国兆光电
GUO ZHAO OPTOELECTRONICS

OLP061XGC02-01

Silicon-based OLED Microdisplay

Product Manual

Version 1.1

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Version Release History

Version No.	Date	Page No.	Content
1.0	2021-12-29		Official version release
1.1	2022-05-12	11	Change the table

Content

1 Product introduction

OLP061XGC02-01 microdisplay is a silicon-based OLED microdisplay with top-emitting, high-efficiency, and independently developed by Nanjing Guozhao Optoelectronics Technology Co., Ltd. It’s silicon-based substrate uses 0.18 μm CMOS technology. This product integrates some modules like signal enhancement circuits, row and column drive circuits, logic control circuits, and other modules. It supports 8/16 / 24bit digital video signal, ITU-R BT656 standard input mode. Through the I2C line serial programming interface, it can realize the control and adjustment of display mode, display direction, brightness, contrast and other functions. This product has the characteristics of low-power consumption, high-resolution, high-integration, miniaturization, etc., and it can be widely used in various near-eye display systems with miniaturization, high-resolution, low-power consumption and wide-temperature range.

1.1 **Major features**

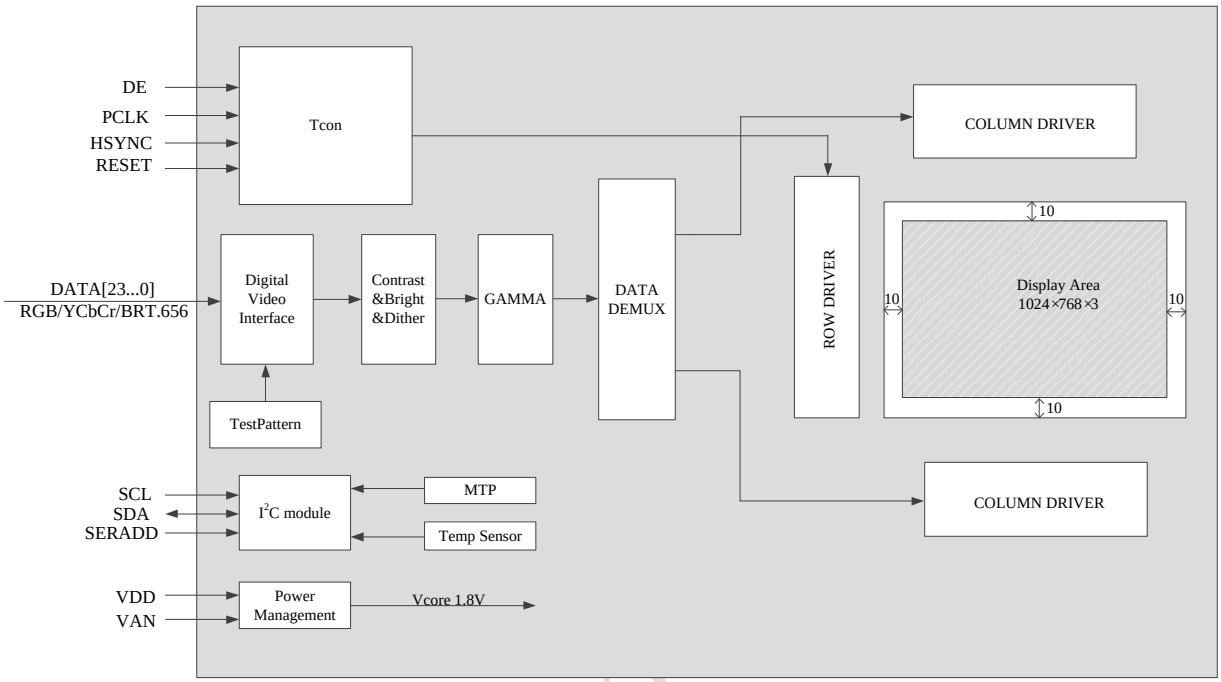
- Low power consumption
- High contrast
- The communication port supports the I2C universal serial protocol
- The input port supports RGB, YCbCr, ITU-R BT.656 encoding formats
- Embedded temperature sensor
- PWM-mode brightness adjustment function
- Brightness adaptive adjustment function supported
- Support image brightness and contrast digital signal enhancement functions
- Support horizontal/ vertical image mirroring, and timed movement function
- Support image display position adjustment, compatible with low-resolution image display

1.2 **Product feature parameters**

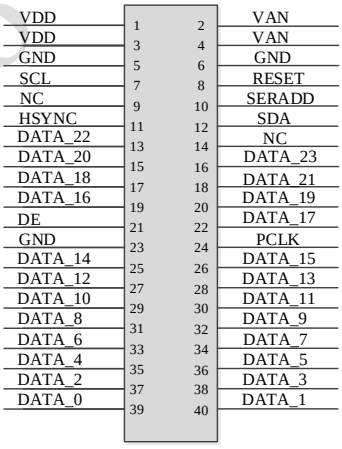
Item	Feature parameter
Product category	Colored
Resolution	1024×768（1044×788 reserved）
Pixel arrangement	RGB Vertical Stripe
Pixel dimension	12μm×12μm
Active area	12.3mm×9.2mm
Gray level	256-level
Uniformity @150cd/m^2	≥ 90%
Contrast	＞10000:1
Frame rate	25Hz～75Hz
Video interface	24bit-RGB、 8/16/24bit-YCbCr 、ITU-R BT.656
Typical luminance	200 cd/m^2
Recommended luminance	40d/m^2～400 cd/m^2
Operating voltage	1.8V、5.0V
Typical power consumption	150mW @60Hz
	120mW @25Hz
Chromaticity	X = 0.290 ， Y = 0.320
Weight	<1.7g

2 Function overview and ports

2.1 Functional block diagram



2.2 Pinout description



Note:

For detailed connector dimensions and connector FPC recommended design sizes, please refer to Section 6.

