



## **Tentative Product Specification**

**Module name: P0430WQLC-T**

**Issue date: 2007/12/26**

**Version: 1.0**

<b>Customer</b>		
<b>Approved by Customer</b>		
<b>Approved by CMEL</b>		
<b>PD Division</b>	<b>ENG Division</b>	<b>QA Dept</b>

**Note:**

1. The information contained herein may be change without prior notice. It is therefore advisable to contact CHI MEI EL Corp. before designed your product based on this specification.



**Reversion History**

<b>Version</b>	<b>Date</b>	<b>Page</b>	<b>Description</b>
Ver.1.0	2007/12/26	All	Tentative specification was first issued



### 1. Purpose:

This documentation defines general product specification for OLED module supplied by CMEL. The information described in this technical specification is tentative. Please Contact CMEL's representative while your product is modified.

### 2. General Description:

- Driving Mode: Active Matrix
- Color Mode: Full Color (16M color)
- Driver IC: HX5116, COG Assembly
- Interface:  
8bit serial RGB and 24bit parallel RGB interface
- Application: Portable DVD, PMP, GPS, Photo Frame etc.

### 3. Mechanical Data:

No.	Items	Specification	Unit
1	Diagonal Size	4.3	Inch
2	Resolution	480 RGB x 272	
3	Pixel Pitch	H: 0.198 V: 0.198	um
4	Active Area	95.0 x 53.8	mm
5	Outline Area	103.5 x 67	mm
6	Thickness	1.95	mm
7	Weight	TBD	g



#### 4. Maximum ratings:

Symbol	Parameter	Value	Unit
VCC	Logic Supply Voltage	-0.3 to +3.6	V
VCI	Analog Supply Voltage	-0.3 to +3.6	V
TA	Operating Temperature	-20 to +60	°C
Tstg	Storage Temperature	-40 to +85	°C

Table 7.1 Maximum ratings

Maximum ratings are those values beyond which damages to the device may occur. Functional operation should be restricted to the limits in the Electrical Characteristics tables or Pin Description section. Unused outputs must be left open.

## 5. Electrical Characteristic:

### 5.1 DC Characteristic

#### DC Characteristics

 (Unless otherwise specified, Voltage Referenced to VSS = 0V, VCC = 1.5 to 3.6V, T<sub>A</sub> = -20 to 70C)

