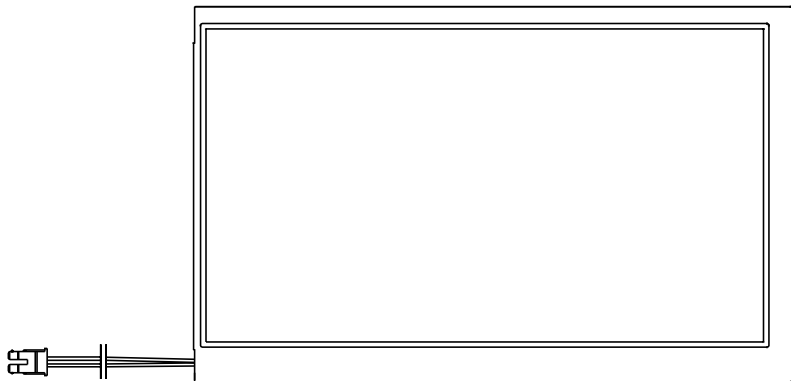




PRODUCT SPECIFICATION

HDA700L-2S

7", TFT WVGA (800X480) COLOR
LCD DISPLAY MODULE



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1. SUMMARY

This technical specification applies to 7" TFT-LCD module with a LED Backlight unit and a 40-pin TTL interface. This module supports 800*R.G.B x 480 WVGA mode and can display 262,144 colors.

2. FEATURES

- Thin and Light Weight.
- WVGA(800x480 pixels) resolution.
- 3.3 V TTL interface

3. GENERAL SPECIFICATIONS

Parameter	Specifications	Unit
Screen size	7"(Diagonal)	inch
Display Format	800 RGB x 480	dot
Active area	152.4x91.44	mm
Pixel size	190.5 x 190.5	um
Surface treatment	Anti-glare	
Color Saturation (NTSC)	45	%
Pixel Configuration	RGB Vertical Stripe	
Outline dimension	165(W) x 104.44(H) x 5.2 (D)	mm
Weight	TBD	g
View Angle direction (Gray inversion)	6 o'clock	
Temperature Range	Operation	-20~70 °C
	Storage	-30~80 °C

4. ABSOLUTE MAXIMUM RATINGS (GND=0V)

Item	Symbol	Condition	Min.	Max.	Unit	Remark
Power Voltage	Vcc	GND=0	-0.3	6	V	-
Input logic voltage	Vi	GND=0	-0.3	Vcc+0.3	V	Note1

Note 1: DCLK, DE, R0~ R5, G0~ G5, B0~ B5

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5. ELECTRICAL CHARACTERISTICS

5.1 Recommended Operation condition (GND=0, Ta=25)

Parameter		Symbol	Rating			Unit	Condition
			Min.	Typ.	Max.		
Power Supply Voltage		Vcc	3	3.3	3.6	V	
Input logic voltage	High Level	VIH	0.7Vcc	-	Vcc	V	Note 1
	Low Level	VIL	0	-	0.3Vcc	V	Note 1

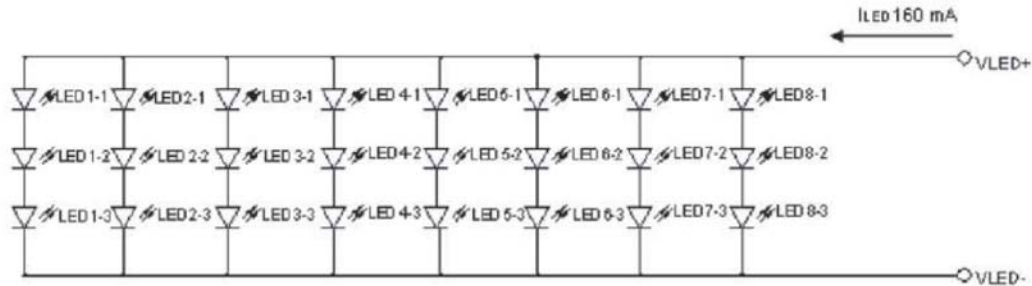
Note 1: DCLK, DE, R0~ R5, G0~ G5, B0~ B5.

