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NT156FHM-T00

Preliminary Product Specification

Rev. A00

CHONGQING BOE OPTOELECTRONICS TECHNOLOGY CO.,LTD

REVISION HISTORY

REV.	ECN No.	DESCRIPTION OF CHANGES	DATE	PREPARED
P0	-	Initial Release	2016.5.11	
X10		Update EDID : X10	2016.8.16	
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A00		Update EDID : A00	2017.02.23	

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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	344.16(H) ×193.59(V)	mm	
Number of pixels	1920 (H) ×1080 (V)	pixels	
Pixel pitch	0.17925(H) ×0.17925(V)	mm	
Pixel arrangement	RGB Vertical stripe		
Display colors	6	bit	
Display mode	Normally White		
Outline Dimension	359.5+/-0.5 (W) x 223.8 +/-0.5 (H) x 3.2 max. (T) , LCD PCB flat type (bottom) . VESA outline	mm	
Weight	380(max)	g	
Back-light	Lower Down side, 1-LED Lighting Bar type		Note 1
Power consumption	P_D : 0.8	W	Note 2
	P_{BL} : 2.8	W	
	P_{total} : 3.6	W	

Note 1: LED Lighting Bar (36*LED Array)
Note 2: 1.65W @worst pattern, 0.8W @mosaic pattern

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	TBD	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	Glare		
Surface Hardness	3	H	
Support OS	Win8.x and Win10 compliant		
TP Power Consumption	TBD	mW	@ 5 finger

2.0 ABSOLUTE MAXIMUM RATINGS

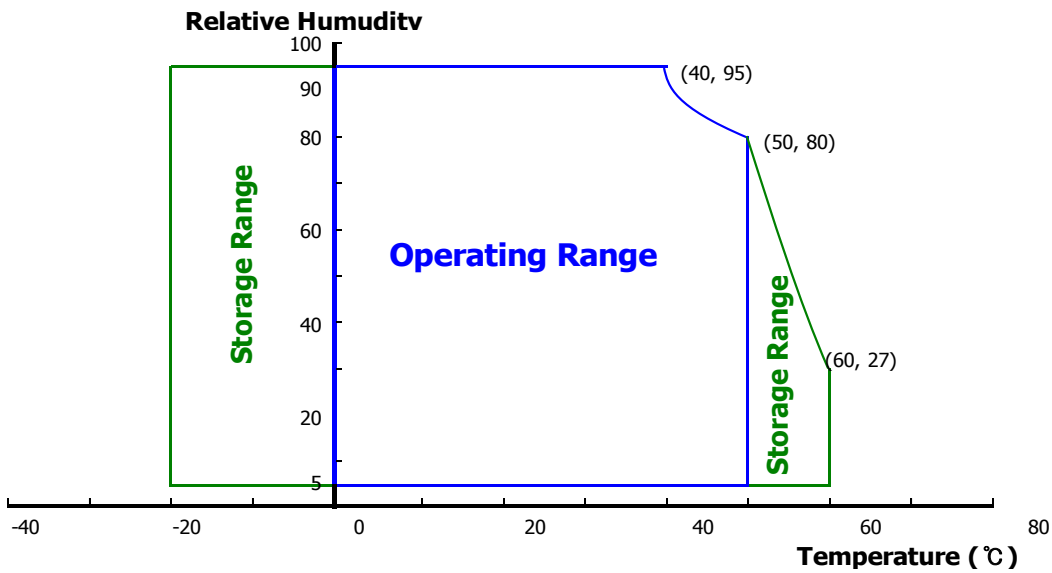
The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 3.

< 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.



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}	-	-	200	mV	At V_{DD} = 3.3V
Power Supply Current		I_{DD}	-	240	500	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	
CABC enable	High level		2.0		3.5	V	
	Low level		0		0.6	V	
Bist enable	High level		2.0		3.5	V	
	Low level		0		0.6	V	
Power Consumption		P_D	-	0.8	1.65	W	Note 1
		P_{BL}	-		2.8	W	Note 2
		P_{total}	-	-	4.45	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 : R/G/B Pattern

