Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

PROPRIETARY NOTE
THIS SPECIFICATION IS THE PROPERTY OF BOE BJ AND SHALL NOT BE REPRODUCED OR COPIED WITHOUT THE WRITTEN PERMISSION OF BOE BJ AND MUST BE RETURNED TO BOE BJ UPON ITS REQUEST

BOE

SPEC. NUMBER	PRODUCT GROUP	Rev.	ISSUE DATE	PAGE
	TLCM	P0	2016.03.30	1 OF 32

NT156WHM-T00

Preliminary Product Specification

Rev. P0

www.panelook.com

CHONGQING BOE OPTOELECTRONICS TECHNOLOGY CO.,LTD

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

PRODUCT GROUP	REV	ISSUE DATE	BOE
TLCM PRODUCT	P0	2016.03.30	

SPEC. NUMBER	SPEC. TITLE	PAGE
	NT156WHM-T00 Preliminary Product Specification	2 OF 32

REVISION HISTORY

REV.	ECN No.	DESCRIPTION OF CHANGES	DATE	PREPARED
P0	-	Initial Release	2016.3.30	

www.panelook.com

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

Contents

No.	Items	Page
	REVISION HISTORY	2
	CONTENTS	3
1.0	General Description	4
2.0	Absolute Maximum ratings	6
3.0	Electrical specifications.	7
4.0	Optical specifications.	10
5.0	Interface Connection	15
6.0	Signal Timing Specification	18
7.0	Input Signals, Basic Display Colors & Gray Scale of Colors	20
8.0	Power Sequence	21
9.0	Mechanical Characteristics	22
10.0	Reliability Test	23
11.0	Handling & Cautions.	23
12.0	Label	24
13.0	Packing information	25
14.0	Mechanical Outline Dimension	27
15.0	EDID Table	29

www.panelook.com

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

1.0 General Description

1.1 Application

- Notebook PC With Touch function

1.2 General Specification

1.2.1.General LCM Specification(Table 1.)

<Table 1. General LCM Specifications>

Parameter	Specification	Unit	Remarks
Active area	344.23(H) × 193.54(V)	mm	
Number of pixels	1366 (H) × 768 (V)	pixels	
Pixel pitch	0.252 (H) × 0.252 (V)	mm	
Pixel arrangement	RGB Vertical stripe		
Display colors	262K	colors	
Display mode	Normally White		
Outline Dimension	359.5(H)*223.8(V) (W/PCB)*3.4(Max) 359.5(H)*206.5(V)*3.2(Max)	mm	
Weight	370 (max)	g	
Back-light	Lower Down side, 1-LED Lighting Bar type		Note 1
Power consumption	P_D: 1.0(max)	W	
	P_{BL}: 2.6(max.)	W	
	3.6(max.)	W	

Notes : 1. LED Lighting Bar (36*LED Array)

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

1.2.2.General Touch Specification(Table 2.)

<Table 2. General Touch Specifications>

Parameter	Specification	Unit	Remarks
Type of Touch Sensor	Self Capacitance		
Touch Structure	On Cell		
Panel Size	15.6”		
Outline Dimension	N/A(Cover Lens Free)	mm	
TP View Area	N/A(Cover Lens Free)	mm	
TP Active Area	X 345.96 × Y 193.74	mm	
Total Thickness	N/A(Cover Lens Free)	mm	
Interface	USB		
Report Rate	Follow win8 – 100Hz		
Multi-Touch Point	10 points		
Input method	Finger		
Touch panel sensor IC	G7500		
Channel	1500		
Surface treatment	N/A		
Surface Hardness	3	H	
Support OS	Win8.x and Win10 compliant		
TP Power Consumption	220 max.	mW	@ 5 finger

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

2.0 ABSOLUTE MAXIMUM RATINGS

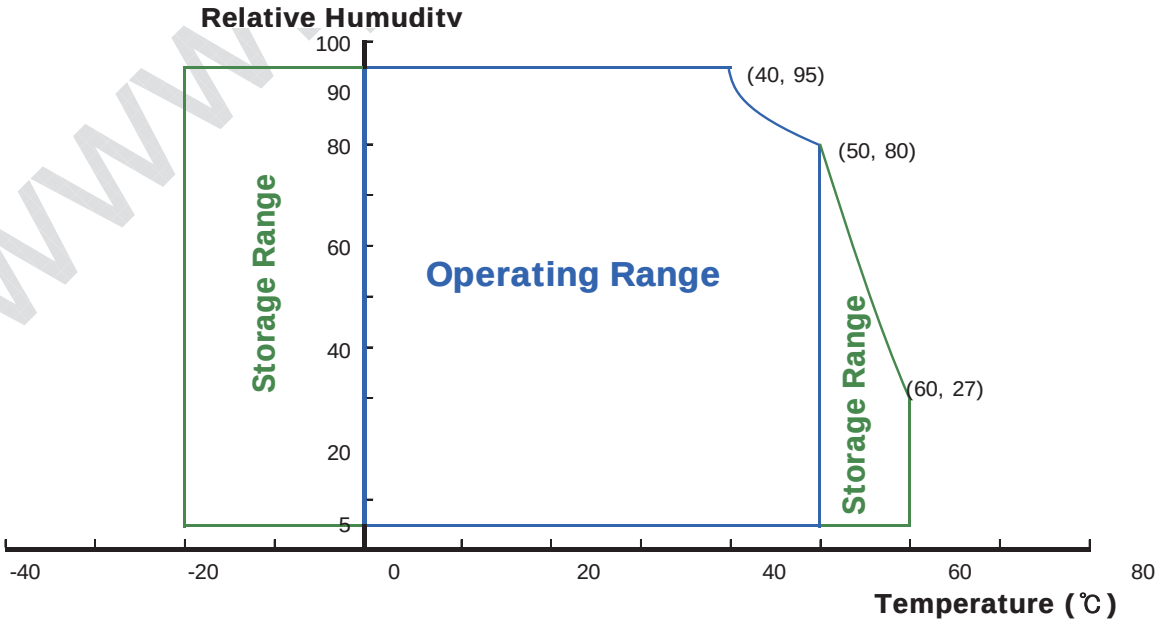
The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 3.

< Table 3. Absolute Maximum Ratings> Ta=25+/-2°C

Parameter	Symbol	Min.	Max.	Unit	Remarks
Power Supply Voltage	V_{DD}	-0.3	4.0	V	Note 1
Logic Supply Voltage	V_{IN}	V_{SS}-0.3	V_{DD}+0.3	V	
Operating Temperature	T_{OP}	0	+50	℃	Note 2
Storage Temperature	T_{ST}	-20	+60	℃	

Notes : 1. Permanent damage to the device may occur if maximum values are exceeded functional operation should be restricted to the condition described under normal operating conditions.

2. Temperature and relative humidity range are shown in the figure below.
95 % RH Max. (40 ^{O}C ≥ Ta)
Maximum wet - bulb temperature at 39 ^{O}C or less. (Ta > 40 ^{O}C) No condensation.