5.2 LED Driving Conditions

Ta = 25

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED current	I _{LED}	-	160	-	mA	Note 1
LED voltage	V _{LED}	-	9.9	-	V	
LED Life Time	-	10,000	20,000	-	Hr	Note 2

Note 1: There are 8 Groups LED shown as below, V_{led}=9.9V, I_{led}=160mA



Note 2 : Brightness to be decreased to 50% of the initial value.

5.3 TFT-LCD current consumption

Parameter	Symbol	Rating			Unit	Condition
		Min.	Typ.	Max		
LCD power current	I _{cc}	--	200	260	mA	black pattern
LED power current	I _{LED}	--	160	200	mA	

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6. AC CHARACTERISTICS

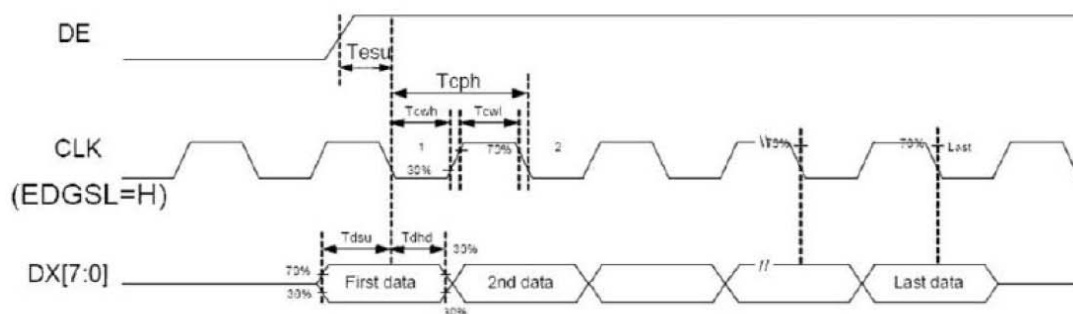
6.1 AC Electrical CHARACTERISTICS

Parameter	Symbol	Rating			Unit
		Min.	Typ.	Max	
Data setup time	T _{dsu}	6	-	-	ns
Data hold time	T _{dhd}	6	-	-	ns
DE setup time	T _{esu}	6	-	-	ns
CLK frequency	F _{CPH}	29.40	33.26	42.48	MHz
CLK period	T _{CPH}	23.54	30.06	34.01	ns
CLK pulse duty	T _{CWH}	40	50	60	%
CLK pulse duty	T _{CWL}	40	50	60	%
DE period	T _{DEH} +T _{DEL}	1000	1056	1200	T _{CPH}
DE pulse width	T _{DEH}	-	800	-	T _{CPH}
DE frame blanking	T _{DEB}	10	45	110	T _{DEH} +T _{DEL}
DE frame width	T _{DE}	-	480	-	T _{DEH} +T _{DEL}

Note We suggest using the typical value, so it can have better performance.