2. Calculated value for reference (VLED× ILED)

3.2 Backlight Unit

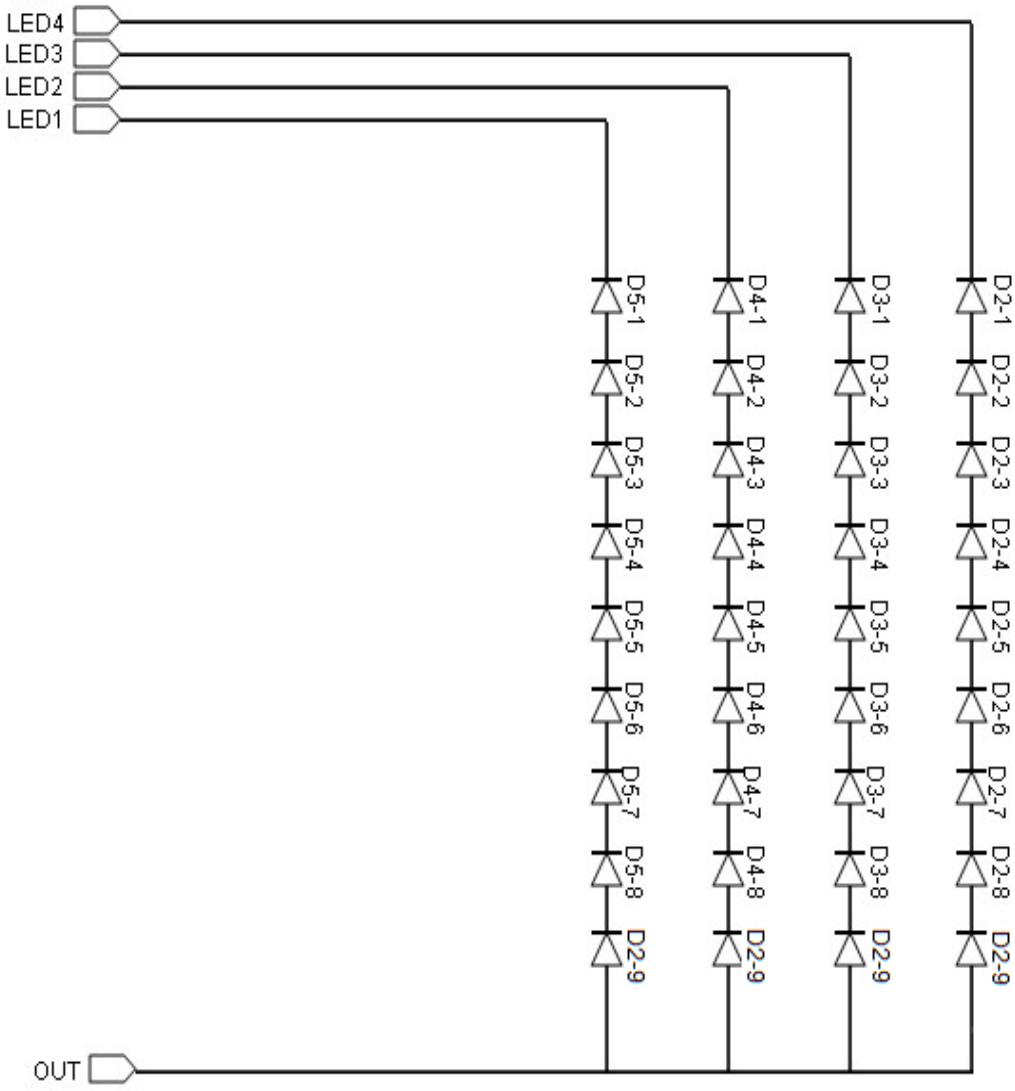
< Table 5. LED Driving guideline specifications >

Ta=25+/-2°C

Parameter			Min.	Typ.	Max.	Unit	Remarks
LED Forward Voltage		V_F	-	-	3.0	V	-
LED Forward Current		I_F	-	22		mA	-
LED Power Consumption		P_{LED}		-	2.6	W	Note 1
LED Life-Time		N/A	15,000	-	-	Hour	I_F = 20.3mA
Power supply voltage for LED Driver		V_{LED}	5	12	20	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}	200	-	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.

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±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	40	45	-	Deg.	Note 1
		Θ_9		40	45	-	Deg.	
	Vertical	Θ_{12}		10	15	-	Deg.	
		Θ_6		30	40	-	Deg.	
Luminance Contrast ratio		CR	Θ = 0°	400	500			Note 2
Luminance of White	5 Points	Y_w	Θ = 0° I_{LED} = 21mA	187	220	-	cd/m^2	Note 3
White Luminance uniformity	5 Points	ΔY5		80	-	-		Note 4
	13 Points	ΔY13		60	-	-		
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			
Response Time (Rising + Falling)		T_{RT}	Ta= 25° C Θ = 0°	-	12	16	ms	Note 6
Cross Talk		CT	Θ = 0°	-	-	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 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).

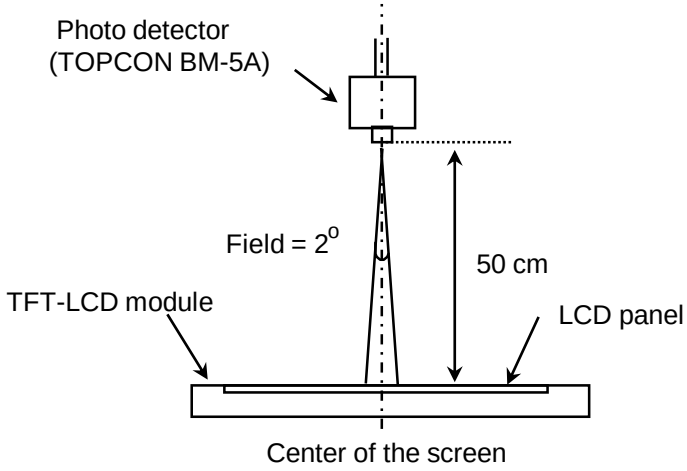
5. The color chromaticity coordinates specified in Table 5 shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

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).

