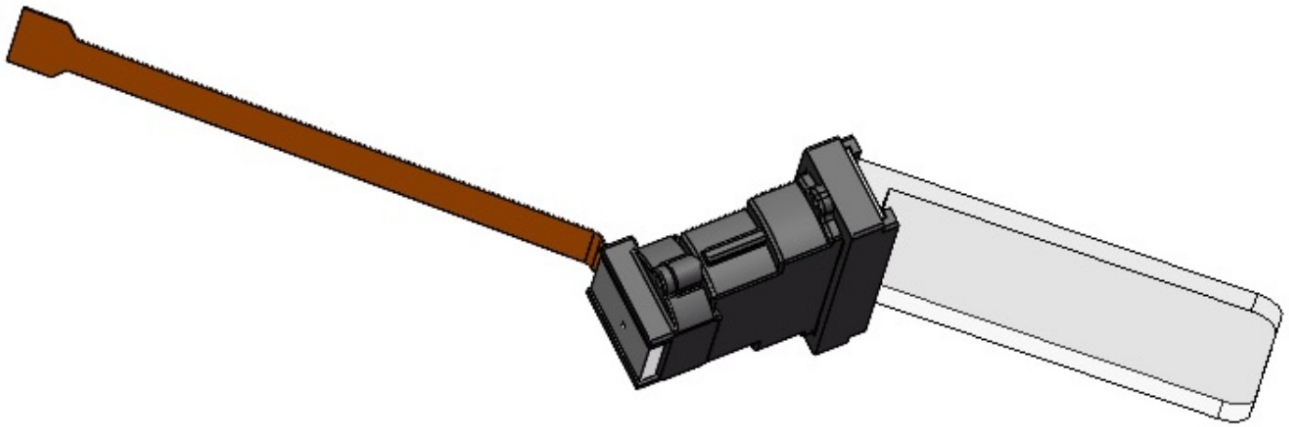
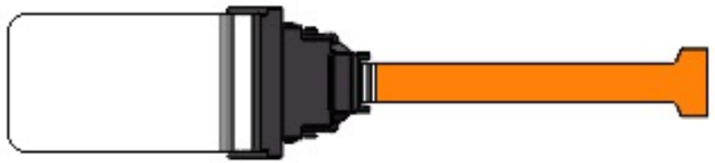
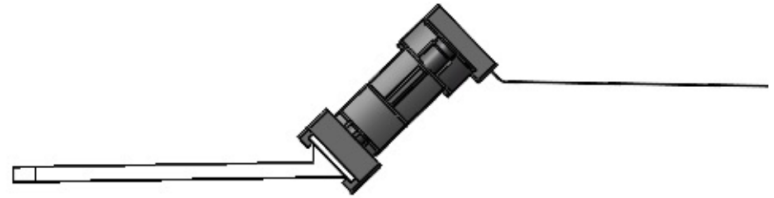
AR Waveguide Optical Module.

