TV101WUM-AD0

Product Specification

Rev. P3

HEFEI BOE OPTOELECTRONICS TECHNOLOGY CO.,LTD

REVISION HISTORY

REV.	ECN No.	DESCRIPTION OF CHANGES	DATE	PREPARED
P0	-	Initial Release	2015.1.9	
P1	-	Change the DPN of Label	2015.3.15	
P2	-	Modify the PIN function	2015.4.28	
P3	-	Modify the Storage Temperature	2016.6.10	

Contents

1.0 General Description

1.1 Application

- Tablet 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	216.806(H) ×135.504 (V)	mm	
Number of pixels	1920×3(RGB)×1200	pixels	
Pixel pitch	0.11292*0.11292	mm	
Pixel arrangement	RGB Vertical stripe		
Display colors	16.7M	colors	
Display mode	Normally Black		
Dimensional outline	255.9×169.1	mm	With TP
Weight	225.2 Max	g	With TP
Back-light	Lower Down side, 1-LED Lighting Bar type		Note 1
Power consumption	P_D : 0.95 (max)	W	
	P_{BL} :2.5(max)	W	
	P_{total} :3.45(max)	W	

Notes : 1. LED Lighting Bar (21*LED Array)

1.2 .2. Mechanical Characteristics(Table 2.)

<Table 2. Mechanical Characteristics>

Parameter	Specification	Unit	Remarks
TP Technology	OGS	-	
Touch Structure	ETE		
OGS Overall Size	255.9 x 169.1	[mm]	
TP View Area	217.76×138.4	[mm]	
TP Active Area	216.81×135.5	[mm]	
Total Thickness	3.475	[mm]	
Surface Hardness	7H Min	-	
Surface Treatment	AS Coating	-	
OGS Sensor Thickness	0.7	[mm]	
Bonding Mode	Directing Bonding	-	
ASF (Anti-Split Film)	YES		
Anti-Water			
Transmittance	90	%	After Bonding
Strength	350	mpa	

1.2 .3.LCM Electrical characteristics(Table 3.)

<Table 3. LCM Electrical characteristics>

Parameter	Specification	Unit	Remarks
Control Board Form	PCBA	-	
Control Board Size	214.2×11.87	[mm]	
Control Board Thickness	Max1.9 (PCB+ Component Area+ Adhesive)	[mm]	
Type of Master IC	BT51011BH		
Number of channels	1540		
VDD	3.3	[V]	
Interface	MIPI	-	
Touch Points (min)	10	-	
Auto Calibration	YES		
Power Consumption (max.)	0.12	[Watts]	

1.2 .4. TP Electrical characteristics (Table 4.)

<Table 4. TP Electrical characteristics>

Parameter	Specification	Unit	Remarks
TP Technology	OGS	-	
Touch Structure	ETE	-	
System OS	WIN 8	-	
Control Board Form	COB	-	Wacom provide
Control Board Size	On System	[mm]	
Control Board Thickness	On System	[mm]	
Type of Master IC	W9006	-	
Number of Tx / Rx	35/56	-	
VDD	3.3	[V]	
Interface	USB	-	
Touch Points (min)	10	-	
Active pen	YES	-	
Auto Calibration	YES	-	
Power Consumption (max.)	0.12	[Watts]	

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 2.

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

Parameter	Symbol	Min.	Max.	Unit	Remarks
Power Supply Voltage	V_{DD}	-0.3	4.5	V	Note 1
Operating Temperature	T_{OP}	-20~65		℃	
Storage Temperature	T_{ST}	-40~80		℃	

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.

3.0 ELECTRICAL SPECIFICATIONS

3.1 Electrical Specifications

< Table 3. 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}	-	-	350	mV	At V_{DD} = 3.3V
Power Supply Current	I_{DD}	-	-	288	mA	Note 1
Differential Input Voltage	V_{ID}	70	-	-	mV	
Power Consumption	P_D	-	-	0.95	W	Note 1
	P_{BL}	-	-	2.5	W	Note 2
	P_{total}	-	-	3.45	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 (V_{LED} × I_{LED})

3.2 Backlight Unit

< Table 4. 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	-	18.5	-	mA	-
LED Power Consumption	P_{LED}		-	2.5	W	
LED Life-Time	N/A	15,000	-	-	Hour	I_F = 20mA Note 1
Power supply voltage for LED Driver	V_{LED}	4.5	7	12	V	

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

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.

4.2 TTL Optical Specifications

<Table 5. TTL Optical Specifications>

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	Horizontal	Θ_3	CR > 10	80	-	-	Deg.	Note 1
		Θ_9		80	-	-	Deg.	
	Vertical	Θ_{12}		80	-	-	Deg.	
		Θ_6		80	-	-	Deg.	
Luminance Contrast ratio		CR	Θ = 0°	-	800	-		Note 2
Luminance of White	5 Points	Y_w	Θ = 0° I_{LED} = 20mA	340	400	-	cd/m^2	Note 3
White Luminance uniformity	5 Points	ΔY5		-	-	20%		Note 4
	13 Points	ΔY13		-	-	35%		
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°					
		y_R						
	Green	x_G						
		y_G						
	Blue	x_B						
		y_B						
Gamut				-	50		%	
Response Time (Rising + Falling)		T_{RT}	Ta= 25° C Θ = 0°	-	30		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 (33,37,73,77) 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 : ΔY13 and ΔY5. ΔY13 =1- Minimum Luminance of 13 points /Maximum Luminance of 13 points , ΔY5 =1- Minimum Luminance of 5 points /Maximum Luminance of 5 points
(see FIGURE 2 and FIGURE 3).

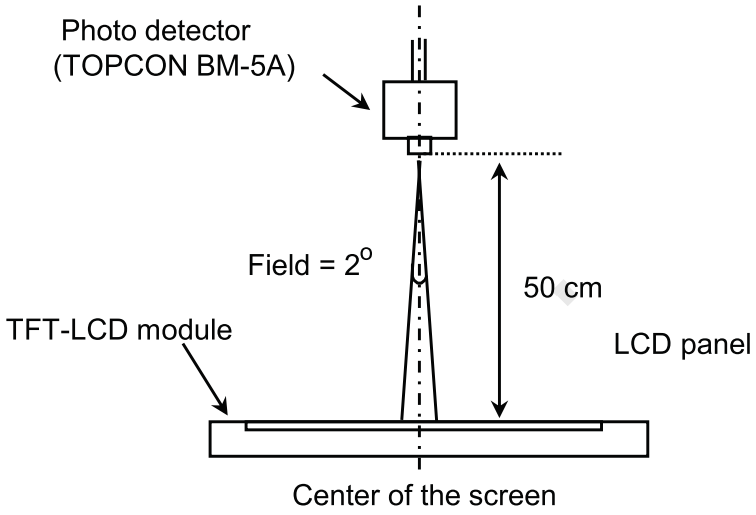
5. The color chromaticity coordinates specified in Table 5 shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

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).