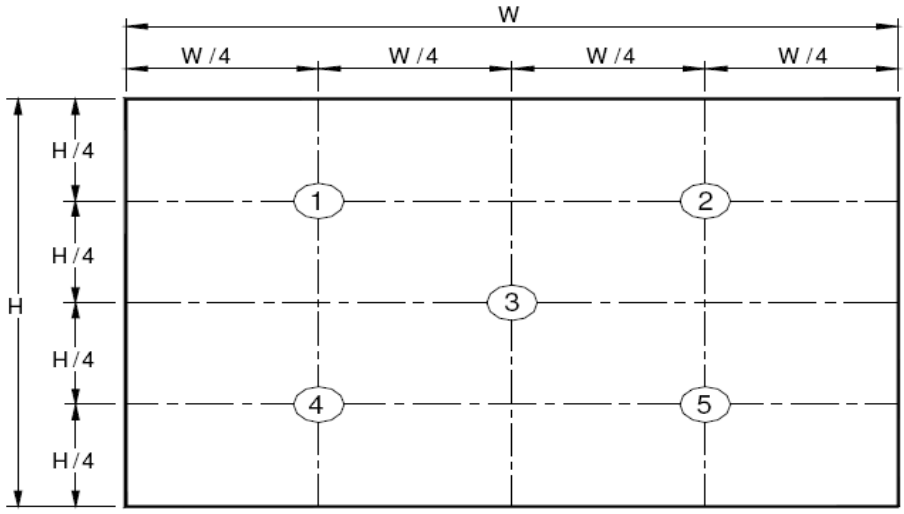
4.3 Optical measurements

Figure 1. Measurement Set Up



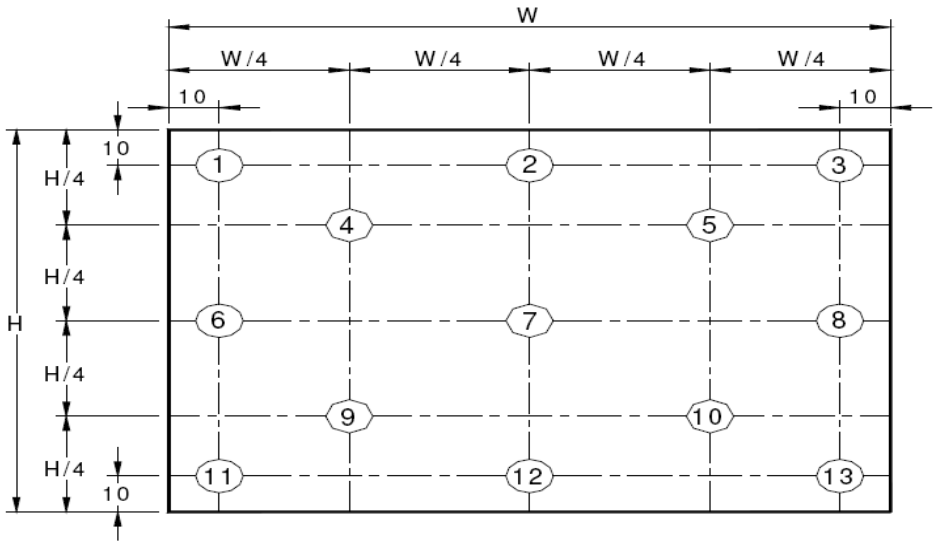
Optical characteristics measurement setup

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



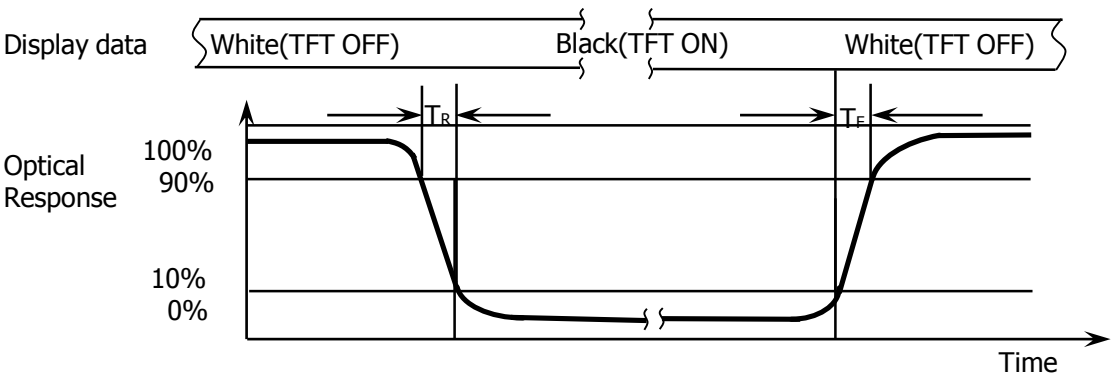
Center Luminance of white is defined as luminance values of center 5 points across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.

Figure 3. Uniformity Measurement Locations (13 points)



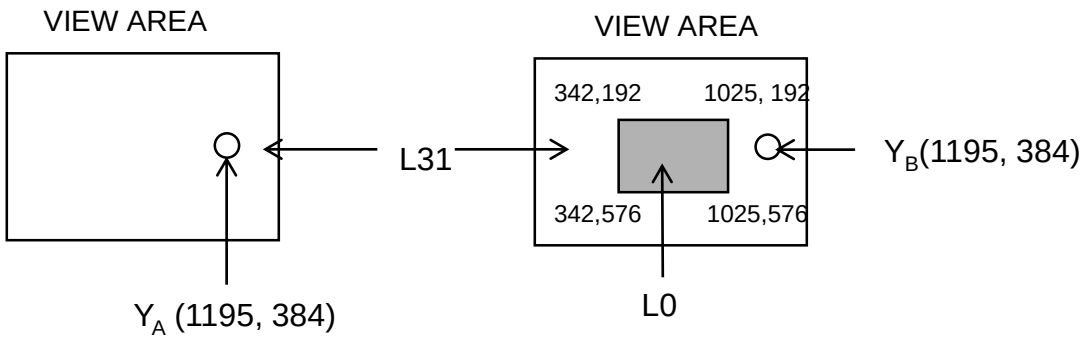
The White luminance uniformity on LCD surface is then expressed as : ΔY5 = Minimum Luminance of five points / Maximum Luminance of five points (see FIGURE 2) , ΔY13 = Minimum Luminance of 13 points /Maximum Luminance of 13 points (see FIGURE 3).

