sxW2 is a highly integrated SOC (system-on-chip), with no industry precedent, targeted for high-volume 3-channel capture and projection light engine applications. sxW2 is the first video processor to include brightness non-uniformity compensation, allowing separate gain and offset control for chrominance non-uniformity compensation as standard feature (sxW2-300).

sxW2 features independent extended-precision Geometry Correction Engines, one per channel (sxW2-300). The advanced distortion correction and brightness/hue compensation capability of the Geometry Correction Engines enables the capture and delivery of superior quality, artifact-free video for the highest fidelity consumer experience in RPTV (Rear-Projection Television), home theater front projectors, and 3-sensor HD video cameras.

The chip processes up to 3-color components with different pincushion/barrel correction, keystone correction, and rotational misalignment correction. This enables the correction of optical problems, such as lateral chromatic aberration, 2- or 3-panel convergence correction (prism-to-microdisplay or prism-to-sensor misalignments and channel-to-channel magnification imbalances).

The chip’s unprecedented features allow new degrees of freedom for system designers seeking to inexpensively implement RPTVs with diagonal-to-depth ratios from 4:1 to over 10:1, using techniques such as curved mirrors, advanced lenses, and circular TIR (Total Internal Reflection) Fresnel lenses.

sxW2-300 allows lens designs to be modified in order to improve performance (better MTF, lower distortion, reduced temperature effects) while reducing costs (less expensive glass, simpler lens construction, reduction of aspherical elements). For zoom lenses, the chip can dynamically correct for distortion and lateral chromatic aberration as the focal length varies. This provides further cost reduction, by allowing designers to use simpler mechanical elements. The system designers can also take advantage of sxW2 to greatly simplify alignment and calibration of light engines and their prism/panel assemblies.

An embedded 32-bit RISC CPU provides the central control for the chip and computes the geometry factors required to correct for misalignment in the field.
sxW2 offers complete input-to-output 4:4:4 color processing.

Extended Internal Bit Precision

By extending the internal processing of warp map calculations from 12-bit to 16-bit, sxW2 enables 1/32 pixel accuracy for:
- More precise convergence and alignment applications
- More precise correction for curved mirror profiles, allowing for better image quality
- More precise correction for distortion due to mirror flex or chassis flex
- More precise factory and field alignment and calibration

Geometry Processing

sxW2’s unprecedented geometry processing engine can correct for lens distortion, lens lateral chromatic aberration, geometry distortions, rotational misalignments, brightness and color non-uniformities, 2- and 3-panel convergence, independently for each channel (sxW2-300) at full 1920 x 1080p @60 Hz video rates.

Geometry Correction Engine

The chip allows for:
- Lateral chromatic aberration correction in projection lenses, lowering cost of the lens and allowing for improving the MTF (Modulation Transfer Function) and f# (ratio of lens focal length to its entrance pupil diameter)
- Extreme LCA correction in three discrete wavelengths allows effective use of 3-color solid-state laser or LED illumination in all-spherical element lens designs (sxW2-300)
- Independent misalignment/convergence adjustment for 3x LCD and 3x LCOS RPTVs
- More precise and rapid factory alignment/calibration
- Field calibration and alignment of light engines (procedure never attempted nor possible in the past)
- Very aggressive ultra-thin chassis RPTV (Slimline™) designs

Per-Channel Brightness Compensation

Per-channel brightness/shading non-uniformity compensation allows for:
- Improvement in image quality of projection-based systems (as they are all subject to brightness non-uniformity, due to vignetting and 4th power cosine losses)
- Compensation for color shade variations in light engines, due to prism and dichroic coating performance variations with light incidence angles and wavelengths, and stress birefringence
- Compensation in brightness due to light leakage in the chassis, both in the factory and in the field

Target Applications

Increase performance, and decrease BOM (Bill of Materials) for the following applications:
- Projection light engine
- 3-sensor camera engine
- Projection engine/camera engine alignment and calibration
- Projection engine/camera engine brightness/color non-uniformity compensation
- Brightness non-uniformity compensation in direct view LCD TVs
- Fixed focal length lenses (sxW2-300)
- Zoom lenses (sxW2-300)