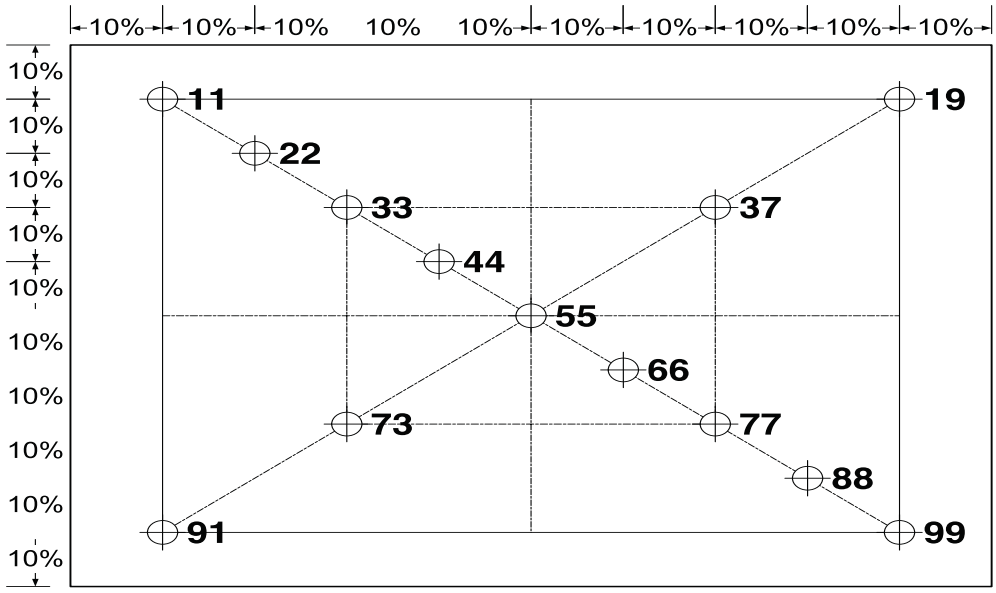
4.3 Optical measurements

Figure 1. Measurement Set Up



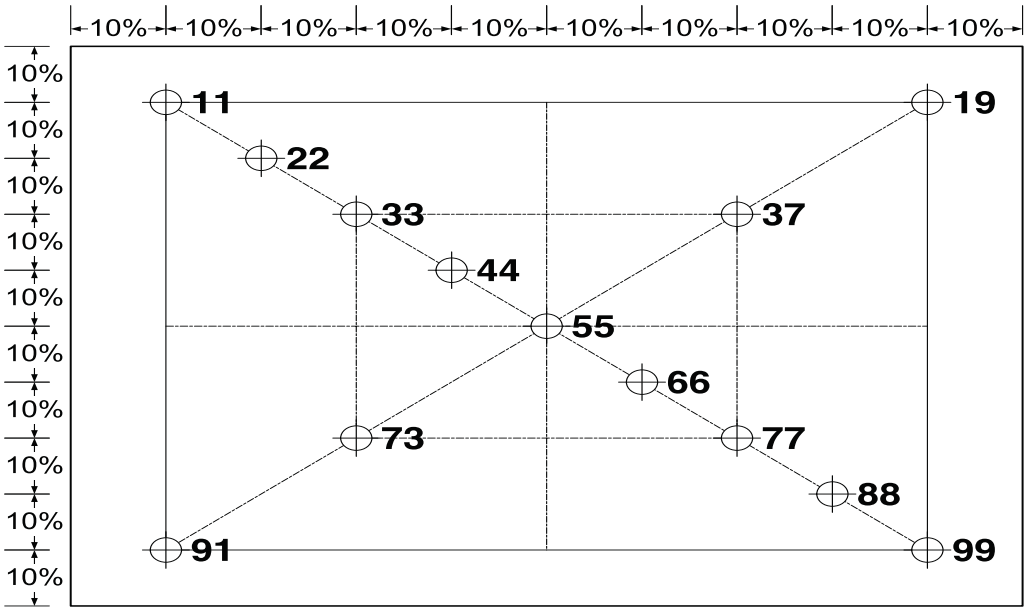
Optical characteristics measurement setup

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



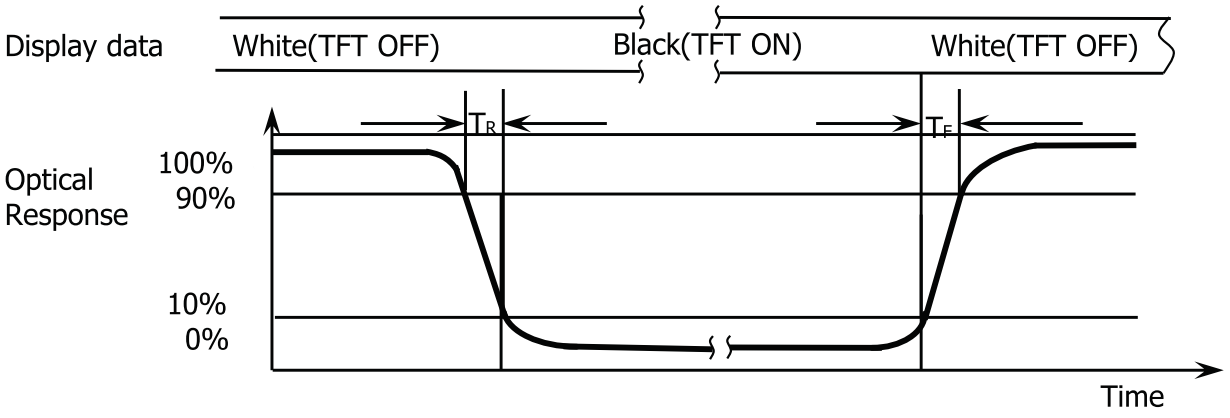
Center Luminance of white is defined as luminance values of center 5 points (33,37,55,73,77)across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.

