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NV140FHM-A20

Preliminary Product Specification

Rev. P0

HEFEI XINSHENG OPTOELECTRONICS TECHNOLOGY CO.,LTD

PRODUCT GROUP

REV

ISSUE DATE



TFT- LCD PRODUCT

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NV140FHM-A20 Preliminary Product Specification

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REVISION HISTORY

REV.	ECN No.	DESCRIPTION OF CHANGES	DATE	PREPARED
P0	-	Initial Release(OGS)	2014.12.18	都智/刘晓锋

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1.0 General Description

1.1 Application

- Notebook PC With Touch function

1.2 General Specification

1.2.1.General Total Solution Specification(Table 1.)

<Table 1. General Specifications>

Parameter	Specification	Unit	Remarks
Active area	309.312 (H) × 173.988 (V)	mm	
Number of pixels	1920 (H) × 1080 (V)	pixels	
Pixel pitch	0.1611(H) X 0.1611 (V)	mm	
Pixel arrangement	RGB Vertical stripe		
Display colors	262K	color s	
Display mode	Normally Black		
Dimensional outline	326.18±0.25(H)*205.1±0.5(V) *3.0(Max) (without OGS) 326.18±0.25(H)*205.1±0.5(V) *4.05(Max) (with OGS)	mm	
Weight	290(max) (without OGS) 415(max) (with OGS)	g	
Back-light	Lower Down side, 1-LED Lighting Bar type		Note 1
Power consumption	P _D : 0.9 (max)	W	
	P _{BL} :4.0(max)	W	
	P _{total} :4.9(max)	W	

Notes : 1. LED Lighting Bar (50*LED Array)

Notes: 2. Maximum Measurement Condition :Mosaic Pattern

1.2 .2. Mechanical Characteristics(Table 2.)

<Table 2. Mechanical Characteristics>

Parameter	Specification	Unit	Remarks
TP Technology	PCT(Projected Capacitive)	-	
Touch Structure	OGS		
OGS Overall Size	X:321.1±0.15×Y:185.9±0.1	[mm]	
TP View Area	X:310.4±0.1×Y:174.95±0.1	[mm]	
TP Active Area	313.4*177.95	[mm]	
Total Thickness	4.05Max	[mm]	
Surface Treatment	No AS Coating	-	
Surface Hardness	≥7H	-	
OGS Sensor Thickness	0.7 (CT40 Glass)	[mm]	
Bonding Mode	Directing Bonding	-	
ASF (Anti-Split Film)	No		
Anti-Water	No		
Transmittance	≥87	%	
Strength	4PB B10 ≥500	Mpa	
Weight	415 Max	g	

1.2 .3.Electrical characteristics(Table 3.)

<Table 3. Electrical characteristics>

Parameter	Specification	Unit	Remarks
TP Technology	PCT(Projected Capacitive)	-	
Touch Structure	OGS		
System OS	WIN8		
Control Board Form	FPCA	-	
Control Board Size	74.74*27.66	mm	
Type of Master IC	EKTH 3915SU		
Number of Tx / Rx	36/63		
VDD	5	V	
Interface	USB (预留I ² C)	-	
Touch Points (min)	10	-	
Auto Calibration	Yes		
Power Consumption(Max.)	Active:0.264;Idle:0.075;Sleep:0.0066	W	

2.0 ABSOLUTE MAXIMUM RATINGS

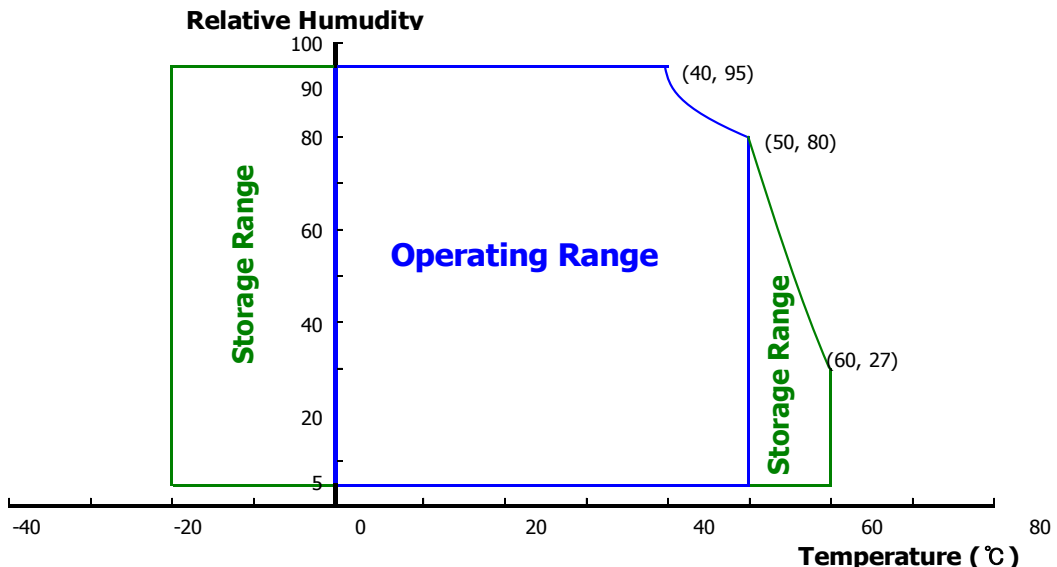
The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 4.

< Table 4. 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	°C	Note 2
Storage Temperature	T _{ST}	-20	+60	°C	

- 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 °C ≥ Ta)
 Maximum wet - bulb temperature at 39 °C or less. (Ta > 40 °C) No condensation.



3.0 ELECTRICAL SPECIFICATIONS

3.1 Electrical Specifications

< Table 5. 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}	-	210	-	mA	Note 1
Positive-going Input Threshold Voltage	V _{IT+}	-	-	100	mV	V _{cm} = 1.2V typ.
Negative-going Input Threshold Voltage	V _{IT-}	-100	-	-	mV	
Differential Input Voltage	V _{ID}	200	-	600	mV	
Power Consumption	P _D	-	-	0.9	W	Note 1
	P _{BL}	-	-	4	W	Note 2
	P _{total}	-	-	4.9	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°C.