One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

3.0 ELECTRICAL SPECIFICATIONS

3.1 Electrical Specifications

< Table 4. Electrical specifications > Ta=25+/-2°C

Parameter		Min.	Typ.	Max.	Unit	Remarks
Power Supply Voltage	V_{DD}	3.0	3.3	3.6	V	Note 1
Permissible Input Ripple Voltage	V_{RF}	-	-	100	mV	At V_{DD} = 3.3V
Power Supply Current	I_{DD}	-	197	-	mA	Note 1
Differential Input Voltage	V_{ID}	100	-	600	mV	
Power Consumption	P_D	-	0.65	1.0	W	Note 1
	P_{BL}	-	-	2.6	W	Note 2
	P_{total}	-	-	3.6	W	

Notes : 1. The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for 3.3V at 25℃.
a) Typ : Mosaic Pattern
b) Max : Skip sub pixel255

2. Calculated value for reference (VLED× ILED)

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

3.2 Backlight Unit

< Table 5. LED Driving guideline specifications >

Ta=25+/-2°C

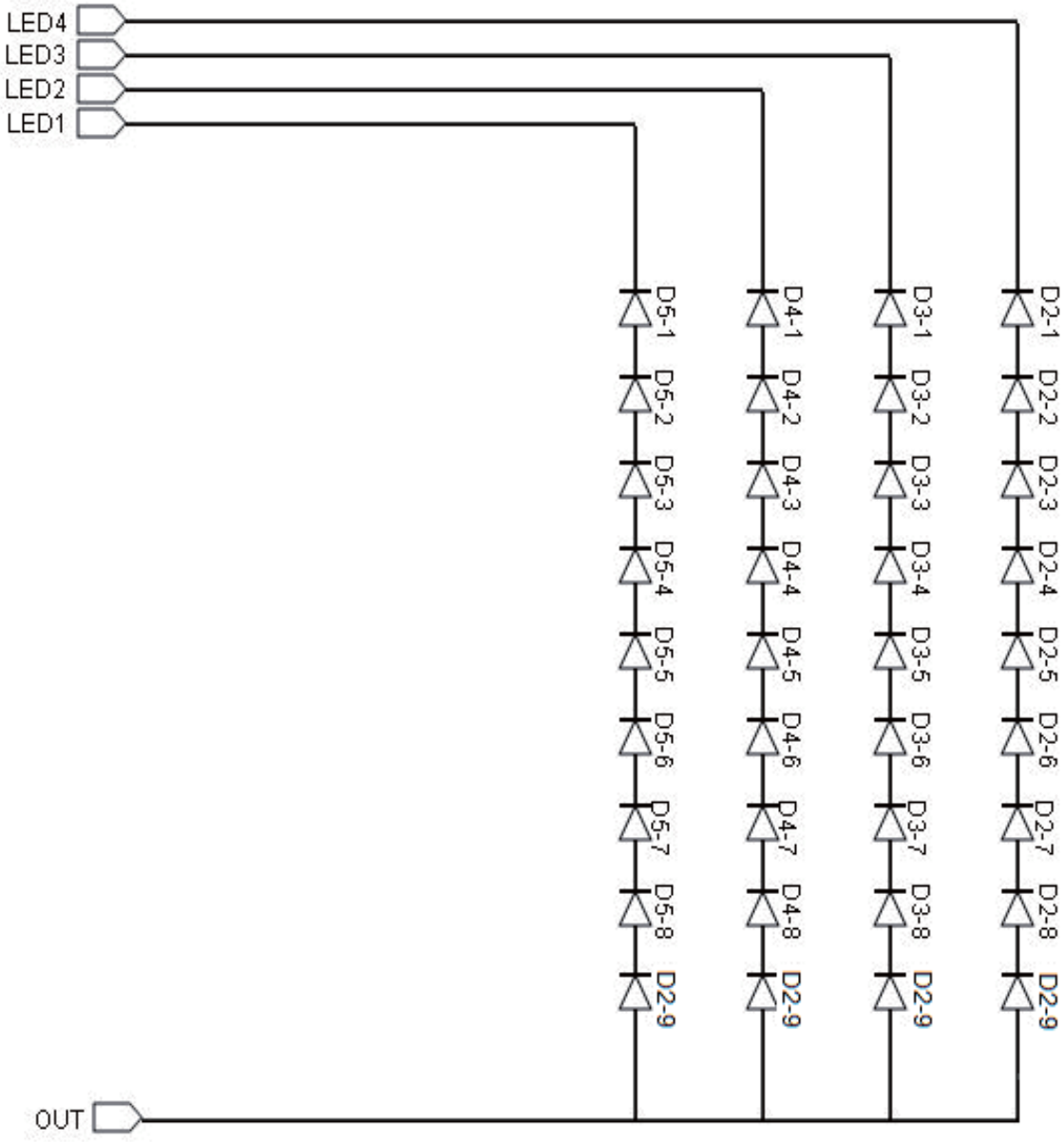
Parameter			Min.	Typ.	Max.	Unit	Remarks
LED Forward Voltage		V_F	-	-	3.1	V	-
LED Forward Current		I_F	-	20	-	mA	-
LED Power Consumption		P_{LED}	-	-	2.6	W	Note 1
LED Life-Time		N/A	15,000	-	-	Hour	I_F = 20mA
Power supply voltage for LED Driver		V_{LED}	5	12	21	V	
EN Control Level	Backlight on		2.5		5.0	V	
	Backlight off		0		1.0	V	
PWM Control Level	PWM High Level		2.5		5.0	V	
	PWM Low Level		0		0.1	V	
PWM Control Frequency		F_{PWM}	100	-	10,000	Hz	
Duty Ratio		-	1	-	100	%	Note3

Notes : 1. Power supply voltage12V for LED Driver
Calculator Value for reference $I_F \times V_F \times 36 /$ efficiency = P_{LED}
2. The LED Life-time define as the estimated time to 50% degradation of initial luminous.
3. 1% duty cycle is achievable with a dimming frequency less than 1KHz.

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

3.3 LED structure



One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

4.0 OPTICAL SPECIFICATION

4.1 Overview

The test of Optical specifications shall be measured in a dark room (ambient luminance ≤ 1 lux and temperature = 25±2℃) with the equipment of Luminance meter system (Goniometer system and TOPCON BM-5) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0°. We refer to θØ=0 (=θ3) as the 3 o'clock direction (the "right"), θØ=90 (= θ12) as the 12 o'clock direction ("upward"), θØ=180 (= θ9) as the 9 o'clock direction ("left") and θØ=270(= θ6) as the 6 o'clock direction ("bottom"). While scanning θand/or Ø, the center of the measuring spot on the Display surface shall stay fixed. The backlight should be operating for 30 minutes prior to measurement. VDD shall be 3.3+/- 0.3V at 25°C. Optimum viewing angle direction is 6 'clock.

4.2 Optical Specifications

<Table 6. Optical Specifications>

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	Horizontal	Θ_3	CR > 10	-	45	-	Deg.	Note 1
		Θ_9		-	45	-	Deg.	
	Vertical	Θ_{12}		-	20	-	Deg.	
		Θ_6		-	40	-	Deg.	
Luminance Contrast ratio		CR	Θ = 0°	-	500	-	-	Note 2
Luminance of White	5 Points	Y_w	Θ = 0° I_{LED} = 20mA	-	200	-	cm/m²	Note 3
White Luminance uniformity	5 Points	ΔY5		80	-	-	-	Note 4
	13 Points	ΔY13		65	-	-	-	
White Chromaticity		x_w	Θ = 0°	0.283	0.313	0.343	-	Note 5
		y_w		0.299	0.329	0.359	-	
Reproduction of color	Red	x_R	Θ = 0°	-0.03	0.590	+0.03	-	
		y_R			0.350		-	
	Green	x_G			0.330		-	
		y_G			0.555		-	
	Blue	x_B			0.153		-	
		y_B			0.119		-	
Gamut		-	-	-	45	-	%	
Response Time (Rising + Falling)		T_{RT}	Ta= 25° C Θ = 0°	-	12	-	ms	Note 6
Cross Talk		CT	Θ = 0°	-	-	2.0	%	Note 6

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

Notes :

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see FIGURE 1).

2. Contrast measurements shall be made at viewing angle of Θ= 0 and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state .
(see FIGURE 1) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. Center Luminance of white is defined as luminance values of 5 point average across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.

4. The White luminance uniformity on LCD surface is then expressed as : ΔY =Minimum Luminance of 5(or 13) points / Maximum Luminance of 5(or 13) points.
(see FIGURE 2 and FIGURE 3).