Figure 3. Uniformity Measurement Locations (13 points)



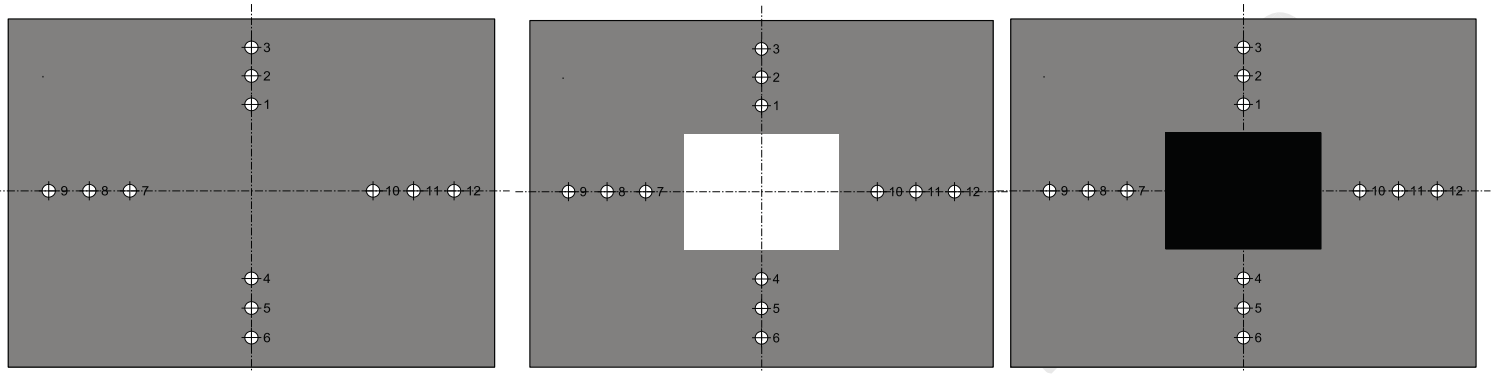
The White luminance uniformity on LCD surface is then expressed as : ΔY5 = 1- Minimum Luminance of five points / Maximum Luminance of five points (see FIGURE 2) , ΔY13 =1- Minimum Luminance of 13 points /Maximum Luminance of 13 points (see FIGURE 3).

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



Mid Gray White on Gray Black on Gray

$$CrossTalk_{WonG} = (L_{WonG} - L_{Gray}) / L_{Gray} * 100\%$$
$$CrossTalk_{BonG} = (L_{BonG} - L_{Gray}) / L_{Gray} * 100\%$$

Where:

L_{Gray}= the luminance of full mid gray screen at that point (cd/m^2)

$L_{WonG\ or\ Bon\ G}$ = Subsequent luminance of that point with the white box displayed or with the black box displayed(cd/m^2)

The location measured will be exactly the same in both patterns

Point	x	y
1	0	3/12 h
2	0	4/12 h
3	0	5/12 h
4	0	-3/12 h
5	0	-4/12 h
6	0	-5/12 h
7	-3/12 w	0
8	-4/12 w	0
9	-5/12 w	0
10	0	3/12 w
11	0	4/12 w
12	0	5/12 w

Calculate shadowing for each point by comparing the luminance of full mid gray screen at that point to the luminance of the same point with the white box displayed and to the luminance of the same point with the black box displayed. (Refer to FIGURE 5).

5.0 INTERFACE CONNECTION.

5.1 Electrical Interface Connection

The electronics interface connector is FH34SRJ-34S-0.5SHor Compatible.
The connector interface pin assignments are listed in Table 6.

<Table 6. Pin Assignments for the Interface Connector>

Terminal	Symbol	Functions
Pin No.	Symbol	Description
1	VDD	Power Supply(3.3V typ.)
2	VDD	Power Supply(3.3V typ.)
3	H-sync	H-sync
4	LED EN	LED driver Enable Input
5	LED PWM	Backlight LED driver PWM Input
6	EDID SDA	EDID Data Input
7	EDID SCL	EDID Clock Inpu
8	GND	Ground
9	GND	Ground
10	DSI_D2P/Rx-IN2P	MIPI data pair 2 positive signal
11	DSI_D2N/Rx-IN2N	MIPI data pair 2 negative signal
12	GND	Ground
13	DSI_D1P/Rx-IN1P	MIPI data pair 1 positive signal
14	DSI_D1N/Rx-IN1N	MIPI data pair 1 negative signal
15	GND	Ground
16	DSI_CLKP/Rx-CLKP	MIPI Clock positive signal
17	DSI_CLKN/Rx-CLKN	MIPI Clock negative signal
18	GND	Ground
19	DSI_D0P/Rx-IN0P	MIPI data pair 0 positive signal
20	DSI_D0N/Rx-IN0N	MIPI data pair 0 negative signal

5.0 INTERFACE CONNECTION.

5.1 Electrical Interface Connection

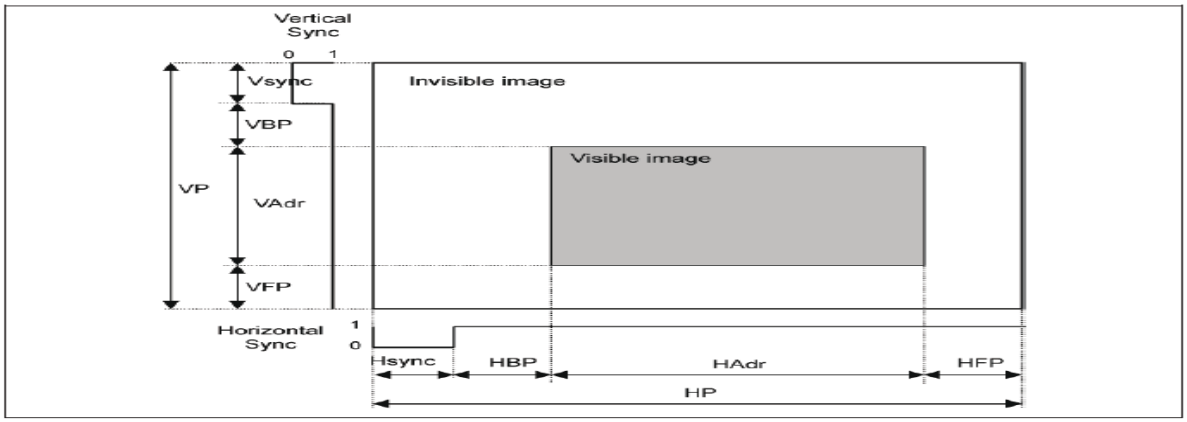
The electronics interface connector is FH34SRJ-34S-0.5SHor Compatible.
The connector interface pin assignments are listed in Table 6.