- a) Typ : Mosaic Pattern
- b) Max : R/G/B Pattern



2. Calculated value for reference (V_{LED} × I_{LED})

3.2 Backlight Unit

< Table 6. LED Driving guideline specifications >

Ta=25+/-2°C

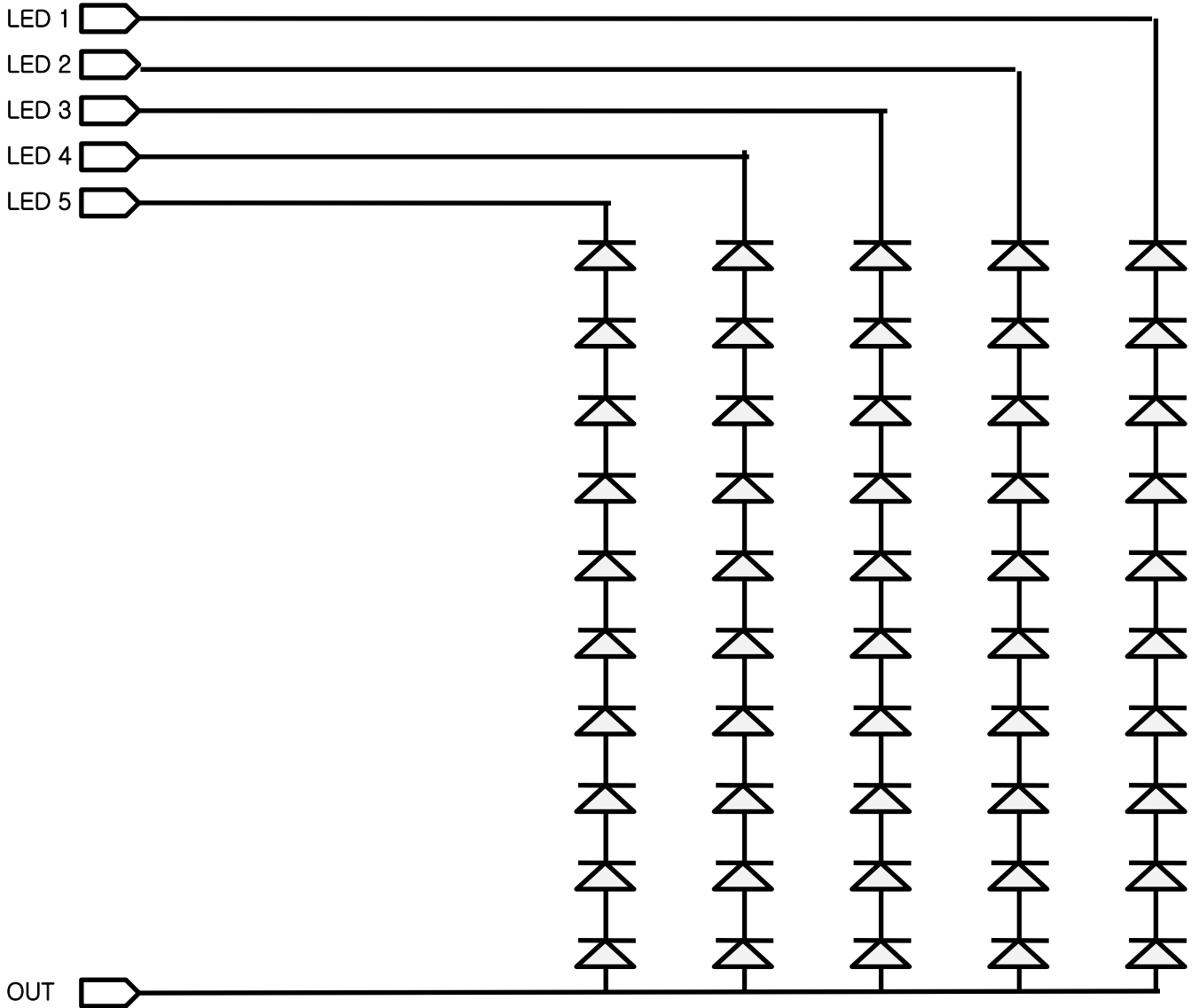
Parameter		Min.	Typ.	Max.	Unit	Remarks
LED Forward Voltage	V _F	-	-	3.0	V	-
LED Forward Current	I _F	-	22.7		mA	-
LED Power Consumption	P _{LED}		-	4.0	W	Note 1
LED Life-Time	N/A	15,000	-	-	Hour	I _F = 20mA
Power supply voltage for LED Driver	V _{LED}	6	12	21	V	
EN Control Level	Backlight on	2.2		5.0	V	
	Backlight off	0		0.6	V	
PWM Control Level	PWM High Level	2.2		5.0	V	
	PWM Low Level	0		0.6	V	
PWM Control Frequency	F _{PWM}	180	-	10,000	Hz	
Duty Ratio	-	5	-	100	%	

Notes : 1. Power supply voltage 12V for LED Driver, Driver efficiency 87%,

Calculator Value for reference $I_F \times V_F \times 50 / 0.87 = P_{LED}$

2. The LED Life-time define as the estimated time to 50% degradation of initial luminous.

3.3 LED structure



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 = $25\pm 2^\circ\text{C}$) with the equipment of Luminance meter system (Goniometer system and PR730) 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 $\theta\theta=0$ ($=\theta_3$) as the 3 o'clock direction (the "right"), $\theta\theta=90$ ($=\theta_{12}$) as the 12 o'clock direction ("upward"), $\theta\theta=180$ ($=\theta_9$) as the 9 o'clock direction ("left") and $\theta\theta=270$ ($=\theta_6$) as the 6 o'clock direction ("bottom"). While scanning θ and/or Φ , 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 $3.3\pm 0.3\text{V}$ at 25°C . Optimum viewing angle direction is 6 'clock.

4.2 Optical Specifications

<Table 7. Optical Specifications>

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	Horizontal	θ_3	CR > 10	-	85	-	Deg.	Note 1
		θ_9		-	85	-	Deg.	
	Vertical	θ_{12}		-	85	-	Deg.	
		θ_6		-	85	-	Deg.	
Luminance Contrast ratio		CR	$\theta = 0^\circ$	-	800			Note 2
Luminance of White	5 Points	Y_w	$\theta = 0^\circ$ $I_{LED} = 21.6\text{mA}$	-	270	-	cd/m^2	Note 3
White Luminance uniformity	5 Points	ΔY_5		80	-	-		Note 4
	13 Points	ΔY_{13}		65	-	-		
White Chromaticity		x_w	$\theta = 0^\circ$	0.283	0.313	0.343		Note 5
		y_w		0.299	0.329	0.359		
Reproduction of color	Red	x_R	$\theta = 0^\circ$	-0.03	0.640	+0.03		
		y_R			0.340			
	Green	x_G			0.336			
		y_G			0.620			
	Blue	x_B			0.150			
		y_B			0.040			
Gamut					72		%	
Response Time (Rising + Falling)		T_{RT}	$T_a = 25^\circ\text{C}$ $\theta = 0^\circ$	-	30	35	ms	Note 6
Cross Talk		CT	$\theta = 0^\circ$	-	-	2.0	%	Note 7

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 $\Theta = 0$ 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 : $\Delta Y = \text{Minimum Luminance of 5(or 13) points} / \text{Maximum Luminance of 5(or 13) points}$.
(see FIGURE 2 and FIGURE 3).

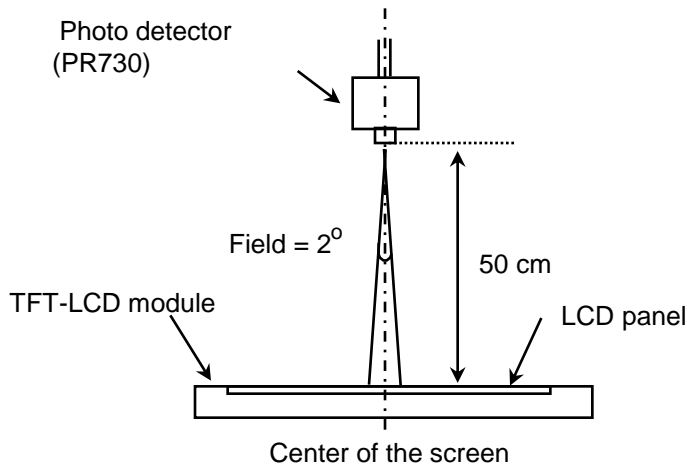
5. The color chromaticity coordinates specified in Table 5 shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

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 T_r , and 90% to 10% is T_d .