Pin	Name	Function
1	VDD	Digital circuit power supply
2	VAN	Analog circuit power supply
3	VDD	Digital circuit power supply
4	VAN	Analog circuit power supply
5	GND	Power ground
6	GND	Power ground
7	SCL	I2C clock
8	$\overline{\text{RESET}}$	Reset signal, active low
9	NC	Internally not connected, no use constraints
10	SERADD	I2C slave address
11	HS	Video horizontal synchronization
12	SDA	I2C data
13	DATA_22	Data signal R[6]
14	NC	Power ground
15	DATA_20	Data signal R[4]
16	DATA_23	Data signal R[7]
17	DATA_18	Data signal R[2]
18	DATA_21	Data signal R[5]
19	DATA_16	Data signal R[0]
20	DATA_19	Data signal R[3]
21	DE	Video data enable
22	DATA_17	Data signal R[1]
23	GND	Power ground
24	PCLK	Video clock
25	DATA_14	Data signal G[6]
26	DATA_15	Data signal G[7]
27	DATA_12	Data signal G[4]
28	DATA_13	Data signal G[5]
29	DATA_10	Data signal G[2]
30	DATA_11	Data signal G[3]
31	DATA_8	Data signal G[0]
32	DATA_9	Data signal G[1]
33	DATA_6	Data signal B[6]
34	DATA_7	Data signal B[7]

Pin	Name	Function
35	DATA_4	Data signal B[4]
36	DATA_5	Data signal B[5]
37	DATA_2	Data signal B[2]
38	DATA_3	Data signal B[3]
39	DATA_0	Data signal B[0]
40	DATA_1	Data signal B[1]

3 Electrical features

3.1 Absolute Maximum Ratings

Symbol	Item	Min.	Max.	Unit
VDD	Digital circuit power supply	-0.3	2.2	V
VAN	Analog circuit power supply	-0.3	5.5	V
V_I	Input digital signal level	-0.3	VAN-0.3	V
Tst	Storage ambient temperature	-55	+75	℃

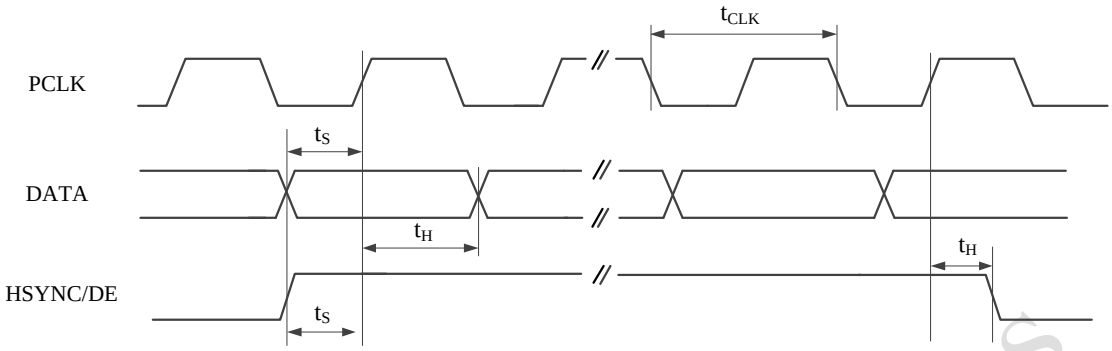
3.2 DC Characteristics

Symbol	Item	Min.	Typ.	Max.	Unit
V_D	VDD voltage	1.70	1.80	1.90	V
I_D	VDD current	—	—	40	mA
V_A	VAN voltage	4.90	5.00	5.10	V
I_A	VAN current	—	—	25	mA
V_{IL}	Valid low level of digital signal	-0.3	—	0.5	V
V_{IH}	Valid high level of digital signal	1.2	—	3.6	V
Top	Working ambient temperature	-45	+25	+65	℃

Note:

Digital input signals are compatible with 1.8V, 2.5V, 3.3V standards, but must meet the electrical standards in the table above.

3.3 **AC Characteristics**



Symbol	Item	Min.	Typ.	Max.	Unit
t_S	Setup time	4	—	—	ns
t_H	Hold time	1.5	—	—	ns
t_{CLK}	Clock cycle	—	15.4	—	ns
d_{CLK}	Duty cycle	45	50	55	%

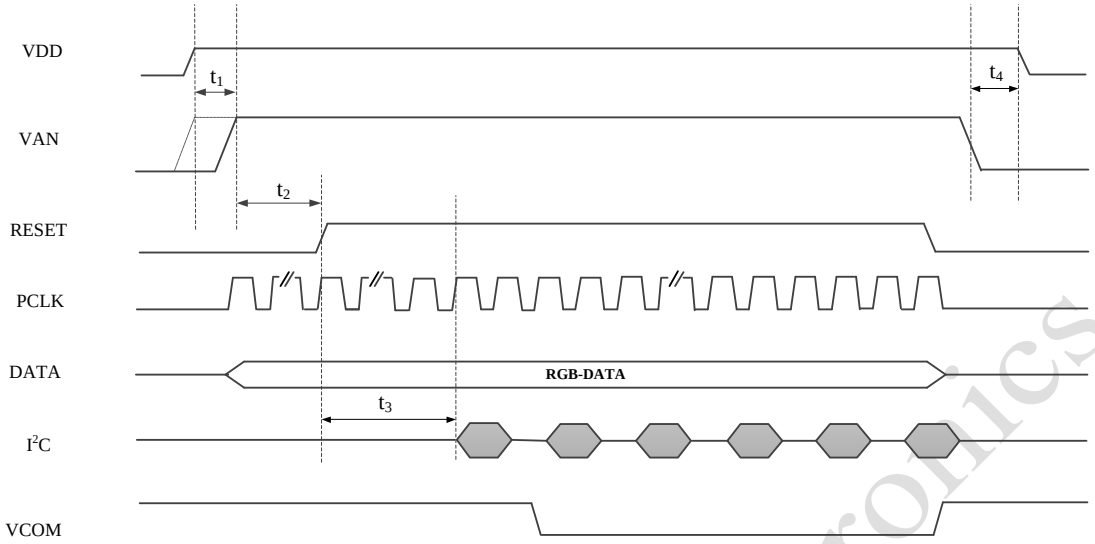
3.4 **Power Consumption**

Symbol	Item	Typ.		Unit
		60Hz	25Hz	
P_{VDD}	VDD power consumption	70	43	mW
P_{VAN}	VAN power consumption	80	77	mW
P_{POWER}	Total power consumption	150	120	mW

Note:

The brightness test condition is 200cd/m^2, the temperature test condition is +25℃ ±2℃, and the test screen is full white.

