
# Your Source for Game-Changing Low-Power Displays

## Low-Power Display Technology

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### INTRODUCTION

Power management is one of the core issues with providing peak display performance in high-ambient and outdoor lighting environments. But with Sharp's leading-edge technologies, compensating for high power requirements is a thing of the past. Our low-power, high-performance display solutions change the game, enabling a whole new world of designs. Choose from Monochrome and 64-color Memory-In-Pixel (MIP) LCDs or full-color, high-resolution Reflective IGZO displays.

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# Put the Muscle of Sharp Low Power Displays to Work in Your Next Design

### OUTDOOR READABILITY

From edge-of-vision to bright sunlight

### LOW-POWER

No backlight required in reflective mode

### WIDE TEMPERATURES

Operates in even the most extreme environments

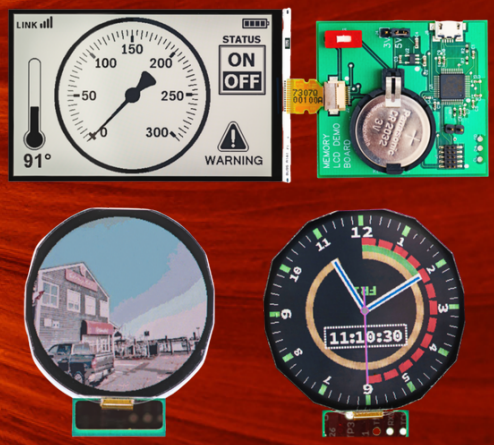
### THIN + LIGHTWEIGHT

Slim profile enables compact product design

# Memory in Pixel LCDs

## Choose from monochrome or 64-color for wearable and remote applications

*Our Memory-In-Pixel (MIP) technology provides high-performance solutions for wearable and portable applications — or any product with a battery. Sizes range from 1.08-inch to 4.4-inch (diagonal) with static-image operation at power levels as low as 10's of microamps.*




### Memory in Pixel Displays: High Resolution for Detailed Graphics

Traditionally, reflective Film-compensated STN (FSTN) has been the workhorse of monochrome, reflective displays for a variety of outdoor/hand-held display applications. However, these displays are limited in terms of performance and low-power attributes.

FSTN displays typically require a 5V VDD supply and an LCD VEE supply, both of which increase power requirements. For example, a QVGA FSTN display will require approximately 82mW of power to display low-resolution, low-contrast images.

Sharp's monochrome MIP WQVGA display requires only 50uW in a static image hold or 175uW in a 1Hz update mode.

The FSTN display does not have a static image hold mode, so it must be refreshed at 60Hz constantly.

The Sharp MIP is a mere 0.2% of the power in 1Hz update mode and 0.06% of the power in static image hold.

### Memory in Pixel Display Optical Performance is Superior

Higher resolution enables detailed graphics and multi-language support without any penalty in regard to power dissipation. And fast response time allows smooth animation and graphical content.

**Low-Power Performance**

| | Sharp Mono MIP | FSTN |
|---|---|---|
| **Contrast Ratio** | 15:1 | 6:1 |
| **Viewing Angle** | +/- 60° | +/- 40° |
| **Response Time** | +10/-20mS | +190/-210mS |
| **Pixel Pitch** | 0.147 x 0.147mm | 0.36 x 0.36mm |

# R-IGZO LCDs

## Full-color and high-resolution for hand-held and signage applications

*Our Reflective IGZO displays combine full-color and high resolution in a low-power reflective LCD. Current available sizes are 5.0-inch (diagonal) for hand-held, portable applications and 31.5-inch (diagonal) targeted at outdoor signage applications. Both sizes include low-power backlighting for low-ambient viewing.*