6.2 Timing Controller Timing Chart

Clock and Data input waveforms



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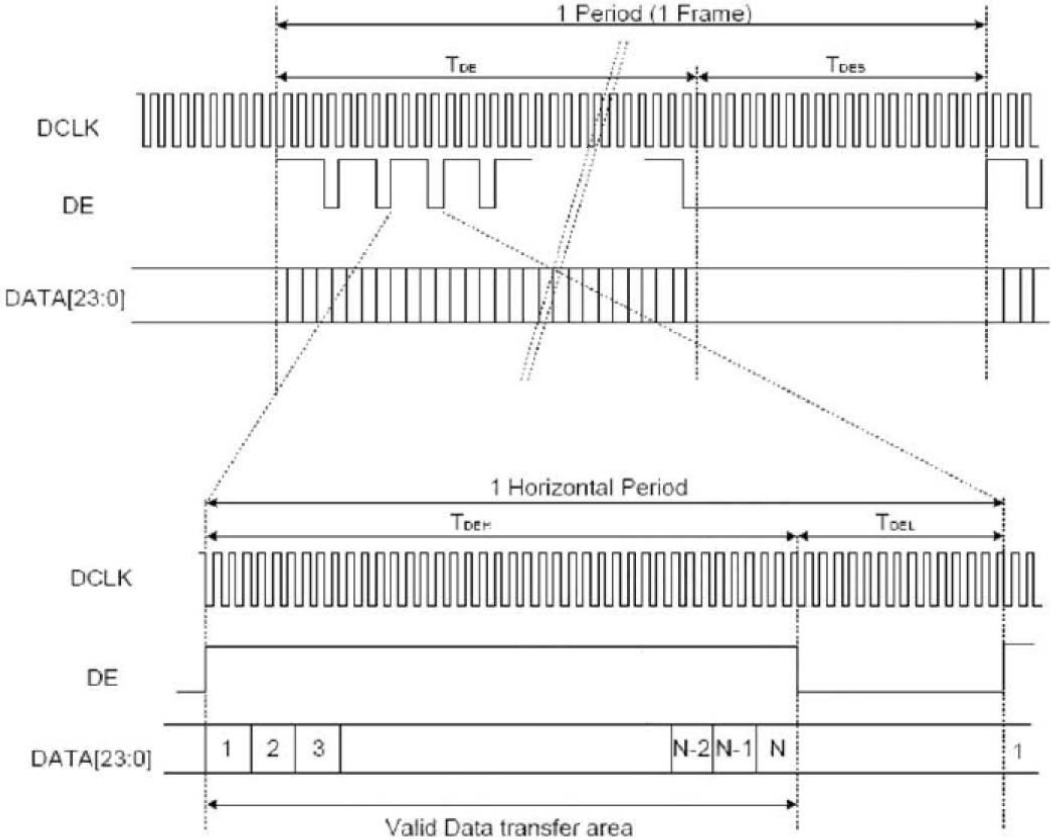
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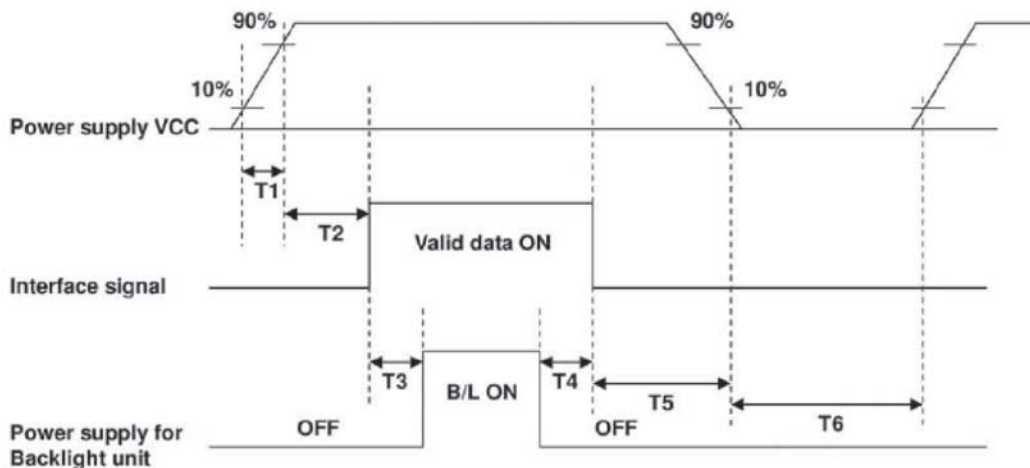
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6.3 Data input format



6.4 Power ON/OFF sequence



Parameter	SPEC.			Unit
	Min.	Typ.	Max.	
T1	1		2	ms
T2	0	60		ms
T3	200			ms
T4	200			ms
T5	1			ms
T6	1000			ms

7. OPTICAL CHARACTERISTIC

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Brightness	-	Viewing normal angle $\theta = \phi = 0$	300	350	-	cd/m ²	Center of display
Response time	Tr		-	5	10	ms	Note 3, 5
	Tf		-	11	16	ms	
Contrast ratio	CR			250	400	-	-
Color Chromaticity	White	Wx	0.249	0.299	0.349	-	Note 2, 6, 7
		Wy	0.278	0.328	0.378		
Viewing angle	Hor	θR	60	70	-	Deg.	Note 1
		θL	60	70	-		
	Ver	ϕ	50	60	-		
		ϕB	60	70	-		