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

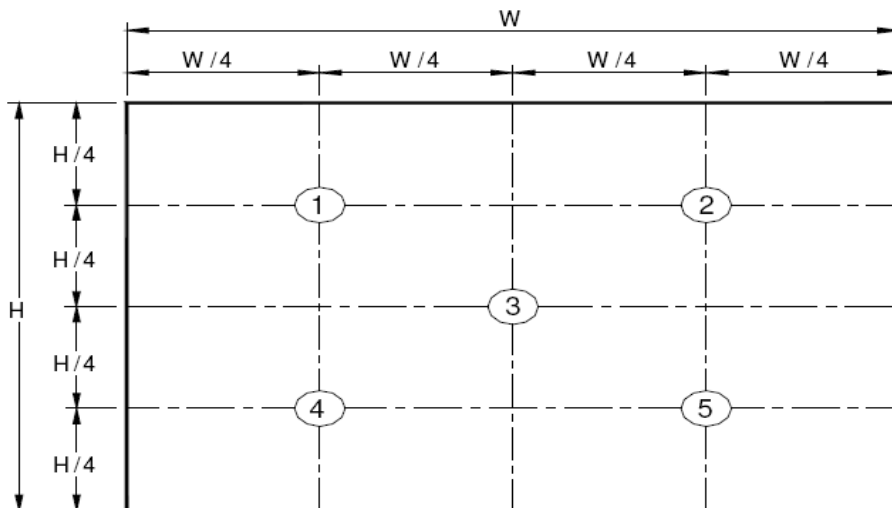
4.3 Optical measurements

Figure 1. Measurement Set Up



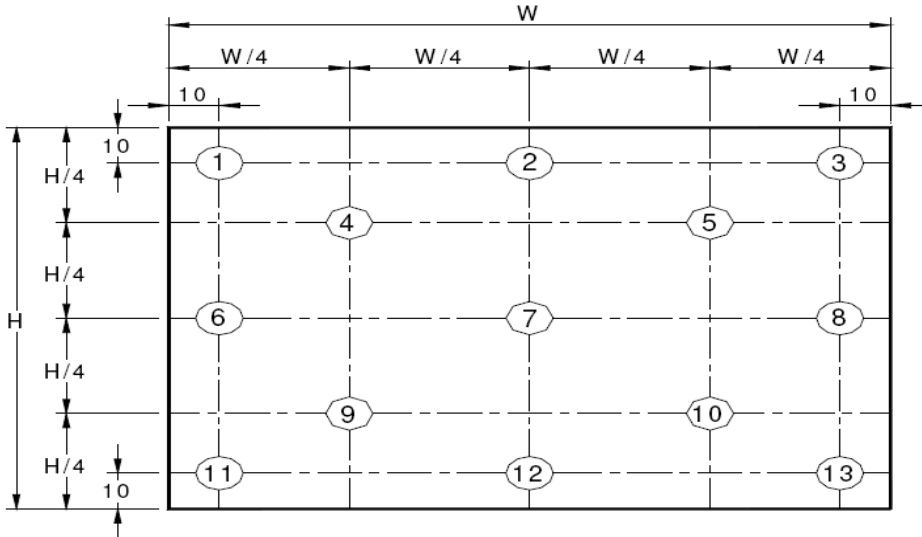
Optical characteristics measurement setup

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



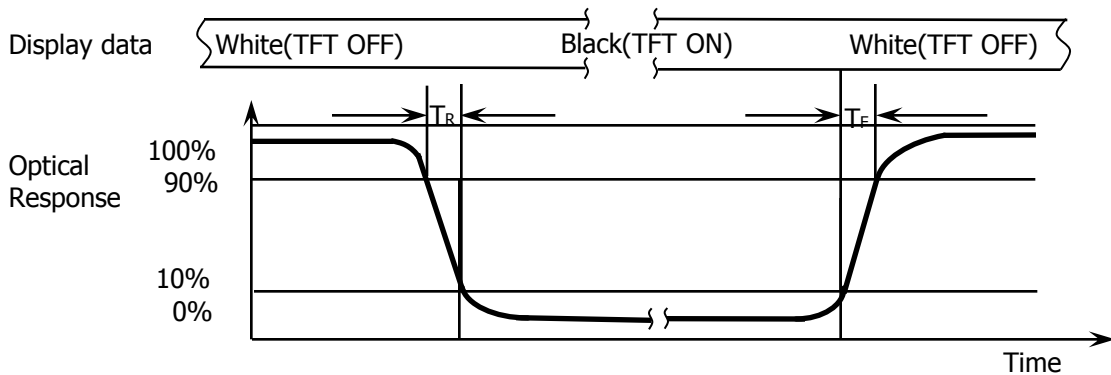
Center Luminance of white is defined as luminance values of center 5 points across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.

Figure 3. Uniformity Measurement Locations (13 points)



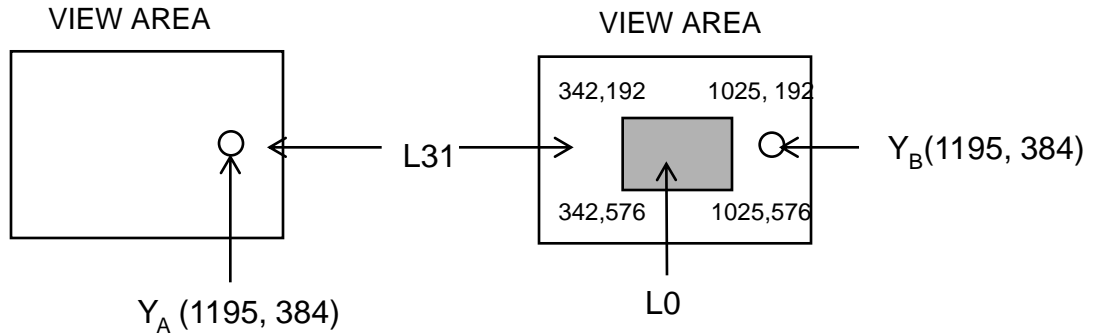
The White luminance uniformity on LCD surface is then expressed as : $\Delta Y_5 = \text{Minimum Luminance of five points} / \text{Maximum Luminance of five points}$ (see FIGURE 2) , $\Delta Y_{13} = \text{Minimum Luminance of 13 points} / \text{Maximum Luminance of 13 points}$ (see FIGURE 3).

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 T_d and 90% to 10% is T_r .

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/m²)

Y_B = Subsequent luminance of measured area (cd/m²)

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 (Y_A) of a 25mm diameter area, with all display pixels set to a gray level, to the luminance (Y_B) of that same area when any adjacent area is driven dark (Refer to FIGURE 5).

5.0 INTERFACE CONNECTION.

5.1 Electrical Interface Connection

The electronics interface connector is UJU IS050-L40B-C10 or Compatible.

The LCM connector interface pin assignments are listed in Table 8.

