



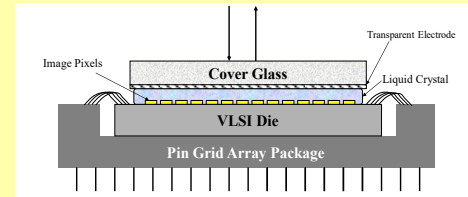
Hi-Definition, Hi-Speed Visible Band Scene Projectors

Kent Optronics has developed a family of the most advanced high-definition (1920×1152) scene projectors which can generate dynamic motion pictures in spectral bands from visible, to Long Wave Infrared.

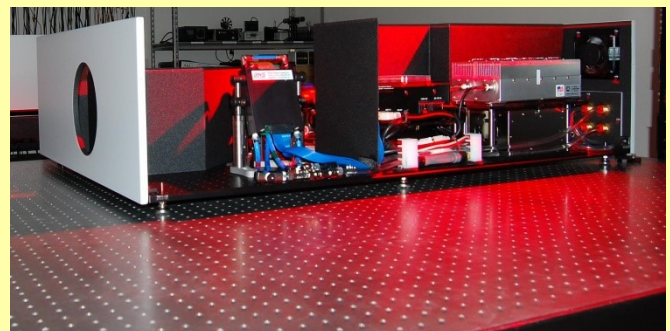
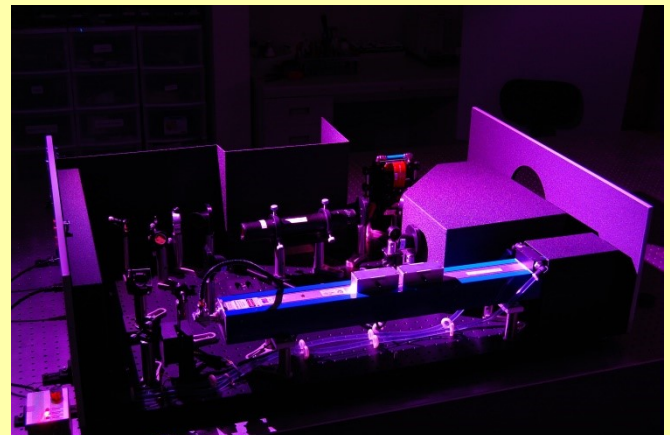
These devices use reflective LCoS arrays, fabricated for the specific spectral waveband of interest, to create the hi-definition image with typically 12-14 bits of stable amplitude resolution and selectable frame rates from 30-200 Hz. A high-speed model can achieve up to 700 Hz for the visible band. Various illuminators can be employed to achieve 30 W/m² sr output, or even greater if laser illuminator source is employed. It displays scenes from internally stored memory or accepts rendered motion image frames from a rendering computer via our proprietary NUC Module.

We are adding Hi-Definition, Hi-Speed Visible Band Scene Projectors to our existing product family of Short-Wave Infrared (SWIR), Mid-Wave Infrared (MWIR), and Long Wave Infrared (LWIR). The visible band projector can be merged with the IR projector(s) for multispectral output.

The projector is a stand-alone and turnkey instrument, demonstrating the highest performance presently available, for users in hardware-in-the-loop (HWIL) and sensor test and evaluation (T&E). The instrument consists of a high-power illumination engine, a high-speed Liquid Crystal on Silicon (LCoS) display engine, and a variable aperture variable focal length optical projection engine (OPE). It uses standard video interfaces. The illumination engine consists of Visible-Near IR light sources. The light from the illumination engine is directed to the LCoS display engine via an optical relay train. The high-power light sources enable the high optical power output.



LCoS Array diagram↑ and package↓



Integrated Scene Projection Display Interior

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Hi-Def, Hi-Speed, Visible Scene Projectors

The display engine consists of up to two LCoS display panels, depending upon customer's application. Each LCoS is a 1920×1152 array with individually addressed liquid crystal pixels. The spectral image is created by electrooptically modulating the optical phase of individual pixels such that the reflected light energy is dynamically modulated. The modulated imaging beam is coupled to an optical projection engine.

The optical projection engine is built to specific customer requirements with precision components to avoid aberrations. It can feature variable aperture operation up to 15 cm (6") in diameter and variable image size up to 10 cm (4"). It projects the imaging beam directly into the entrance pupil of the sensor under test.

The systems outstanding performance is enabled by key innovations in our design and proprietary liquid crystal material - the result: 30-200 Hz frame rate (up to 700 Hz- band dependent), 12 – 14 bits stable dynamic range, and low loss in Visible which also allows Near IR capability.

In addition to Visible projectors, we also offer a series of high Apparent Temperature IR products for different IR regions and temperatures:

- Single color display in SWIR, MWIR, LWIR
- Multi-color display in V-NIR, SWIR, MWIR & LWIR
- Multispectral Polarized Scene Projector - providing dynamic spectral scene images with independently modulated polarization at image pixel level for HWIL and polarimetric IR sensor test and evaluation (T&E).

Visible (hi-definition, hi-speed) Scene Projector Specifications

Parameter	Specification	Parameter	Specification
Spectral range	Visible or NIR to 1.65 um	Clear aperture	Up to 15 cm (variable)
Spectral image bandwidth	Discretely variable via filters (tunable system available)	Output optical power	(30W/m ² sr) bandwidth dependent
Image pixel format	1920 × 1152 pixels	Pixel pitch size	~9.2 micron
Pixel effective fill factor	~92.5%	Pixel operability	>99.99%
NUC (Non-uniformity correction)	c.v. <5% (Coefficient of variation)	Projected image beam	Collimated or customer demanded FOV
Dynamic range	12-14 bits	Projected image size	Up to 10 cm × 10 cm (variable)
Frame rate	Selectable 30 – 200 Hz std Up to 700Hz high speed	Video interfaces	HDMI 60Hz; PCIe ~700 Hz
Integration time for 12-bit accuracy	~0.8 ms	Cooling	LCoS (chilled water) Rest: air cooled
Response time	Spectrally dependent	Dimension (cm)	102 (L) × 102 (W) × 35 (H)
Address mode/refresh	Analog drive/ 868 Hz toggle frequency	Weight	~ 85 kg
Maximum duty factor	Up to 100%	Input electric power	120 V (60 Hz), 20 A