3.5 **Power Sequence**



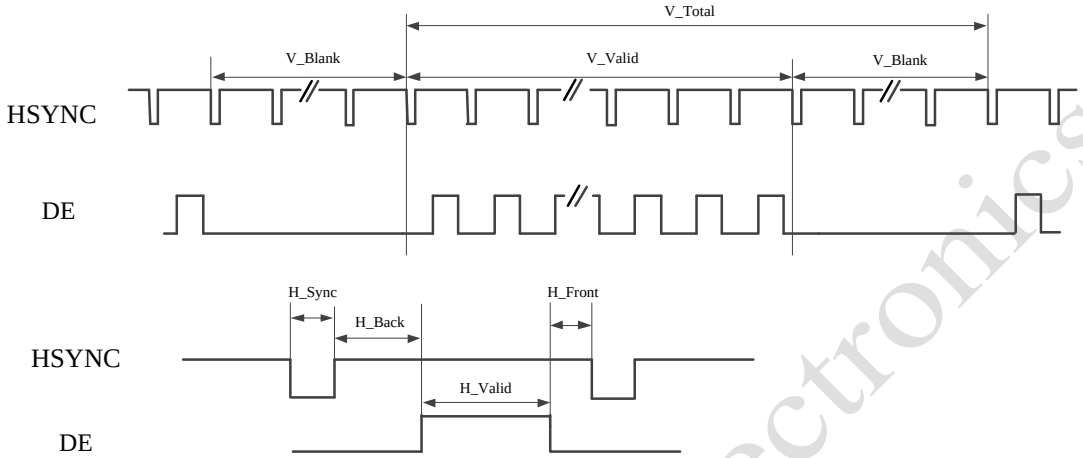
Symbol	Item	Min.	Typ.	Max.	Unit
t_1	VAN power-on delay	0	—	—	ms
t_2	Power settling time	5	—	—	ms
t_3	MTP content loading and data refresh time	frames time×5	—	—	—
t_4	Power-off interval time	0	—	—	ms

Note:

1. To avoid the display error, we need to ensure the accuracy of video data and at least a frame of time, then configure the 94H register with 0xDA, open VCOM voltage, light up the screen.
2. During power-off, if the VDD voltage is not lower than VAN voltage, two power supplies can be turned off at the same time.
3. Before RESET is pulled up, the PCLK needs to enter a steady state.

3.6 **Video sequence**

The timing of the video signal input to the microdisplay shall be in accordance with VESA Standard. When the timing of the video signal is not in accordance with VESA Standard, the parameters below can be configured according to the timing requirements as shown in figure.



Symbol	Item	Min.	Typ.	Max.	Unit
V_Blank	Field blanking period	22	38	240	HSYNC
V_Valid	Field validity period	—	768	—	HSYNC
H_Sync	Row blanking period synchronization period	20	136	500	PCLK
H_Back	Row blanking period back porch	20	160	500	PCLK
H_Front	Row blanking period front porch	20	24	500	PCLK
H_Valid	Row validity period	—	1024	—	PCLK

4 Function description

4.1 Register Map

Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	Default
01H	0	0	Internal test pattern selection			Input video format selection			0x03
03H	Signal scan start position selection								0x00
07H	Synchronization mode		1	0	Interlace/ progressive scanning		Vertical scanning	Horizontal scanning	0x20
08H	0	0	Direction of movement	Move the number of columns left/ right					0x00
09H	0	0	Direction of movement	Move the number of columns up/down					0x00
0AH	0	Left/ right shift enable	Up/ down shift enable	Timed movement distance (number of rows/ columns).					0x00
0BH	Time interval for movement TIME [31:24]								0x00
0CH	Time interval for movement TIME [23:16]								0x00
0DH	Time interval for movement TIME [15:8]								0x00
0EH	Time interval for movement TIME [7:0]								0x00
78H	Digital adjustment of image brightness								0x80
7CH	Digital adjustment of image contrast								0x80
8BH	Data mode selection								0x09
8CH	Internal temperature detection readings								read only
94H	Internal VCOM voltage enable control								0xD8
98H	Adjusts the internal VCOM voltage value of the screen								0x36
A9H	Brightness auto-adjust enable control								0x01
ACH	Counter range selection								0x11
ADH	Parity field difference								0x00
AEH	Counter start location selection								0x1F
B0H	R for red, internal 256-level gray scale selection								0x00
B1H	G for green, internal 256-level gray scale selection								0x00
B2H	B for blue, internal 256-level gray scale selection								0x00
B4H	Total pixels of rows H_Total [7:0].								0x40
B5H	0	0	0	0	Total pixels of rows H_Total [11:8]				0x05
B7H	Valid pixels of rows H_Valid [7:0]								0x00
B8H	0	0	0	0	Valid pixels of rows H_Valid [11:8]				0x04
BAH	Number of valid lines in a frame V_Valid [7:0]								0x00
BBH	0	0	0	0	Number of valid lines in a frame V_Valid [11:8]				0x03
BEH	Number of total lines in a frame V_Total [7:0]								0x26
BFH	0	0	0	0	Number of total lines in a frame V_Total [11:8]				0x03
C2H	First row display location								0x00
C3H	Last row display location								0x00
C4H	First column display location								0x00
C5H	Last column display location								0x00
C6H	0	1	0	0	PWM scan mode selection				0x44
CEH	PWM value								0x64

4.2 **Internal test diagram setting**

The microdisplay has a variety of built-in test diagrams, and different test images can be selected by setting the bit5-bit3 values of register 01H. External data and synchronization signals are not required when selecting an internal test diagram, only a stable clock signal PCLK is required.