<Table 8. Pin Assignments for the LCM Interface Connector (1-30pin) >

Terminal	Symbol	Functions
Pin No.	Symbol	Description
1	NC	No Connection
2	H_GND	Ground
3	LANE1_N	eDP RX channel 1 negative
4	LANE1_P	eDP RX channel 1 positive
5	H_GND	Ground
6	LANE0_N	eDP RX channel 0 negative
7	LANE0_P	eDP RX channel 0 positive
8	H_GND	Ground
9	AUX_CH_P	eDP AUX CH positive
10	AUX_CH_N	eDP AUX CH negative
11	H_GND	Ground
12	LCD_VCC	Power Supply, 3.3V (typ.)
13	LCD_VCC	Power Supply, 3.3V (typ.)
14	NC	No Connection
15	H_GND	Ground
16	H_GND	Ground
17	HPD	Hot plug detect output
18	BL_GND	LED Ground
19	BL_GND	LED Ground
20	BL_GND	LED Ground
21	BL_GND	LED Ground
22	BL_ENABLE	LED enable pin(+3.3V Input)
23	BL_PWM	System PWM Signal Input
24	H_sync	H_sync
25	NC	No Connection
26	BL_POWER	LED Power Supply 5V-21V
27	BL_POWER	LED Power Supply 5V-21V
28	BL_POWER	LED Power Supply 5V-21V
29	BL_POWER	LED Power Supply 5V-21V
30	NC	No Connection

<Table 8. Pin Assignments for the LCM Interface Connector (31-40pin) >

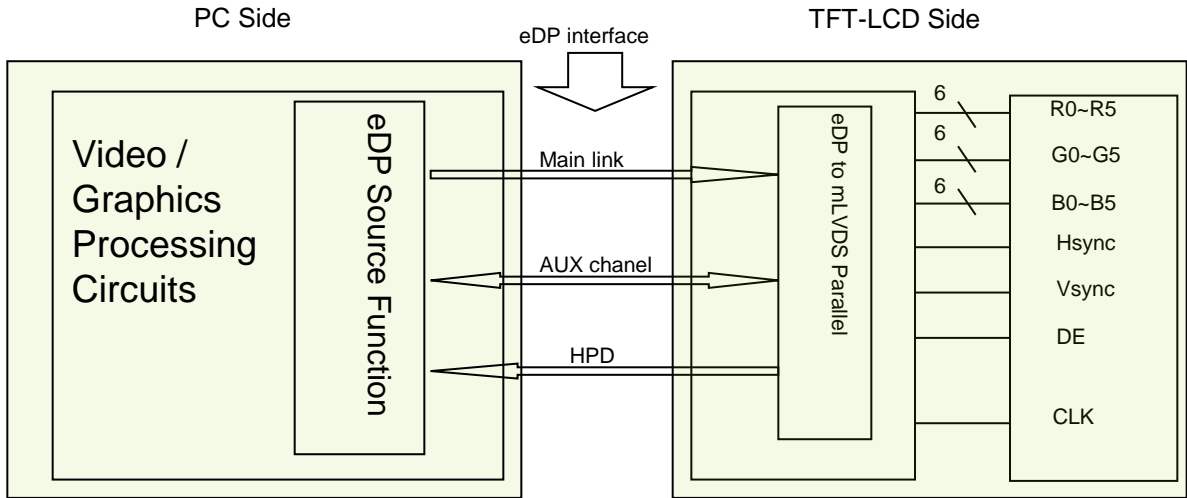
Terminal	Symbol	Functions
Pin No.	Symbol	Description
31	TP_D-	USB Data- for Touch
32	TP_D+	USB Data+ for Touch
33	GND	No Connection
34	VTSP	Touch panel power supply (5.0V)
35	VTSP	Touch panel power supply (5.0V)
36	TP_EN	Touch enable
37	TP_CLK	I2C clock for touch
38	TP_Data	I2C data for touch
39	INT	Interrupt for touch
40	RST	Reset for touch

The OGS connector interface pin assignments are listed in Table 9.

<Table 9. Pin Assignments for the OGS Interface Connector>

Terminal	Symbol	Functions
Pin No.	Symbol	Description
1	TP_D-	USB D- Pin
2	TP_D+	USB D+ Pin
3	GND	Ground.
4	VTSP(5V)	Power supply
5	VTSP(5V)	Power supply
6	TP_EN	Touch Panel Report Enable Pin.
7	TP_CLK	NC(Reserved for IIC)
8	TP_DATA	NC(Reserved for IIC)
9	INT	NC(Reserved for IIC)
10	RST	NC(Reserved for IIC)

5-2. eDP Interface



Note. Transmitter : NT71892QG or equivalent.
 Transmitter is not contained in Module.

5.4 Back-light & LCM Interface Connection

Interface Connector: **CRT F10401-1092**

<Table 10. Pin Assignments for the BLU & LCM Connector>

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	LED1	LED cathode connection	6	NC	No Connection
2	LED2	LED cathode connection	7	NC	No Connection
3	LED3	LED cathode connection	8	Vout	LED anode connection
4	LED4	LED cathode connection	9	Vout	LED anode connection
5	LED5	LED cathode connection	10	Vout	LED anode connection

6.0 SIGNAL TIMING SPECIFICATION

6.1 The NT140FHM-A20 is operated by the DE only.

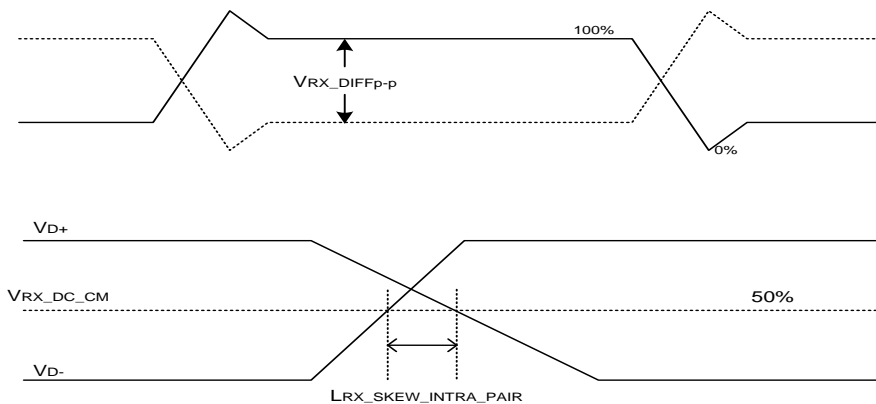
Item		Symbols	Min	Typ	Max	Unit
Clock	Frequency	1/Tc	100	139.8	160	MHz
	High Time	Tch	-	4/7Tc	-	Tc
	Low Time	Tcl	-	4/7Tc	-	Tc
Frame Period		Tv	1080	1120	1238	lines
			40	60	66	Hz
			25	16.67	15.15	ms
Vertical Display Period		Tvd	-	1080	-	lines
One line Scanning Period		Th	1980	2080	2400	clocks
Horizontal Display Period		Thd	-	1920	-	clocks

6.2 eDP Rx Interface Timing Parameter

The specification of the eDP Rx interface timing parameter is shown in Table 8.