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.

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).

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	Description	PIN NO	Symbol Function	Description
1	DBC	DBC enable	21	BL_GND	Backlight_ground
2	H_GND	High Speed Ground	22	BL_Enable	Backlight On / Off
3	Lane1_N	Comp Signal Link Lane 1	23	BL_PWM	System PWM signal Input
4	Lane1_P	True Signal Link Lane 1	24	NC	Reverse for supplier only
5	H_GND	High Speed Ground	25	NC	Reverse for supplier 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
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
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	TP_EN	Touch function enable
17	HPD	HPD signal pin	37	NC	NC for I2C input
18	BL_GND	Backlight_ground	38	NC	NC for I2C input
19	BL_GND	Backlight_ground	39	NC	NC for I2C input
20	BL_GND	Backlight_ground	40	NC	NC Reset for Touch

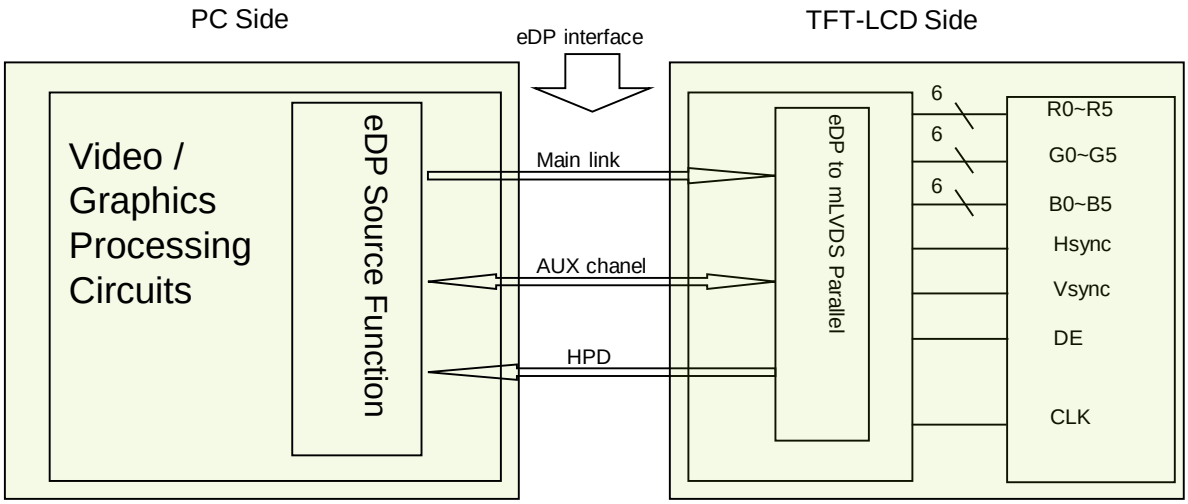
PIN36：

1.Touch_En pin need to pull high by touch PCB- default is pull high

2.System side only connect this pin with open drain

3.Touch suppliers need to provide I/F design guide to ODM.

5-2. eDP Interface



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

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	NC	No 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	10	Vout	LED anode connection

6.0 SIGNAL TIMING SPECIFICATION

6.1 The NT156FHM-T00 is operated by the DE only.

Item		Symbols	Min	Typ	Max	Unit
Clock	Frequency	1/Tc	139.9	152.6	162.8	MHz
	High Time	Tch	-	4/7Tc	-	Tc
	Low Time	Tcl	-	3/7Tc	-	Tc
Frame Period		Tv	1100	1160	1180	lines
			-	60	-	Hz
			-	16.67	-	ms
Vertical Display Period		Tvd	-	1080	-	lines
One line Scanning Period		Th	2120	2192	2300	clocks
Horizontal Display Period		Thd	-	1920	-	clocks

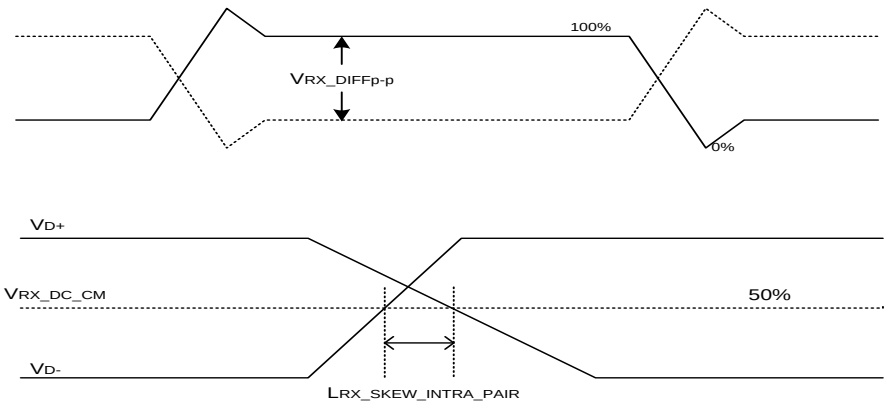
Note: This Module can support low frame refresh rate 48Hz.