Note 1: Definition of viewing angle range

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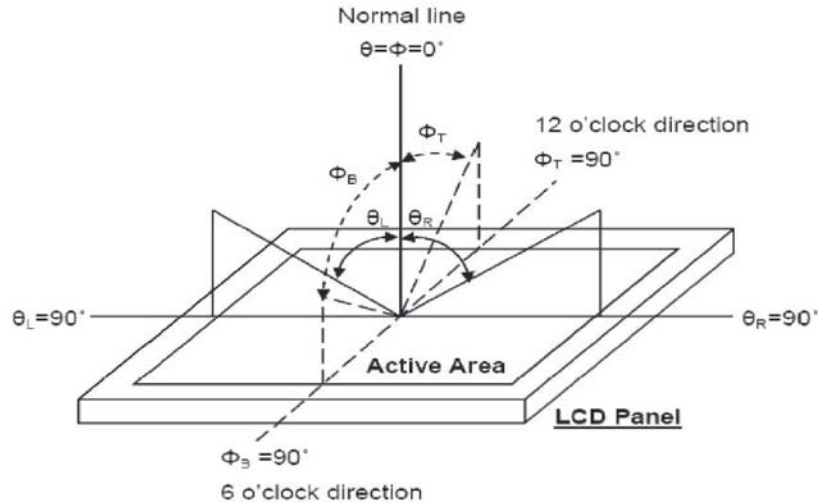


Fig. 7-1 Definition of viewing angle

Note 2: Test equipment setup:

After stabilizing and leaving the panel alone at a driven temperature for 10 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7 luminance meter 1.0° field of view at a distance of 50cm and normal direction.

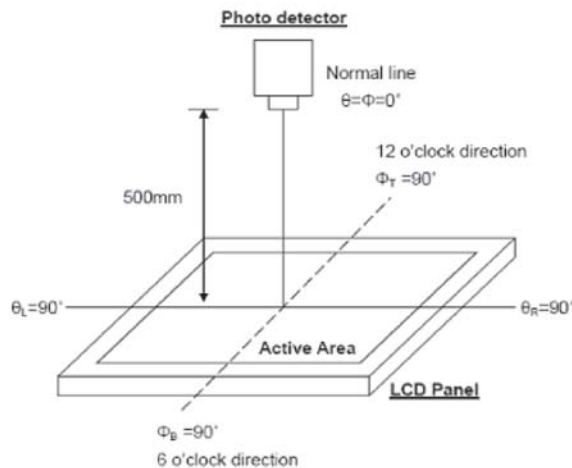


Fig. 7-2 Optical measurement system setup

Note 3: Definition of Response time:

The response time is defined as the LCD optical switching time interval between "White state and "Black" state. Rise time, T_r , is the time between photo detector output intensity changed from 90% to 10%. And fall time, T_f , is the time between photo detector output intensity changed from 10% to 90%

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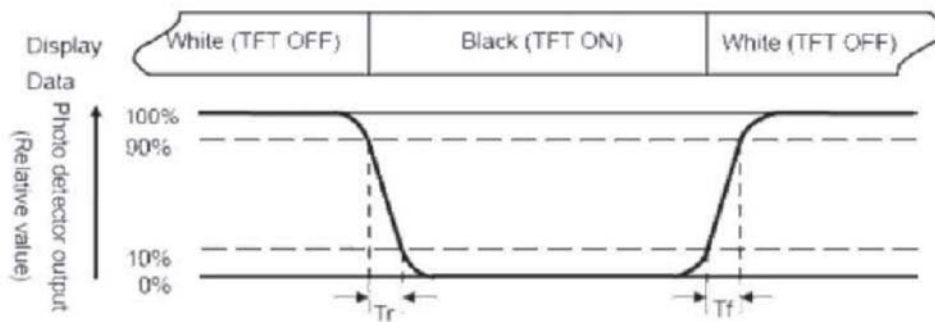


Fig. 7-3 Definition of response time

Note 4: Definition of contrast ratio:
The contrast ratio is defined as the following expression.

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5: White $V_i = V_{i50} \pm 1.5V$

Black $V_i = V_{i50} \pm 2.0V$

"±" means that the analog input signal swings in phase with VCOM signal.

"±" means that the analog input signal swings out of phase with VCOM signal.