ARM-104

Product display



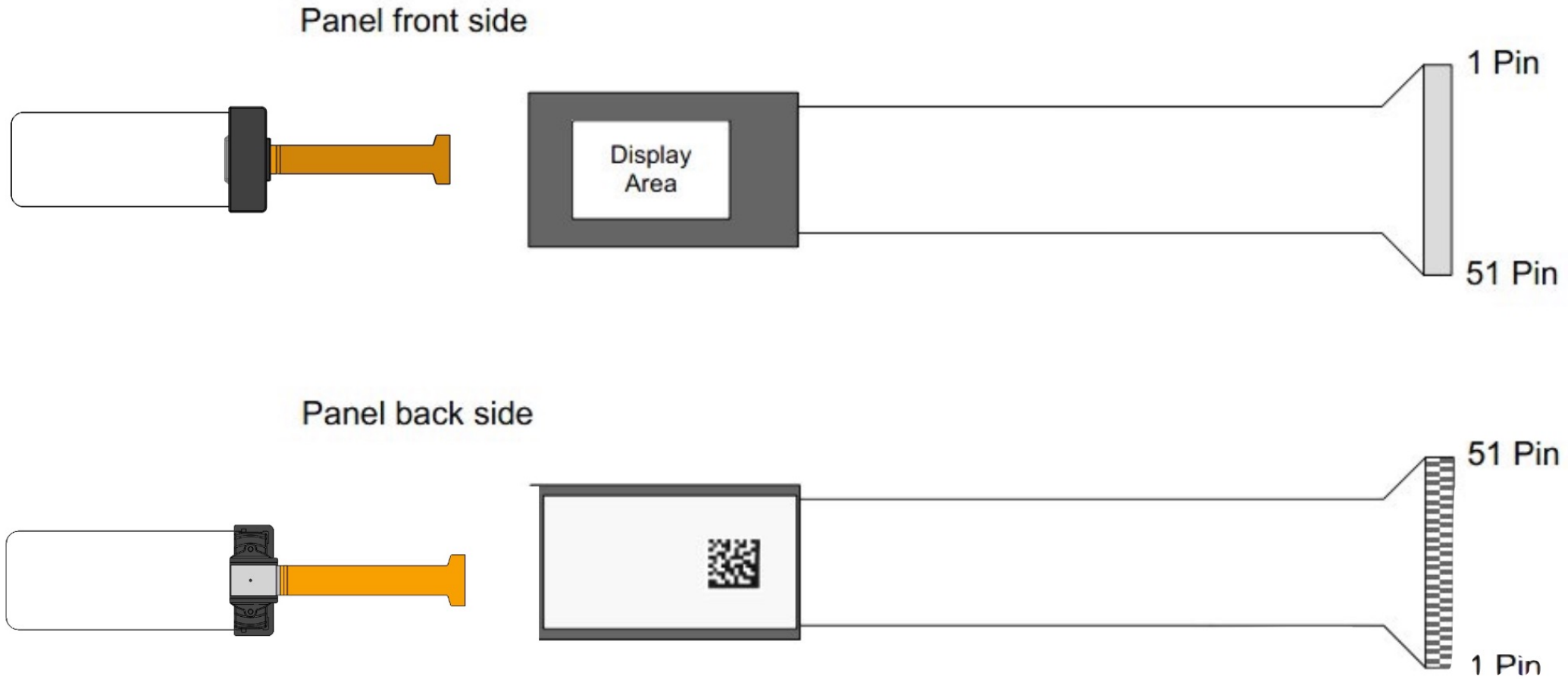




AW70s Optical Parameters Table

Parameter Name	Parameter Value
Field of View	24° (±1°)
Screen Type/Specification	Micro-OLED (0.23 inch)
Virtual Screen	51 inches @ 3 meters
Eye Movement Range	8mm x 4mm
Exit Pupil Distance	22mm
Transparency	85%
Brightness	400 nits (adjustable)
Exit Pupil Diameter	8mm
Distortion	⩽2%
Brightness Uniformity	⩾80%
Contrast Ratio	10,000:1
Resolution	640x400
Color	RGB Full Color
Signal Format	RGB TTL
Waveguide Size	21*38*1.7mm (customizable)
Module Weight	9.3g
Drainage Volume	2.11cc

Pin Assignment



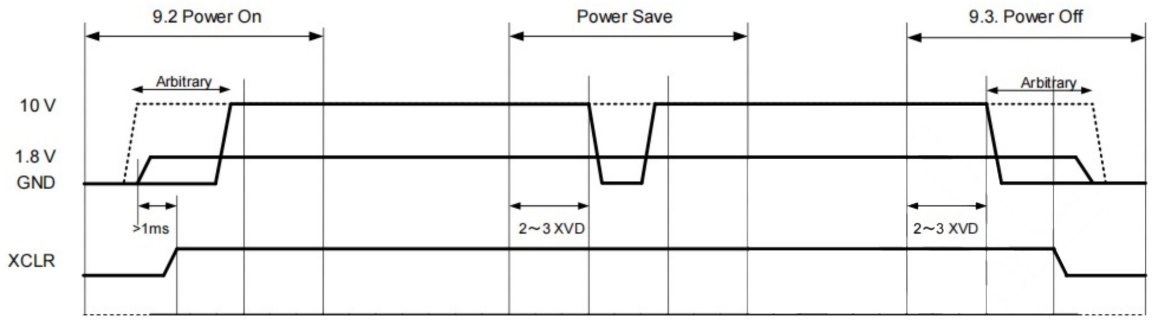
The recommended choice for the FPC connector socket is Molex 504070-5191.

Power parameter requirements

Recommended operating conditions

Item	Symbol	Min	Typ	Max	Unit
1.8V power supply	VDD1	1.62	1.8	1.98	V
10V power supply	VDD2	9.7	10.0	10.3	V
EL cathode voltage	Vcath	-0.3	0	0.3	V
Operating temperature range	Tpnl	-20		70	°C