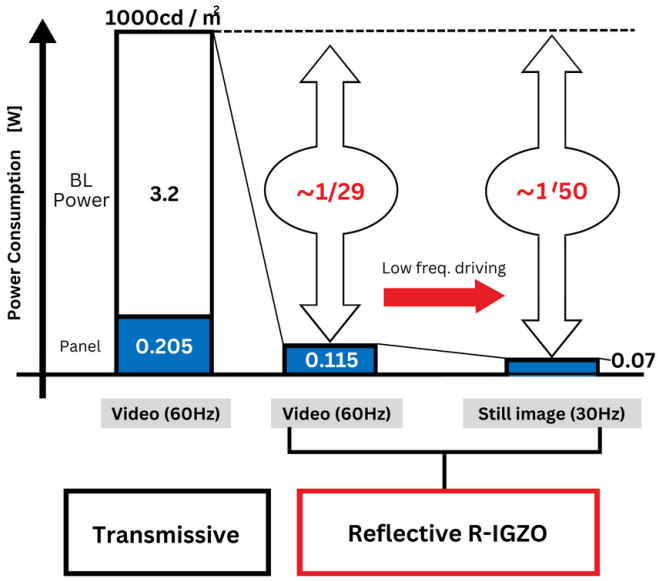
### Reflective IGZO Displays Eliminate the Backlight

For outdoor, bright sunlight environments, traditional transmissive displays require a high-power, high-heat generating backlight to compete with the sun. This poses problems for thermal management and power dissipation at the system level. Sharp's 5" R-IGZO display negates the need for such a backlight, resulting in an extremely low-power solution for handheld and portable applications.

### Same Performance at Just 3.6% of the Power Requirement

With a typical high-bright (1000 nit) transmissive display, the total power is 3.2W at 60Hz refresh. With no backlight, the R-IGZO display is 115mW at 60Hz, which is just 3.6% of the power requirement.

**Sharp's 5" R-IGZO Low-Power Performance**




*Backlight power is 0.33 W at 50 nits. Only needed at night.*

- *Power consumption comparison (5" HD720 basis)*
- *Reflective IGZO is 3.6% of the power compared to a high-bright transmissive display.*

# R-IGZO LCDs

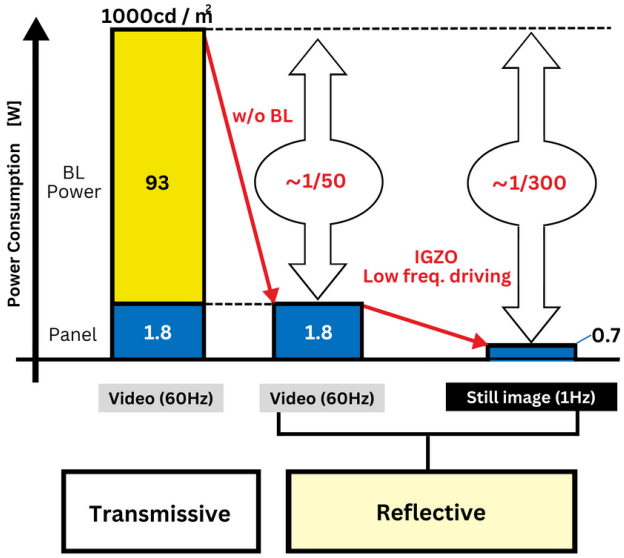
## Lower Power Requirement Saves Time and Money

Sharp's 31.5" R-IGZO display is targeted at outdoor signage enabling solar or Power-Over-Ethernet (POE) installations. This negates the need for permits and licensed electricians to drop a 120V power line.

## Less Thermal Management Reduces Maintenance

Standard high-bright, transmissive displays also present problems in terms of high internal heating and eliminating dust intrusion in outdoor signage applications. This adds cost for the thermal management design, multiple fans, and the need to replace filters on the fans. The reflective IGZO display can eliminate these issues due to the low internal heat rise and elimination of external fans, enabling a maintenance-free, sealed housing.

**Sharp's 31.5" R-IGZO Low-Power Performance**



# Sharp Low-Powered Displays

**Enabling Outstanding Sunlight Viewability at a Fraction of the Power and Cost**

In conclusion, Sharp's low-power displays enable outstanding sunlight viewability at a fraction of the power of other standard technologies historically used in outdoor or mobile applications. This saves costs in terms of battery size and/or extensive thermal management techniques within the product.

Options range from high-contrast monochrome and 64-color MIP displays to full-color, high-resolution R-IGZO displays. These options address every type of content that might be needed in outdoor and mobile applications.

**Visit our Website to Learn More**

Go online to find more product information, get in touch with our team, or receive a demo.

https://sharpsecd.com/#/LowPowerDisplays