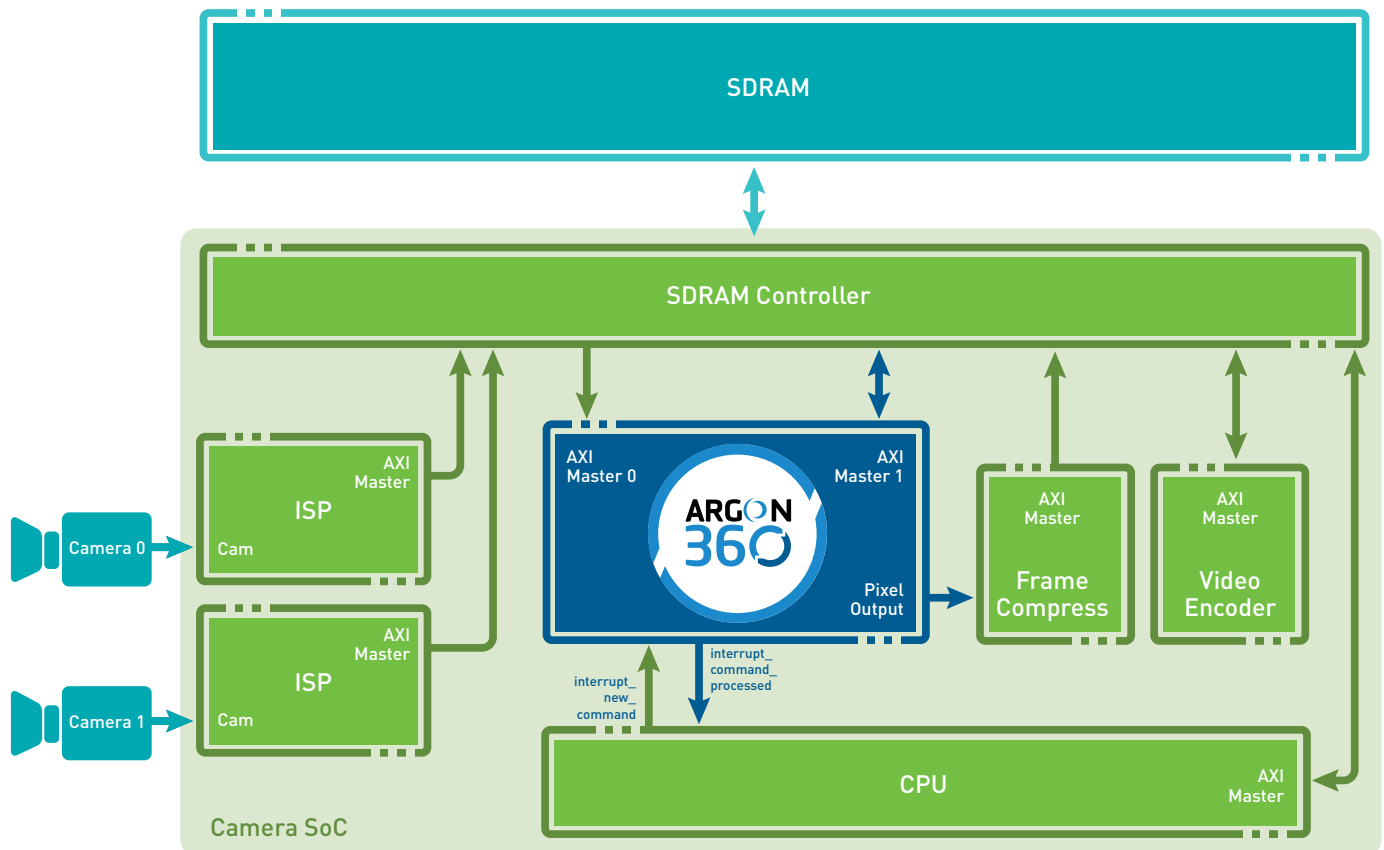
**Argon360** has been designed for use in applications such as:

- Action cameras
- Broadcast equipment
- Security cameras
- Medical equipment
- Drones

## Specification

Item	Specification
Number of input sensors	1 to 6
Maximum input pixel rate	1062 megapixels/s (35.4 megapixels per frame at 30fps such as 4 x 4096x2160 sensors)
Input format	10-bit YUV420
Output modes	Equirectangular, cylindrical or rectilinear with programmable width and height, zoom and rotation
Maximum output pixel rate	1062 megapixels/s (35.4 megapixels per frame at 30fps)
Output format	10-bit YUV420
Power consumption	Similar to an HEVC encoder at the same geometry

Item	Specification
SDRAM bandwidth	$Bandwidth \approx input\_pixel\_rate * 2[bytes/pixel] * optional\_ISP\_compression\_factor * 1.05[cache\ miss\ allowance] + 2[write\ and\ read] * output\_pixel\_rate * 1.333[pyramid] * 1.875[bytes/pixel] * 0.5[compression\ factor] * 1.2[alpha\ allowance] * 1.2[overlap\ allowance]$
Design clock rate	The IP is designed for straightforward timing closure at 600MHz on a 16nm process
Estimated IP size	6.8M gates 8.5Mbits of SRAM Silicon area 2.1mm <sup>2</sup> (at 16nm, assuming 7M gates/mm <sup>2</sup> and 7.5 Mbit/mm <sup>2</sup> )



Argon360 example application

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