5. The color chromaticity coordinates specified in Table 5 shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

6. The electro-optical response time measurements shall be made as FIGURE 4 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr, and 90% to 10% is Td.

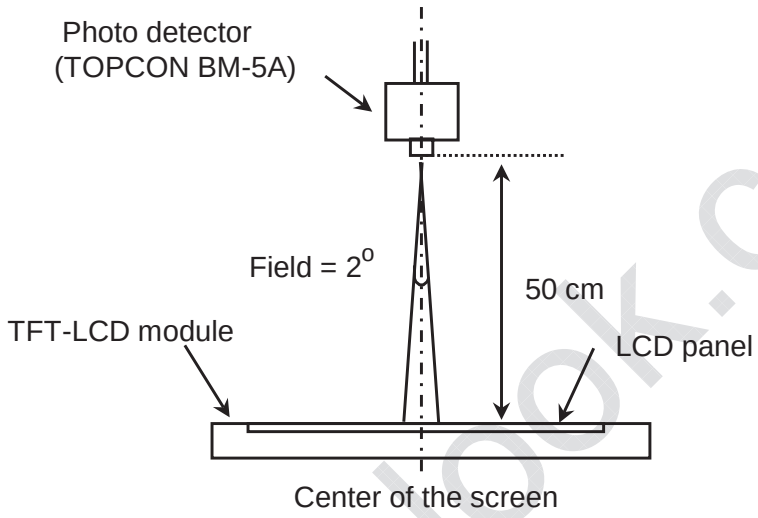
7. Cross-Talk of one area of the LCD surface by another shall be measured by comparing the luminance (YA) of a 25mm diameter area, with all display pixels set to a gray level, to the luminance (YB) of that same area when any adjacent area is driven dark.
(See FIGURE 5).

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

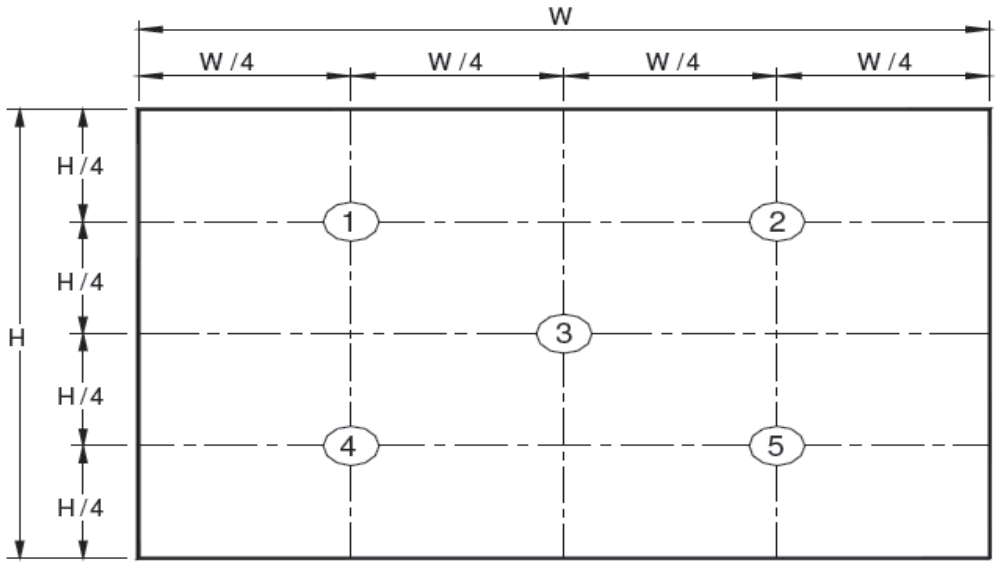
4.3 Optical measurements

Figure 1. Measurement Set Up



Optical characteristics measurement setup

Figure 2. White Luminance and Uniformity Measurement Locations (5 points)

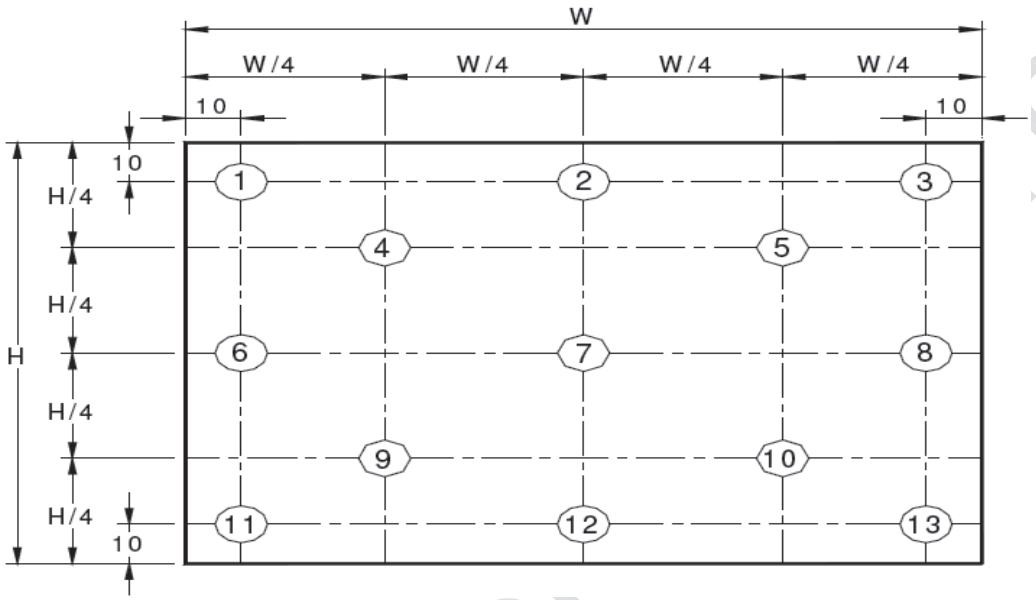


Center Luminance of white is defined as luminance values of center 5 points across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

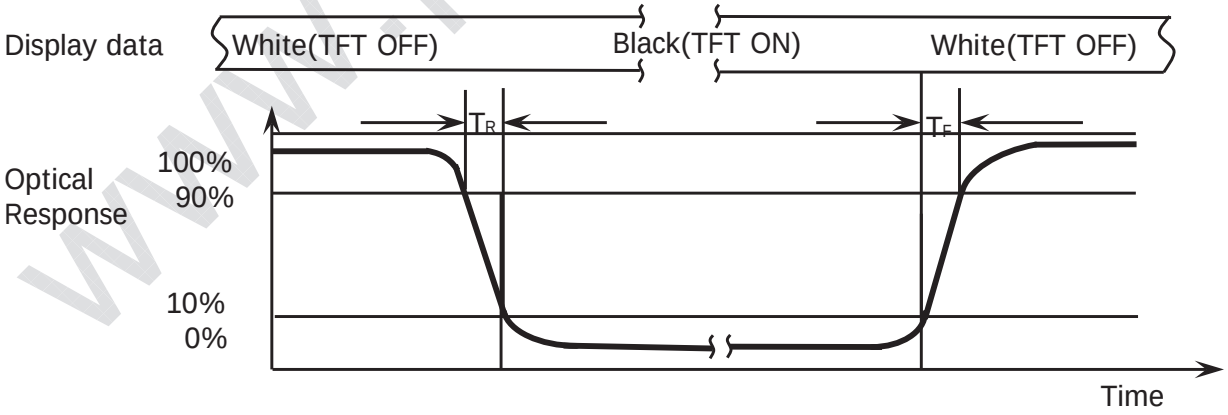
Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

Figure 3. Uniformity Measurement Locations (13 points)



The White luminance uniformity on LCD surface is then expressed as : ΔY5 = Minimum Luminance of five points / Maximum Luminance of five points (see FIGURE 2) , ΔY13 = Minimum Luminance of 13 points /Maximum Luminance of 13 points (see FIGURE 3).