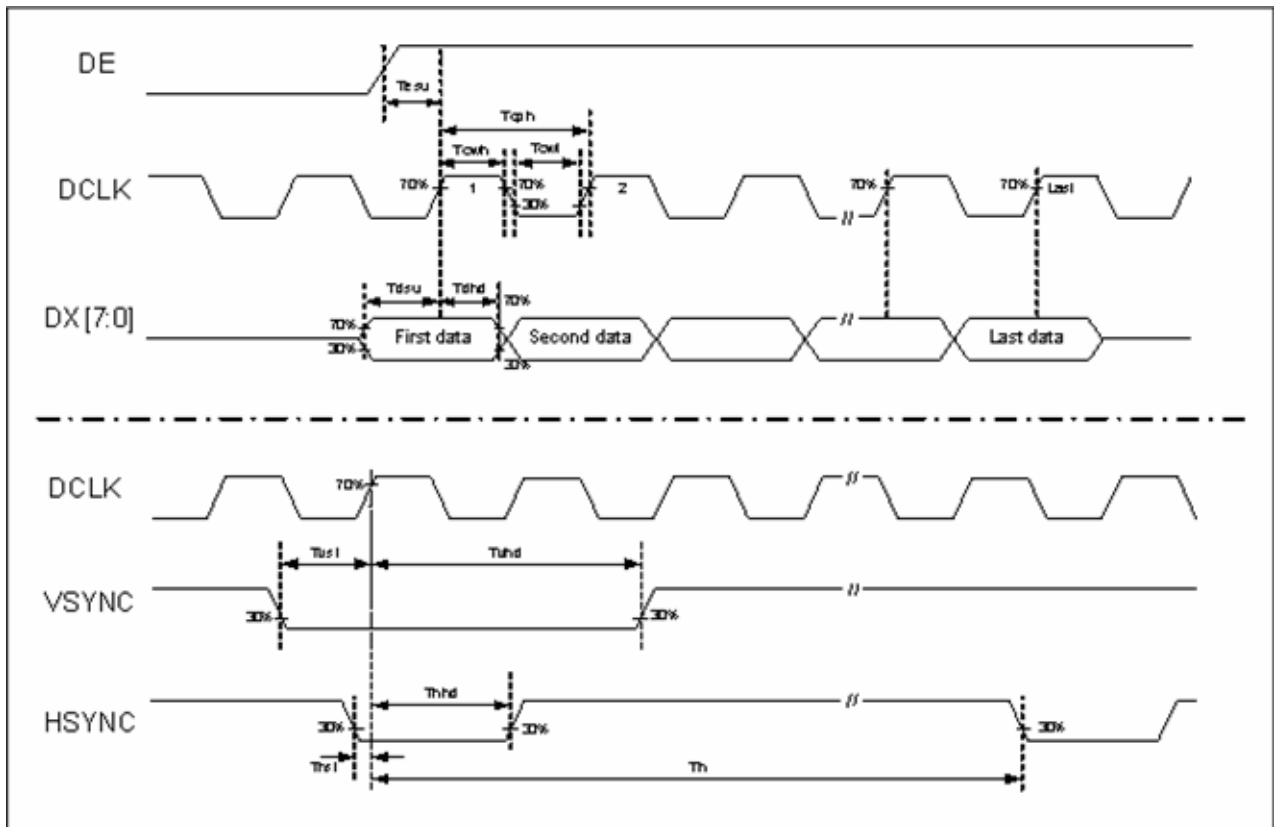
Parameter	Symbol	Test condition	Min.	Typ.	Max.	Unit
System power supply pins of the logic block	VCC	-	1.5	-	3.6	V
Booster Reference Supply Voltage Range	VCI	-	3.0	-	3.6	V
DDVDH Output Voltage 1	DDVDH	Set CP1X=0	4.9	5.1	5.3	V
DDVDH Output Voltage 2	DDVDH	Set CP1X=1	5.8	6.0	6.2	V
VGAM1OUT Output Voltage 1	VGAM1OUT	Set CP1X=0	4.7	4.8	4.9	V
VGAM1OUT Output Voltage 2	VGAM1OUT	Set CP1X=1	5.7	5.8	5.9	V
Gate driver High Output Voltage	VGH	-	+3	-	+8	V
Gate driver Low Output Voltage	VGL	-	-8	-	-3	V
OLED Diode Refer Voltage	ARREF	-	-8	-	+8	V
Logic High Output Voltage	VOH	I <sub>out</sub> =-400μA	0.8 * VCC	-	VCC	V
Logic Low Output Voltage	VOL	I <sub>out</sub> =400μA	0	-	0.2 * VCC	V
Logic High Input voltage	VIH	-	0.8 * VCC	-	VCC	V
Logic Low Input voltage	VIL		0	-	0.2 * VCC	V
Logic Input Current	IIL/IIH	No pull up or pull low	-1	-	1	μA
Pull high resistance	RH	Pull up pins	600	900	1200	KΩ
Pull low resistance	RL	Pull low pins	600	900	1200	KΩ
High Output Current	IOH	S1~S107, V <sub>o</sub> =4.9V vs. 4V	50	-	-	μA
Low Output Current	IOL	S1~S107, V <sub>o</sub> =0.1V vs. 1V	-	-	-50	μA
Output leakage Current	IOZ	-	-1	-	1	μA
Output voltage offset	VOS	S1~S107, V <sub>o</sub> =0.1V~DDVDH-0.1V		±10		mV
Output voltage deviation	VOD	S1~S107, V <sub>o</sub> =0.1V~DDVDH-0.1V		±10		mV
Analog standby current	ISTB	VCI=3.0V, Stand by mode		-	10	uA
Analog operating current	IVCI	VCI=3.0V, S1~S160 no load		TBD		mV
Analog operating current	IVCI	VCI=3.0V, S1~S160 no load		TBD		mV
Logic Pins Input Capacitance	CIN	-	-	5	7.5	pF