<Table 6. Pin Assignments for the Interface Connector>

Terminal	Symbol	Functions
Pin No.	Symbol	Description
21	GND	Ground
22	DSI_D3P/Rx-IN3P	MIPI data pair 3 positive signal
23	DSI_D3N/Rx-IN3N	MIPI data pair 3 negative signal
24	GND	Ground
25	GND	Ground
26	GND	Ground
27	GND	Ground
28	NC	Not Connection
29	BIST	Aging Mode Power Supply
30	NC	Not Connection
31	LED+	LED Power Supply (4.5V ~ 12V)
32	LED+	LED Power Supply (4.5V ~ 12V)
33	LED+	LED Power Supply (4.5V ~ 12V)
34	LED+	LED Power Supply (4.5V ~ 12V)

5.2 MIPI Input signal Timing Specifications

ITEM			SYNBOL	min	typ	max	UNIT
LCD	Frame Rate		-	-	60	-	Hz
	Pixels Rate		-	156.8	156.8	159.9	MHz
Timing	DCLK	Frequency	fCLK	490	490	498	MHz
		Period	Tclk	2.01	2.04	2.04	ns
	Horizontal	Horizontal total time	tHP	1946	1946	1951	t_{CLK}
		Horizontal Active Time	tHadr	1920			t_{CLK}
		Horizontal Pulse Width	tHsync	1	1	1	t_{CLK}
		Horizontal Back Porch	tHBP	14	14	14	t_{CLK}
		Horizontal Front Porch	tHFP	11	11	16	t_{CLK}
	Vertical	Vertical total tim e	tvp	1343	1343	1366	t_H
		Vertical Active time	tVadr	1200			t_H
		Vertical Pulse Width	tVsync	1	1	1	t_H
		Vertical Back Porch	tVBP	32	32	32	t_H
		Vertical Front Porch	tVFP	110	110	133	t_H
Differential Swing			VDswing	400	500	-	mV
Bit Rate			TX SPD(M BPS)	980	980	995	Mbps
Pixel Fomat				-	24	-	Data bit /pixel
Lane				-	4	-	Lane



5.4 Back-light & LCM Interface Connection

<Table 7. Pin Assignments for the BLU & LCM Connector>

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	FB1	LED cathode connection	6	FB6	LED cathode connection
2	FB2	LED cathode connection	7	NC	NC
3	FB3	LED cathode connection	8	VBL	LED anode connection
4	FB4	LED cathode connection	9	VBL	LED anode connection
5	FB5	LED cathode connection			

5.5 TP Interface Connection

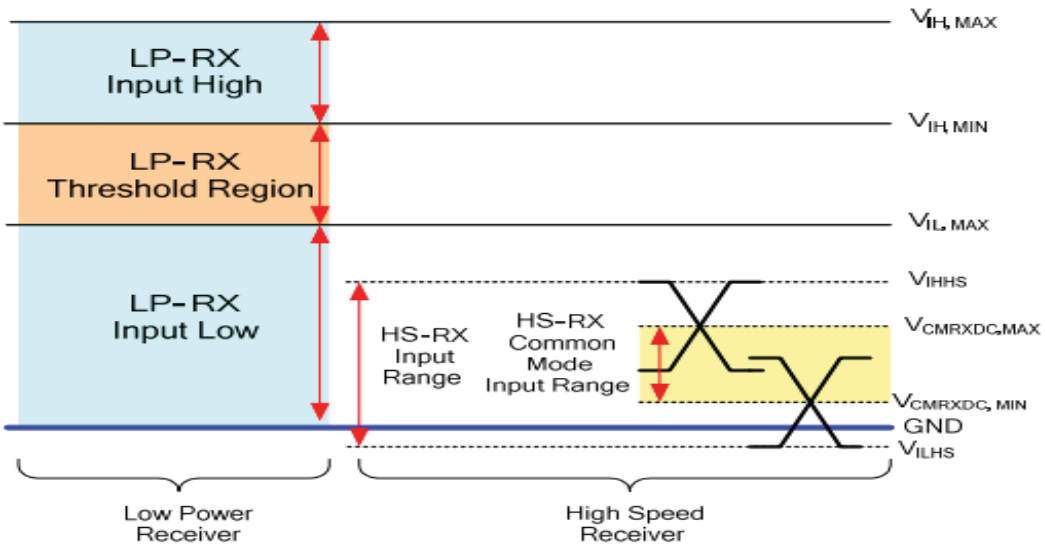
PIN	1-2	3-4	5-48	49-50	51-52	53-80
Function	Dum	ESD GND	RX44-RX1	GND	Guard	TX28-TX1
PIN	81-82	83-84				
Function	ESD GND	GND				

The electronics interface connector is FH29DJ-80S-0.2SHW or Compatible.
The connector interface pin assignments are listed :

Pin No.	Symbol	Description
1	ESDRING1	NC
2	GND	Ground
3-30	TX1-TX28	Touch operation:TX
31	Guard	ESD Protection
32-33	GND	Ground
34-77	RX1-RX44	Touch operation:RX
78-79	GND	Ground
80	GNDRING	NC