<Table 11. 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	VRX-DIFFp-p	100	0	1320	mV	
Rx input DC common mode voltage	VRX_DC_CM	-	GND	-	V	
Differential termination resistance	RRX-DIFF	80	-	100	Ω	
Single-ended termination resistance	RRX-SE	40	-	60	Ω	
Rx short circuit current limit	IRX_SHORT	-	-	20	mA	
Intra-pair skew at Rx package pins (HBR) RX intra-pair skew tolerance at HBR	LRX_SKEW_INTRA_PAIR	-	-	150	ps	

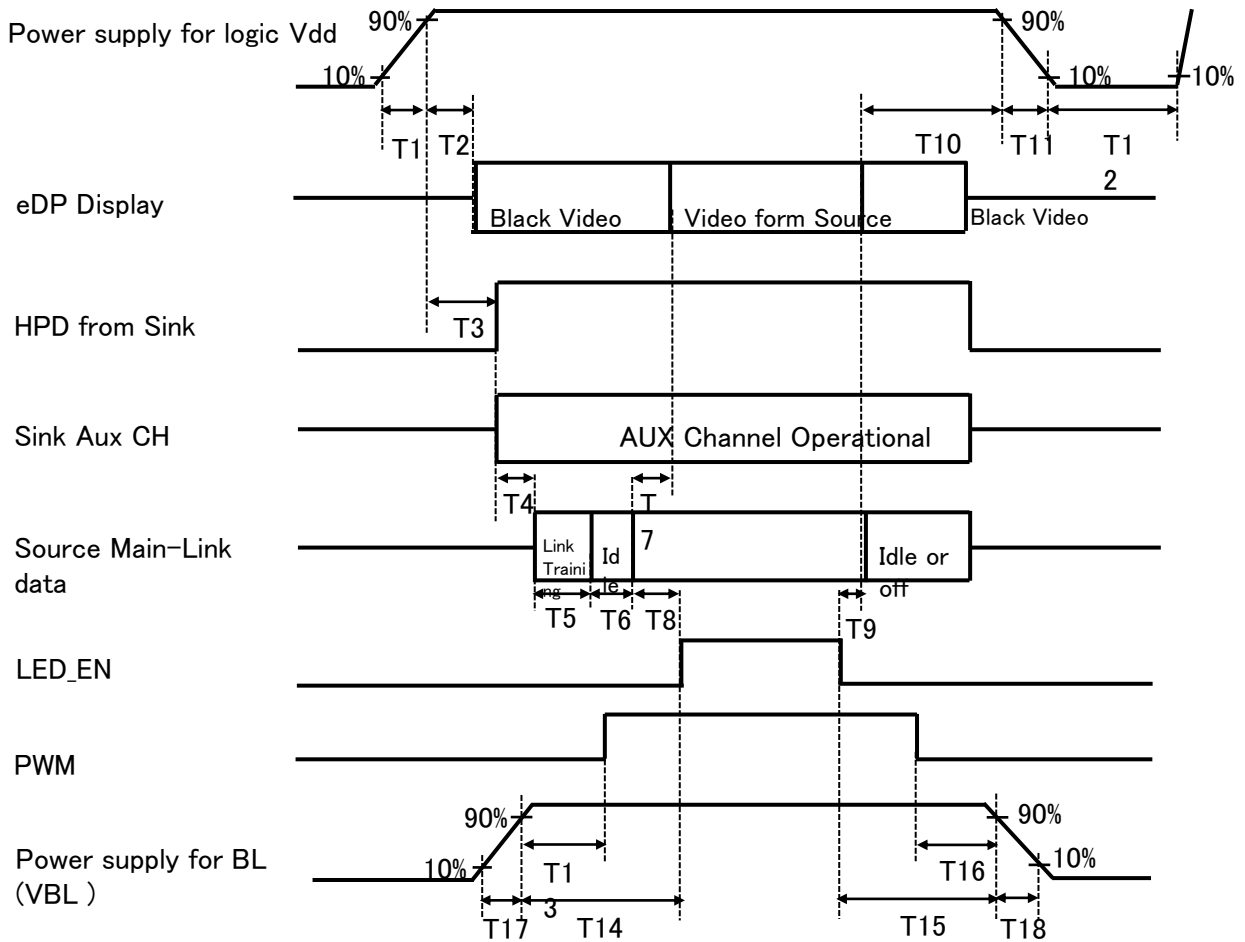


7.0 INPUT SIGNALS, BASIC DISPLAY COLORS & GRAY SCALE OF COLORS

	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

8.0 POWER SEQUENCE

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



- 0.5ms ≤ T1 ≤ 10 ms
- 0ms ≤ T2 ≤ 200 ms
- 0ms ≤ T3 ≤ 200 ms
- 0ms ≤ T13
- 0ms ≤ T14
- 0ms ≤ T17
- 0ms ≤ T7 ≤ 50ms
- 0ms ≤ T10 ≤ 500 ms
- 0 ms ≤ T11 ≤ 10 ms
- 150ms ≤ T12
- 0ms ≤ T15
- 0ms ≤ T16
- 0ms ≤ T18

Notes:

1. When the power supply VDD is 0V, keep the level of input signals on the low or keep 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.

9.0 Connector Description

Physical interface is described as for the connector on LCM.

These connectors are capable of accommodating the following signals and will be following components.

9.1 TFT LCD Module

Connector Name /Description	For Signal Connector
Manufacturer	UJU or Compatible
Type/ Part Number	IS050-L40B-C10 or Compatible
Mating housing/ Part Number	I-PEX 20454-040T or Compatible

10.0 RELIABILITY TEST

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

<Table 12. Reliability test (TLCM) >

No	Test Items	Conditions
1	High temperature storage test	Ta = 70°C/240h
2	Low temperature storage test	Ta = -30°C/240h
3	High temperature & high humidity operation test	Ta = 40°C, 90%RH, 240 hrs
4	High temperature operation test	Ta = 50 °C, 240 hrs
5	Low temperature operation test	Ta = 0 °C, 240 hrs
6	Thermal shock	Ta = -40 °C ↔ 80 °C (15min), 50 cycle
7	Vibration test (non-operating)	2-200Hz/0.001-0.03PSD/Random/ ±X, ±Y,Z(30min)
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: ±15kV Contact: ±8kV

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.

(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

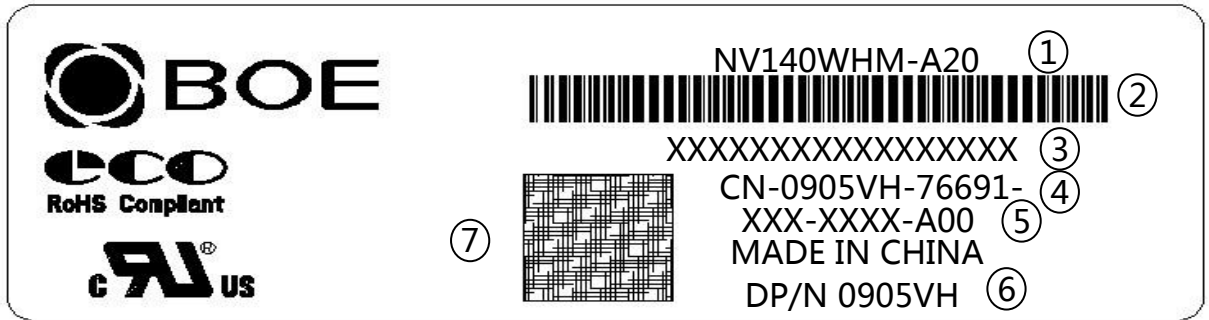
- Do not apply fixed pattern data signal to the LCD module at product aging.
- Applying fixed pattern for a long time may cause image sticking.

