



# 2K x 2k OLED-XL™ Microdisplay

## 2K x 2K OLED-XL MICRODISPLAY CAPABILITIES

The 2K x 2K OLED-XL microdisplay from eMagin Corporation is an active-matrix organic light emitting diode (AMOLED) microdisplay intended for near-to-eye applications that demand high-resolution, high-quality imaging, compact size, and very low power. Combining a total of 12,879,552 active dots, the 2K x 2K microdisplay is built on a single crystal silicon backplane and features eMagin's proprietary thin-film OLED XL technology offering extended life and luminance performance.

The OLED-XL design also features eMagin's proprietary "Deep Black" architecture that ensures off-pixels are truly black, automatically optimizes contrast under all conditions, and delivers imagery that is hard to separate from reality. The 2K x 2K microdisplay includes circuitry that ensures a full 256 gamma-corrected gray levels; an on-chip set of look-up-tables for digital gamma correction; and pulse-width-modulation (PWM), which together with the standard analog control, provides an extended dimming range. The PWM function also enables an impulse drive mode of operation that significantly reduces motion artifacts in high-speed scene changes.

The active array is comprised of 2072 x 2072 square pixels with a 9.3-micron pitch and a 75% fill factor. An extra 24 columns and 24 rows (beyond the 2048 x 2048 main array) are provided to enable the active window of the WUXGA microdisplay to be shifted by up to 12 pixels, horizontally and vertically for optical alignment purposes. Each full pixel is laid out as three 3.1 x 9.3 micron identical sub-pixels, which together form the 9.3-micron square RGB color group. Three primary color filter stripes are applied in alignment with the sub-pixels on a white-emissive OLED layer to form the color display.

Unique to this microdisplay is the ability to configure the active area to any size from 512 x 512 up to 2048 x 2048 pixels in steps of four columns and one row. The resulting window can be positioned anywhere within the underlying 2072 x 2072 pixel array. The display timing can be adjusted to match the format being shown, enabling lower power operation due to the reduced pixel bandwidth, similar to that of smaller displays having the same format. The number of data inputs can also be reduced based on the format selected, allowing for a smaller interface interconnect to be used for some applications.

The 2K x 2K OLED-XL microdisplay includes a very low-power, low-voltage-differential-signaling (LVDS) serialized interface for video data transport that minimizes the number of board interconnections and connector size; reduces electromagnetic emissions (EMI) and enables a lightweight and flexible cable link to a remote video source. Compatibility with standard LVDS drivers simplifies system integration.



## 2K x 2K OLED-XL MICRODISPLAY ADVANTAGES

- Compact, lightweight, HD emissive display
- Ultra High-resolution/very low power
- Deep Black™ high contrast (up to 100,000:1)
- Instant on at low temperatures/no heaters
- Integrated temperature sensor
- Low power LVDS interface
- High commercial/military ruggedness
- No back light or liquid materials required

## APPLICATIONS

- Immersive 3D HD Gaming/Video Headsets
- Augmented reality HMDs
- HD Resolution Electronic Viewfinders
- Computer-based 3D Simulation & Training
- Night vision/thermal imaging devices
- Medical/Scientific imaging
- Fixed and Rotary Wing aircraft HMDs



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## GENERAL OPERATING CHARACTERISTICS

### FORMAT

- 2048 (x 3) x 2048
- Total pixel array 2072 (x3) x 2072

### PIXEL PITCH & ASPECT RATIO

- 9.3  $\mu$  square

### COLOR PIXEL ARRANGEMENT

- R,G,B vertical stripe

### VIEWING AREA

- 27.25 mm diagonal (1.07")
- Electronic image centering (1 to 12 pixels H and V)

### DISPLAY ASPECT RATIO

- Square

### MECHANICAL ENVELOPE

- 32.96 x 25.95 x 5.527 (L x W x H)

### COLOR GAMUT

- >75% of NTSC gamut
- Up to 256 gray levels

### UNIFORMITY

- >85% End to end
- >95% Pixel to pixel uniformity

### CONTRAST RATIO

- >10,000:1
- Dimming ratio >500:1 with CR > 1,000:1 Typical

### LUMINANCE

- 250 cd/m<sup>2</sup> (white luminance – full color display)

### TEMPERATURE

- Operating: -45°C to >+70°C
- Storage: -55°C to +90°C

### HUMIDITY

- 85% RH non-condensing

### VIDEO INPUTS

#### R, G, B INPUTS

- Serialized LVDS, 24b Digital RGB (17 twisted line pairs)
- Configurations of 5, 9 or 17 LVDS

#### VIDEO FORMATS

- 2K x 2K and programable window

#### VIDEO SIGNAL BANDWIDTH

- 279 MHz maximum

#### CONTROL & SERIAL INTERFACE

- I<sup>2</sup>C Serial Interface

#### FRAME RATE

- 50 to 120 Hz (~500hz 512x512 window)

### POWER INTERFACE

#### POWER SUPPLY (V<sub>DD</sub>)

- 1.8 Vdc (logic), 5Vdc analog/display

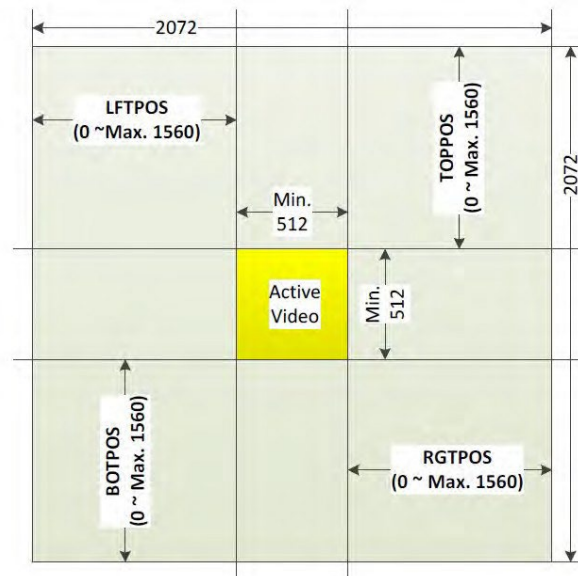
#### TOTAL POWER DISSIPATION

- <675 mW typical @ 150cd/m<sup>2</sup>

\* Data represent performance at 20°C for standard commercial and industrial pricing. Characteristics will vary with temperature requirements. Low-cost commercial or consumer operating specifications may vary.

All specifications are subject to change.

## ACTIVE WINDOW CONFIGURATION



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