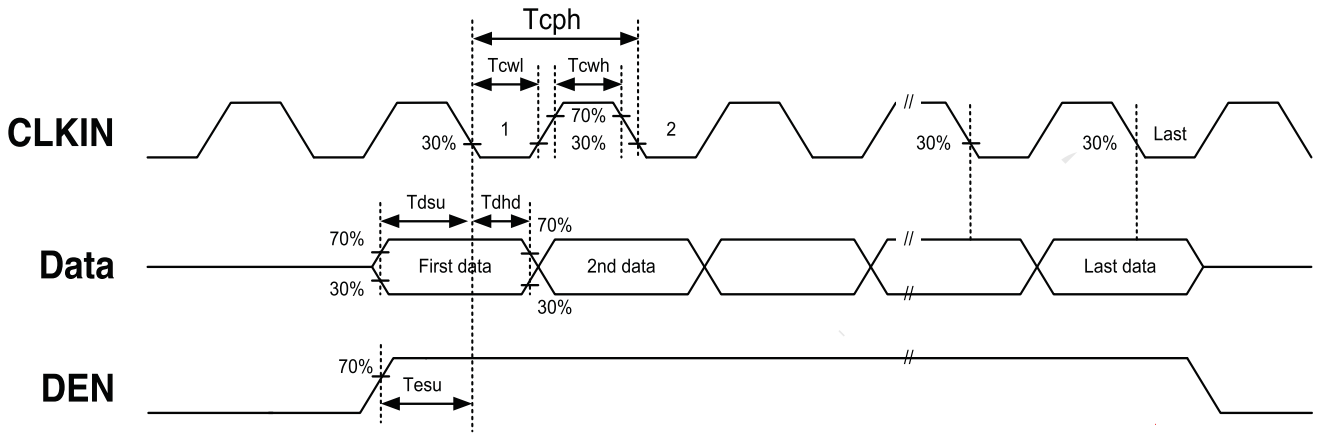
6.0 SIGNAL TIMING SPECIFICATION

6.1 MIPI Rx Interface Timing Parameter



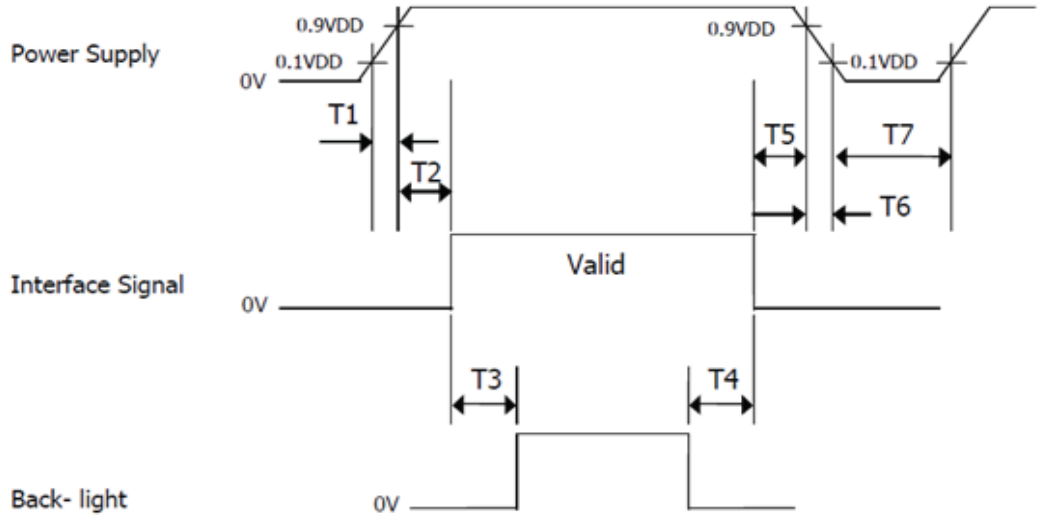
Item		Parameter	Min.	Typ.	Max.	Unit
HS_RX	Common-mode voltage HS receive mode	VCMRX(DC)	155	—	330	mV
	Differential input high threshold	VIDTH	—	—	70	mV
	Differential input low threshold	VIDTL	70	—	—	mV
	Single-ended input high voltage	VIHHS	—	—	460	mV
	Single-ended input low voltage	VILHS	-40	—	—	mV
	Differential input impedance	ZID	60	75	95	Ω
LP_RX	Logic 1 input voltage	VIH	1100	1200	1300	mV
	Logic 0 input voltage. not in ULPState	VIL	-150	—	150	mV

6.2 SIGNAL TIMING WAVEFORMS OF INTERFACE SIGNAL



7.0 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



Parameter	Values			Units
	Min	Typ	Max	
T1	0	-	10	ms
T2	0	-	50	ms
T3	200	-	-	ms
T4	200	-	-	ms
T5	0.5	-	50	ms
T6	0	-	10	ms
T7	500	-	-	ms

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.

8.0 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.

8.1 LCD Module

Connector Name /Description	Manufacturer
MIPI Connector	FH34SRJ-34S-0.5SH
B/L Connector	UJU PF040-B09B-C09

9.0 RELIABILITY TEST

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(TBD)

10.0 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.

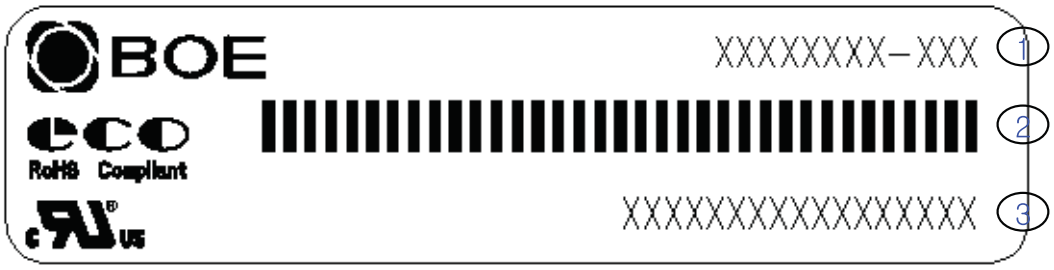
(4) Cautions for the atmosphere
- Dew drop atmosphere should be avoided.
- Do not store and/or operate the LCD module in a high temperature and/or humidity atmosphere. Storage in an electro-conductive polymer packing pouch and under relatively low temperature atmosphere is recommended.

(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.

