

AR Optical Waveguide Module

ARM-102

Product display



ARM-102 Optical Parameters Table

| Parameter | Specification |
|-----------------------|-----------------------|
| Field of View | 60°=52.3°(H)×29.4°(V) |
| Resolution | 1920 x 1080 |
| Color | Full-color RGB |
| Brightness | 500 nits |
| Contrast Ratio | 500:1 (FOFO) |
| Brightness Uniformity | Over 90% |
| Grayscale | 8-bit |
| Eye Movement Range | 12x8 (mm) |
| Transmittance | 85% |
| Imaging Distance | Optically Infinite |
| Displacement Volume | 4.4CC |

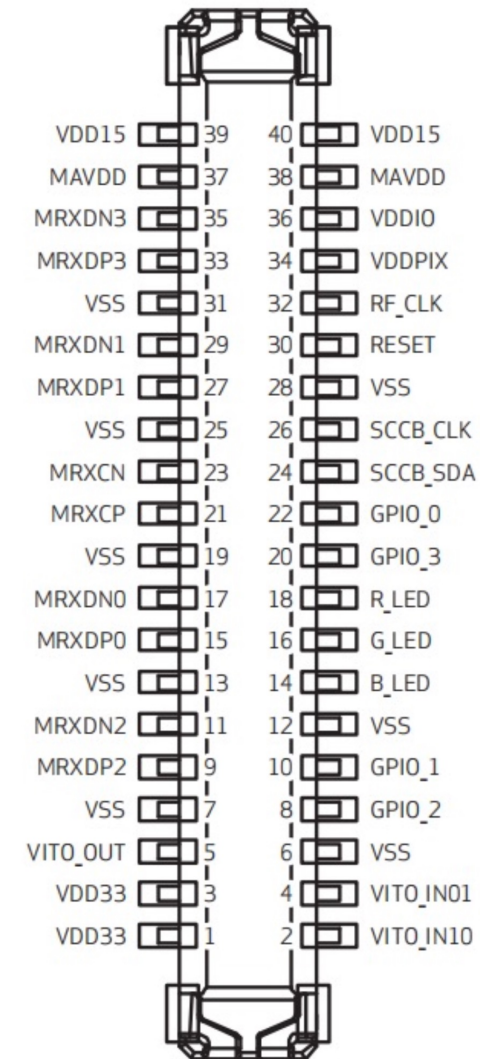
LCOS Specifications

Recommended Working Conditions

| Symbol | Parameter | Min | Typ | Max | Unit |
|--------------------|-----------------------------------|----------------|------|-------------------|------|
| V_{DD33} | DRAM supply voltage | 3.0 | 3.30 | 3.63 | V |
| V_{DDPIX} | Pixel supply voltage ^a | 3.0 | 3.30 | 3.63 | V |
| V_{DDIO} | IO supply voltage | 1.62 | 1.8 | 1.98 | V |
| V_{DD15}^b | Core supply voltage | 1.425 | 1.5 | 1.575 | V |
| MAVDD ^b | MIPI supply voltage | 1.425 | 1.5 | 1.575 | V |
| VSS | Ground | 0 | 0 | 0 | V |
| V_{IH} | High level input voltage | $2/3 V_{DDIO}$ | \ | $V_{DDIO}^{+0.3}$ | V |
| V_{IL} | Low level input voltage | $V_{SS-0.3}$ | \ | 0.4 | V |