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	

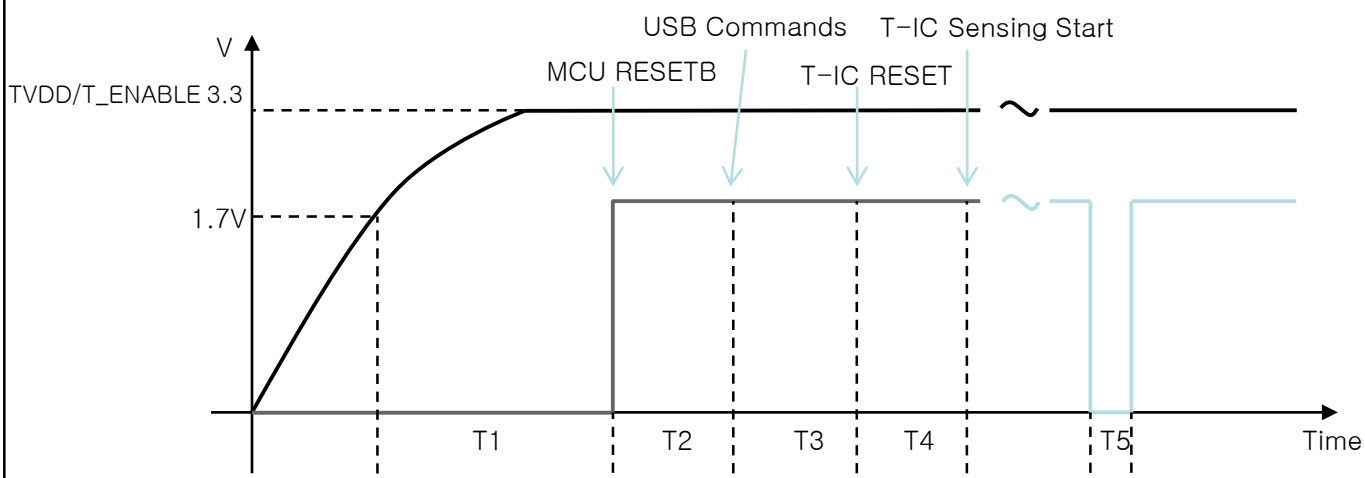


6.3 Touch Interface Timing Parameter

The specification of the Touch interface timing parameter is shown in Table 9.2

<Table 9.2 Touch Interface Timing Specification>

ITEM	Symbol	Time	Unit
MCU Power ON ~ T_ENABLE	T0	≥0us	us
MCU Power ON ~ MCU Reset(MCU Internal Reset)	T1	≥400us	us
MCU Reset ~ USB Commands	T2	≥50ms	ms
USB Commands ~ Touch IC Reset	T3	≥600ms	ms
Touch IC Reset ~ Touch IC Sensing Start	T4	≥500ms	ms
Touch IC Reset low-level width	T5	≥10	us