Power-on timing



Pin Map

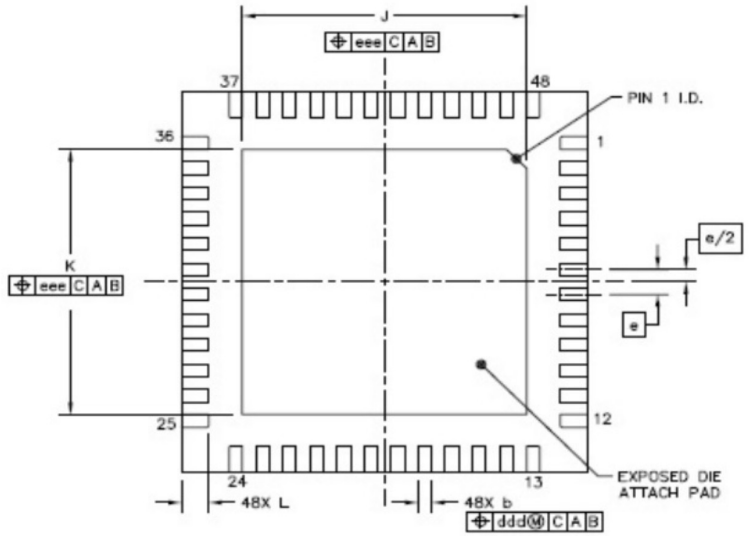
1	VCATH
2	VCCP
3	VCAL
4	VG255
5	VG0
6	VOFS
7	VREF
8	VDD2
9	VSS
10	VDD1
11	MCLK
12	XHD
13	XVD
14	VSS
15	XCLR
16	DATA7
17	DATA6
18	DATA5
19	DATA4
20	DATA3
21	DATA2
22	DATA1
23	DATA0
24	DATA15
25	DATA14
26	DATA13
27	DATA12
28	DATA11
29	DATA10
30	DATA9
31	DATA8
32	DATA23
33	DATA22
34	DATA21
35	DATA20
36	DATA19
37	DATA18
38	DATA17
39	DATA16
40	TEST
41	XSCK
42	XCS
43	SI
44	SO
45	TEST
46	TEST
47	VSS
48	VDD1
49	VSS
50	VDD2
51	VCCP

Specifications of ICN6211

Recommended operating conditions

		MIN	TYP	MAX	UNIT
V_{DD}	VDD1 & VDD2 & VDD3 power supply	1.65		3.66	V
V_{PSN}	Supply noise on any V_{CC} pin	f(noise) > 1MHz		0.05	V
T_A	Operating free-air temperature	-40		85	℃
T_{CASE}	Case temperature			92.2	℃
V_{DSI_PIN}	DSI input pin voltage range	-50		1350	mV
$f_{(I2C)}$	Local I2C input frequency			400	KHz
f_{HS_CLK}	DSI HS clock input frequency	40		500	MHz
t_{setup}	DSI HS data to clock setup time(Figure 7-1)	0.15			UI
t_{hold}	DSI HS data to clock hold time(Figure 7-1)	0.15			UI

Package specifications



MIPIVideoTimingTable(27MHz)

Parameter	H_ACTIVE	V_ACTIVE	HFP	VFP	HSYNC	VSYNC	HBP	VBP	PCLK
Value	640	400	96	57	64	6	58	62	27.027MHz

Initialization configuration parameters for ICN6211 (MIPI to RGB888)

ICN6211_Writebyte(ICN6211[i*2], ICN6211[i*2+1]); // i represents the register address, i+1 represents the register data
ICN6211[50] = {0x20, 0x80, 0x21, 0x90, 0x22, 0x12, 0x23, 0x60, 0x24, 0x40, 0x25, 0x3A, 0x26, 0x00, 0x27, 0x39, 0x28, 0x06, 0x29, 0x3E, 0x34, 0x80, 0x36, 0x60, 0xB5, 0xA0, 0x5C, 0xFF, 0x2A, 0x01, 0x56, 0x92, 0x6B, 0x71, 0x66, 0x00, 0x67, 0x00, 0x68, 0x80, 0x69, 0x2C, 0x10, 0x40, 0x11, 0x88, 0xB6, 0x20, 0x51, 0x20, 0x09, 0x10};

IIC timing sequence for ICN6211 (MIPI to RGB888)

- Write one byte to certain offset

  ST → 0x58 → ACK → OFFSET → ACK → DATA → ACK → STOP.

- Write more bytes to successive address.

  ST → 0x58 → ACK → OFFSET → ACK → DATA0 → ACK → DATA1 → …… → DATAn → ACK → STOP.

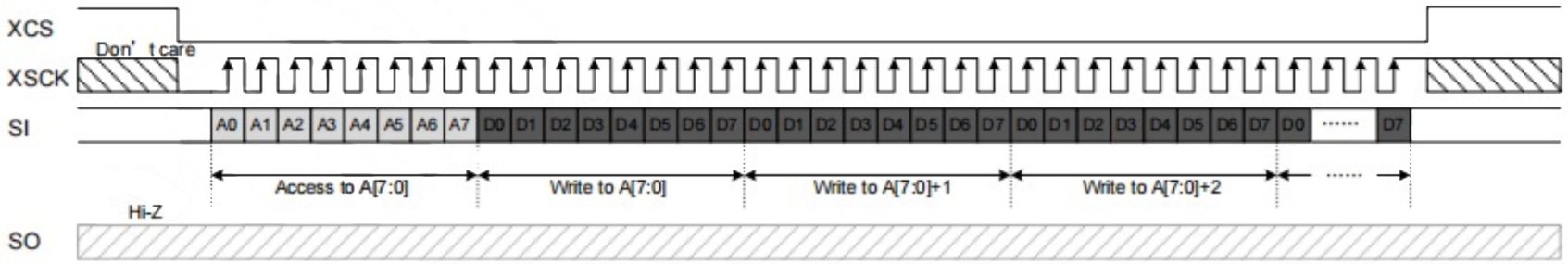
- Read data from certain offset.