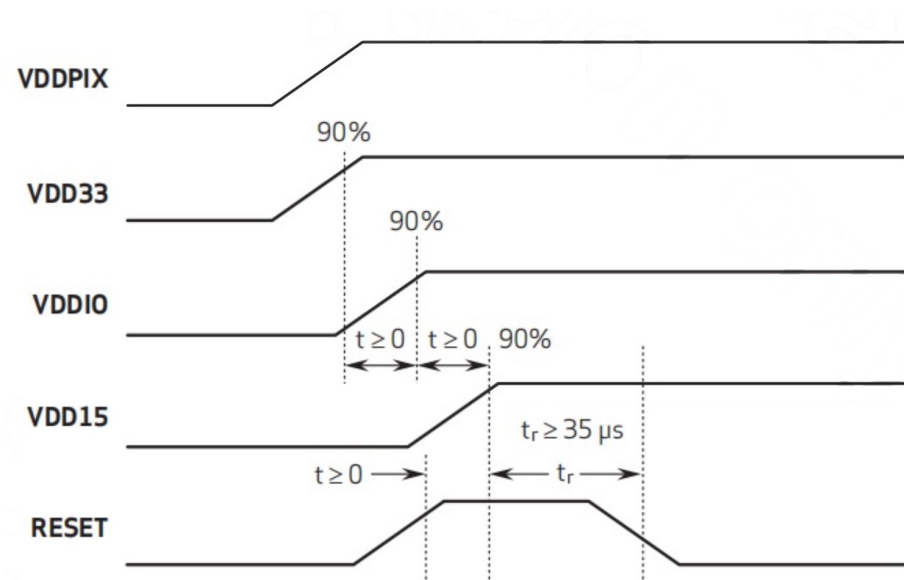
| Symbol | Parameter | Min | Typ | Max | Units |
|-------------|---------------------------------|-----|-----|-----|---------|
| I_{IL} | Input leakage | -20 | \ | 20 | μA |
| C_1 | Input capacitance | \ | \ | 5 | pF |
| I_{DD33} | DRAM supply current, 3.3V | \ | 6 | 10 | mA |
| I_{DDPIX} | Pixel supply current, 3.3V | \ | 14 | 70 | mA |
| I_{DDIO} | IO supply current | \ | 1 | 5 | mA |
| I_{DD15} | Supply current, V_{DD15} | \ | 150 | 200 | mA |
| I_{MAVDD} | MIPI supply current, V_{DD15} | \ | 22 | 36 | mA |
| C_{ITO} | ITO capacitance | \ | 3.0 | 5.0 | nF |

Pin Map



LCOS Specifications

Recommended Working Conditions

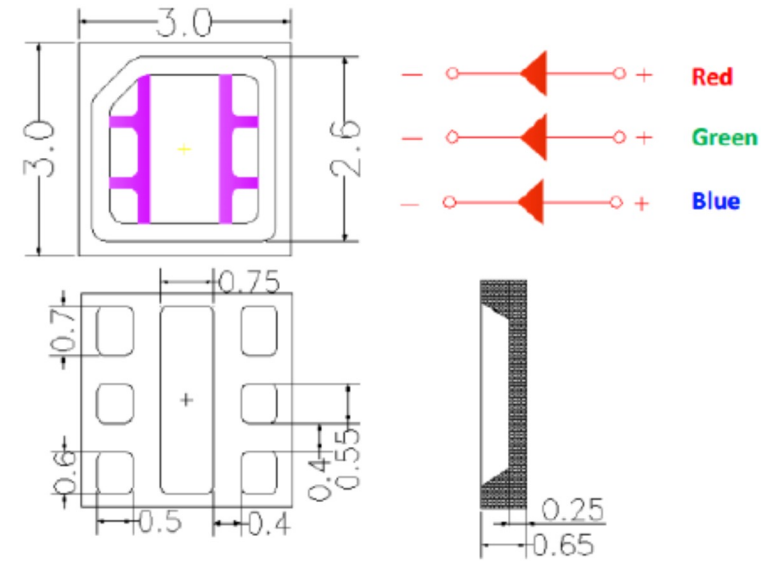


LED Specification Parameters

Electrical Parameters

| Parameter | Maximum value | Unit |
|--|----------------------|---------|
| Power dissipation | R:560 | mW |
| | G:680 | |
| | B:680 | |
| Pulse current (1/10 duty, 0.1ms pulse) | R:300 | mA |
| | G:300 | |
| | B:300 | |
| Forward current | R:150 | mA |
| | G:150 | |
| | B:150 | |
| Reverse voltage | 5 | V |
| Junction temperature | 100°C | |
| Operating temperature | -40°C to +85°C | |
| Storage temperature | -40°C to +90°C | |
| Soldering temperature | 255°C for 10 Seconds | |
| ESD (classification acc AEC Q101) | ESD hbm | R:2000V |
| | | G:1000V |
| | | B:1000V |
| | ESD mm | 200V |

