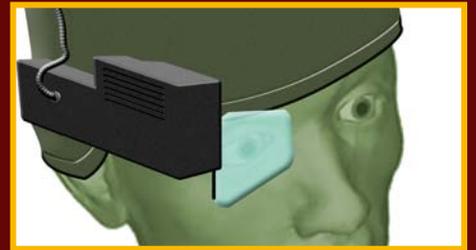


HSI-K02/03

LCoS Micro Projection Module



Systems, Inc.

HSI-K02/03 - Near to Eye SVGA Microprojection Module

Assisted Reality Displays

Assisted reality is a mixed reality technology. Assisted reality displays present additional information in overlay to the real world. With these optical see-through modules the user can see real world and virtual assistance information simultaneously.

Near to Eye Microprojection Module

The Near-to-Eye Projection Module provides extremely bright, full-color, high-resolution SVGA images using Brillian's Z86D-3 liquid-crystal-on-silicon (LCoS™) microdisplay. Images can yield up to 1,800 fL of brightness in RGB mode. A generous field of view, long eye relief, a large eyebox, and low distortion are all enabled in this innovative design.

Field-sequential operation allows use of the 480,000 pixels for red, green, and blue—offering a true 800 x 600 image in both color and monochrome applications. Large pixel count and small pixel gaps, as well as sequential use of the same pixel for red, green and blue offers a very sharp and photo-like image.



Customized Brightness:

The Near-to-Eye microdisplay module is available in 2 different versions (HSI-K02 and HSI-K03 - see specifications table) and employs the latest LED illumination from renowned manufacturers. HOLOEYE can customize LED selections for both brightness and wavelength. Operating in monochrome modes, brightness of more than 4,000 fL can be achieved.

Low Power:

The HSI-K02 is well suited for battery-operated products. Low operating currents and adjustable brightness levels can save power and extend battery life.

Low Temperature:

The Near-to-Eye module employs a heater and temperature

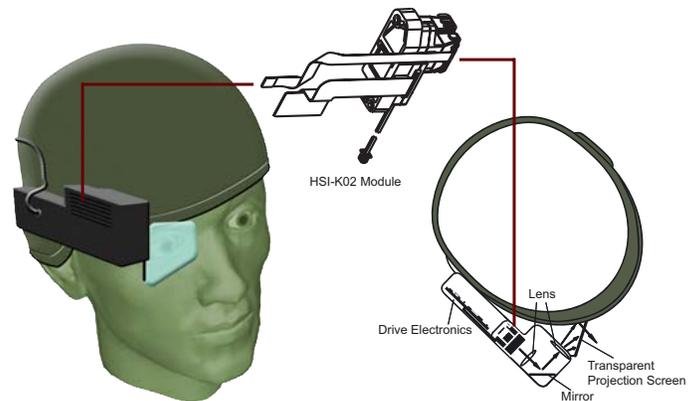
sensor operating at -32°C (-25.6°F). Operation without a heater is possible above 0°C (32°F).

Long Lifetime:

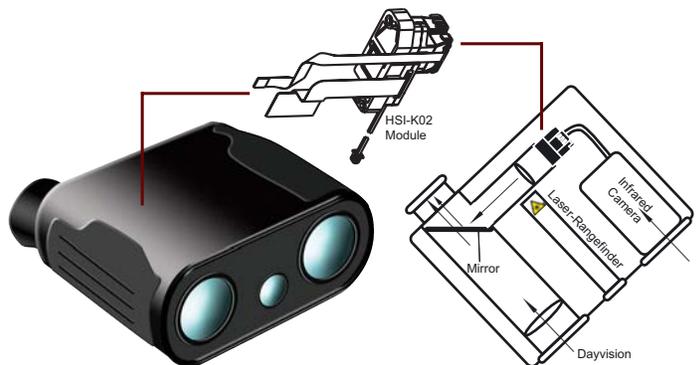
Well established liquid crystal technology and non-organic LED illumination provides durability and reliability. The robust design allows extreme operational and storage temperature ranges.

See-Through Applications:

The Near-to-Eye projection module is the perfect choice for daylight applications, where brightness is essential. See-Through designs, such as augmented reality, and natural scenes with data overlays are visible even in high brightness daylight conditions.



Design Example:
Helmet Mounted Optical See-Through Application



Design Example: Dayvision Infrared Handheld Device

Key Features and Benefits

Over 4,000 fL maximum brightness:

Extraordinary brightness and clarity to greatly enhance image quality.

Applicable to field-of-view optics:

The design enables a variety of field-of-view products.

>93% microdisplay fill factor:

Delivers smooth, high-quality images without pixellation or the “screen door” effect.

Lightweight:

Just 23 grams, the display with illumination module is ideally suited for applications that require a compact, mobile design.

Complete drive-electronics + module solutions:

The device can easily be adapted to meet a wide range of reference and custom design requirements.



HSI-K02 Module - Specifications

Configurations HSI-K02/03: Includes optical module, standard microdisplay and illumination LED assemblies, assembled.