  ST → 0x58 → ACK → OFFSET → ACK → RESTART → 0X59 → ACK → DATA0 → ACK → DATA1 → …… → DATAn → NACK → STOP.

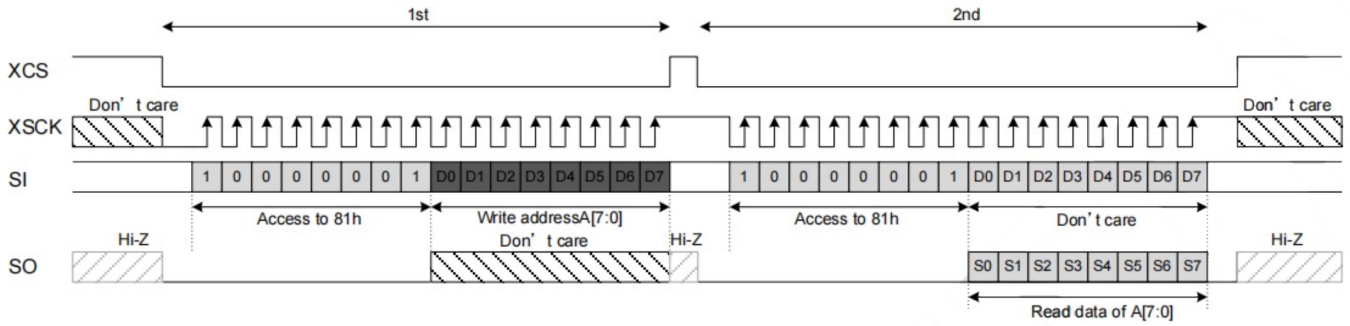
Initialization configuration parameters for ECX336 (screen)

HAL_SPI_Transmit(&hspi1, SONY_DATA, sizeof(SONY_DATA), 1000);
uint8_t SONY_DATA[130] =
{0x00, 0x0F, 0x00, 0x00, 0x20, 0x3F, 0xC8, 0x00, 0x40, 0x04, 0x00, 0x10, 0x00, 0x00, 0x00, 0x00, 0x56, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,0x00, 0x00, 0x01, 0x00, 0x40, 0x40, 0x40, 0x80, 0x40, 0x40,0x40, 0x0B, 0xBE,
0x3C, 0x02, 0x7A, 0x02, 0xFA, 0x44, 0x01, 0xD4, 0x00, 0x03, 0x5A, 0x00, 0x76, 0x02, 0xFE, 0x02, 0x0D, 0x00, 0x39, 0x00, 0x3A, 0x02,
0x12, 0x02, 0x13, 0x80, 0x00,0x00, 0x2D, 0x08, 0x01, 0x7E, 0x08, 0x0A, 0x04, 0x00, 0x3A, 0x01, 0x58, 0x01, 0x2D, 0x01, 0x15, 0x00,
0x2B, 0x11, 0x02, 0x11, 0x02, 0x25, 0x04, 0x0B, 0x00, 0x23, 0x02, 0x1A, 0x00, 0x0A, 0x01, 0x8C, 0x30, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x60, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x68, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,0x01};

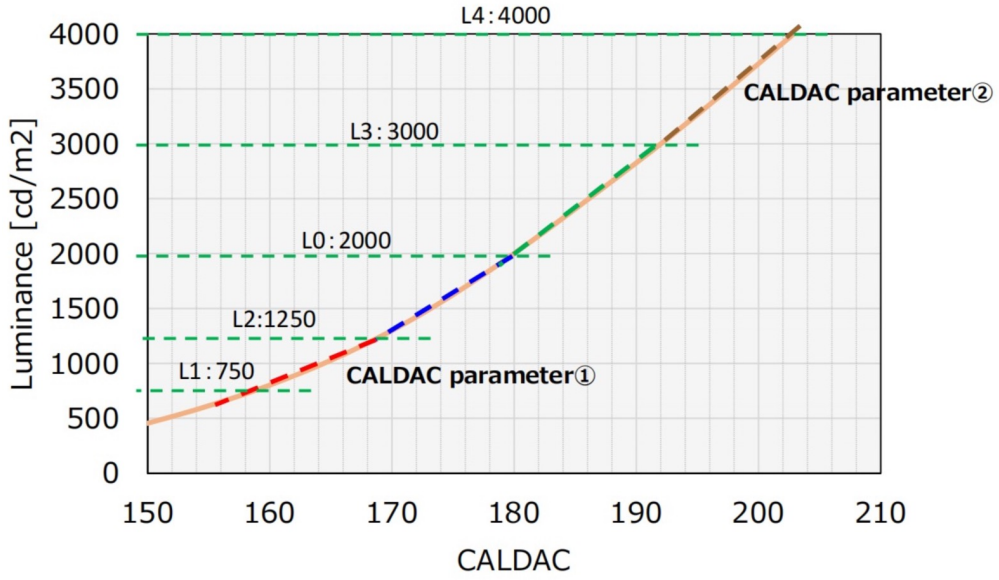
SPI write timing sequence for ECX336 (screen)



SPI read timing sequence for ECX336 (screen)



Optical display area



To obtain the corresponding values for R_CALDAC, R_L1_CALDAC, R_L2_CALDAC, R_L3_CALDAC, and R_L4_CALDAC from registers 0xC2, 0xC4, 0xC5, 0xC6, and 0xC7 respectively, you can use the following linear relationship. After calculating the corresponding parameters for R_CALDAC, you can write them to register 0x2A.