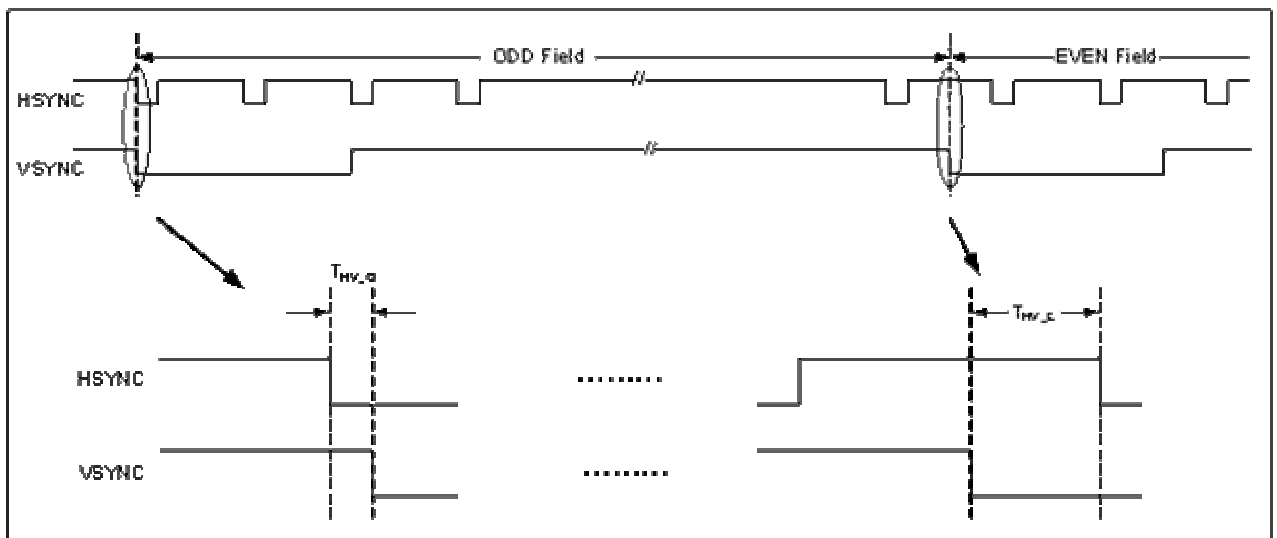
## 5.2 AC Characteristic

### 5.2.1 AC Electrical Characteristics

PARAMETER	Symbol	Min.	Typ.	Max.	Unit
HSYNC setup time	$T_{hst}$	10	-	-	ns
HSYNC hold time	$T_{hhd}$	10	-	-	ns
VSYNC setup time	$T_{vst}$	10	-	-	ns
VSYNC hold time	$T_{vhd}$	10	-	-	ns
Data setup time	$T_{dsu}$	10	-	-	ns
Data hold time	$T_{dhd}$	10	-	-	ns
DE setup time	$T_{esu}$	10	-	-	ns
VSYNC falling to HSYNC falling time on odd field @ RGB mode	$T_{HV\_O}$	-4	0	+4	$T_{CPH}$
VSYNC falling to HSYNC falling time on even field @ RGB mode	$T_{HV\_E}$	0.4	0.5	0.6	$T_H$
Source output settling time	$T_{ST}$	-	3	-	$\mu s$
Source output loading R	$R_{SL}$	-	25	-	K ohm
Source output loading C	$C_{SL}$	-	16	-	pF
Gate signals settling time (90%)	$T_{GL}$	-	0.5	-	$\mu s$
Gate signals loading R	$R_{GL}$	-	5.6	-	K ohm
Gate signals loading C	$C_{GL}$	-	30	-	pF
SW signals settling time (90%)	$T_{SW}$	-	0.6	-	$\mu s$
SW signals loading R	$R_{SW}$	-	1.4	-	K ohm
SW signals loading C	$C_{SW}$	-	85.5	-	pF