+ Microdisplay Type Brilliant Z86D-3 LCoS™ SVGA	+ Microdisplay Image Area 9.6 mm x 7.2 mm 12 mm diagonal (0.47" diagonal)	+ Brightness HSI-K02 HSI-K03 Monochrome: Red: 680 fL 1,800 fL Green: 1,500 fL 4,000 fL Blue: 600 fL 1,600 fL RGB: 400 fL 1,800 fL
+ Microdisplay Color Mode Field sequential 120 Hz frame rate 360 Hz color field rate	+ Module Dimensions 44.36 x 21.8 x 28.16 mm	+ Illumination Eyebow 7 mm diameter @ 28° FOV
+ Microdisplay Resolution 800 x 600 pixels	+ Weight 23 g (0.8 oz)	+ Illumination LEDs Power Min. 17,4 mW (HSI-K02 – in Color Mode) Max. 4,7 W (HSI-K03 – in Monochrome Mode) Actual dissipation depends on brightness requirements.
+ Microdisplay Aperture Ratio / Fill Factor >93%	+ Virtual Image Size Compatible with 24-28° FOV	Display only: 400 mW
+ Temperature Range -20 to +60 °C (operating) -45 to +70 °C (storage)	+ Imaging Exit Pupil Compatible with eyepieces 1 mm diaphragm exit pupil (at 28° FOV)	
	+ Contrast min. 80:1	

HSI-K02 Front Light High Brightness Development Kit

With the HSI-K02 developer kit the user can accelerate near-to-eye product development and eliminate the time and expense of complex optical development, prototyping, and tooling. Ready-to-implement electrical reference designs for driving and illuminating the microdisplays are available along with personalized levels of technical support for both reference and custom designs.

HOLOEYE's near-to-eye components enable rapid prototyping of headmounted display and viewfinder designs. Whether you're developing viewfinders for rugged outdoor applications, or HUDs for commercial products; HSI-K02 provides stunning image performance.



HSI-K02 Front Light Module:

The main units of the development kit are the HSI-K02 Front Light module and the Electronic Control Box. The HSI-K02 module is mounted on a stand that accommodates a detachable ocular lens. This allows access to the optical interface of the HSI-K02 module for inspection and measurement.

Color or Monochrome:

The kit operates in color mode offering up to 400 fL brightness. When operated in monochrome mode, brightness can increase to over 1,000 fL. Colors in monochrome mode can be selected within the primary color space.

Electronic Control Box:

Accommodates the display driver chip and provides inputs for DVI-digital, DVI-analog, VGA, PAL and NTSC. Best results are achieved by using the DVI-digital interface. When PAL or NTSC input is used, a scaler function expands the number of horizontal lines from the original format to 800 lines, but ultimate resolution is limited by the input source.

LVDS:

The kit is equipped with an LVDS cable and associated driver and receiver circuits. This cable connection can be easily extended to a few yards so the display unit and the electronics can be positioned at different locations.

Control Software:

The control software provides user access to gamma tables, illumination control (LED brightness) and internal registers.

IR Remote Control:

The remote control provides easy access to the internal OSD menus to select video functions.

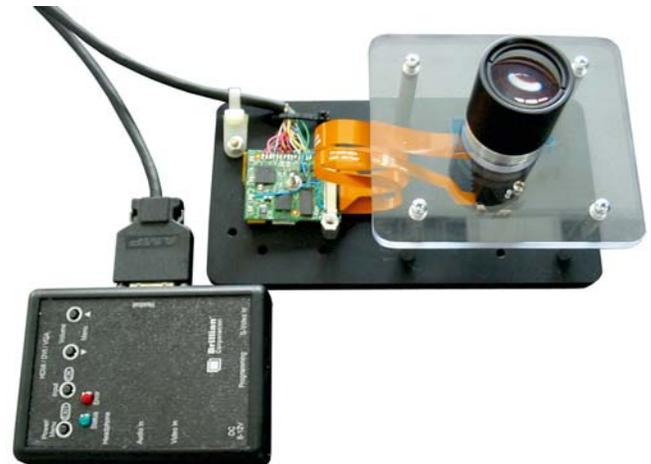
I2C Bus:

The control box features an I2C interface that gives access to all internal registers in the electronics.

Features

HOLOEYE provides comprehensive support for this development kit:

- Driver FPGA solution that has a full digital input interface.
- Interface solutions for analog PAL and NTSC composite video including VGA.
- Interface solutions for DVI-analog and DVI-digital.
- Cable driver solution for up to 10 yards cable
- Verilog HDL code with the display drive function for adapting customer's ASIC design.



Supplied Hardware Components:

- HSI-K02 High Brightness Front Light Module.
- LVDS Cable Receiver
- LVDS Cable
- Ocular Lens
- Stand
- Electronics Control Box with DVI Extension
- AC Adapter
- Programming Cable
- I2C Dongle
- Control Software