(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



① FG-Code 前12位

② TLCM 条形码

③ TLCM ID ④~⑦为Dell要求 TTL ID 编码规则如下：

序号号	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
代码	S	L	S	T	1	2	3	5	9	4	2	0	0	0	1	D	B
描述	GBN		等级	line	年	月	FG-Code后4位					Serial Number					

(2) High voltage caution label

	<p>HIGH VOLTAGE CAUTION</p>	<p>COLD CATHODE FLUORESCENT LAMP IN LCD PANEL CONTAINS A SMALL AMOUNT OF MERCURY. PLEASE FOLLOW LOCAL ORDINANCES OR REGULATIONS FOR DISPOSAL.</p>
	<p>RISK OF ELECTRIC SHOCK. DISCONNECT THE ELECTRIC POWER BEFORE SERVICING</p>	

(3) Box label

BOE
BEIJING BOE DISPLAY TECHNOLOGY CO., LTD.

MODEL: XXXXXXXXX-XXX ^① Q' TY: XX ^②

SERIAL NO:XXXXXXXXXXXXX ^③ DATE: 20XX/XX/XX ^④

BOX ID 条形码

XXXX ^⑤

序列号标注部分需打印, 说明如下:

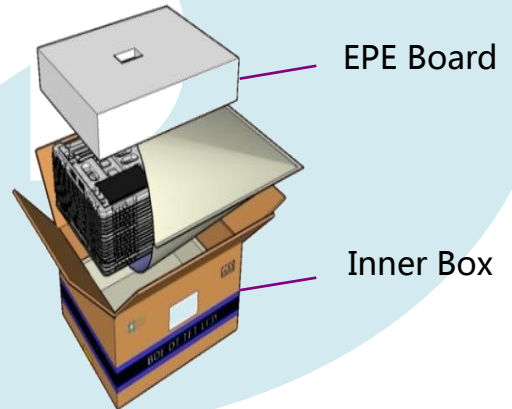
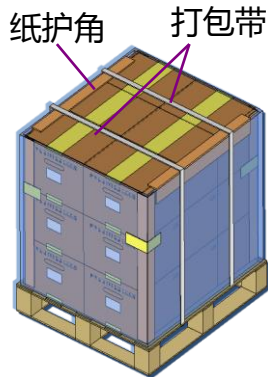
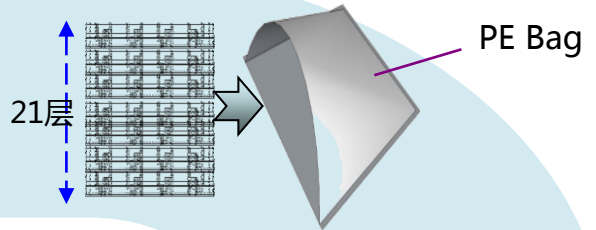
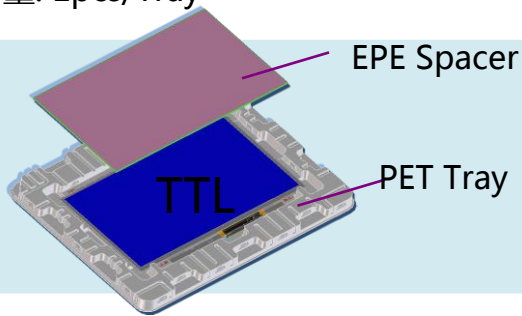
- ①FG-CODE(前12位)
- ②Total Quantity
- ③Box ID
- ④Packing Date
- ⑤FG-Code后四位

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				

13.0 PACKING INFORMATION

13.1 Packing order

- 将 1pcs TLCM 平放入Tray, Panel 面向上放置EPE Spacer
- 容量: 1pcs/Tray



- 每个Pallet上放3层Box, 1层6箱,共计18ea Box
- Pallet 四边及打包带位置放置纸护角后,以缠绕膜包裹
- 容量: 360pcs/Pallet

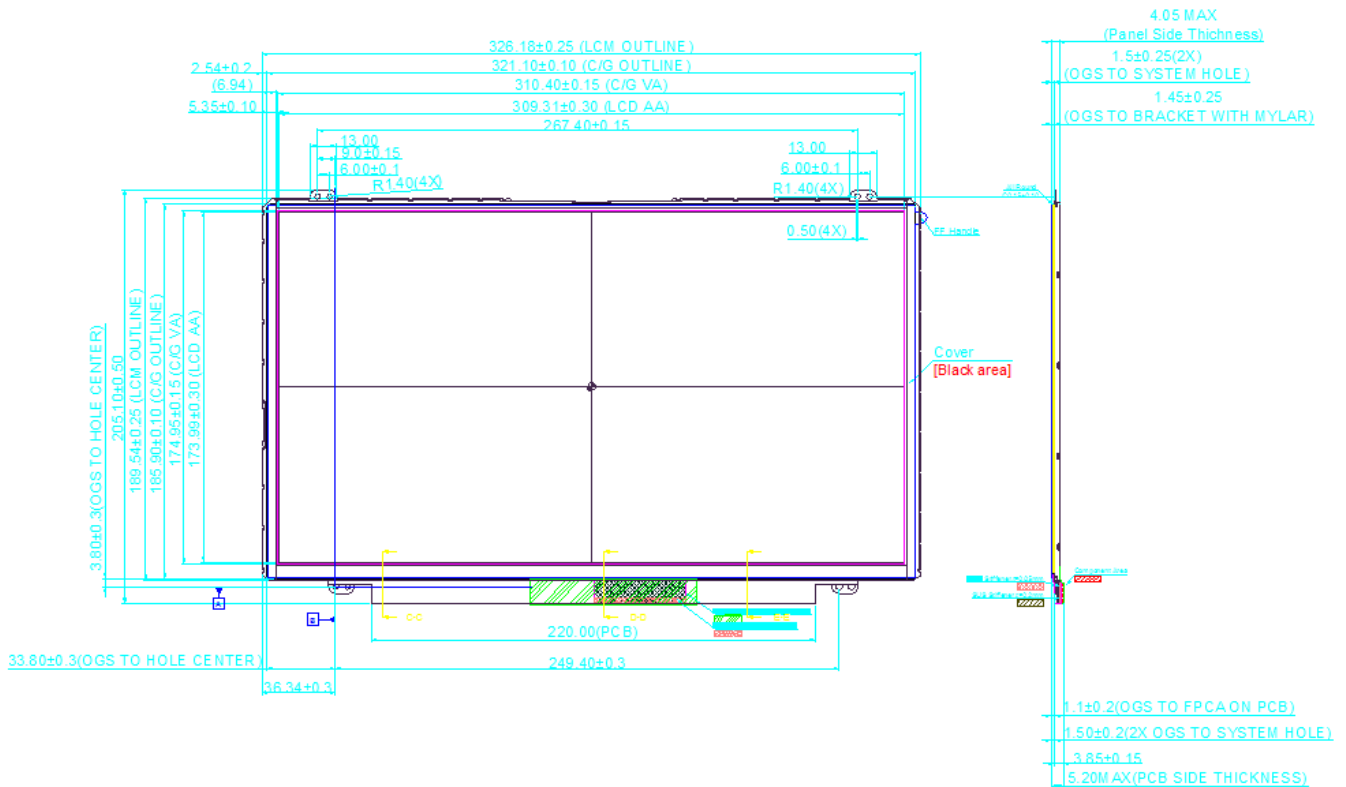
- 将PET Tray堆码后平放入Inner Box
- 上下放置EPE Board
- 容量 : 20pcs/Inner Box

13.2 Notes

- Box Dimension: 496mm × 396mm × 290mm
- Package Quantity in one Box: 20 pcs
- Total Weight: TBD