Product Outer Dimensions



OP02220BA Screen Initialization Configuration Parameters (iic)

| | | | | | | | | | | |
|---|----|----|----|----|----|-----|----|----|-----|---|
| S | 1 | 1 | 0 | 0 | 1 | 0 | A0 | 0 | ACK | |
| | M0 | S0 | C1 | C0 | T0 | R10 | R9 | R8 | ACK | |
| | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 | ACK | |
| | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | ACK | |
| | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | ACK | |
| | | | | | | | | | | |
| | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | ACK | |
| | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | ACK | P |

I2C_OV02220_burst_Write(device_ID, xferData, MEM_ADDR_START, COUNT_SIZE); //device_ID: device address; xferData: corresponding data group of the register; MEM_ADDR_START: start address of the register; COUNT_SIZE: data group size.

ISL97901 (LED DRIVER IC) Initialization Configuration Parameters

(The chip device address is 0x50 or 0x52) Write the corresponding configuration parameters in sequence according to the following register addresses. Registers (0x00 ~ 0x1E): {0x00, 0x00, 0x04, 0x00, 0x82, 0x10, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x6E, 0x5C, 0x5C, 0x00, 0x00, 0x66, 0x9A, 0x9A, 0x9A, 0x00, 0x55, 0x40}; (Changing the corresponding values can change the color and brightness of the corresponding LED).

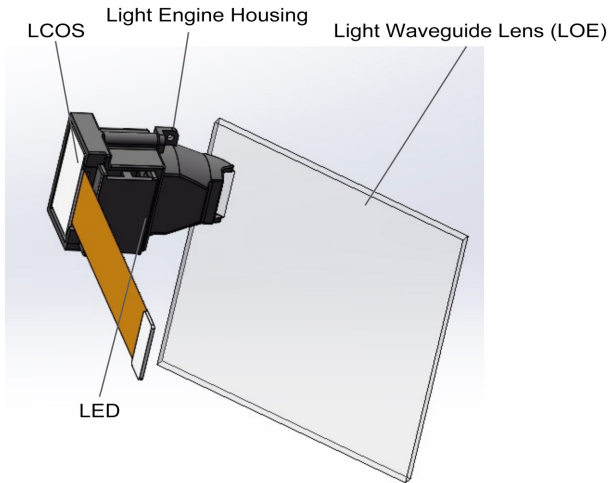
MIPI Video Timing Table

Non-Burst Mode
Sync-pulse
Continuous CLK

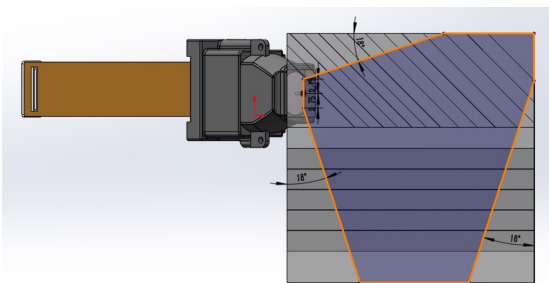
| Parameter | Horizontal timing (pixels) | Vertical timing (lines) |
|------------------|----------------------------|-------------------------|
| Visible area | 1920 | 1080 |
| Front porch | 88 | 4 |
| Sync pulse | 44 | 5 |
| Back porch | 148 | 36 |
| Whole line/frame | 2200 | 1125 |

Light Mechanism Composition

- 1.The LCOS FPC connector is a 30pin, which can connect to the HIROSE BM23FR0.6-30DS-0.35V(51) connector.
- 2.The specification for the LED plug-in connector: 1mm High, 0.5mm Pitch, 4Pin (Model: AYF530435).