Address	Number of bit	Detailed description
01H	bit5 - bit3	000：With registers 02H, 03H, 04H, 0~255 grayscale of R, G, B signals can be selected respectively 001: Pure white field 010: Pure red field 011: Pure green field 100: Pure blue field 101: Transition grayscale plot from left to right 110: Color bar 111: Checkerboard

4.3 **Video Interface**

4.3.1 Selection of input signal format

Address	Number of bit	Detailed description
01H	bit2 - bit0	000: 8bit - YCbCr, progressive mode, 8bit - BT.656, interlaced mode; 001: 16bit - YCbCr, 4:2:2 mode; 010: 24bit – YCbCr, 4:4:4 mode; 011: 24bit – RGB, 4:4:4 mode; 101: Internal test diagram;

When inputting video signals in different formats, the pin correspondence is shown as below.

Ports	BT.656 （Interlaced）	YCbCr （Progressive）	YCbCr 4:2:2	YCbCr 4:4:4	RGB 4:4:4
DATA23	GND	GND	GND	Y[7]	R[7]
DATA22				Y[6]	R[6]
DATA21				Y[5]	R[5]
DATA20				Y[4]	R[4]
DATA19				Y[3]	R[3]
DATA18				Y[2]	R[2]
DATA17				Y[1]	R[1]
DATA16				Y[0]	R[0]
DATA15	Y/Cb/Cr[7]	Y/Cb/Cr[7]	Y[7]	Cb[7]	G[7]
DATA14	Y/Cb/Cr[6]	Y/Cb/Cr[6]	Y[6]	Cb[6]	G[6]
DATA13	Y/Cb/Cr[5]	Y/Cb/Cr[5]	Y[5]	Cb[5]	G[5]
DATA12	Y/Cb/Cr[4]	Y/Cb/Cr[4]	Y[4]	Cb[4]	G[4]
DATA11	Y/Cb/Cr[3]	Y/Cb/Cr[3]	Y[3]	Cb[3]	G[3]
DATA10	Y/Cb/Cr[2]	Y/Cb/Cr[2]	Y[2]	Cb[2]	G[2]
DATA9	Y/Cb/Cr[1]	Y/Cb/Cr[1]	Y[1]	Cb[1]	G[1]
DATA8	Y/Cb/Cr[0]	Y/Cb/Cr[0]	Y[0]	Cb[0]	G[0]
DATA7	GND	GND	Cb/Cr[7]	Cr[7]	B[7]
DATA6			Cb/Cr[6]	Cr[6]	B[6]
DATA5			Cb/Cr[5]	Cr[5]	B[5]
DATA4			Cb/Cr[4]	Cr[4]	B[4]
DATA3			Cb/Cr[3]	Cr[3]	B[3]
DATA2			Cb/Cr[2]	Cr[2]	B[2]
DATA1			Cb/Cr[1]	Cr[1]	B[1]
DATA0			Cb/Cr[0]	Cr[0]	B[0]

4.3.2 ITU-R BT.656 format signal register setting

The micro display screen supports ITU-R BT.656 signals in embedded synchronous format. Take standard PAL-D video as an example, the register settings when the image is centered are shown as below.

Address	Value	Configuration description
01H	0x00	The BT.656 (interlaced) format is 0x00
03H	0x01	The BT.656 (interlaced) format is 0x01
07H	0x24	Interlace scanning is selected when it is embedded synchronization
8BH	0x08	When the number of valid pixels on a row is less than 1024, set to 0x08
ACH	0x10	When the number of valid pixels on a row is less than 1024, set to 0x10
ADH	0x01	Set to 0x01
AEH	0x10	Set to 0x10
B4H	0x60	H_Total is 0x360
B5H	0x03	
B7H	0xD0	H_Valid is 0x2D0
B8H	0x02	
BAH	0x20	V_Valid is 0x120
BBH	0x01	
BEH	0x38	V_Total is 0x138
BFH	0x01	
C2H	0x60	The first row shows the start position,(768-576)/ 2 is 96, and configured as 0x60
C3H	0x60	The last row shows the start position,(768-576)/2 is 96, and configured as 0x60
C4H	0x98	The first column shows the start position,(1024-720)/2 is 152, and configured as 0x98
C5H	0x98	The last column shows the start position,(1024-720)/2 is 152,and configured as 0x98
C6H	0x47	The BT.656 (interlaced) format is 0x47
CEH	0x64	PWM value, at which point the brightness is the greatest

Note:

When the input video signal is ITU-R BT.656 format, it is incompatible with the default factory 24bit-RGB format. For brightness adjustment and other functions, please contact Guozhao for technical support.

4.3.3 YCbCr signal format description

When the input digital video signal is in YCbCr encoding format, YCbCr digital signal needs color space transformation inside the chip, the transformation relationship is shown below follows.

$$R = Y + Cr \times 179/128 - 179$$

$$G = Y - Cb \times 44/128 - Cr \times 91/128 + 135$$

$$B = Y + Cb \times 227/128 - 227$$

Note:

The use status of the YCbCr encoding mode is not compatible with the default factory 24bit-RGB mode, the use scope and method need to be defined again. To use the YCbCr mode, contact Guozhao for technical support.

4.4 Up/down and/or right/left inverse display

Each setting mode is shown below.

Address	Number of bit	Detailed description
07H	bit1	Vertical display setting 0: Vertical normal display 1: Vertical mirror display
	bit0	Horizontal display setting 0: Horizontal normal display 1: Horizontal mirror display

（a）Default display

（b）Horizontal inverse

（c）Vertical inverse

（d）Horizontal and vertical inverse

4.5 **Image display position**

The micro display screen supports the display setting of the full-screen image at any position, and the horizontal and vertical offset position values can be set separately, and the max. value is 0x0A.

Address	Number of bit	Detailed description
08H	bit5	Enable setting in horizontal position 0: Display start point moves to the right; 1: Display start point moves to the left;
	bit4-bit0	Number of columns to move, ranging from 0x00 to 0x0A
09H	bit5	Enable setting in vertical position 0: Display start point moves down; 1: Display start point moves up;
	bit4-bit0	Number of columns to move, ranging from 0x00 to 0x0A

4.6 **Images move at regular intervals**

The microdisplay supports the dynamic movement in the horizontal or vertical direction. When the timed movement function is turned on, the whole screen image will automatically move at the set time interval in accordance with the order of down, right, up and left, with the same number of rows/ columns moving up and down and left and right, and finally return to the initial position before moving.