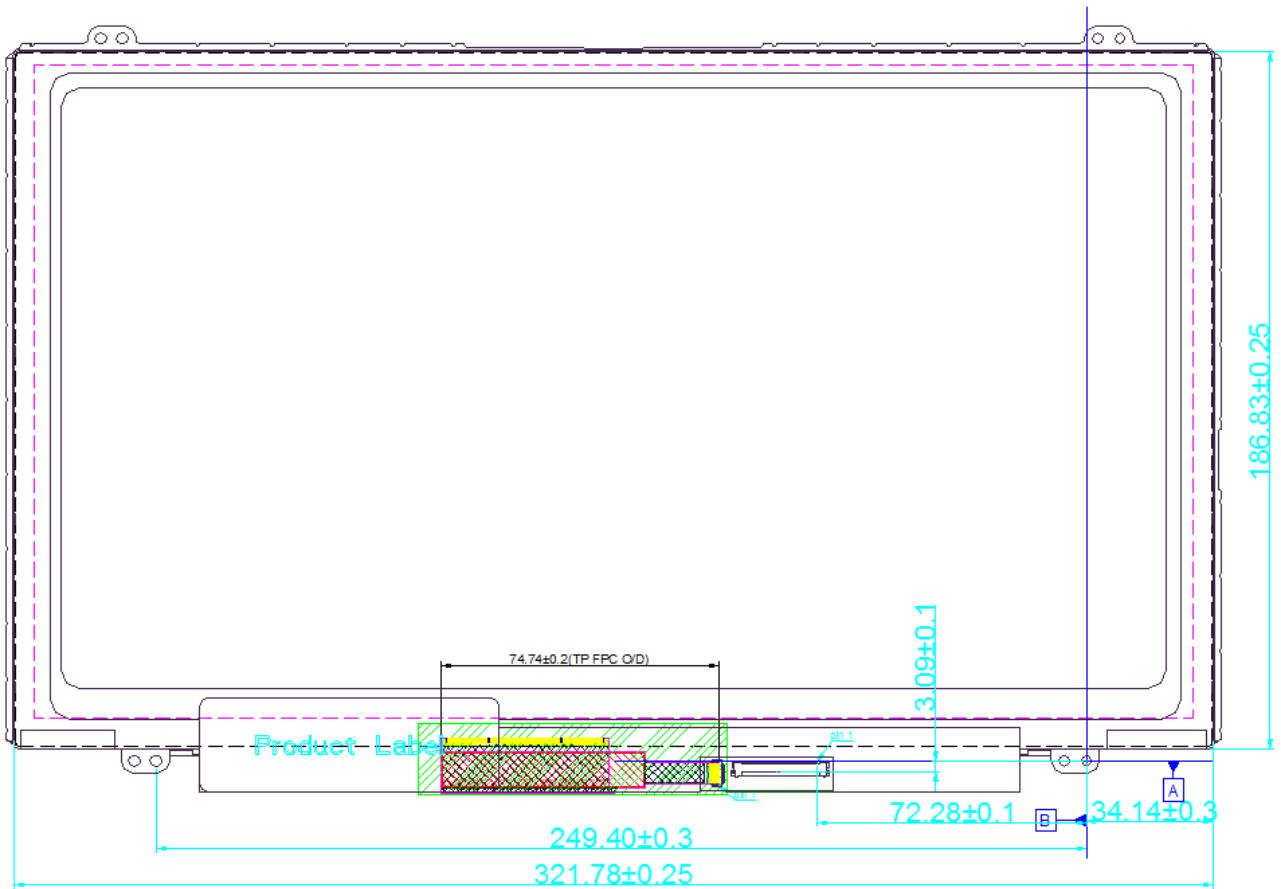
14. MECHANICAL OUTLINE DIMENSION
14.1 Total Solution Outline Dimension

Figure 6. Total Solution Outline Dimensions (Front view)



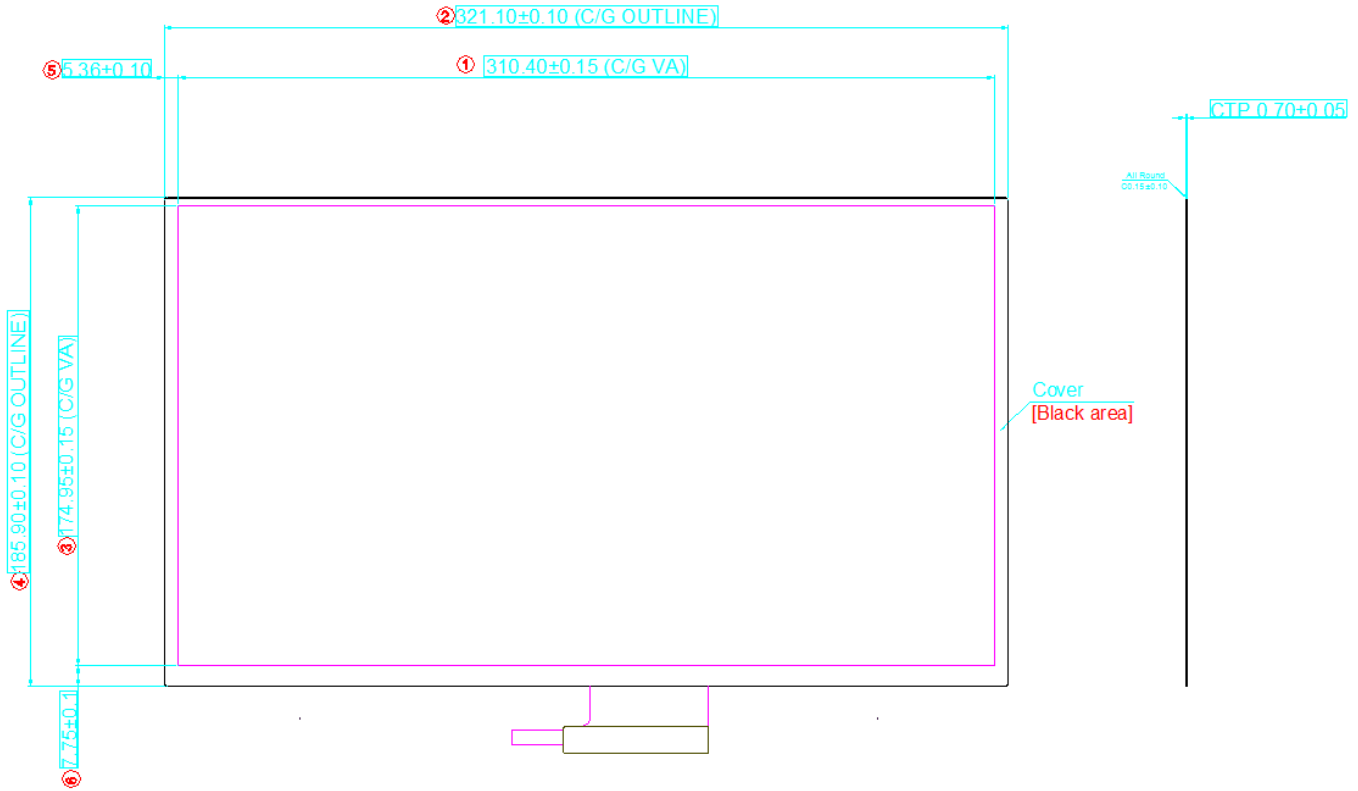
14.2 Total Solution Outline Dimension

Figure 7. Total Solution Outline Dimensions (Rear view)