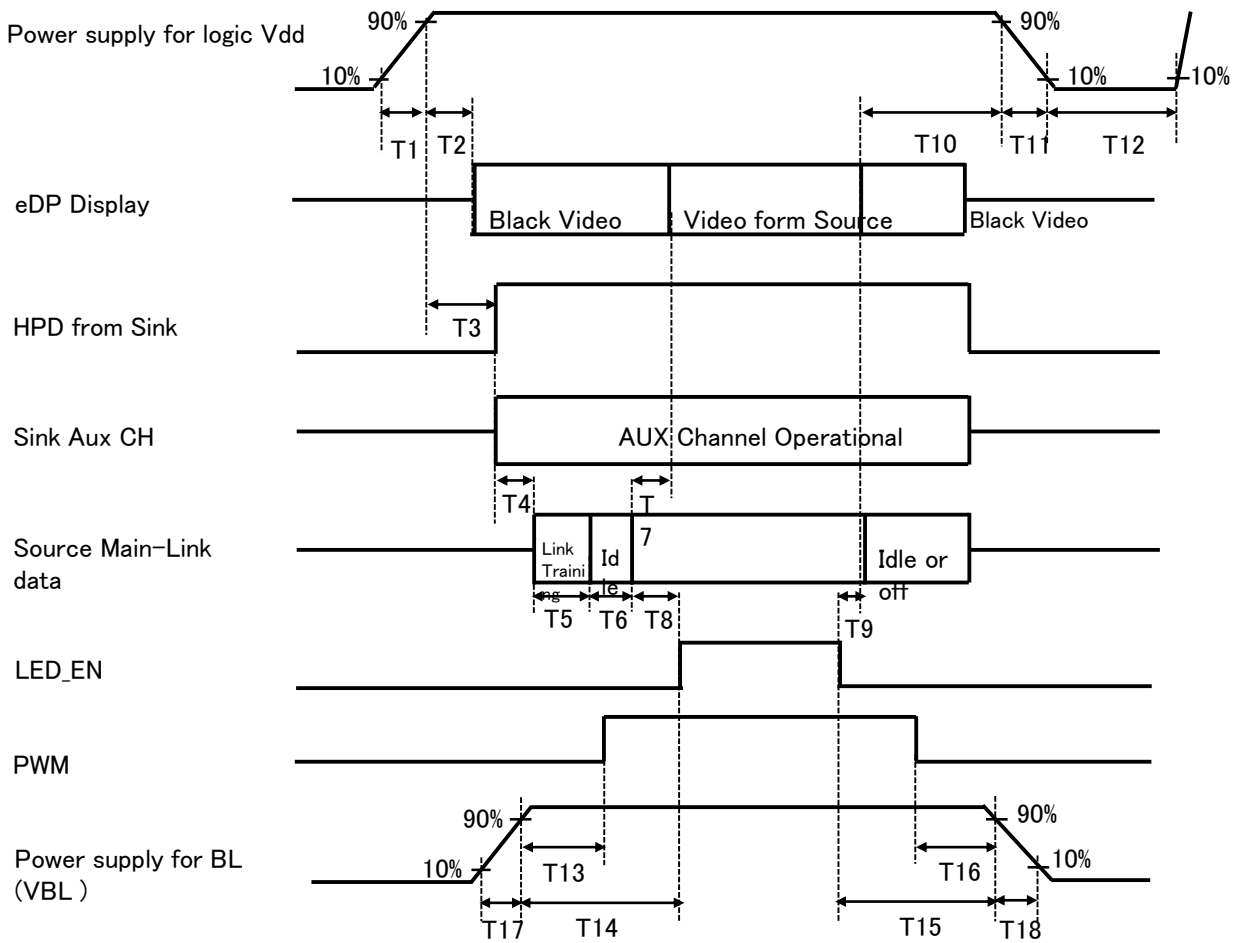


7.0 INPUT SIGNALS, BASIC DISPLAY COLORS & GRAY SCALE OF COLORS

	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 seq uence shall be as shown in below



- 0.5ms ≤ T1 ≤ 10 ms
- 0ms ≤ T2 ≤ 200 ms
- 0ms ≤ T3 ≤ 200 ms
- 200ms ≤ T4+T5+T6+T8
- 0ms ≤ T13
- 0ms ≤ T14
- 0.5ms ≤ T17
- 0ms ≤ T7 ≤ 50ms
- 0ms ≤ T9 ≤ 50ms
- 0ms ≤ T10 ≤ 500 ms
- 0ms ≤ T11 ≤ 10 ms
- 500ms ≤ T12
- 20ms ≤ T15
- 10ms ≤ T16
- 0.5ms ≤ T18 ≤ 20 ms

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.

9.0 MECHANICAL CHARACTERISTICS

9.1 Dimensional Requirements

FIGURE 6 shows mechanical outlines for the model NT156FHM-T00.

Other parameters are shown in Table 10.

<Table 10. Dimensional Parameters>

Parameter	Specification	Unit
Active Area	344.16 (H) ×193.59 (V)	
Number of pixels	1920 (H) X 1080 (V) (1 pixel = R + G + B dots)	
Pixel pitch	0.17925 (H) X 0.17925 (V)	
Pixel arrangement	RGB Vertical stripe	
Display colors	6bit	
Display mode	Normally white	
Dimensional outline	359.5(H)*223.8(V) (W/PCB)*3.2(Max) 359.5 (H)×206.5(V)×3.2 (max)	mm
Weight	380 (max)	gram

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.

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.

(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.

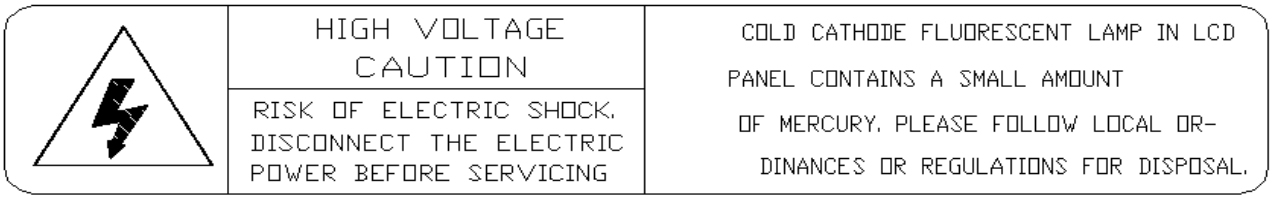
12.0 LABEL

(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					

(2) High voltage caution label



(3) Box label

蓝色字体为后打印标识, 说明如下:

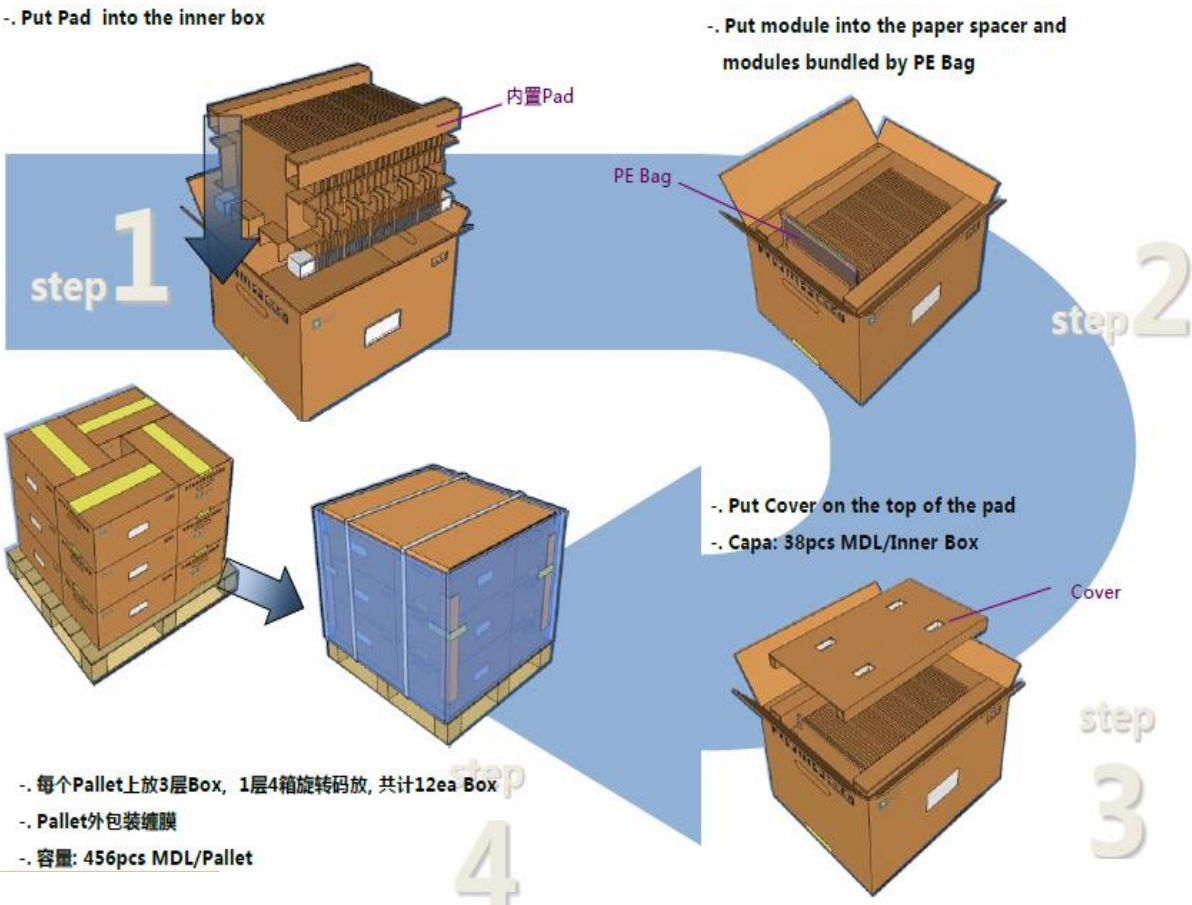
1. **FG-CODE**
2. **Box 产品数量**
3. **Box ID, 编码规则如下**
4. **Box Packing 日期**
5. **产品物料号(客户端)**
6. **FG-CODE 后四位**