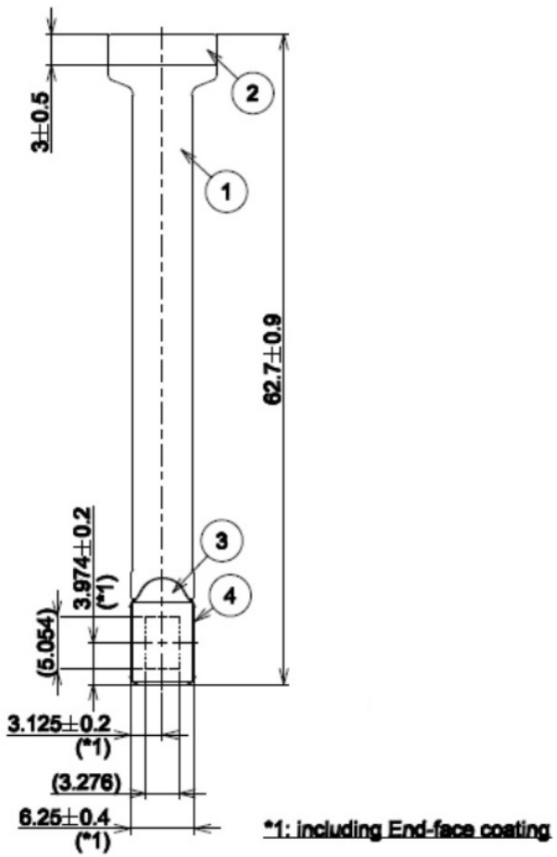
R_CALDAC = (Register Value of R_CALDAC[7:0]) * Linear Scaling Factor

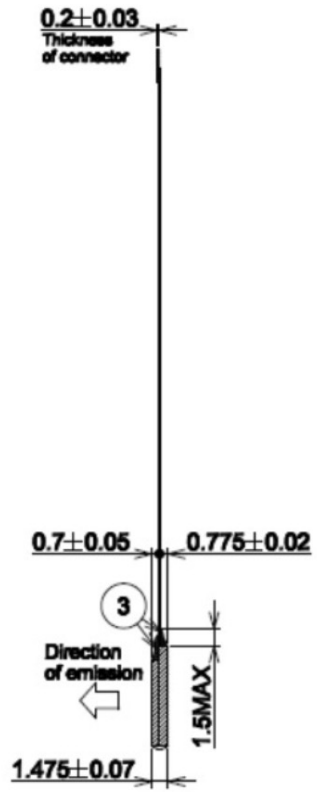
Optical display area

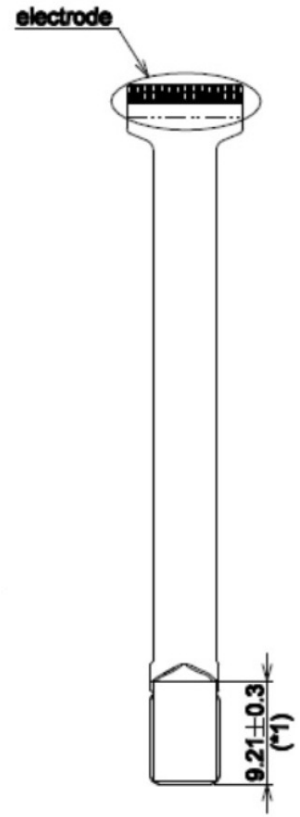
Module Outline

(Unit: mm)