The 100% transmission is defined as the transmission of LCD panel when all the input terminals of module are electrically opened.

Note 6: Definition of color chromaticity (CIE 1931)
Color coordinates measured at the center point of LCD

Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

Note 8 : Uniformity (U) = $\frac{\text{Brightness (min)}}{\text{Brightness (max)}} \times 100\%$ Brightness (max)

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8. INTERFACE

8.1 LCM PIN Definition

Pin No.	Symbol	Description	Remark
1	GND	Power Ground	
2	GND	Power Ground	
3	NC	Not Connect	
4	Vcc	Power Supply for Digital Circuit	
5	Vcc	Power Supply for Digital Circuit	
6	Vcc	Power Supply for Digital Circuit	
7	Vcc	Power Supply for Digital Circuit	
8	NC	Not Connect	
9	DE	Data Enable	
10	GND	Power Ground	
11	GND	Power Ground	
12	GND	Power Ground	
13	B5	Blue Data 5 (MSB)	
14	B4	Blue Data 4	
15	B3	Blue Data 3	
16	GND	Power Ground	
17	B2	Blue Data 2	
18	B1	Blue Data 1	
19	B0	Blue Data 0 (LSB)	
20	GND	Power Ground	
21	G5	Green Data 5 (MSB)	
22	G4	Green Data 4	
23	G3	Green Data 3	
24	GND	Power Ground	
25	G2	Green Data 2	
26	G1	Green Data 1	
27	G0	Green Data 0	
28	GND	Power Ground	
29	R5	Red Data 5 (MSB)	
30	R4	Red Data 4	
31	R3	Red Data 3	
32	GND	Power Ground	
33	R2	Red Data 2	
34	R1	Red Data 1	
35	R0	Red Data 0 (LSB)	
36	GND	Power Ground	
37	GND	Power Ground	
38	DCLK	Clock Signals ; Latch Data at the Falling Edge	
39	GND	Power Ground	
40	GND	Power Ground	

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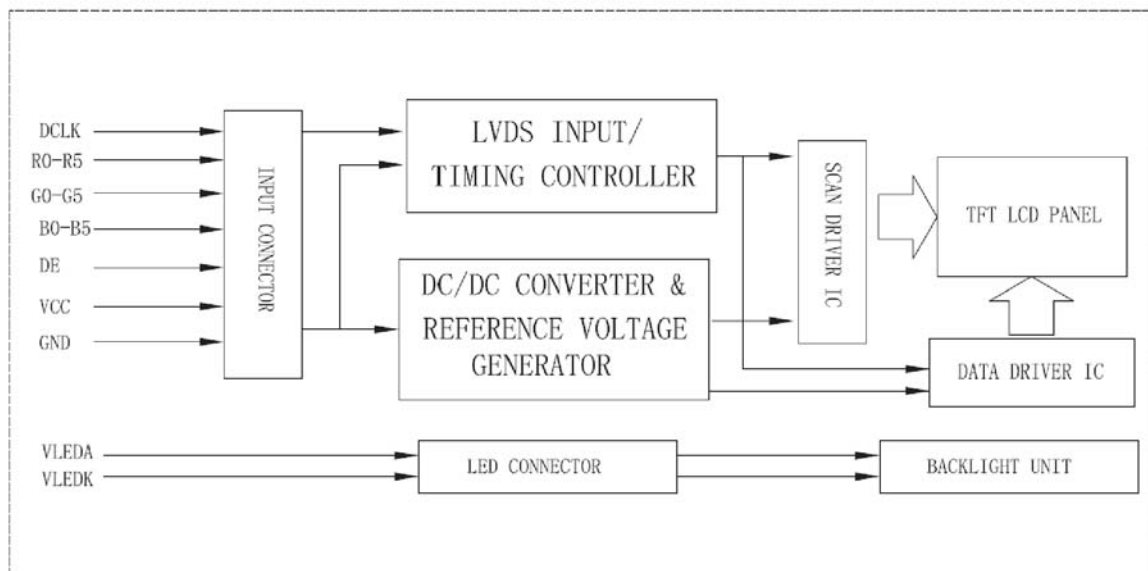
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8.2 Backlight Driving Part