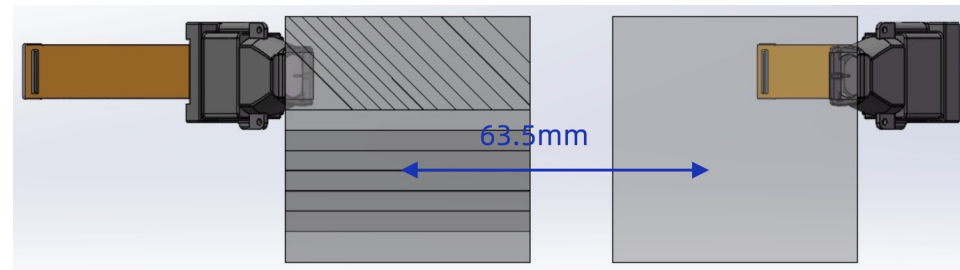
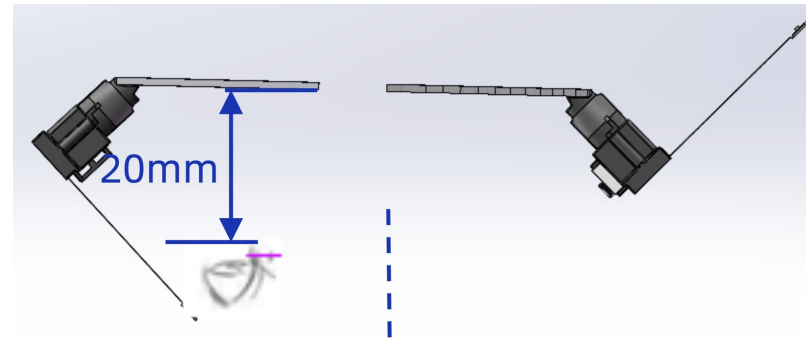
Optical Display Area



Waveguide size 44.3x42.7mm (Default shape)

Binocular Design Instructions

- 1.The LOE structure of the light waveguide lens in the left and right light engine modules is symmetrically designed.
- 2.The housings, LED boards, and LCOS boards of the left and right light engine modules are designed symmetrically.
- 3.The distance between the eyeball and LOE is recommended not to exceed 18mm.
- 4.The recommended design value for the distance between the display centers of the left and right eyes is 63.5mm (corresponding to the human eye's pupil distance).