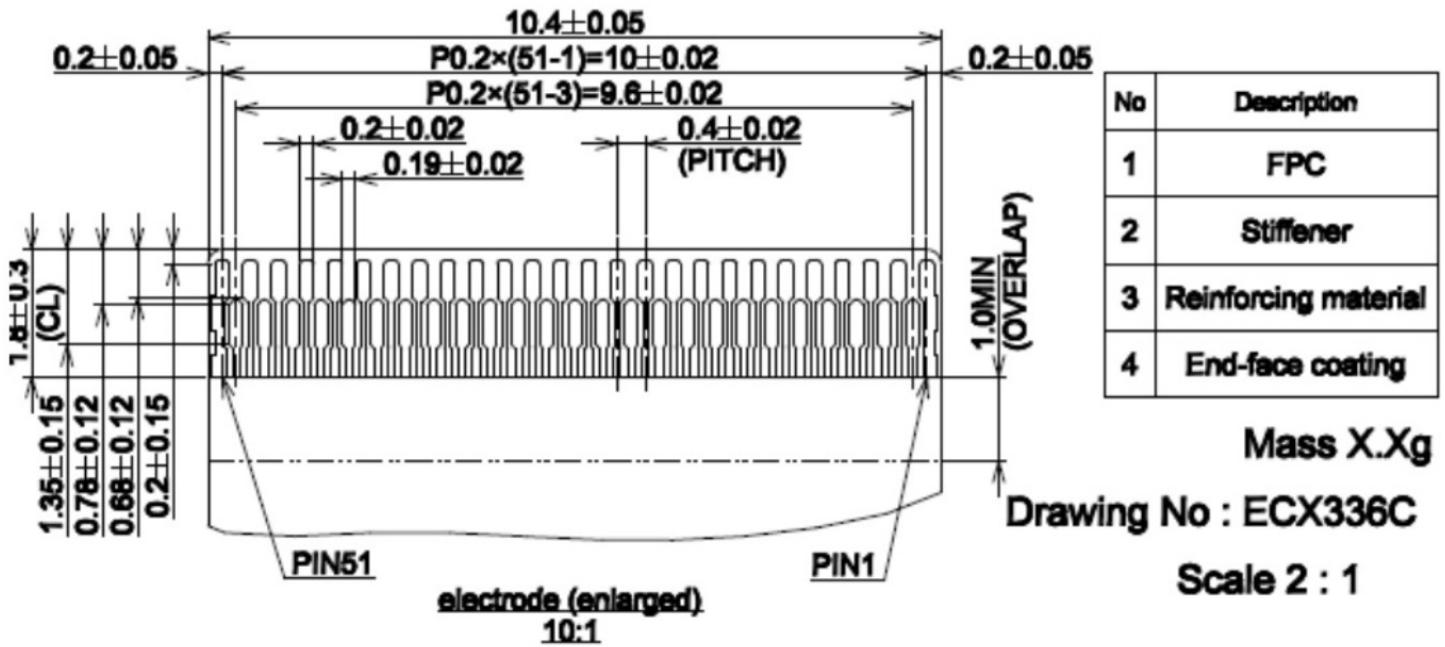
provisional ver.







Module Outline



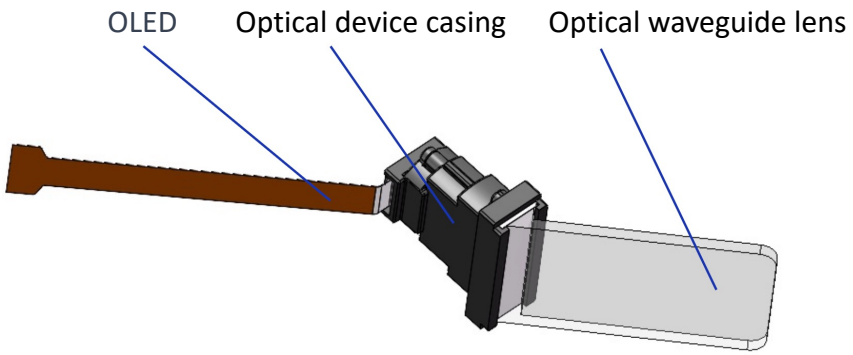
No	Description
1	FPC
2	Stiffener
3	Reinforcing material
4	End-face coating

Mass X.Xg

Drawing No : ECX336C

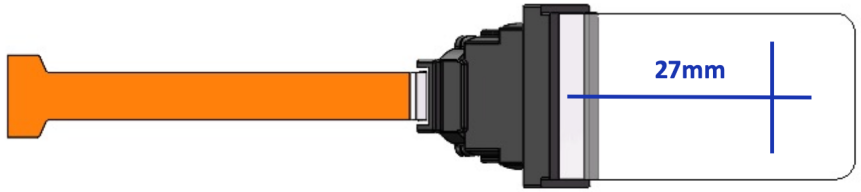
Scale 2 : 1

Optical Mechanism



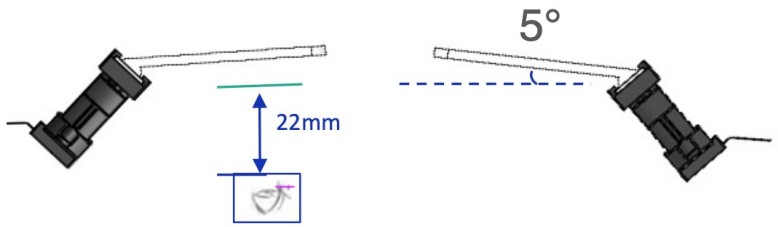
Optical display area

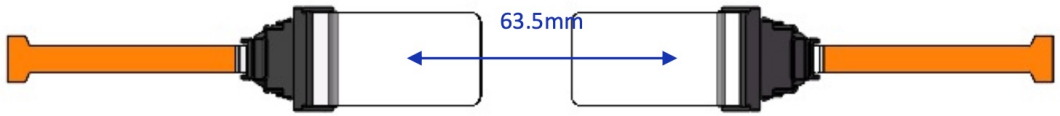
Display area: 38mm × 19mm (prohibited from cutting). Display center designed to be aligned with the human eye when in use.