Figure 4. Response Time Testing

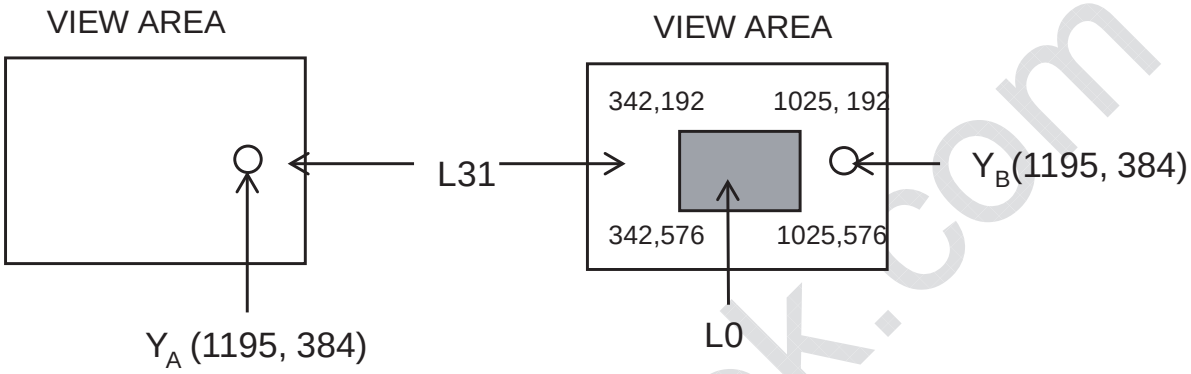


The electro-optical response time measurements shall be made as shown in FIGURE 4 by switching the “data” input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Td and 90% to 10% is Tr.

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

Figure 5. Cross Modulation Test Description



$$\text{Cross-Talk (\%)} = \left| \frac{Y_B - Y_A}{Y_A} \right| \times 100$$

Where:

Y_A = Initial luminance of measured area (cd/m^2)

Y_B = Subsequent luminance of measured area (cd/m^2)

The location measured will be exactly the same in both patterns

Cross-Talk of one area of the LCD surface by another shall be measured by comparing the luminance (YA) of a 25mm diameter area, with all display pixels set to a gray level, to the luminance (YB) of that same area when any adjacent area is driven dark (Refer to FIGURE 5).

www.panelook.com

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

5.0 INTERFACE CONNECTION.

5.1 Electrical Interface Connection

The electronics interface connector is MSAK24025P40_G or Compatible.
The connector interface pin assignments are listed in Table 7.

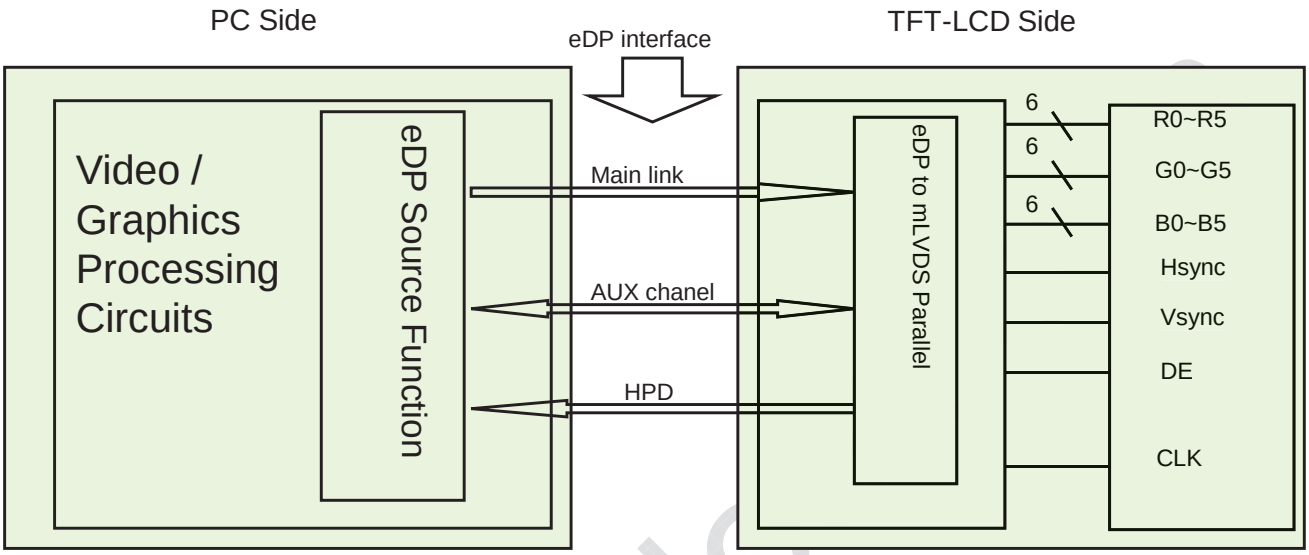
<Table 7. Pin Assignments for the Interface Connector>

PIN NO	Symbol Function	PIN NO	Symbol Function
1	NC No Connect	21	BL_GND Backlight_ground
2	H_GND High Speed Ground	22	BL_Enable Backlight On / Off
3	NC	23	BL PWM DIM System PWM signal Input
4	NC	24	NC No connect (Reverse for AUO TEST only)
5	H_GND High Speed Ground	25	NC No connect (Reverse for AUO TEST only)
6	Lane0_N Comp Signal Link Lane 0	26	BL_PWR Backlight power
7	Lane0_P True Signal Link Lane 0	27	BL_PWR Backlight power
8	H_GND High Speed Ground	28	BL_PWR Backlight power
9	AUX_CH_P True Signal Auxiliary Ch.	29	BL_PWR Backlight power
10	AUX_CH_N Comp Signal Auxiliary Ch.	30	NC No Connect (Reserved for CM)
11	H_GND High Speed Ground	31	TP_D- USB Data- for Touch
12	LCD_VCC LCD logic and driver power	32	TP_D+ USB Data+ for Touch
13	LCD_VCC LCD logic and driver power	33	GND Ground–Shield
14	LCD_Self_Test LCD Panel Self Test Enable	34	VTSP Touch panel power supply (5V)
15	LCD GND LCD logic and driver ground	35	VTSP Touch panel power supply (5V)
16	LCD GND LCD logic and driver ground	36	NC/TP_EN No Connection (Reserve for Touch function enable)
17	HPD HPD signale pin	37	TP_CLK I2C Clock for Touch (NC for USB input)
18	BL_GND Backlight_ground	38	TP_Data I2C Data for Touch (NC for USB input)
19	BL_GND Backlight_ground	39	INT Interrupt for Touch (NC for USB input)
20	BL_GND Backlight_ground	40	RST Reset for Touch (NC for USB input)

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

5-2. eDP Interface



Note. Transmitter : Parade DP501 or equivalent.
Transmitter is not contained in Module.

5.3.eDP Input signal

Lane 0	
R0-5:0	G0-5:4
G0-3.0	B0-5:2
B0-1:0	R1-5:0
G1-5:0	B1-5:4
B1-3:0	R2-5:2
R2-1:0	G2-5:0
B2-5:0	R3-5:4
R3-3:0	G3-5:2
G3-1:0	B3-5:0

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

5.4 Back-light & LCM Interface Connection

<Table 8. Pin Assignments for the BLU & LCM Connector>

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	LED	LED cathode connection	6	NC	No Connection
2	LED	LED cathode connection	7	Vout	LED anode connection
3	LED	LED cathode connection	8	Vout	LED anode connection
4	LED	LED cathode connection	9	Vout	LED anode connection
5	NC	No Connection			

www.panelook.com

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

6.0 SIGNAL TIMING SPECIFICATION

6.1 The NT156WHM-T00 is operated by the DE only.

Item		Symbols	Min	Typ	Max	Unit
Clock	Frequency	1/Tc	67.5	72.3	76.3	MHz
	High Time	Tch	-	4/7	-	Tc
	Low Time	Tcl	-	3/7	-	Tc
Frame Period		Tv	778	790	802	lines
			-	60	-	Hz
			-	16.7	-	ms
Vertical Display Period		Tvd	768	768	768	lines
One line Scanning Period		Th	1446	1526	1586	clocks
Horizontal Display Period		Thd	1366	1366	1366	clocks

Note: This Module can support low frame refresh rate 50Hz & 40Hz.

www.panelook.com

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

6.2 eDP Rx Interface Timing Parameter

The specification of the eDP Rx interface timing parameter is shown in Table 9.