Address	Number of bit	Detailed description
0AH	bit6	Horizontal timed movement control 0: Dynamic movement function is turned off; 1: Dynamic movement function is turned on;
	bit5	Vertically timed movement control 0: Dynamic movement function is turned off; 1: Dynamic movement function is turned on;
	bit4-bit0	Number of columns/rows to move, range from 0x00 to 0x0A
0BH	bit7-bit0	The time interval for movement is STICK_TIME, and the unit interval is one frame; Register 0BH value is STICK_TIME[31:24]; Register 0CH value is STICK_TIME[23:16]; Register 0DH value is STICK_TIME[15:8]; Register 0EH value is STICK_TIME[7:0];
0CH	bit7-bit0	
0DH	bit7-bit0	
0EH	bit7-bit0	

Note:

There are 10 redundancy pixels on the top, bottom, left and right of the display screen, and when the dynamic movement function is turned on, the range of movement cannot exceed the range of redundant pixels.

4.7 **Compatible with low-resolution display**

The microdisplay is compatible with images with resolutions below 1024×768, such as 800×600, 640×480 resolution, or other irregular resolution image formats. When compatible with low-resolution display images, the register needs to be configured accordingly.

Take 800×600 resolution video images conforming to VESA standard as an example, the dot clock is 40 MHz, the refresh rate is 60Hz, H_Total is 1056 Pixels, and V_Total is 628 lines. The register configuration is shown below when the video image input in 24bit-RGB format is displayed in the center.

Address	Value	Description
01H	0x03	0x03 is in 24Bit-RGB format
8BH	0x08	Set to 0x08
ACH	0x10	Set to 0x10
B4H	0x20	H_Total is 0x420
B5H	0x04	
B7H	0x20	H_Valid is 0x320
B8H	0x03	
BAH	0x58	V_Valid is 0x258
BBH	0x02	
BEH	0x74	V_Total is 0x274
BFH	0x02	
C2H	0x54	The first row shows the start position,（768-600）/2 is 84 and configured as 0x54
C3H	0x54	The first row shows the start position,（768-600）/2 is 84 and configured as 0x54
C4H	0x70	The first column shows the start position,（1024-800）/2 is 112 and configured as 0x90
C5H	0x70	The first column shows the start position,（1024-800）/2 is 112 and configured as 0x90

Note:

The min. resolution must be no less than 534×278.

4.8 **Image zoom function**

The OLP061XGC02-01silicon-based OLED microdisplay adds the image scaling function, which enables full-screen display of images with a resolution lower than 1024×768, such as 800×600 resolution and 640×480 resolution. When scaling low resolution images, the registers need to be configured accordingly.

Address	Value	Description
01H	0x03	0x03 is in 24Bit-RGB format
05H	0x08	Zoom function enabled
06H	0x80	
9CH	0xFB	800x600 image zoom display
	0xC8	720x576 image zoom display
	0xCE	640x480 image zoom display

Address	Value	Description
01H	0x00	BT.656 register configuration
03H	0x01	
07H	0x24	
8BH	0x08	
ACH	0x10	
ADH	0x01	
AEH	0x10	
B4H	0x60	
B5H	0x03	
B7H	0xD0	
B8H	0x02	
BAH	0x20	
BBH	0x01	
BEH	0x38	
BFH	0x01	
C6H	0x47	
CEH	0x64	
05H	0x08	Zoom function enabled
06H	0x80	
9CH	0xC8	BT.656 image zoom display

4.9 **Temperature detection**

The microdisplayhas temperature detection function, and the temperature conversion formula is:

$$T = 0.48 \times Reg(8CH) - 47.3$$

Where: T is the actual temperature value and Reg(8CH) is the reading of the temperature register 8CH.

Note:

1. The temperature reading changes greatly during the initialization of the micro display screen, and it is recommended to read the temperature value after a few seconds of stabilization;
2. During normal operation, the temperature reading update cycle is four frame image cycles.

4.10 **Brightness adjustment**

The factory default luminance of the microdisplay is about 200cd/m^2, and the recommended brightness range is 40cd/m^2~ 400cd/m^2. The user can adjust the brightness appropriately according to the needs of the use. The luminance adjustment mode is the built-in PWM mode, the corresponding configuration register address is CEH, adjust the brightness by changing the values of register. The factory default value for the CEH register is 0x64, the adjustment step is 0x01, the higher the PWM value, the higher the brightness, and the PWM value corresponds to max. brightness is 0xC9.

The PWM value of the register is inversely proportional to the brightness of the screen, and the relationship formula is shown below.

$$L = (400 * 4M)/N$$

M indicates the PWM register value converted to decimal,;

N indicates the number of V_Total, and L indicates the brightness value.

The value of the PWM shall not exceed the V_Total value of total rows and needs to be used in constraints.

4.11 **Brightness adaptive adjustment**

Due to the varying full temperature features of silicon-based OLED micro display screen, the brightness increases at high temperature and decreases at low temperature. In order to improve the consistency of brightness at different temperatures, the micro display screen has built-in brightness adaptive adjustment mechanism, that is, the brightness of the screen is automatically compensated at different temperatures. Register A9 is enable control, and is 0x01 by default, to turn off this function, please set the configuration value to 0x00。

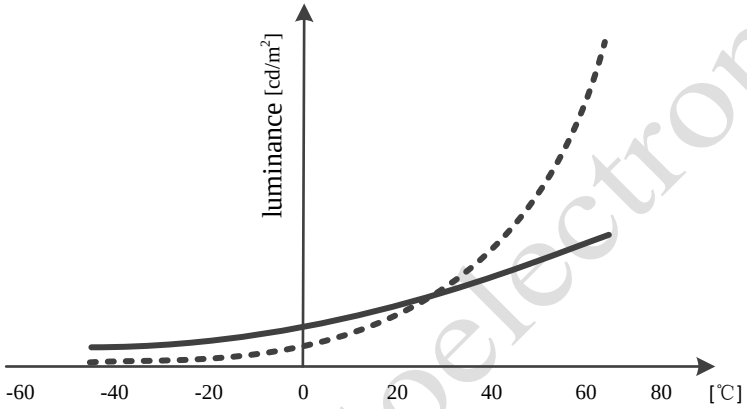


Figure above, the dashed line is the brightness curve at full temperature when the brightness adaptive adjustment is turned off, and the solid line is the brightness curve at full temperature after the brightness adaptive adjustment function is turned on. By test, after the brightness adaptive adjustment function is turned on, the brightness is effectively compensated in the high and low temperature sections, so that the brightness at high and low temperatures is as close as possible to the default brightness of normal temperature, and the image display effect basically meets the observation requirements at full temperature.