Binocular design instructions

1.Symmetrical design of the light waveguide lens (LOE) structure for the left and right optical module.
2.Symmetrical design of the optical module casing and OLED screen for the left and right optical module.
3.It is recommended to keep the distance between the eye and LOE no greater than 22mm.
4.The recommended design value for the distance between the display centers of the left and right eyes is 63.5mm (corresponding to the interpupillary distance of the human eye).





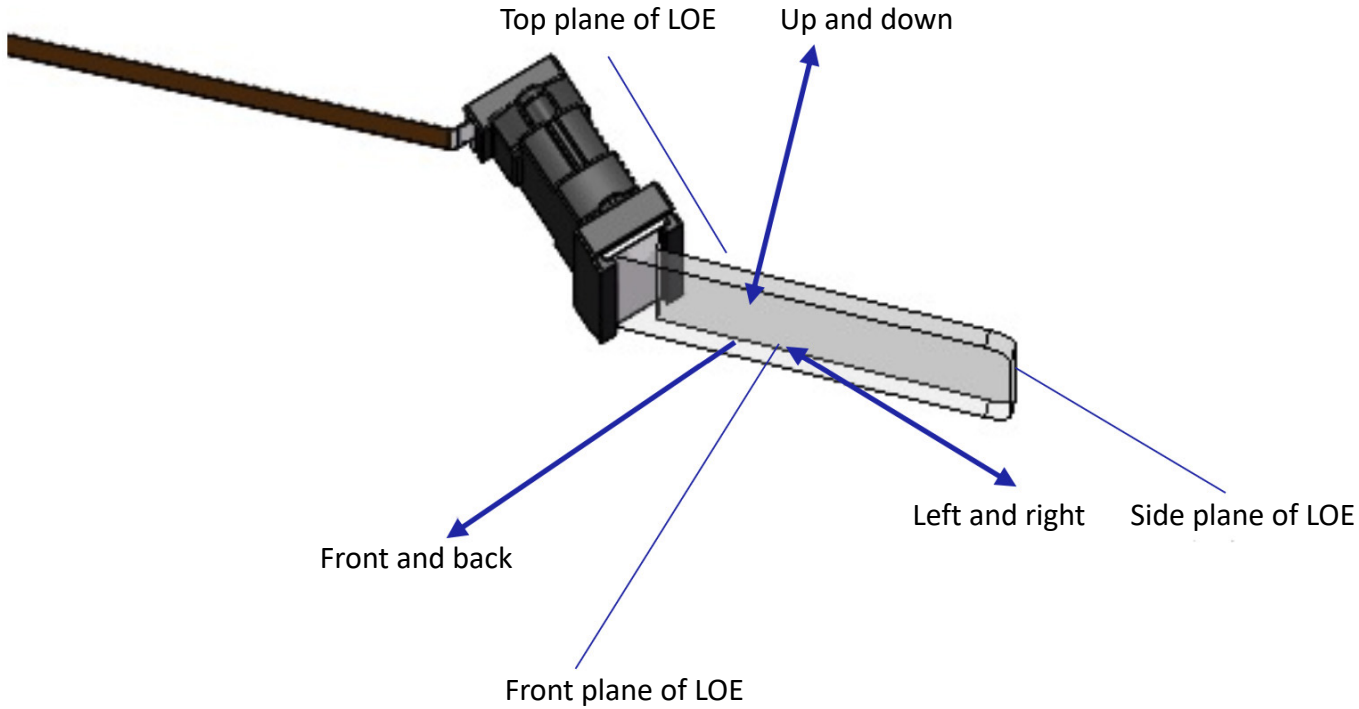
Positioning surface

The waveguide plate serves as the reference for the assembly process of various components in the optical module. It has the highest dimensional and positional accuracy and can be used as the primary positioning surface for the assembly of the optical module and eyeglass housing.

1.Front plane of LOE: Provides positioning in the front-back direction.
2.Top plane of LOE: Provides positioning in the vertical direction.
3.Side plane of LOE: Provides positioning in the left-right direction.

