



# PHOENIX DISPLAY INTERNATIONAL, INC.

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## PHOENIX DISPLAY INTERNATIONAL, INC

### SPECIFICATION FOR LCD MODULE

<b>CUSTOMER</b>	
<b>PART NUMBER</b>	PDI043WQHS-67
<b>DESCRIPTION</b>	4.3" 480*(RGB)*272
<b>VERSION</b>	V1.1
<b>ISSUE DATE</b>	12-Apr-19

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**Document Revision History**

<b>Version</b>	<b>Date</b>	<b>Page</b>	<b>Description</b>	<b>Changed By</b>
V1.0	2019-03-27	all	First issue	Aron
V1.1	2019-4-12	5,8,9	Update Brightness and Chromaticity	Aron

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# 1. LCM Specification

## 1.1 Description

TST043WQHS-67( is a transmissive type color active matrix liquid crystal display(LCD) which uses amorphous thin film transistor(TFT) as switching devices. This product is composed of a TFT LCD panel, a drive IC, a FPC, and a LED-backlight unit. The active display area is 4.3inches diagonally measured and the native resolution is 480\*RGB\*272.Features of this product are listed in the following table.

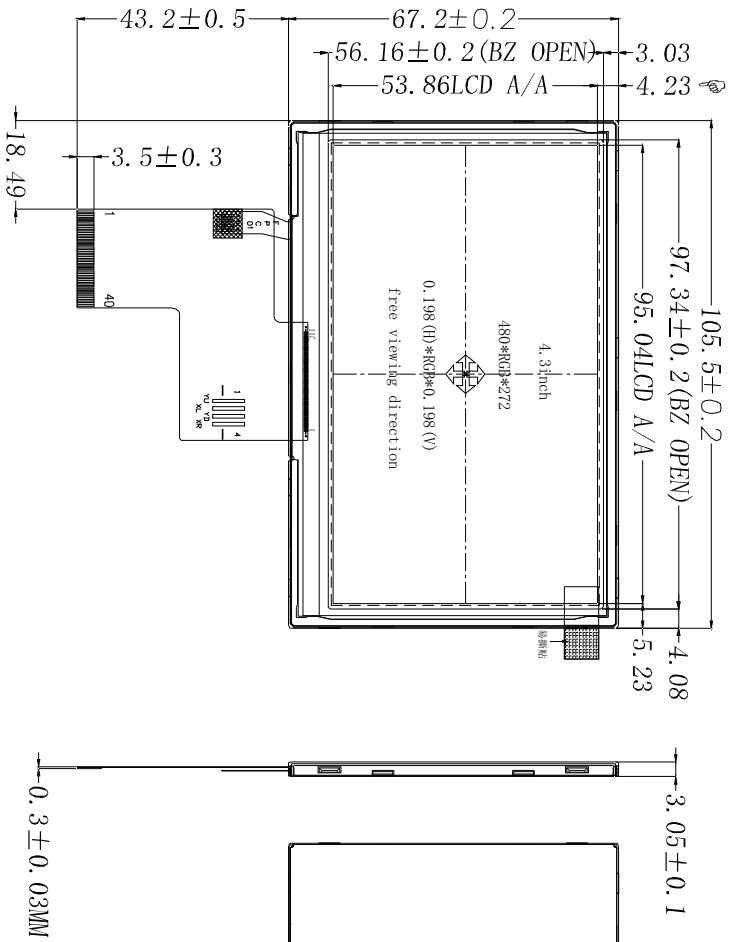
## 1.2 Functions & Features

**Table 1.1 Module Functions & Features**

<b>Parameter</b>	<b>Value</b>	<b>Unit</b>
LCD Mode	TFT/Transmissive	-
Color Depth	16.7M	-
Display Resolution	480*RGB*272	pixels
Module Size	105.5 (H)*67.2(V)*3.05(T)(Exclude FPC)	mm
Active Area (A.A.)	95.04 (L)* 53.86 (W)	mm
Pixel Arrangement	RGB-stripe	-
Viewing Direction	ALL	
Display Mode	Normally Black	
LCD Controller/Driver	ST7282	-
IC Package Type	COG	-
Interface	RGB24-bit	-
Power Supply Voltage	2.8~3.3	V
Backlight	White LED*16	pcs