Clock and Data input waveforms



Define the HSYNC to VSYNC timing for RGB mode



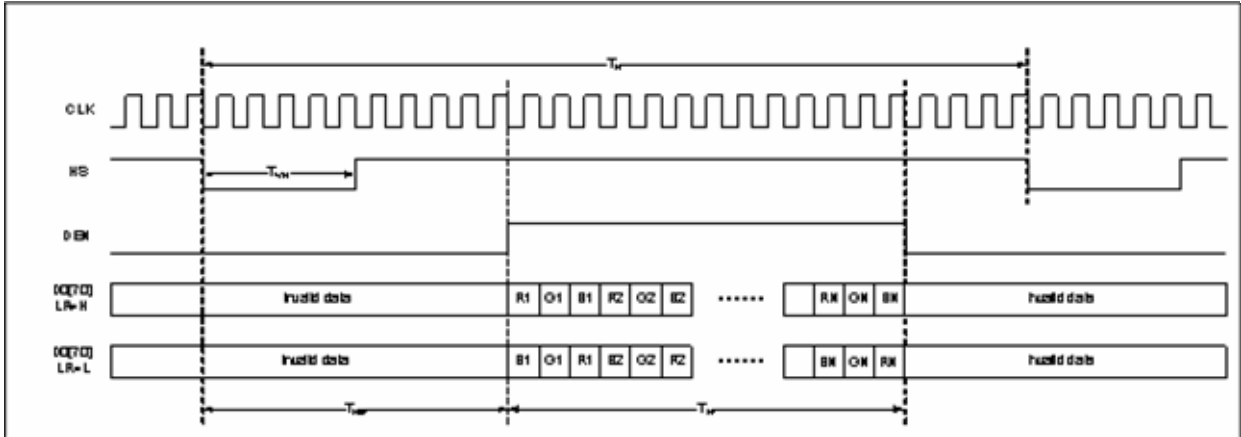
5.2.2 480RGB X 272 serial RGB interface

PARAMETER	Symbol	Min.	Typ.	Max.	Unit
DCLK frequency	$F_{CPH}$	33.3	-	-	MHz
DCLK period	$T_{CPH}$	-	-	30	ns
DCLK pulse duty	$T_{CWH}$	40	50	60	%
HSYNC period	$T_H$	-	1836	-	$T_{CPH}$
HSYNC pulse width	$T_{WH}$	5	90	-	$T_{CPH}$
HSYNC-first horizontal data time	$T_{HBP}$	274	306	337	$T_{CPH}$
DE pulse width	$T_{EP}$	-	1440	-	$T_{CPH}$
VSYNC pulse width	$T_{WV}$	1	3	5	$T_H$
VSYNC-1 <sup>st</sup> Data input (DE) time	$T_{VBP}$	4	20	35	$T_H$
VSYNC period	$T_V$	302	-	-	$T_H$