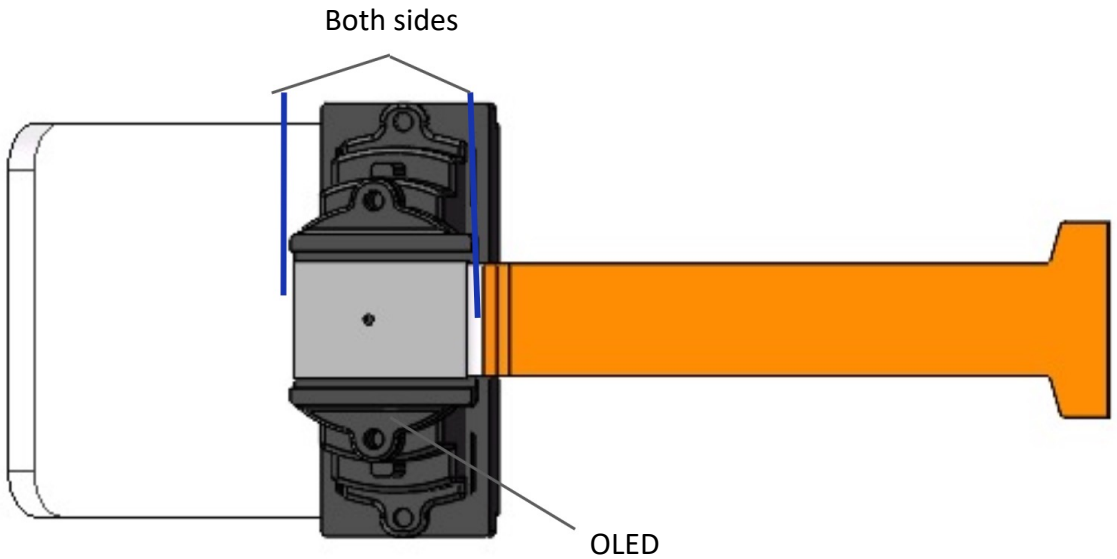
Fixing method

The internal contour of the waveguide plate in the design of the front shell of the glasses is aligned with the contour of the aforementioned positioning surfaces. Following the corresponding positions of the positioning surfaces and the corresponding positions on the optical module, the optical module is fixed to the eyeglass housing (ensuring the strength of the front shell of the glasses).

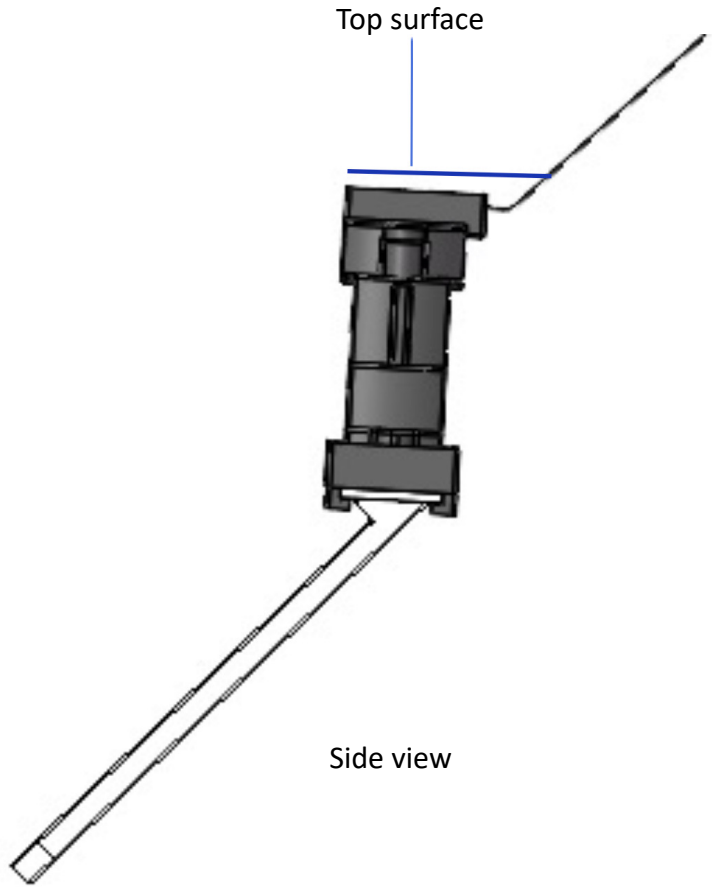


OLED panel

1.In order to ensure optical display performance, the OLED panel and optical module casing are assembled with adaptors, which may result in positional differences between them (for different optical module variants). This necessitates structural clearance (in the front view) for the OLED panel in the design of the glasses, with a minimum of 1mm on each side.
2.The surface adjustment range of the OLED panel is relatively large (in the side view), requiring a minimum gap of 1mm to be designed in the structural components of the glasses.



Front view



Side view

Operating temperature/humidity of the optical module

Recommended operating temperature for use is -35 to 80°C with a humidity range of 45% to 70% RH.
Recommended storage temperature is -50 to 100°C.

Service life

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

Extreme environmental usage conditions

Extreme high temperature operating condition: 80°C -> The screen displays normally without any image abnormalities or flickering. The driver board functions properly.
Extreme low temperature operating condition: -35°C -> The screen displays normally without any image abnormalities or flickering. The driver board functions properly.
Extreme high temperature storage condition: 100°C -> It can operate normally after returning to room temperature, without any abnormalities.
Extreme low temperature storage condition: -50°C -> It can operate normally after returning to room temperature, without any abnormalities.