# 2. Mechanical Specification

LCD Type	4.3" TFT Transmissive, Normally black/FPS
Resolution	480(RGB)*272
View Direction	free
Driver IC	ST7282
Color Depth	16.7M
Interface Types	RGB24-bit
Opening voltage	VDD=3.3V
TP/Lens	Without
Backlight LEDs	16 LEDs, 40mA, 24.8V
Surface luminance	900(TYP), 1000(Qmax)cd/m2, IF=40mA
Operating temperature	-20 °C ~ 70 °C
Storage Temperature	-30 °C ~ 80 °C
Storage Humidity	5~95% RH, 90% max



LCM PIN Definition

Pin	Signal	Description
1	LBD	Power for LBD
2	LBD	Power for LBD
3	GND	Power ground
4	VDD	Power supply
5	GND	Power ground
6	R0	Red data (R5B)
7	R1	Red data
8	R2	Red data
9	R3	Red data
10	R4	Red data
11	R5	Red data
12	G0	Green data (G5B)
13	G1	Green data
14	G2	Green data
15	G3	Green data
16	G4	Green data
17	G5	Green data
18	G6	Green data
19	G7	Green data
20	G8	Green data
21	B0	Blue data (B5B)
22	B1	Blue data
23	B2	Blue data
24	B3	Blue data
25	B4	Blue data
26	B5	Blue data
27	B6	Blue data (B5B)
28	B7	Blue data
29	B8	Blue data
30	GND	Power Ground
31	CLK	Panel clock
32	DISP	Panel enable on/off
33	HSYNC	Horizontal sync
34	VSYNC	Vertical sync
35	NC	Not to connect
36	NC	NC
37	GND	NC
38	YD	NC
39	XL	NC
40	TU	NC

Version	Change Record (Change History)	View Angle (View):	Ratio (Proportion):	Design (DESIGN)	Check (AUDITING)	Approval (APPROVED)
A0	初版	MM	1/1			
A1	按实样样品亮度重新图纸	MM	TST043MHHS-17			
A2		MM	A1		Arcon	2019.4.12

Need to pay attention to the key size with \*

### 3. Pin Descriptions (参见 P5 页模组图)

Pin No.	Symbol	Description
1	LED-	Cathode of LED backlight
2	LED+	Anode of LED backlight
3	GND	Power ground
4	VDD	Power voltage
5	R0	Red data (LSB)
6	R1	Red data
7	R2	Red data
8	R3	Red data
9	R4	Red data
10	R5	Red data
11	R6	Red data
12	R7	Red data (MSB)
13	G0	Green data (LSB)
14	G1	Green data
15	G2	Green data
16	G3	Green data
17	G4	Green data
18	G5	Green data
19	G6	Green data
20	G7	Green data(MSB)
21	B0	Blue data(LSB)
22	B1	Blue data
23	B2	Blue data
24	B3	Blue data
25	B4	Blue data
26	B5	Blue data
27	B6	Blue data
28	B7	Blue data(MSB)
29	GND	Power ground
30	DCLK	Pixel clock
31	DISP	Display on/off
32	HSYN	Horizontal sync signal
33	VSYNC	Vertical sync signal
34	DE	Data enable
35	NC	NO connect
36	GND	Power ground
37	NC	NO connect
38	NC	NO connect
39	NC	NO connect
40	NC	NO connect

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## 4. Electrical Units

### 4.1 Absolute Maximum Ratings

The absolute maximum ratings are list on Table 4.1. When used out of the absolute maximum ratings, the LCM may be permanently damaged. Using the LCM within the following electrical characteristics limit is strongly recommended for normal operation. If these electrical characteristic conditions are exceeded during normal operation, the LCM will malfunction and cause poor reliability.