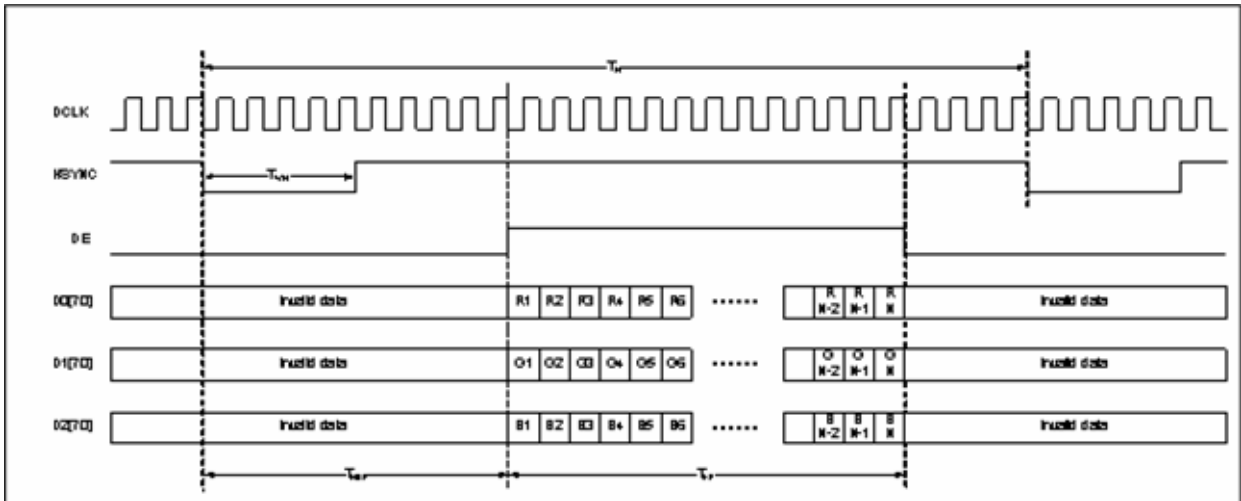
5.2.2 480RGB X 272 parallel RGB interface

PARAMETER	Symbol	Min.	Typ.	Max.	Unit
DCLK frequency	$F_{CPH}$	11.1	-	-	MHz
DCLK period	$T_{CPH}$	-	-	90	ns
DCLK pulse duty	$T_{CWH}$	40	50	60	%
HSYNC period	$T_H$	-	612	-	$T_{CPH}$
HSYNC pulse width	$T_{WH}$	5	30	-	$T_{CPH}$
HSYNC-first horizontal data time	$T_{HBP}$	70	102	133	$T_{CPH}$
DE pulse width	$T_{EP}$	-	480	-	$T_{CPH}$
VSYNC pulse width	$T_{WV}$	1	3	5	$T_H$
VSYNC-1 <sup>st</sup> Data input (DE) time	$T_{VBP}$	4	20	35	$T_H$
VSYNC period	$T_V$	302	-	-	$T_H$

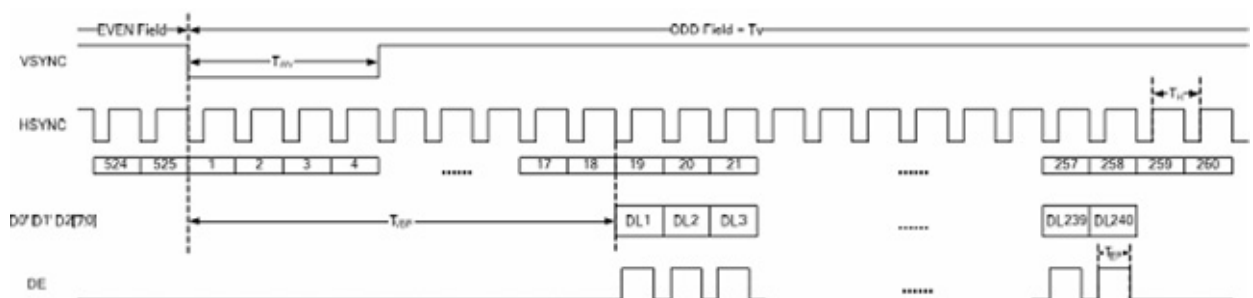




Serial RGB Horizontal Data Format



Parallel RGB Horizontal Data Format



Digital RGB Vertical Data Format



6. Electro-Optical Characteristic:

Items	Symbol	Min	Typ.	Max	Unit	Remark
Operating Luminance	L		250		Cd/m <sup>2</sup>	(1)(5)
Power Consumption	Pon			800	mW	30% pixels on (1)
Response Time	Tres			50	uS	(2)
CIE <sub>x</sub> (White)	W <sub>x</sub>		0.31		-	(5)
CIE <sub>y</sub> (White)	W <sub>y</sub>		0.33		-	(5)
Viewing Angle	VA	160	170		Degree	(3)
Contrast	CR	5000:1	10000:1			(4)
Operation Lifetime	LTop	20000			Hrs	(1)(6)

