

# 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
- 6-stage multi-band blending and gain correction for seamless stitching
- Up to eight 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 eight 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

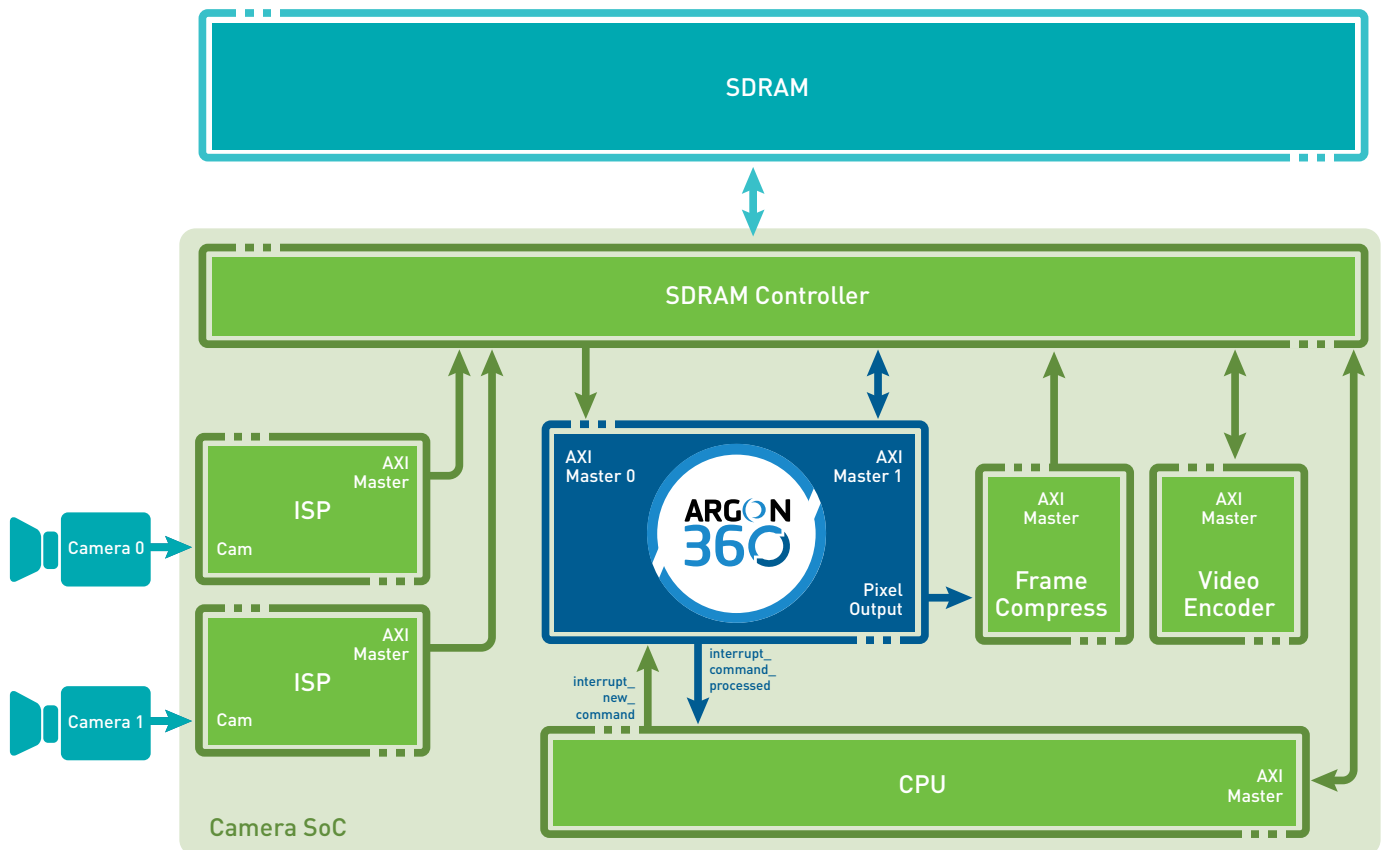
**Argon360** has been designed for use in applications such as:

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

## Specification

Item	Specification
Number of input sensors	1 to 8 (maximum is a parameter and can be reduced to save silicon area)
Maximum input pixel rate	1062 megapixels/s (35.4 megapixels per frame at 30fps such as 4 x 4096x2160 sensors)
Input format	8-bit or 10-bit YUV420 (set by parameter)
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	8-bit or 10-bit YUV420 (as input)
Power consumption	160mW (for 4-camera 4K stitching)

Item	Specification
SDRAM bandwidth	1.8Gbytes/s for 8-bit, two 2880x2880 cameras, 4K equirectangular 30fps output  7.0Gbytes/s for 10-bit, four 3072x3072 cameras with 2:1 ISP compression, 8K equirectangular 30 fps output
Design clock rate	The IP is designed for straightforward timing closure at 600MHz on a 16nm process
Estimated IP size	For 4-camera 8-bit system: 2.2M gates 7.1Mbits of SRAM Silicon area 1.4mm <sup>2</sup> (at 16nm, assuming 6M gates/mm <sup>2</sup> and 7Mbit/mm <sup>2</sup> )



*Argon360 example application*

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