**Table 4.1 Module Absolute Maximum Ratings**

Item	Symbol	Unit	Value	Note
Power Supply Voltage (1)	VCC	V	-0.3 to + 3.6	
Power Supply Voltage (2)	VGH ~ VSS	V	10.0 to +20.0	
Power Supply Voltage (3)	VSS ~ VGL	V	5.0 to +15.0	
Operating Temperature	Top	°C	-20 to +60	
Storage Temperature	Tst	°C	-30 to +70	
Operating Humidity	Hop	%(RH)	10~90	

(VSS=0V)

### 4.2 Electrical characteristics (Ta=25°C)

**Table 4.2:DC Characteristic (Vcc = 2.5 ~ 3.1V)**

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Voltage	Logic	VCC	---	2.8	-	3.3	V
Input Voltage	H level	V <sub>IH</sub>	---	0.8V <sub>dd</sub>	---	V <sub>dd</sub>	V
	L level	V <sub>IL</sub>		0	---	0.2V <sub>CC</sub>	
Current Consumption		I <sub>DD</sub>	With internal voltage generation; VDD=3.0V; Tamb=25°C;	---	---	TBD	mA
LCD Driving Voltage		VOP	---	---	TBD	---	V

## 4.3 Backlight Specification

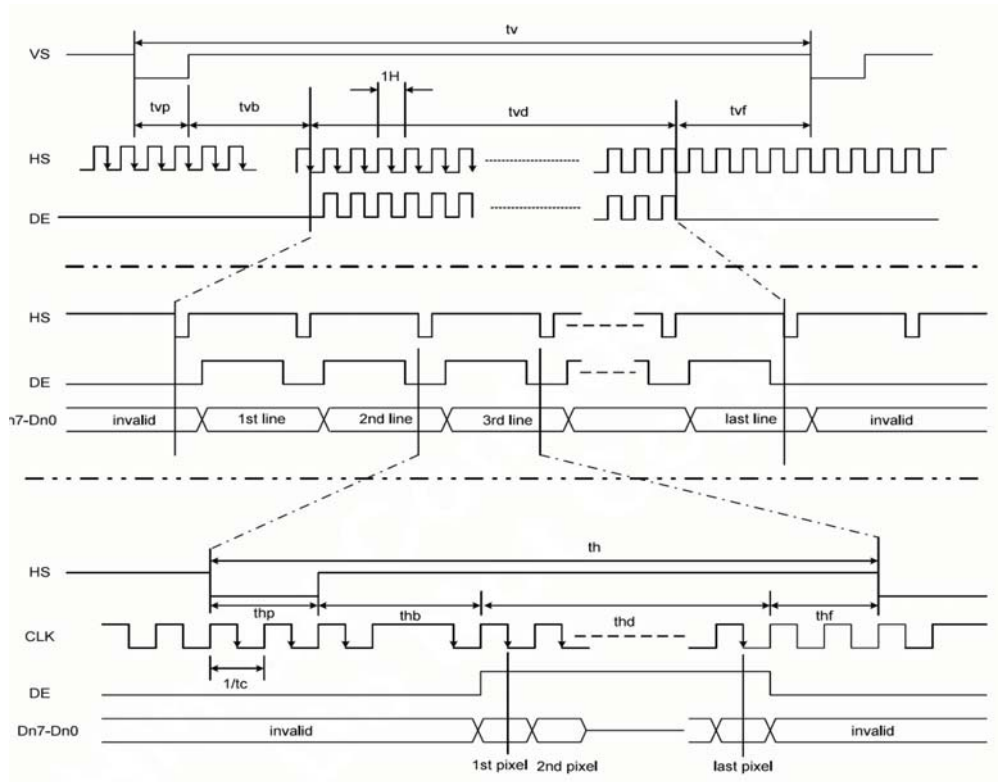
**Table 4.3 Back-light Characteristics**