11.0 LABEL

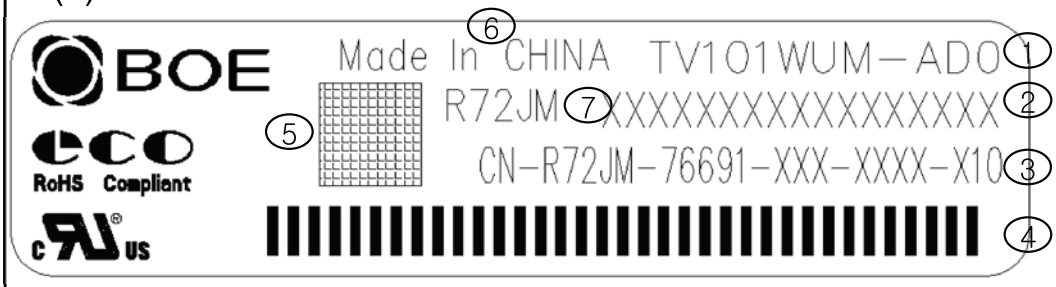
(1) LCM label



Label Size:
48 mm (L) ×12mm (W)
1. FG-CODE
2. MDL ID 条纹码
3. MDL ID

序列号	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
代码	4	F	P	3	1	2	7	3	8	3	0	0	0	1	E	E	J
描述	GBN代码		等级	B3	年份		月	FG Code后四位				序列号					

(2) T-LCM label

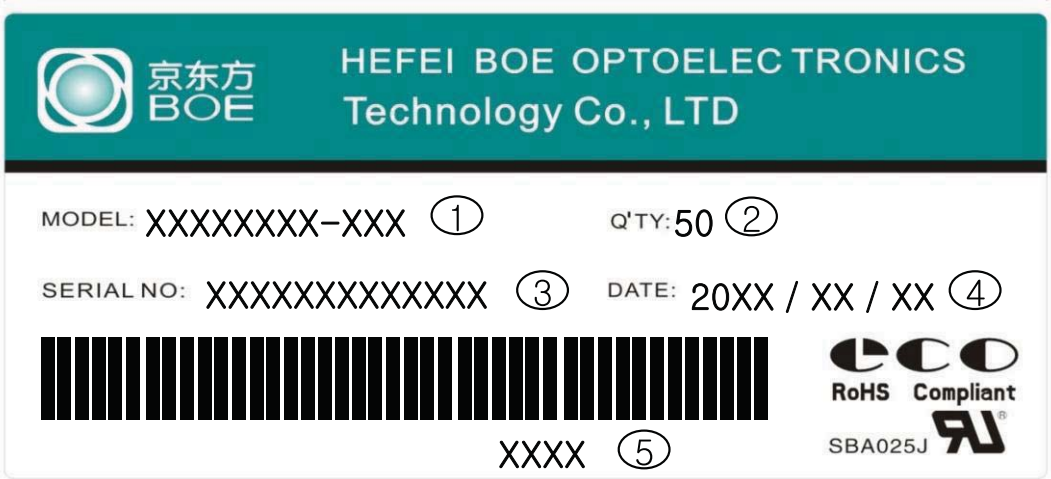


Label Size: 48mm × 12mm / 厚度: 0.075mm

1. FG-CODE
2. MDL ID
3. 客户要求PPID
4. MDL ID 条纹码
5. PPID 二维码
6. Made In CHINA (产地)
7. 客户端物料号

序列号	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
代码	4	F	P	3	1	2	7	3	8	3	0	0	0	1	E	E	J
描述	GBN代码		等级	B3	年份		月	FG Code后四位				序列号					

(3) Box label



Label Size:
110 mm (L) × 56 mm (W)

1. FG-CODE
2. Box 产品数量
3. Box ID, 编码规则如下
4. Box Packing 日期
5. FG-CODE 后四位

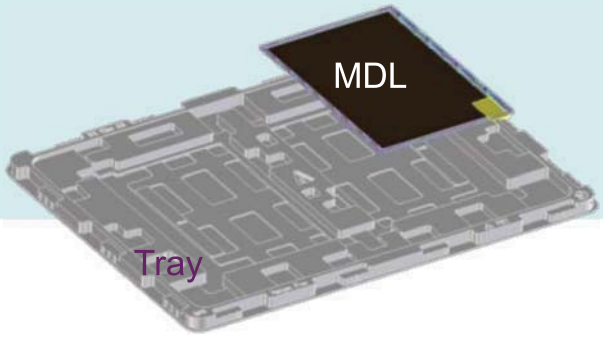
序列号	1	2	3	4	5	6	7	8	9	10	11	12	13
代码	S	L	S	T	1	4	3	D	0	0	1	H	D
描述	GBN代码		等级	TM1	年份		月	Rev	Serial Number				