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				

13.0 PACKING INFORMATION

13.1 Packing order



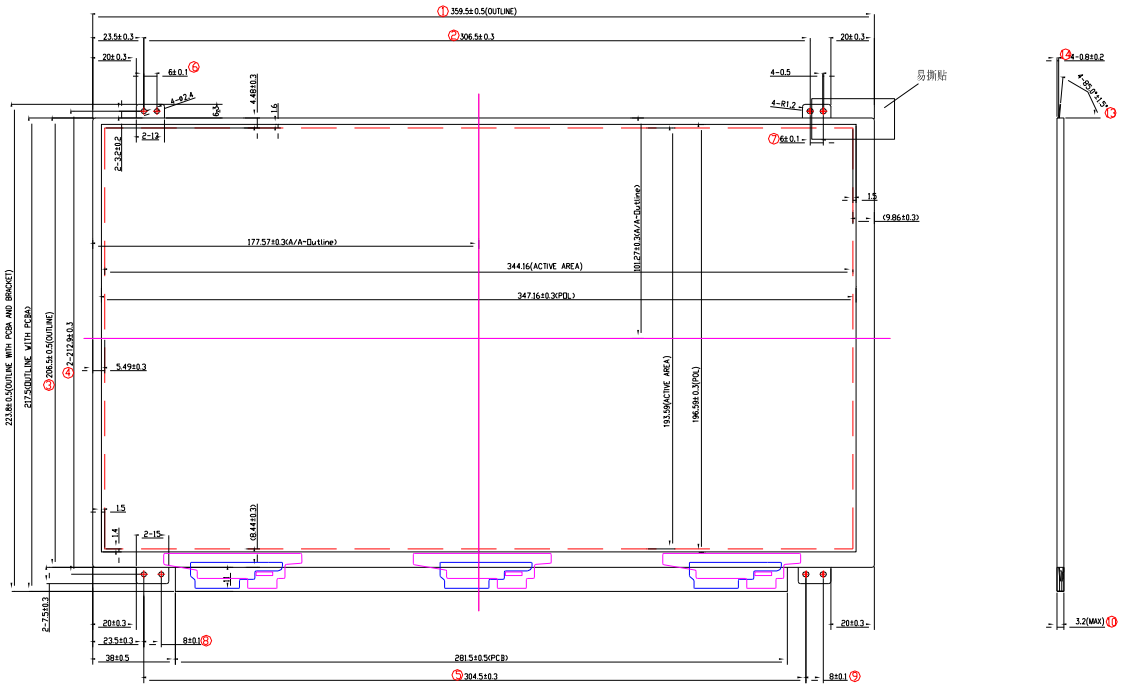
13.2 Notes

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

14. MECHANICAL OUTLINE DIMENSION

14.1 Outline Dimension

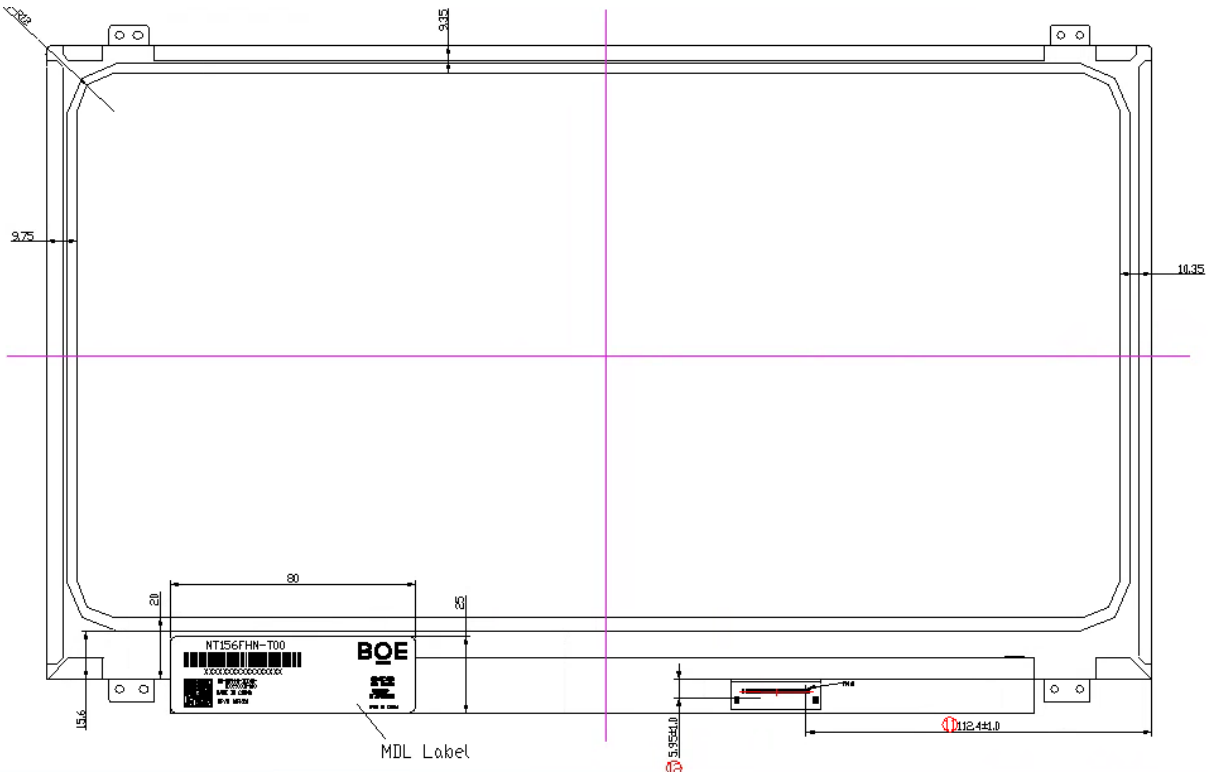
Figure 6. Outline Dimensions (Front view)



Note

1. PCB side is lower than Top Polarizer, and any other PCB component is lower than Top Polarizer.
2. Curve SPEC: 0<=d<=0.5mm.
3. No light leakage from all 4 coners of LCM.
4. Screw Bracket Angle is 85°±1.5°.
5. 尺寸测量方式为卡尺。

Figure 7. TFT-LCD Module Outline Dimensions (Rear view)



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	ED	237		1773	ID = 1773
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	1B	27		2017	Manufactured in 2017
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	604	0.590	Red (x) = 10010111 (0.59)
1C	Red y high bits	59	89	358	0.350	Red (y) = 01011001 (0.35)
1D	Green x high bits	54	84	337	0.330	Green (x) = 01010100 (0.33)
1E	Green y high bits	8E	142	568	0.555	Green (y) = 10001110 (0.555)
1F	Blue x high bits	27	39	156	0.153	Blue (x) = 00100111 (0.153)
20	BLue y high bits	1E	30	121	0.119	Blue (y) = 00011110 (0.119)
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	9C	156		152.6	152.6MHz Main clock
37		3B	59			
38		80	128		1920	Hor Active = 1920
39		10	16		272	Hor Blanking = 272
3A		71	113		-	4 bits of Hor. Active + 4 bits of Hor. Blanking
3B		38	56		1080	Ver Active = 1080
3C		50	80		80	Ver Blanking = 80
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		58	88		344	Horizontal Image Size = 344 mm (Low 8 bits)
43		C1	193		193	Vertical Image Size = 193 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	2E	46		113.1	113.1MHz Main clock
49		2C	44			
4A		80	128		1920	Hor Active = 1920
4B		DE	222		222	Hor Blanking = 222
4C		70	112		-	4 bits of Hor. Active + 4 bits of Hor. Blanking
4D		38	56		1080	Ver Active = 1080
4E		14	20		20	Ver Blanking = 20
4F		40	64		-	4 bits of Ver. Active + 4 bits of Ver. Blanking
50		64	100		100	Hor Sync Offset = 100
51		64	100		100	H Sync Pulse Width = 100
52		44	68		20	V sync Offset = 20 line
53		05	5		20	V Sync Pulse width : 20 line
54		58	88		344	Horizontal Image Size = 344 mm (Low 8 bits)
55		C1	193		193	Vertical Image Size = 193 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		31	49		1	D/PN:1FKK0
60		46	70		F	
61		4B	75		K	
62		4B	75		K	
63		30	48		0	
64		**80**	**128**		10000000	**EDID:A00**
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	

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		21	33		00100001	Frame rate 40Hz~65Hz
74		96	150		10010110	Light Controller:PWM & Max. Luminance 220
75		00	0		00000000	Front Surface: AG & 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		0A	10		00001010	2 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	74	116	116	-	