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply Voltage	VF	Only Backlight	-	23.5	24.2	V
Supply Current	IF		-	30	40	mA
Average Brightness	IV	(With LCD dots all on)	-	780	1000	Cd/m2
CIE Color Coordinate (Without LCD)	X	Backlight Current IF=40mA	-	-	-	-
	Y		-	-	-	
Uniformity	B	Backlight Current IF=40mA	80	-	-	%
Color	White					

**Note:** With 16 pcs white LED parallel connection.

## 5. AC Characteristics

### 5.1 Parallel RGB Mode Timing Diagram





Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Clock cycle	$f_{CLK}^{(1)}$	-	9	15	MHz
Hsync cycle	$1/th$	-	17.14	-	KHz
Vsync cycle	$1/tv$	-	59.94	-	Hz
Horizontal Signal					
Horizontal cycle	th	525	525	605	CLK
Horizontal display period	thd	480	480	480	CLK
Horizontal front porch	thf	2	2	82	CLK
Horizontal pulse width	thp <sup>(2)</sup>	2	41	41	CLK
Horizontal back porch	thb <sup>(2)</sup>	2	2	41	CLK
Vertical Signal					
Vertical cycle	tv	285	286	399	H <sup>(1)</sup>
Vertical display period	tvd	272	272	272	H <sup>(1)</sup>
Vertical front porch	tvf	1	2	227	H <sup>(1)</sup>
Vertical pulse width	tvp <sup>(2)</sup>	1	10	11	H <sup>(1)</sup>
Vertical back porch	tvb <sup>(2)</sup>	1	2	11	H <sup>(1)</sup>

Note: (1) Unit: CLK=1/  $f_{CLK}$ , H= th,

(2) It is necessary to keep  $tvp+tvb=12$  and  $thp+thb=43$  in sync mode. DE mode is unnecessary to keep it.

## 6. Optical Specifications

Optical characteristics are determined after the unit has been 'ON' and stable for approximately 30 minutes in a dark environment at 25°C. The values specified are at an approximate distance 50cm from the TFT-LCD surface at a viewing angle of  $\Phi$  and  $\theta$  equal to 0° .

Measurement condition: Refer to next pages ( C-light source, Halogen Lamp )

\*1): with Polarizer \*2): without Polarizer \*3): Only Color Filter glass

Items	Symbol	Condition	Specifications			Unit	Note
			Min.	Typ.	Max.		
Contrast Ratio	CR		-	800	-	-	
Response Time	$T_R$		-	30	-	ms	
	$T_F$					ms	
Chromaticity	Red	$X_R$		TBD		-	
		$Y_R$		TBD		-	
	Green	$X_G$		TBD		-	
		$Y_G$		TBD		-	
	Blue	$X_B$		TBD		-	
		$Y_B$		TBD		-	
White	$X_W$		0.30	0.32	0.34	-	
	$Y_W$		0.36	0.38	0.40	-	
Viewing angle	Hor.	L(3 o'clock)	Center CR≥10	-	80	-	deg.
		R(9 o'clock)		-	80	-	
	Ver.	U(12 o'clock)		-	80	-	
		D(6 o'clock)		-	80	-	

## 7. Reliability Test Items

No.	Test Items	Test Condition	Remarks
1	High Temperature Storage	T = 80°C for 240hr	Module (Without Contamination)
2	Low Temperature Storage	T = -30°C for 240hr	
3	High Temperature Operating	T = 70°C for 240hr	
4	Low Temperature Operating	T = -20°C for 240hr (But no condensation of dew)	
5	High Temp. and High Humidity Operating	T = 50°C /90% for 240hr (But no condensation dew)	
6	Thermal Shock	-20±2°C~25~70±2°C × 10cycles (30min.) (5min.) (30min.)	
7	ESD test	Voltage: ±8KV R: 330 Ω , C:150pF,Air  discharge, 10time	
8	Packing Shock	1corner, 3edge, 6face / 1.0mDrop	Packing
9	Packing Vibration	Frequency: 10Hz~55Hz~10Hz  Amplitude: 1.5mm,  X, Y, Z direction for total 3hours	