12.0 PACKING INFORMATION

12.1 Packing order

-. 将 2pcs MDL 平放入Tray

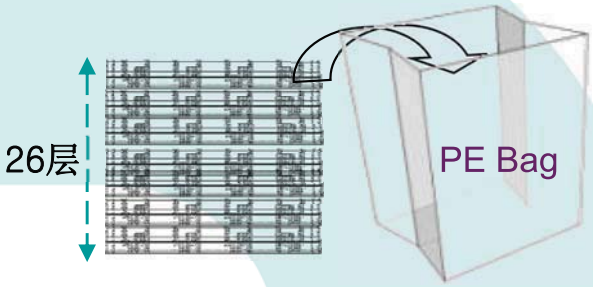
-. 每个MDL 上放置1pcs Spacer



-. 将26pcs PET Tray 平放入PE Bag

-. Tray 不旋转码放

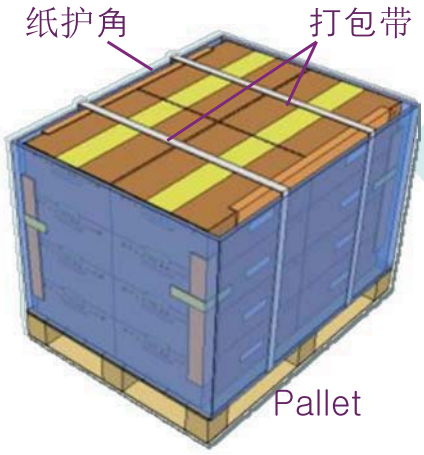
-. 顶部1pcs 空Tray



-. 每个Pallet上放3层Box, 1层4箱,共计12ea Box

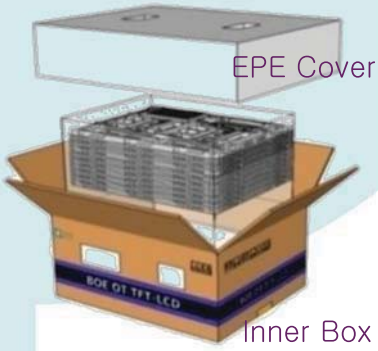
-. Pallet外进行缠膜包装

-. 600pcs Panel / Pallet



-. .将PET Tray堆码后平放入Inner Box 上下放置EPE Board

-. 50pcs/Box



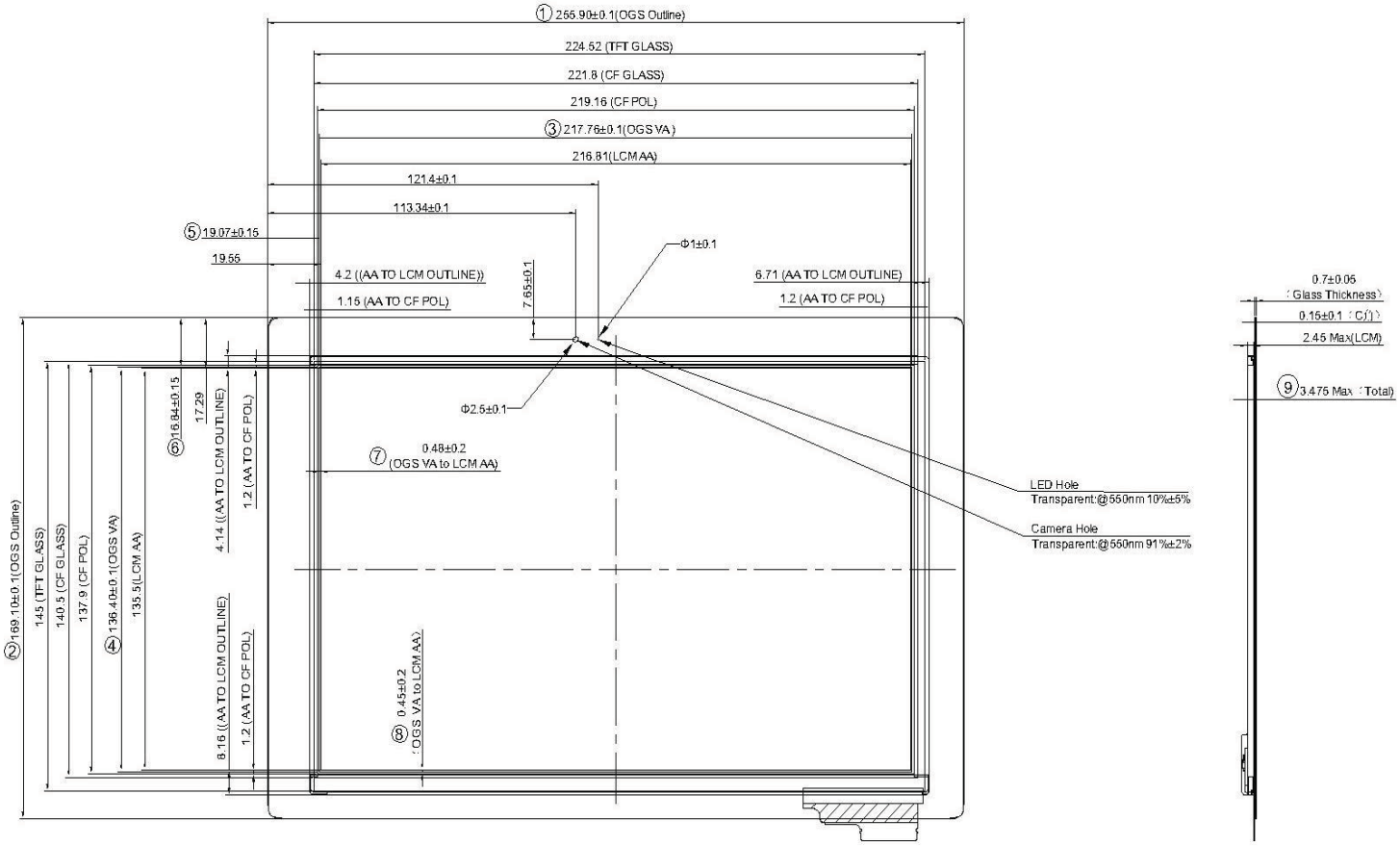
12.2 Notes

- Box Dimension: 500mm(W) x 400mm(D) x 290mm(H)
- Package Quantity in one Box: 50pcs MDL/Box
- Total Weight: TBD