<Table 9. eDP Rx Interface Timing Specification>

Item	Symbol	Min	Typ	Max	Unit	Remark
Spread spectrum clock	ssc		0.5		%	
Differential peak-to-peak input voltage at package pins	$V_{RX-DIFFp-p}$	100	0	1320	mV	
Rx input DC common mode voltage	$V_{RX_DC_CM}$	-	GND	-	V	
Differential termination resistance	$R_{RX-DIFF}$	80	-	100	Ω	
Single-ended termination resistance	R_{RX-SE}	40	-	60	Ω	
Rx short circuit current limit	I_{RX_SHORT}	-	-	20	mA	
Intra-pair skew at Rx package pins (HBR) RX intra-pair skew tolerance at HBR	$L_{RX_SKEW_INTRA_PAIR}$	-	-	150	ps	

www.panelook.com

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

7.0 INPUT SIGNALS, BASIC DISPLAY COLORS & GRAY SCALE OF COLORS

	Colors & Gray scale	Data signal																	
		R0	R1	R2	R3	R4	R5	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	B4	B5
Basic colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Light Blue	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Purple	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray scale of Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△																		
	▽				↑					↑						↑			
	Brighter				↓					↓						↓			
	△	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	▽	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Gray scale of Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	△																		
	▽				↑					↑						↑			
	Brighter				↓					↓						↓			
	△	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0
	▽	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Gray scale of Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	△																		
	▽				↑					↓						↑			
	Brighter				↓					↓						↓			
	△	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1
	▽	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
Gray scale of White & Black	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
	Darker	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0
	△																		
	▽				↑					↑						↑			
	Brighter				↓					↓						↓			
	△	1	0	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1
	▽	0	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

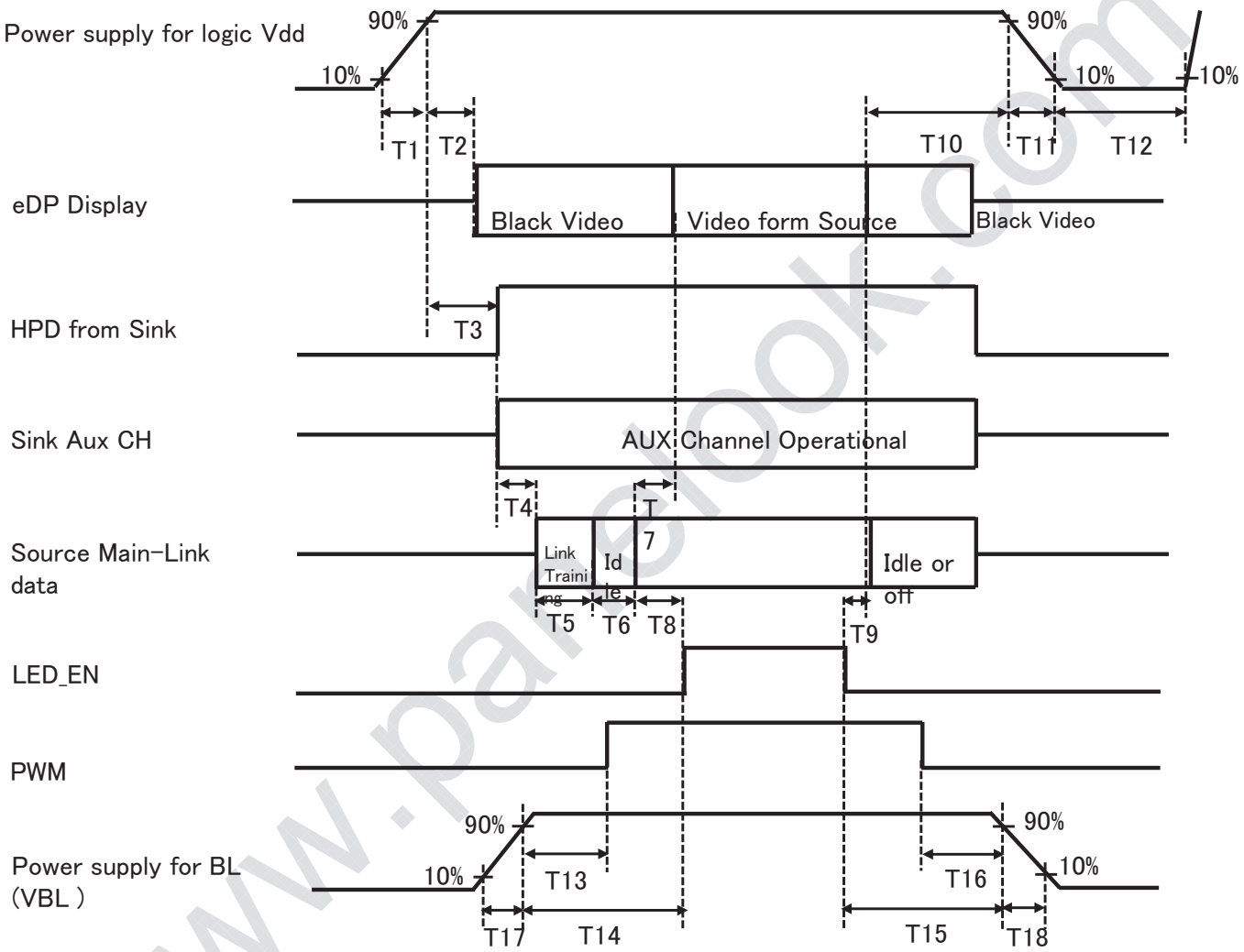
www.panelook.com

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

8.0 POWER SEQUENCE

To prevent a latch-up or DC operation of the LCD module, the power on/off seq uence shall be as shown in below



- 0.5ms ≤ T1 ≤ 10 ms
- 0ms ≤ T2 ≤ 200 ms
- 0ms ≤ T3 ≤ 200 ms
- 10ms ≤ T13
- 20ms ≤ T14
- 0.5ms ≤ T17 ≤ 20ms
- 0ms ≤ T7 ≤ 50ms
- 0ms ≤ T10 ≤ 500 ms
- 0ms ≤ T11 ≤ 10 ms
- 500ms ≤ T12
- 20ms ≤ T15
- 10ms ≤ T16
- 0.5ms ≤ T18

Notes:

1. When the power supply VDD is 0V, keep the level of input signals on the low or k eep high impedance.
2. Do not keep the interface signal high impedance when power is on. Back Light must be turn on after power for logic and interface signal are valid.

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

9.0 MECHANICAL CHARACTERISTICS

9.1 Dimensional Requirements

FIGURE 6 shows mechanical outlines for the model NT156WHM-T00.

Other parameters are shown in Table 10.

<Table 10. Dimensional Parameters>

Parameter	Specification	Unit
Active Area	344.23 (H) ×193.54(V)	
Number of pixels	1366 (H) X 768 (V) (1 pixel = R + G + B dots)	
Pixel pitch	0.252 (H) X 0.252 (V)	
Pixel arrangement	Pixel arrangement RGB Vertical stripe	
Display colors	262K	
Display mode	Normally white	
Outline Dimension	359.5(H)*223.8(V) (W/PCB)*3.4(Max) 359.5(H)*206.5(V)*3.2(Max)	mm
Weight	370(Max)	gram
Back Light	Connector PF040-B09B-C09	
	LED, Horizontal-LED Array type	

9.2 Mounting

See FIGURE 6.