4.12 **Image brightness digital adjustment**

The micro display screen has built-in image brightness digital adjustment function, and the brightness adjustment formula is shown below:

$$Y = Y_0 + \quad (BRT - 128) \times 4$$

Y is the adjusted data value, Y_0 is the input image data value, and BRT is the configuration value of the 78H register. After adjustment, the low gray stage and the high gray stage may produce data overflow, resulting in image distortion, and it is recommended to configure it

as appropriate.

4.13 **Image contrast adjustment**

The micro display screen has built-in image contrast adjustment function, that is, the input image data is processed in the same proportion multiplier mode to achieve the effect of image contrast change. The image contrast adjustment register address is 7CH, and the adjustment range is 0x00 to 0xFF.

The contrast adjustment formula is shown below.

$$Y = Y_0 \times C_{ONT} / 64$$

Y is the adjusted data value, Y0 is the input image data value, and CONT is the 7CH register value.

4.14 **I2C serial port**

The user can set or read the values of the register inside the screen through the I2C serial port. The I2C serial port communication mode conforms to the standard communication protocol, and the host can realize the functions of test screen selection, brightness adjustment, contrast adjustment, temperature reading and so on through the reading and writing of the internal registers of the micro display screen.

The communication rate supports 10KHz~400KHz.

Note:

1. SDA and SCL signals must be pulled up resistors to VIH;
2. When the transmission distance of I2C communication signal is long, please pay attention to the the signal integrity and anti-interference measures of SDA and SCL.
3. When the I2C communication signal is seriously disturbed, I2C communication can be carried out during the field blanking interval, or the communication frequency can be appropriately reduced

4.14.1 Slave address selection

The microdisplay is used as a slave device, the address can be selected by SERADD pin, which is 0x54 when the SERADD pin is low and 0x55 when the SERADD pin is high. The specific slave address and read/ write instructions shown as below.

Slave address	instructions	Bit7 (MSB)	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1 (SERADD)	Bit0 (R/W)	Valid bytes
0x54	Write	1	0	1	0	1	0	0	0	0xA8
	Read	1	0	1	0	1	0	0	1	0xA9
0x55	Write	1	0	1	0	1	0	1	0	0xAA
	Read	1	0	1	0	1	0	1	1	0xAB

4.14.2 Data transfer format

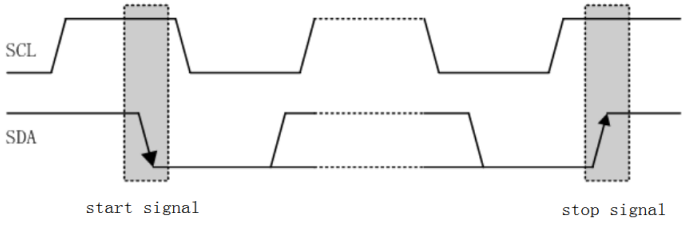
4.14.2.1 Mark bit description

Start signal(S): the change of SDA line from high level to low level when the SCL line is high level;

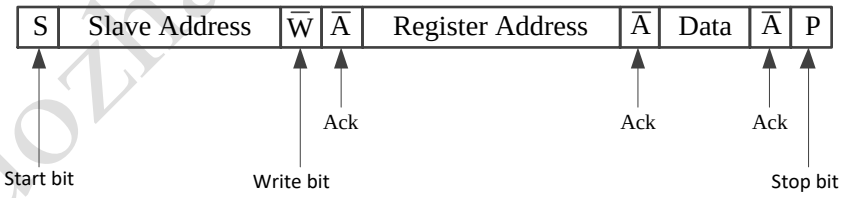
Pause signal (P): the change of SDA line from low level to high level when the SCL line is high level;

Active answer (ACK): SDA at low level indicates active answer;

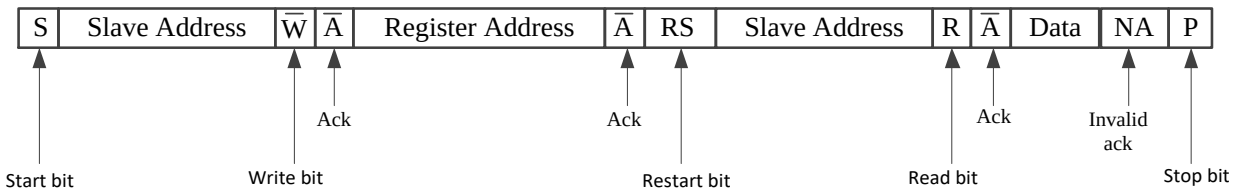
Negative answer (NAK): SDA at high level indicates negative answer;