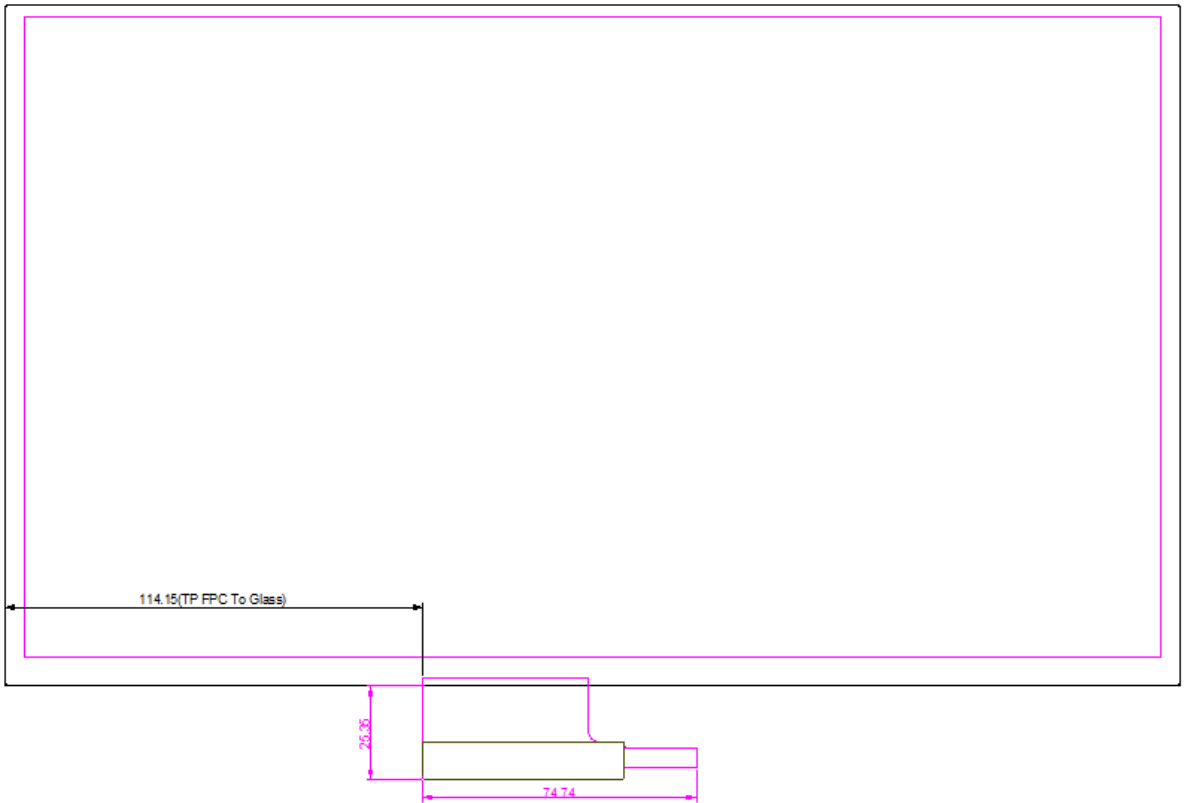
14.3 Touch Panel Outline Dimension

Figure 8. Touch Panel Outline Dimensions (Front view)



14.4 Touch Panel Outline Dimension

Figure 9. Touch Panel Outline Dimensions (Rear view)



15.0 EDID Table

Address (HEX)	Function	Hex	Dec	crc	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	52	82		1618	ID = 1618
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	19	25		2015	Manufactured in 2015
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		-	Refer to right table
15	Max H image size	1F	31		31	31 cm (Approx)
16	Max V image size	11	17		17	17 cm (Approx)
17	Display Gamma	78	120		2.2	Gamma curve = 2.2
18	Feature support	02	2			RGB display, Preferred Timming mode/RGB 4:4:4
19	Red/Green low bits	32	50		-	Red / Green Low Bits
1A	Blue/White low bits	40	64		-	Blue / White Low Bits
1B	Red x high bits	A3	163	652	0.637	Red (x) = 10100011 (0.637)
1C	Red y high bits	56	86	347	0.339	Red (y) = 01010110 (0.339)
1D	Green x high bits	55	85	340	0.333	Green (x) = 01010101 (0.333)
1E	Green y high bits	9E	158	634	0.620	Green (y) = 10011110 (0.62)
1F	Blue x high bits	26	38	153	0.150	Blue (x) = 00100110 (0.15)
20	Blue y high bits	0A	10	40	0.040	Blue (y) = 00001010 (0.04)
21	White x high bits	50	80	320	0.313	White (x) = 01010000 (0.313)
22	White y high bits	54	84	336	0.329	White (y) = 01010100 (0.329)

23	Established timing 1	00	0		-	
24	Established timing 2	00	0		-	
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	99	153		139.8	139.776MHz Main clock
37		36	54			
38		80	128		1920	Hor Active = 1920
39		A0	160		160	Hor Blanking = 160
3A		70	112		-	4 bits of Hor. Active + 4 bits of Hor. Blanking
3B		38	56		1080	Ver Active = 768
3C		28	40		40	Ver Blanking = 40
3D		40	64		-	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		35	53		309	Horizontal Image Size = 309 mm (Low 8 bits)
43		AD	173		173	Vertical Image Size = 173 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	

48	Detailed timing/monitor descriptor #2	AE	174		111.8	111.8208MHz Main clock	
49		2B	43				
4A		80	128		1920	Hor Active = 1920	
4B		A0	160		160	Hor Blanking = 160	
4C		70	112		-	4 bits of Hor. Active + 4 bits of Hor. Blanking	
4D		38	56		1080	Ver Active = 768	
4E		28	40		40	Ver Blanking = 40	
4F		40	64		-	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		35	53		309	Horizontal Image Size = 309 mm (Low 8 bits)	
55		AD	173		173	Vertical Image Size = 173 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			Refer to right above table	
5A		Detailed timing/monitor descriptor #3	00	0			ASCII Data Sting Tag
5B			00	0			
5C	00		0				
5D	FE		254				
5E	00		0		9	DP/N:905VH	
5F	39		57				
60	30		48				
61	35		53				
62	56		86		V	EDID:X20	
63	48		72		H		
64	14		20		00010100		
65	4E		78		N		
66	56		86		V	A	
67	31		49		1		
68	34	52		4			
69	41	65		A			
6A	32	50		2			
6B	30	48		0			

PRODUCT GROUP

REV

ISSUE DATE



TFT- LCD PRODUCT

P0

2014.12.18

SPEC. NUMBER

SPEC. TITLE

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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		9E	158		10011110	Light Controller:PWM & Max. Luminance300
75		00	0		00000000	Front Surface:Anti-Glare & RGB v-stripe
76		10	16		00010000	with DBC
77		00	0		00000000	no Motion Blur & no Active Gamma
78		00	0		00000000	no Wireless Enhancement & no In-Cell Scanner
79		0A	10		00001010	2 Lane edp
7A		01	1		00000001	Built-In Self Test
7B		0A	10			
7C		20	32			
7D	20	32				
7E	Extension flag	00	0			
7F	Checksum	B5	181	181	-	