9.3 Glare and Polarizer Hardness.

The surface of the LCD has an glare coating to maximize readability and hard coating to reduce scratching.

9.4 Light Leakage

There shall not be visible light from the back-lighting system around the edges of the screen as seen from a distance 50cm from the screen with an overhead light level of 350lux.

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

10.0 RELIABILITY TEST

The Reliability test items and its conditions are shown in below.

<Table 11. Reliability test>

No	Test Items	Conditions
1	High temperature storage test	Ta = 60 ℃, 240 hrs
2	Low temperature storage test	Ta = -20 ℃, 240 hrs
3	High temperature & high humidity operation test	Ta = 40 ℃, 80%RH, 240 hrs
4	High temperature operation test	Ta = 50 ℃, 240 hrs
5	Low temperature operation test	Ta = 0 ℃, 240 hrs
6	Thermal shock	Ta = -20 ℃ ↔ 60 ℃ (0.5 hr), 100 cycle
7	Vibration test (non-operating)	1.5G, 10~500Hz,Half Sine X,Y,Z / Sweep rate : 1 hour
8	Shock test (non-operating)	220G, Half Sine Wave 2msec ±X,±Y,±Z Once for each direction
9	Electro-static discharge test (non-operating)	Air : 150 pF, 330Ω, 15 KV Contact : 150 pF, 330Ω, 8 KV

11.0 HANDLING & CAUTIONS

(1) Cautions when taking out the module
- Pick the pouch only, when taking out module from a shipping package.

(2) Cautions for handling the module
- As the electrostatic discharges may break the LCD module, handle the LCD module with care. Peel a protection sheet off from the LCD panel surface as slowly as possible.
- As the LCD panel and back - light element are made from fragile glass material, impulse and pressure to the LCD module should be avoided.
- As the surface of the polarizer is very soft and easily scratched, use a soft dry cloth without chemicals for cleaning.
- Do not pull the interface connector in or out while the LCD module is operating.
- Put the module display side down on a flat horizontal plane.
- Handle connectors and cables with care.

(3) Cautions for the operation
- When the module is operating, do not lose CLK, ENAB signals. If any one of these signals is lost, the LCD panel would be damaged.
- Obey the supply voltage sequence. If wrong sequence is applied, the module would be damaged.

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

(4) Cautions for the atmosphere
- Dew drop atmosphere should be avoided.
- Do not store and/or operate the LCD module in a high temperature and/or humidity atmosphere. Storage in an electro-conductive polymer packing pouch and under relatively low temperature atmosphere is recommended.

(5) Cautions for the module characteristics
- Do not apply fixed pattern data signal to the LCD module at product aging.
- Applying fixed pattern for a long time may cause image sticking.

(6) Other cautions
- Do not disassemble and/or re-assemble LCD module.
- Do not re-adjust variable resistor or switch etc.
- When returning the module for repair or etc., Please pack the module not to be broken. We recommend to use the original shipping packages.

12.0 LABEL

(1) TLCM label

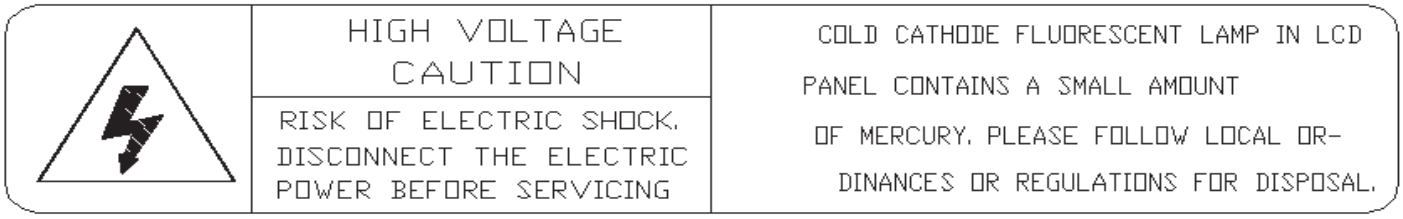
TLCM ID 编码规则:

序列号	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
代码																	
描述	GBN		等级	line	年		月	FG-Code后4位				Serial Number					

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

(2) High voltage caution label



(3) Box label

蓝色字体为后打印标识, 说明如下:

1. **FG-CODE**
2. **Box 产品数量**
3. **Box ID, 编码规则如下**
4. **Box Packing 日期**
5. **产品物料号(客户端)**
6. **FG-CODE 后四位**

Box ID 编码规则

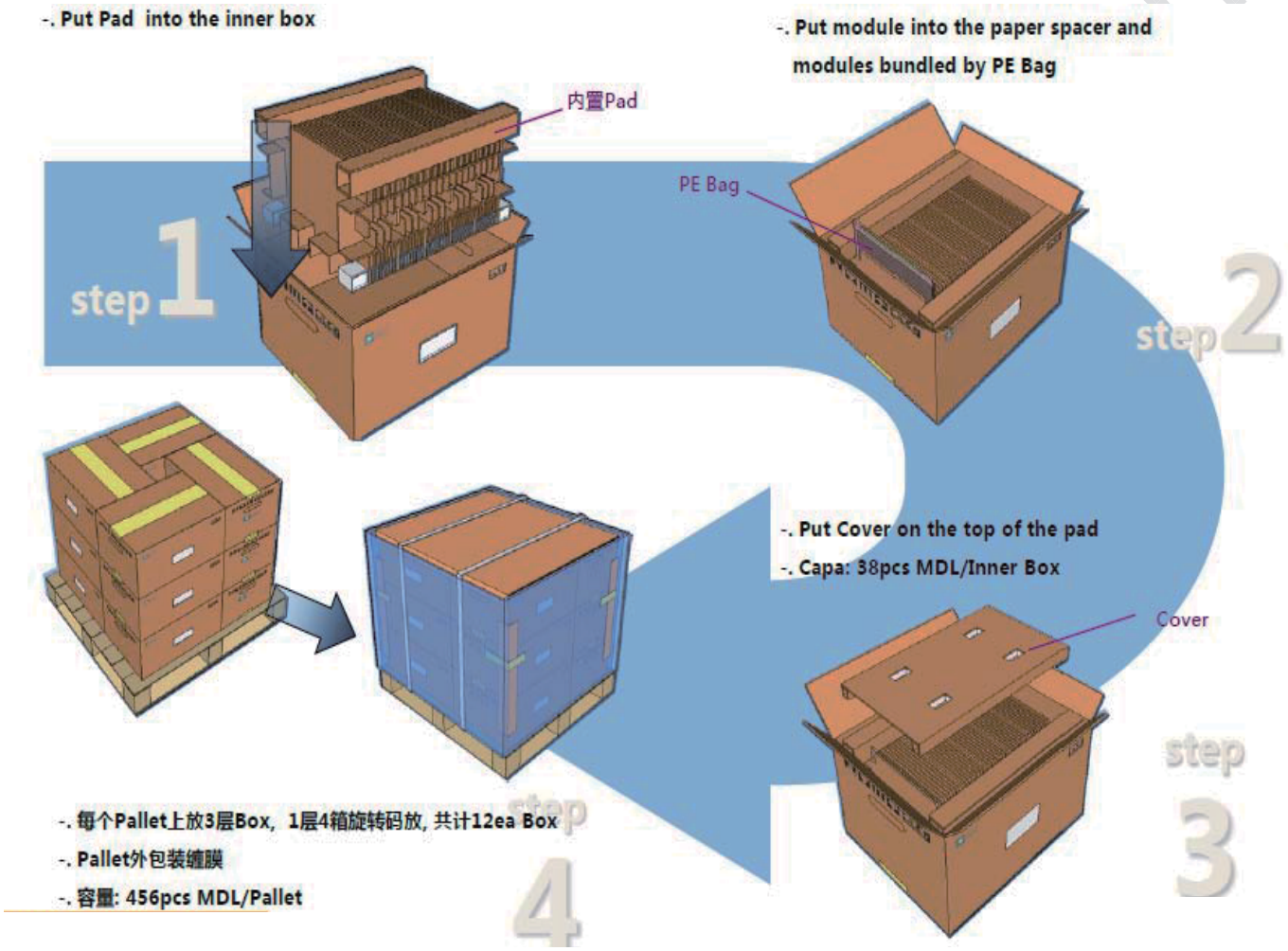
序列号	1	2	3	4	5	6	7	8	9	10	11	12	13
代码	S	L	S	T	1	4	3	D	0	0	1	H	D
描述	GBN代码		等级	TM1	年份		月	Rev	Serial Number				