4.14.2.2 Write data

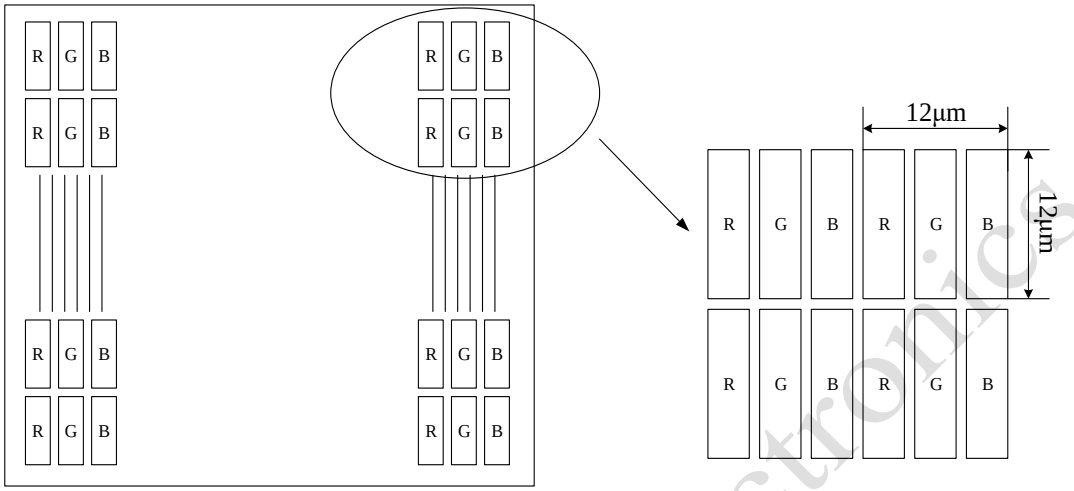


4.14.2.3 Read data



5 Optical features

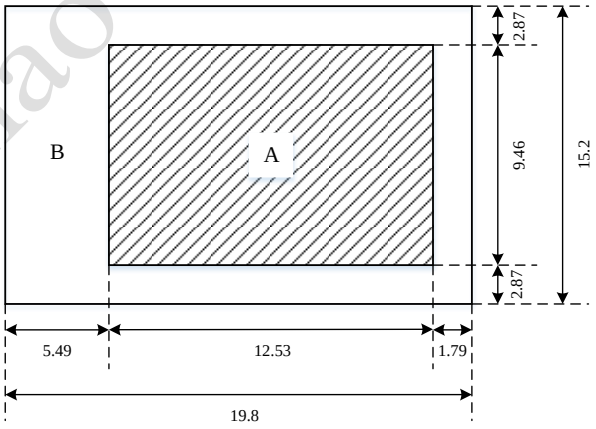
5.1 **Pixel arrangement**



The pixel arrangement of OLP060SVC01-06 silicon-based OLED microdisplay is shown as above, in which each three sub-pixel points form a pixel. The pixel size is 12μm×12μm.

5.2 **Display quality standard**

5.2.1 Display area definition



5.2.2 Defect point inspection standard

Defect points and defects refer to subpixels that do not display correctly, such as pixels that are always bright or dim. The inspection standard for defect points are carried out in accordance with the requirements.

No.	Item	Request
1	2 consecutive dead pixels	full-screen ≤ 1
2	3 or more consecutive dead pixels	0
3	Bright point	No
4	Bad line	No

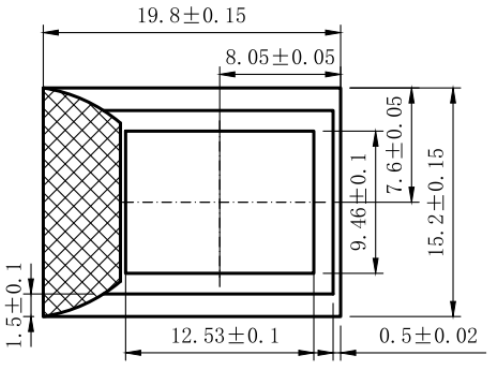
5.2.3 Test conditions

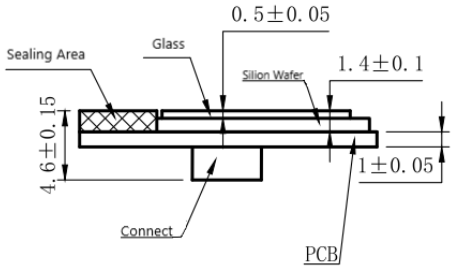
1) Use special test fixture to light up the micro display screen, and check the white-time display of the micro display screen under the brightfield of the microscope at a magnification of 100 ×(objective 10×, eyepiece 10×);
2) Use special test fixture to light up the micro display screen, the micro display screen shows the black field, and use the 12×eyepiece to observe the bright points.

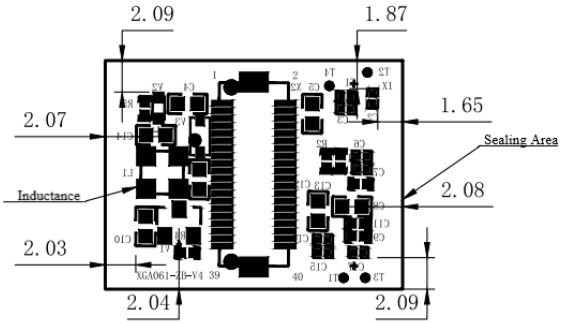
6 Structure and package

6.1 **Product structure**

The micros display screen is 19.8mm×15.2mm, other dimensions are shown as below.