Pin No.	Symbol	Description
1	VLEDA	Red, LED Anode
2	VLEDK	White, LED Cathode

9. BLOCK DIAGRAM

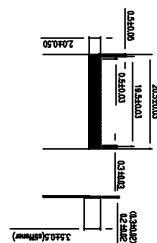
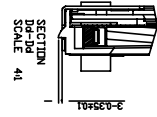
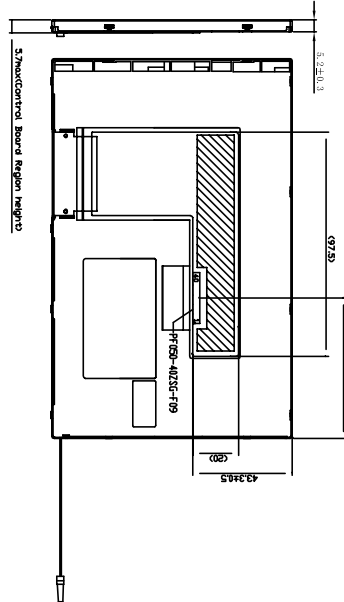
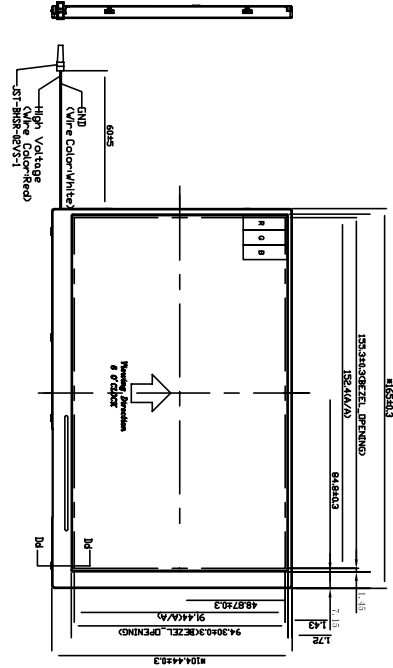


10. QUALITY ASSURANCE

No.	Test Items	Test Condition
1	High Temperature Storage Test	Ta=80°C Dry 240h
2	LOW Temperature Storage Test	Ta=-30°C Dry 240h
3	High Temperature Operation Test	Ta=70°C Dry 240h
4	LOW Temperature Operation Test	Ta=-20°C Dry 240h
5	High Temperature and High Humidity Operation Test	Ta=60°C 90%RH 240h
6	Electro Static Discharge Test	150pF,330Ω,±8KV(Contact)/±15KV(Air),5points/panel, 5 times/point
7	Shock Test(non-operating)	Half sine wave,180G,2ms one shock of each six faces I.e.run 180G 2ms for all six faces
8	Vibration Test(non-operating)	Sine wave,10~500~10Hz 1.5G,0.37oct/min 3axis,1hour/axis
9	Thermat Shock Test	-20°C(0.5h)~70°C(0.5h)/100 cycles(Dry)

****Ta=Ambient Temperature

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Pin No.	Symbol	Pin No.	Symbol
1	GND	21	G5
2	GND	22	G4
3	NC	23	G3
4	VCC	24	GND
5	VCC	25	G2
6	VCC	26	G1
7	VCC	27	GND
8	NC	28	GND
9	DE	29	B5
10	GND	30	B4
11	GND	31	B3
12	GND	32	GND
13	B5	33	B2
14	B4	34	B1
15	B3	35	B0
16	GND	36	GND
17	B2	37	GND
18	B1	38	DLK
19	B0	39	GND
20	GND	40	GND

Pin No.	Symbol	Wire Color
1	VDDA	Red
2	VDDK	White

- 1 Operating Voltage: $V_{cc}=3.3V \pm 5\%$
- 2 Resolution: **800RGB*480**
- 3 Color: **262K**
- 4 Interface: **RGB**
- 5 Display type: **Transmissive**
- 6 Viewing Direction: **6:00**
- 7 Operating Temp: **-20°C~70°C**
- 8 Storage Temp: **-30°C~80°C**
- 9 Driver IC: **HX8262*2, HX8678*1**
- 10 Unspecified tolerance: **±0.2**