Positioning and Installation Design

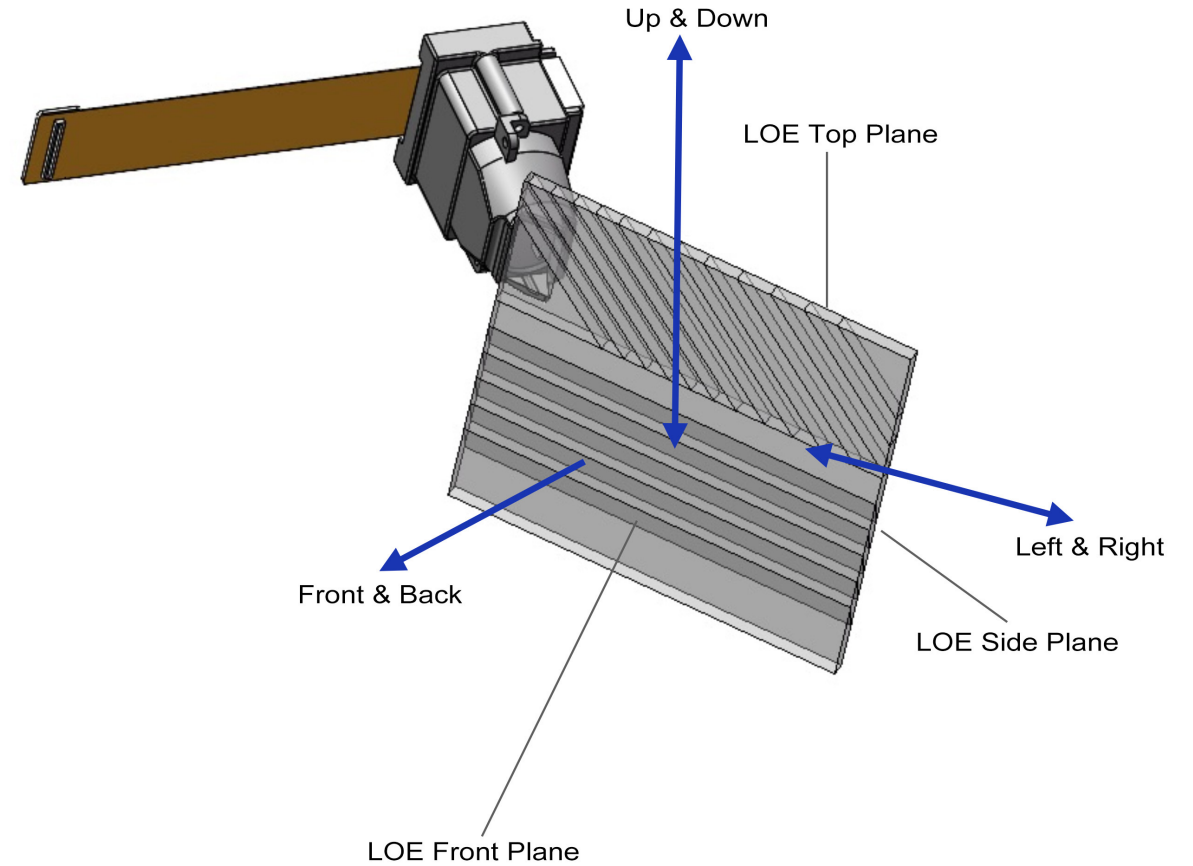
Positioning Surface

The waveguide is the positioning benchmark for the assembly process of various parts of the light engine module, and it has the highest accuracy in terms of shape and position size. It can serve as the primary positioning surface for the assembly of the light engine module and the glasses case.

- 1.LOE Front Surface: Front and back direction positioning
- 2.LOE Upper Surface: Up and down direction positioning
- 3.LOE Side Surface: Left and right direction positioning

Fixation Method

The contour of the waveguide inside the front shell of the glasses is designed to be consistent with the contour of the aforementioned positioning surfaces. According to the positions of these positioning surfaces, corresponding to the positions on the light engine module, the light engine module is affixed to the glasses case (ensuring the strength of the front shell of the glasses).



Optical Machine Working Temperature/Humidity

Recommended for use under conditions of 10°C to 50°C / 45% to 70% RH.

Service Life

- 1.Theoretical service life of the entire machine: 12,000 hours or more (Operating conditions: 10 mW/mm²).
- 2.Aging test of the entire machine (240 hours of continuous operation): 100% of the samples passed.

Extreme Environmental Usage Conditions

Extreme high-temperature operation: At 60°C, the screen displays normally without any image abnormalities or flickering. The control of the driver board is normal.

Extreme low-temperature operation: At 0°C, the screen displays normally without any image abnormalities or flickering. The control of the driver board is normal.

Extreme high-temperature storage: At 70°C, the device can resume normal operation after returning to room temperature without any abnormalities.

Extreme low-temperature storage: At -10°C, the device can resume normal operation after returning to room temperature without any abnormalities.

LCOS-related

Recommended for use under conditions of 10°C to 50°C / 45% to 70% RH.



LED Related

1. It is not recommended to set the LED current too high. It is advisable to operate within the recommended current setting conditions, as the brightness can meet the majority of requirements. Excessive current may result in increased power consumption and high LED temperatures, affecting the product experience.
2. When using different LED driver chips, please ensure that RGB color separation adjustment is possible. The EN signals of the R/G/B channels need to be connected to the OVP0921 to ensure backlight and image synchronization.

Testing Content

- 1.High and low-temperature storage testing.
- 2.High and low-temperature operation testing.
- 3.Operational lifespan testing.

Testing Results

Based on random sampling testing, the samples have passed all the tests. During the testing process, no external appearance changes or structural deformations were observed. The display performance is normal, with no flickering or color deviation detected. There were no signs of fogging observed in the gap between the waveguide and the protective shell. This batch of products has passed the inspection and is deemed qualified.