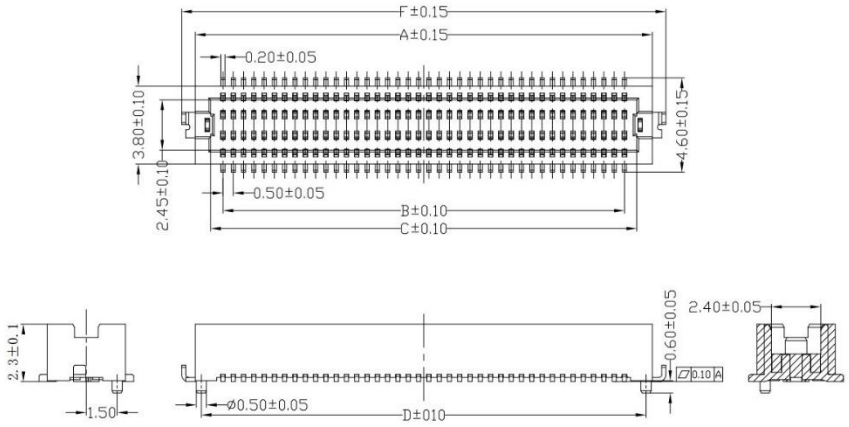






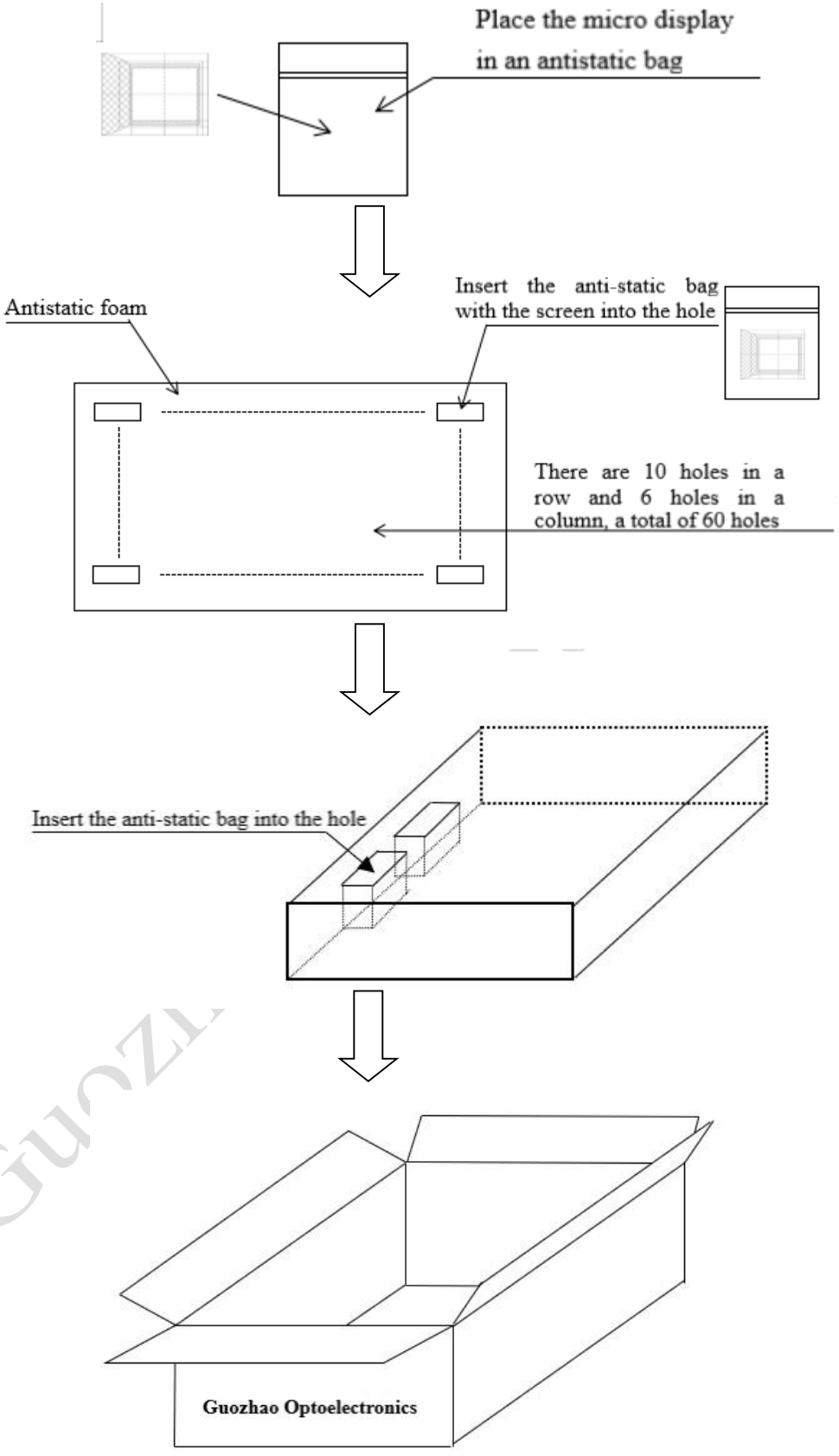
6.2 **Connector dimension and FPC design recommendation**

Unit: mm



Number of Contacts	Dimension(mm)					
	A	B	C	D	E	F
40	12.20	9.50	10.70	11.60	10.80	13.52

6.3 **Product package description**



7 Product precautions

7.1 Use precautions

1. OLP060SVC01-06 silicon-based OLED micro display screen shall be strictly in accordance with the definition of the electrical interface in this manual for power supply and connection signal lines, and maintain the stability of the power supply, and illegal power supply is not allowed;
2. During the use of micro display screen, if you find abnormities such as short circuit and hot, do not repeatedly power the machine to test, please timely find the problem or contact Guozhao Optoelectronics for maintenance;
3. In order to improve the service life of the product and avoid the aggravation of residual shadow, try to reduce the time for the product to display a fixed screen under high temperature or high brightness conditions;
4. The glass and silicon edges of the silicon-based OLED micro display screen are easily damaged and shall not be subject to physical stress;

7.2 Cleaning precautions

1. Do not use any acid, alkali, organic solution/ reagent and other chemicals to scrub or contact the product;
2. Use lens paper or clean cloth to dip a small amount of water or organic solvent, wring dry and wipe the silicon-based OLED microdisplay surface, do not directly clean with wet cloth;
3. 3When wiping the screen with organic solvents, try to avoid wiping the edge of the screen, otherwise it may damage the rubber layer.

7.3 Storage requirements

1. Short-term storage requirements: silicon-based OLED micro display screen allows short-term storage in a dry environment between -50 °C ~ 70 °C (≤ 100 hours);
2. Long-term storage requirements:

1) Room temperature of 25 ℃ ±5 ℃;

2) Dry nitrogen or vacuum sealed container;

3) Avoid violent shaking.

7.4 **Others**

1. Keep the silicon-based OLED micro display screen away from ultraviolet rays and ionizing radiation;
2. Do not bend the silicon-based OLED micro display screen by external force;
3. Keep the silicon-based OLED micro display screen away from heat sources during storage or use;
4. Avoid falling of the silicon-based OLED micro display screen at high altitude.