Note:

Measuring surrounding: dark room

Surrounding temperature: 25°C

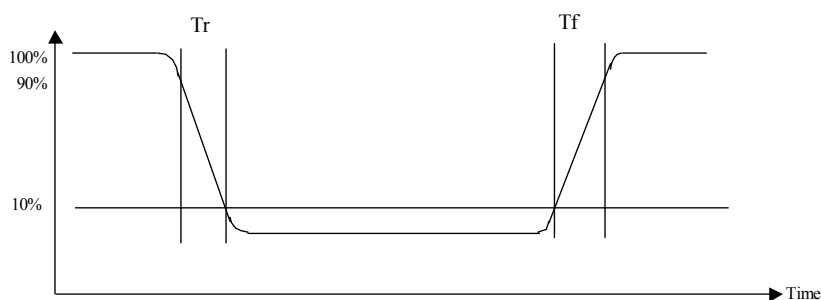
1. Test condition:

a. AR\_VDD= 5V, AR\_VSS= -5V

b. IC Initial Register Setting:

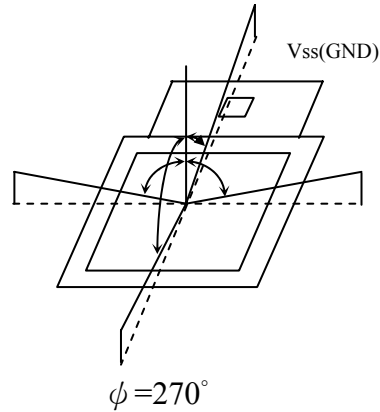
TBD

2. Response Time test condition





3. Viewing angle test condition:



4. Contrast

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

5. Optical tester: CA210

6. Brightness of 30% power consumption. Operating Life Time is defined when the luminance has decayed to less than 50% of the initial measured luminance before life test.



**7. System Diagram:**

TBD



8. Pin Assignment:

PIN	Symbol	I/O	Description	Remarks			
1	TP1	I	Touch panel P1				
2	TP2	I	Touch panel P2				
3	TP3	I	Touch panel P3.				
4	TP4	I	Touch panel P4				
5	AR_VSS	I	Negative voltage for OLED				
6	AR_VSS	I	Negative voltage for OLED				
7	AR_VSS	I	Negative voltage for OLED				
8	AR_VDD	I	Positive voltage for OLED				
9	AR_VDD	I	Positive voltage for OLED				
10	AR_VDD	I	Positive voltage for OLED				
11	ARREF	I/O	Panel refers voltage of the regulator ARREF or external input voltage. (-8V~+8V)				
12	VGL	I/O	Low Voltage output of regulator VGL or external input voltage. (-3V~-8V)				
13	VGH	I/O	High Voltage output of regulator VGH or external input voltage. (+3V~+8V)				
14	LVO	I/O	<b>Negative output voltage of the booster2. (-8.5V)</b>				
15	C22N	I/O	Connect to the step-up circuit, capacitors according to the step-up factor. Leave this pin open if the internal step-up circuit is not used.				
16	C22P						
17	HVO	I/O	Positive output voltage of the booster2. (8.5V)				
18	C21P	I/O	Connect to the step-up circuit, capacitors according to the step-up factor. Leave this pin open if the internal step-up circuit is not used.				
19	C21N						
20	C11N	I/O	Connect to the step-up circuit, 4capacitors according to the step-up factor. Leave this pin open if the internal step-up circuit is not used.				
21	C11P						
22	C12N						
23	C12P						
24	PVSS	P	Charge pump ground pin, it must connect to external ground.				
25	DDVDH	I/O	Output voltage of the booster1. (5.1V/6.0V)				
26	VSSA	P	<b>Analog ground pin. It must connect to external ground.</b>				
27	VSSA	P	<b>Analog ground pin. It must connect to external ground.</b>				
28	VCI	P	<b>A power supply for the Analog circuit. (2.7V~3.6V)</b>				
29	VCI	P	<b>A power supply for the Analog circuit. (2.7V~3.6V)</b>				
30	VGAM1OUT	I/O	Output voltage of the VGAM1OUT regulator and used positive power of source driver. (4.8V/5.8V)				
31	VDDD	I/O	Internal logic voltage input or output pin				
			VDC_ENB=0, VDDD is output, please connect to 1uF capacitor.				
			<table border="1"> <thead> <tr> <th>VDC0</th> <th>VDDD</th> <th>Status</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>1.8V</td> <td>Normal display</td> </tr> </tbody> </table>	VDC0	VDDD	Status	0
VDC0	VDDD	Status					
0	1.8V	Normal display					