13. MECHANICAL OUTLINE DIMENSION

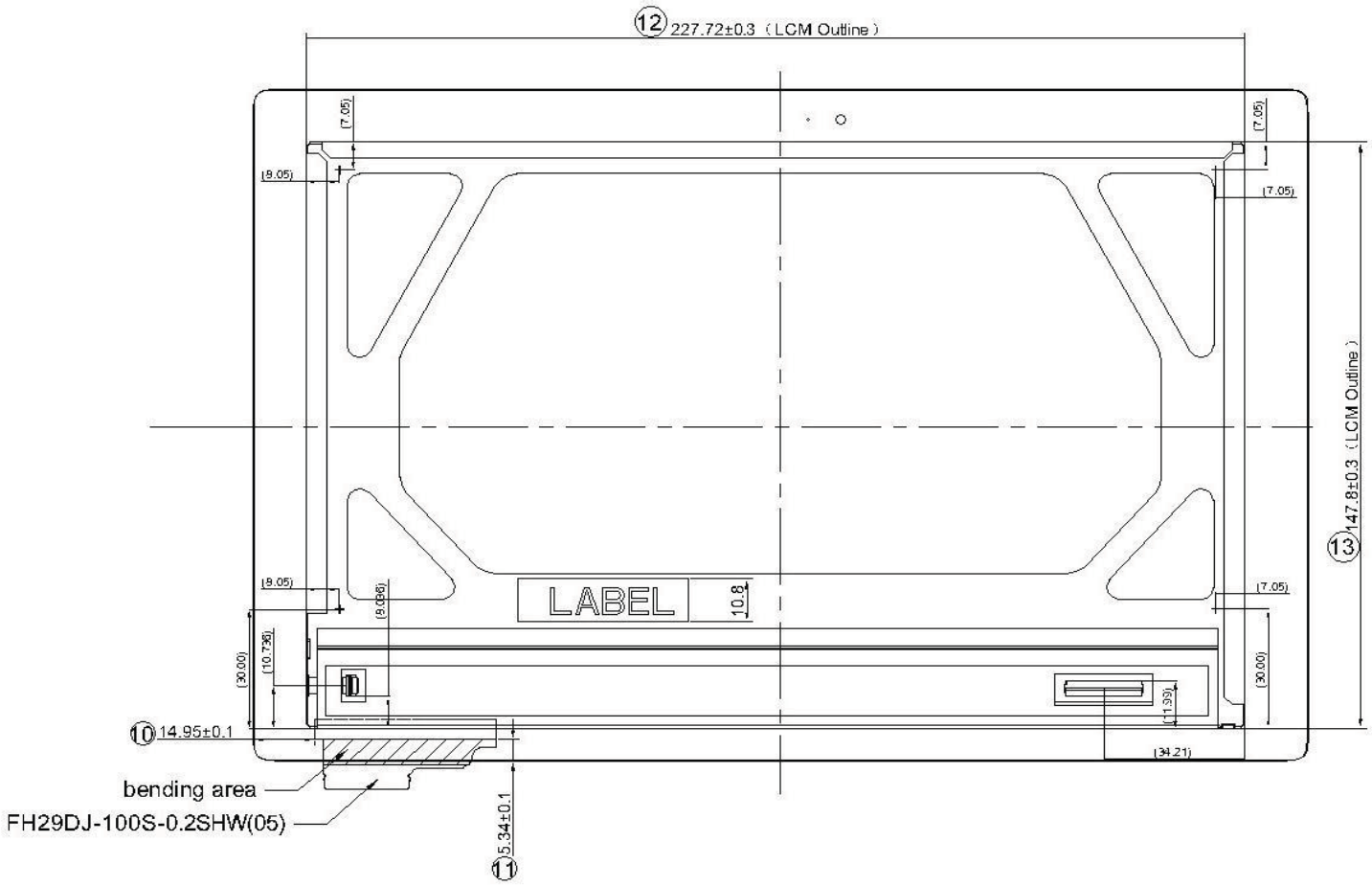
13.1 Total Solution Outline Dimension

Figure 6. Total Solution Outline Dimensions (Front view)



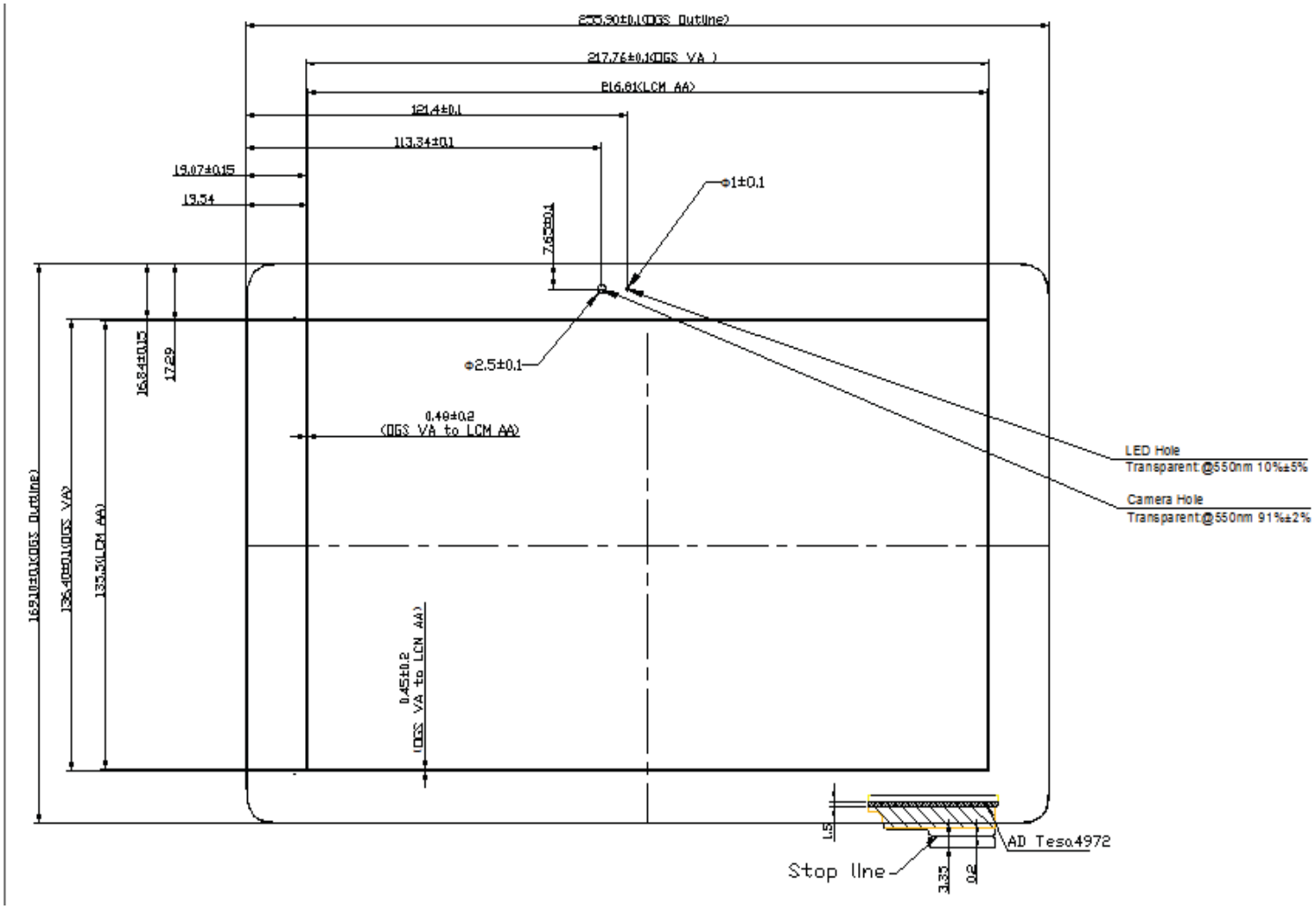
13.2 Total Solution Outline Dimension

Figure 7. Total Solution Outline Dimensions (Rear view)



13.3 Touch Panel Outline Dimension

Figure 8. Touch Panel Outline Dimensions (Front view)



13.4 Touch Panel Outline Dimension

Figure 9. Touch Panel Outline Dimensions (Rear view)