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

13.0 PACKING INFORMATION

13.1 Packing order



13.2 Notes

- Box Dimension: TBD
- Package Quantity in one Box: pcs
- Total Weight: TBD

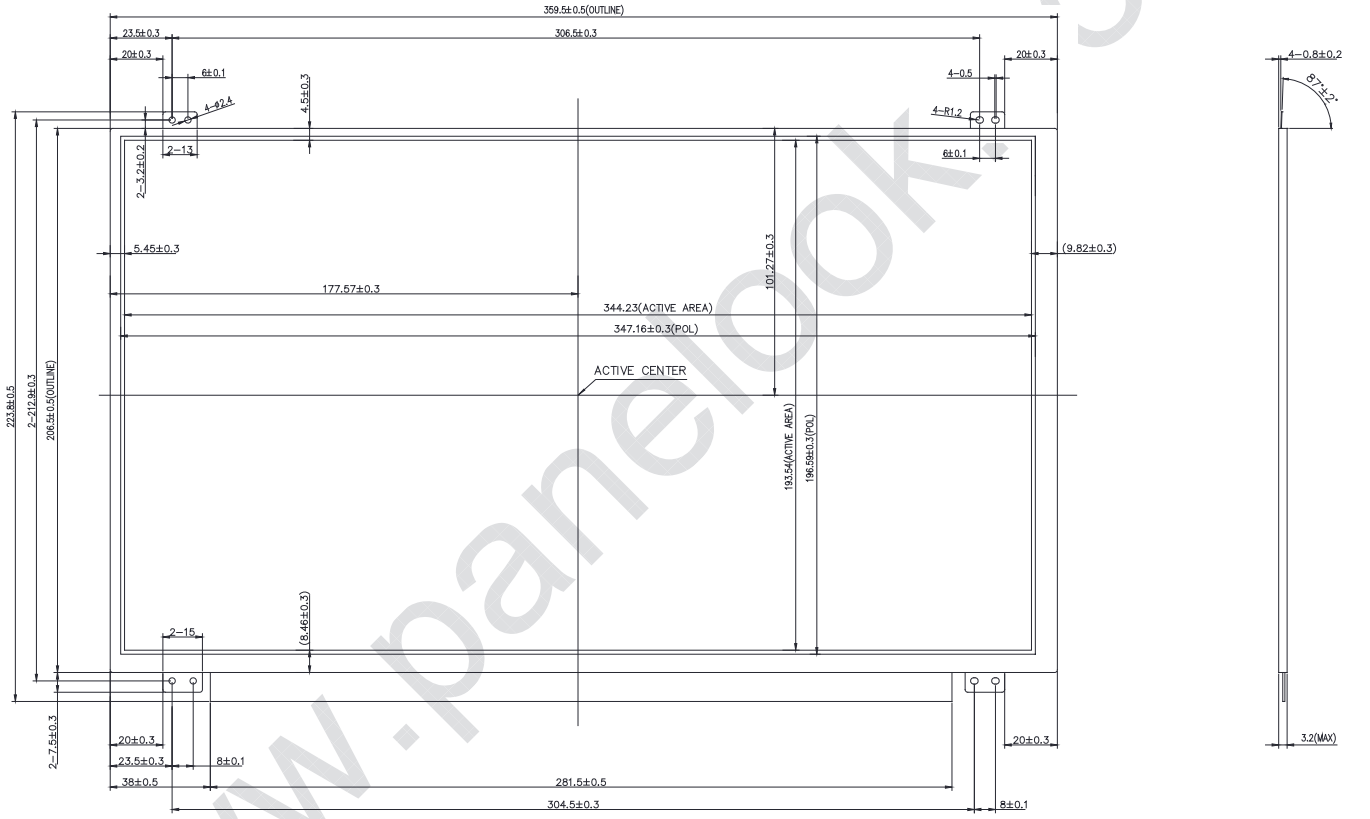
One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

14. MECHANICAL OUTLINE DIMENSION

14.1 Outline Dimension

Figure 6. Outline Dimensions (Front view)



Note

1. PCB side is lower than Top Polarizer, and any other PCB component is lower than Top Polarizer.
2. Warps and Deformation are ±0.5mm MAX.
3. No light leakage from all 4 coners of LCM.
4. Screw Bracket Angle is 87°±2°.