		<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="width: 30px; text-align: center;">1</td> <td style="width: 30px; text-align: center;">2.5V</td> <td style="width: 30px; text-align: center;">OTP program</td> </tr> </table>			1	2.5V	OTP program	
1	2.5V	OTP program						
		VDC_ENB=1, VDDD is input. (Input range = 1.6V~2.75V)						
32	VCC	P	A power supply for the Digital circuit. (1.5V~3.6V)					
33	VSSD	P	Digital ground pin. It must connect to external ground.					
34	NRESET	I	Reset pin. Setting either pin low initializes the LSI. Must be reset after power is supplied. (Normally pull high)					
35	NCS	I	Serial Interface chip enable pin. (Normally pull high)					
36	SCL	I	Serial Interface clock input pin. (Normally pull high)					
37	SDA	I	Serial Interface data line. (Normally pull high)					
38	DE	I	Negative voltage for OLED					
39	VSYNC	I	Frame synchronizing signal.					
			If VSPL=0: Active low. If VSPL=1: Active high.					
40	HSYNC	I	Line synchronizing signal.					
			If HSPL=0: Active low. <b>If HSPL=1: Active high.</b>					
41	DCLK	I	Dot clock signal.					
			If DPL=0: Data are input on the rising edge of DOTCLK. <b>If DPL=1: Data are input on the falling edge of DOTCLK.</b>					
42	D27	I	Digital data input. DX0 is LSB and DX7 is MSB. (Normally pull low)					
43	D26		1. If parallel RGB input mode is used, D0X, D1X, and D2X indicate R,					
44	D25		G, and B data in turn.					
45	D24		2. If serial RGB or RGBD or CCIR601 or CCIR656 input mode is					
46	D23		selected, only D07~D00 are used, and others short to GND.					
47	D22		<b>DX7~DX0 has 8-bit width, respectively to compose 16,777,216</b>					
48	D21		<b>color and 256 gray scale of 1 pixel.</b>					
49	D20							
50	D17							
51	D16							
52	D15							
53	D14							
54	D13							
55	D12							
56	D11							
57	D10							
58	D07							
59	D06							
60	D05							
61	D04							



62	D03			
63	D02			
64	D01			
65	D00			
66	AR_VDD	I	Positive voltage for OLED	
67	AR_VDD	I	Positive voltage for OLED	
68	AR_VDD	I	Positive voltage for OLED	
69	AR_VSS	I	Negative voltage for OLED	
70	AR_VSS	I	Negative voltage for OLED	
71	AR_VSS	I	Negative voltage for OLED	







**10. Reliability Test:**

TBD



**11. Package:**

TBD