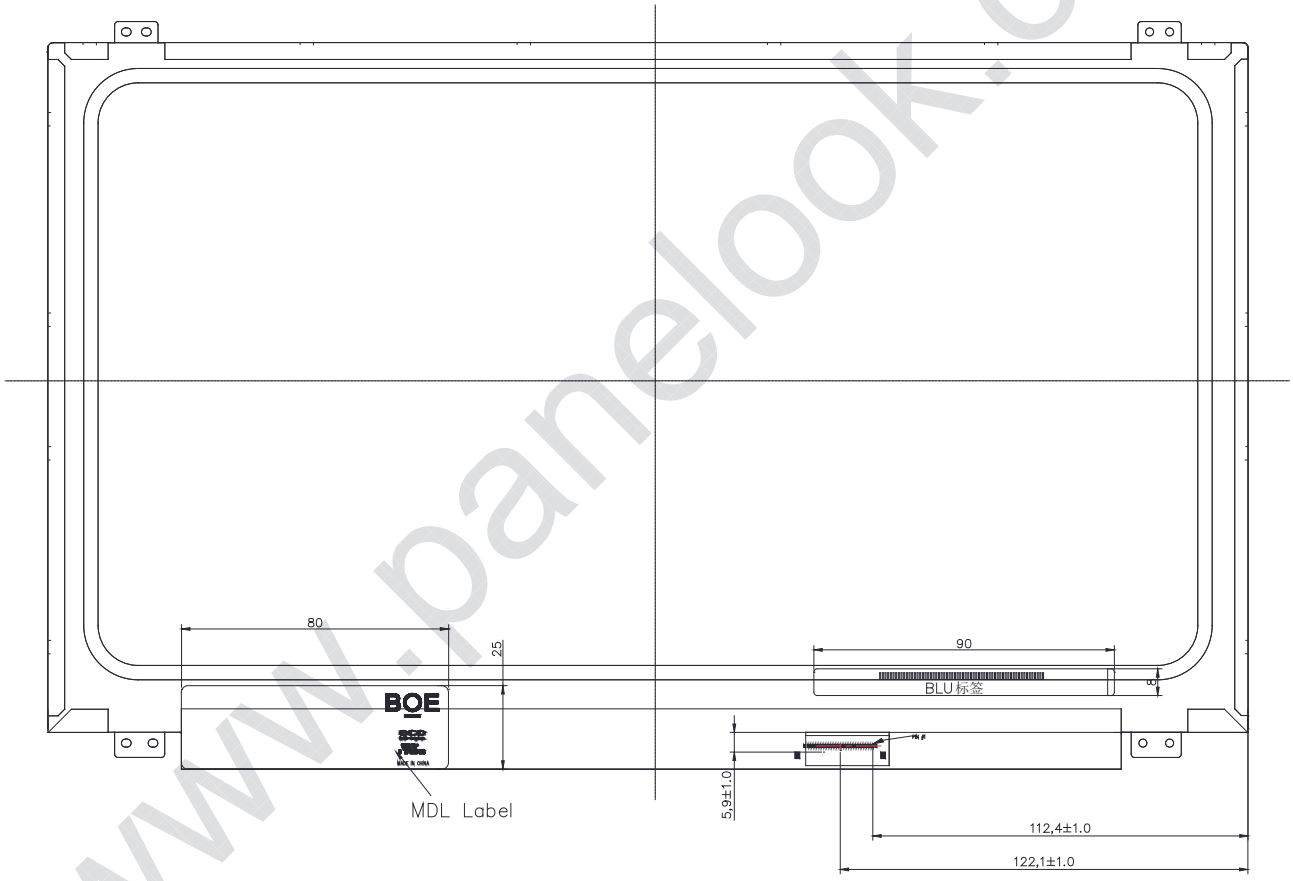
www.panelook.com

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

14.2 Total Solution Outline Dimension

Figure 7. Outline Dimensions (Rear view)



www.panelook.com

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

15.0 EDID Table

Address (HEX)	Function	Hex	Dec	Input values.	Notes
00	Header	00	0	0	EDID Header
01		FF	255	255	
02		FF	255	255	
03		FF	255	255	
04		FF	255	255	
05		FF	255	255	
06		FF	255	255	
07		00	0	0	
08	ID Manufacturer Name	09	9	BOE	ID = BOE
09		E5	229		
0A	ID Product Code	C2	194	1730	ID = 1730
0B		06	6		
0C	32-bit serial No.	00	0		
0D		00	0		
0E		00	0		
0F		00	0		
10	Week of manufacture	01	1	1	
11	Year of Manufacture	1A	26	2016	Manufactured in 2016
12	EDID Structure Ver.	01	1	1	EDID Ver 1.0
13	EDID revision #	04	4	4	EDID Rev. 0.4
14	Video input definition	95	149	-	digital signal/DP input
15	Max H image size	22	34	34	34 cm (Approx)
16	Max V image size	13	19	19	19 cm (Approx)
17	Display Gamma	78	120	2.2	Gamma curve = 2.2
18	Feature support	0A	10		RGB display, Preferred Timming mode
19	Red/Green low bits	24	36	-	Red / Green Low Bits
1A	Blue/White low bits	10	16	-	Blue / White Low Bits
1B	Red x high bits	97	151	0.590	Red (x) = 10010111 (0.59)
1C	Red y high bits	59	89	0.350	Red (y) = 01011001 (0.35)
1D	Green x high bits	54	84	0.330	Green (x) = 01010100 (0.33)
1E	Green y high bits	8E	142	0.555	Green (y) = 10001110 (0.555)
1F	Blue x high bits	27	39	0.153	Blue (x) = 00100111 (0.153)
20	BLue y high bits	1E	30	0.119	Blue (y) = 00011110 (0.119)
21	White x high bits	50	80	0.313	White (x) = 01010000 (0.313)
22	White y high bits	54	84	0.329	White (y) = 01010100 (0.329)
23	Established timing 1	00	0	-	
24	Established timing 2	00	0	-	

www.panelook.com

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

25	Established timing 3	00	0	-	
26	Standard timing #1	01	1		Not Used
27		01	1		
28	Standard timing #2	01	1		Not Used
29		01	1		
2A	Standard timing #3	01	1		Not Used
2B		01	1		
2C	Standard timing #4	01	1		Not Used
2D		01	1		
2E	Standard timing #5	01	1		Not Used
2F		01	1		
30	Standard timing #6	01	1		Not Used
31		01	1		
32	Standard timing #7	01	1		Not Used
33		01	1		
34	Standard timing #8	01	1		Not Used
35		01	1		
36	Detailed timing/monitor descriptor #1	64	100	70.1	70.12MHz Main clock
37		1B	27		
38		56	86	1366	Hor Active = 1366
39		77	119	119	Hor Blanking = 119
3A		50	80	-	4 bits of Hor. Active + 4 bits of Hor. Blanking
3B		00	0	768	Ver Active = 768
3C		13	19	19	Ver Blanking = 19
3D		30	48	-	4 bits of Ver. Active + 4 bits of Ver. Blanking
3E		30	48	48	Hor Sync Offset = 48
3F		20	32	32	H Sync Pulse Width = 32
40		36	54	3	V sync Offset = 3 line
41		00	0	6	V Sync Pulse width : 6 line
42		58	88	344	Horizontal Image Size = 344 mm (Low 8 bits)
43		C2	194	194	Vertical Image Size = 194 mm (Low 8 bits)
44		10	16	-	4 bits of Hor Image Size + 4 bits of Ver Image Size
45		00	0	0	Hor Border (pixels)
46		00	0	0	Vertical Border (Lines)
47		1A	26		Refer to right table

www.panelook.com

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

48	Detailed timing/monitor descriptor #2	A2	162	60.5	60.5MHz Main clock
49		17	23		
4A		56	86	1366	Hor Active = 1366
4B		B9	185	185	Hor Blanking = 185
4C		50	80	-	4 bits of Hor. Active + 4 bits of Hor. Blanking
4D		0	0	768	Ver Active = 768
4E		2D	45	45	Ver Blanking = 45
4F		30	48	-	4 bits of Ver. Active + 4 bits of Ver. Blanking
50		30	48	48	Hor Sync Offset = 48
51		20	32	32	H Sync Pulse Width = 32
52		36	54	3	V sync Offset = 3 line
53		00	0	6	V Sync Pulse width : 6 line
54		58	88	344	Horizontal Image Size = 344 mm (Low 8 bits)
55		C2	194	194	Vertical Image Size = 192 mm (Low 8 bits)
56		10	16	-	4 bits of Hor Image Size + 4 bits of Ver Image Size
57		00	0	0	Hor Border (pixels)
58		00	0	0	Vertical Border (Lines)
59		1A	26		
5A	Detailed timing/monitor descriptor #3	00	0		ASCII Data Sting Tag
5B		00	0		
5C		00	0		
5D		FE	254		
5E		00	0		
5F		48	72	H	D/PN:HXNNJ
60		58	88	X	
61		4E	78	N	
62		4E	78	N	
63		4A	74	J	
64		00	0	00000000	EDID:X00
65		4E	78	N	BOE PN
66		54	84	T	
67		31	49	1	
68		35	53	5	
69		54	84	T	
6A		30	48	0	
6B		30	48	0	

www.panelook.com

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com

Global LCD Panel Exchange Center www.panelook.com 屏库:全球液晶屏交易中心

6C	Detailed timing/monitor descriptor #4	00	0		Product Name Tag (ASCII)
6D		00	0		
6E		00	0		
6F		00	0		
70		00	0		
71		00	0	00000000	6-bit Color Depth & no FRC
72		41	65	01000001	WLED & singal light bar & one light bar
73		01	1	00000001	Frame rate 40Hz~65Hz
74		94	148	10010100	Light Controller : PWM & Max. Luminance 200
75		01	1	00000001	Front Surface: Glare & RGB v-stripe
76		10	16	00010000	NTSC & DBC
77		00	0	00000000	no Motion Blur & no Active Gamma
78		00	0	00000000	no Wireless Enhancement & no In-Cell Scanner
79		09	9	00001001	1 lane edp1.2
7A		01	1	00000001	Built-In Self Test
7B		0A	10		
7C		20	32		
7D		20	32		
7E	Extension flag	00	0		
7F	Checksum	82	130	-	

www.panelook.com

One step solution for LCD / PDP / OLED panel application: Datasheet, inventory and accessory! www.panelook.com