

# 深圳市智诚光电发展有限公司

## SPECIFICATION

Customer: \_\_\_\_\_  
Model Name: PC043IA25-B9.1  
Date: 2022/7/8  
Version: 0.1

- Preliminary Specification
- Final Specification

Remark

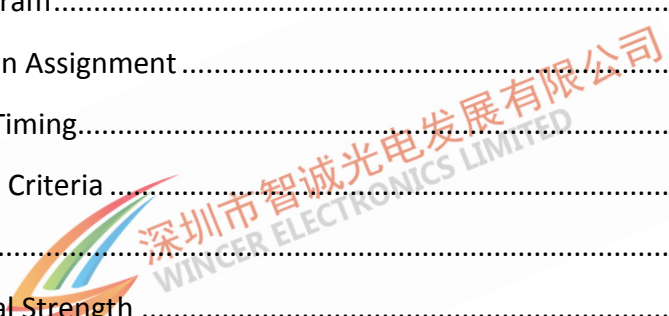

For Customer's Acceptance

Approved by	Comment

Approved by	Reviewed by	Prepared by

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# 1. Revision History

Date	Rev.	Page (New)	Item	Old	New	Reason
20220708	A0	---	---	---	---	First release



## 2. Features

- |                                |   |
|--------------------------------|---|
| (1) LCD Type:                  | 4.3" Active matrix <b>LTPS</b> TFT-LCD. |
| (2) Display mode:              | Transmissive type, Normal Black.        |
| (3) LCD Resolution:            | 480(RGB)(W) x 272(H) pixels.            |
| (4) Display color:             | 16.7M colors.                           |
| (5) Transmittance(TR%):        | 5.98% (Typ. ).                          |
| (6) Contrast Ratio:            | 1000:1(Typ.).                           |
| (7) Viewing Direction:         | ALL.                                    |
| (8) Back Light :               | TBD (Cell shipment without BL).         |
| (9) LCD Driver Inversion Mode: | 2dot Inversion.                         |

## 3. Mechanical Specification

Item	Specifications
Module Size (Typ.)	105.5(W) x67.1 (H) x2.95(D) mm
Number of Pixels	480(RGB)(W) x 272(H) pixels
Active Area	95.04 (W) x 53.86 (H) mm
View Area	96.9(W) x 55.7 (H) mm
Pixel Pitch	198(H) RGB x 198(V) um
Weight (approximately)	TBDg

## 4. Absolute Maximum Rating

Item	Symbol	Min.	Max.	Unit	Remarks
Power Supply for Analog/ Logic	VCC	-0.3	4.6	V	
Operating Humidity	HSTG	10	90	%RH	
Operating Temperature	Top	-10	+60	°C	
Storage Temperature	Tst	-20	+70	°C	

Note: If the LSI is used above these absolute maximum ratings, it may become permanently damaged.

## 5. Electrical Specifications

Item	Symbol	Min.	Typ.	Max.	Unit	Remarks(Ta=25°C)
Power Supply for Analog/Logic	VCC	3.2	3.3	3.4	V	
Current for VCC	I <sub>VCC</sub>	-	TBD	50	mA	

Note: The operations are guaranteed under the recommended operating conditions only. These operations are not guaranteed if a quick voltage change occurs during operation. To prevent noise, a bypass capacitor must be inserted into the line close to power pin.

## 6. Backlight LED specification

The back-light system is an edge-lighting type with 9 LED.

The characteristics of the LED are shown in the following tables.

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED current	IL	--	20	--	mA	(2)
LED voltage	VL	24.3	26.1	27	V	
Operating LED life time	Hr	20K	25K	--	Hours	(1)(2)

Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25±3°C, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note (2) The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25°C and IL=20mA. The LED lifetime could be

decreased if operating IL is larger than 20mA. The constant current driving method is suggested.

The constant current source is needed for white LED back-light driving. When

## 7. Optical Specifications

Item	Symbol	Min.	Typ.	Max.	Unit	Remarks(Ta=25°C)
Contrast Ratio	C/R	800	1000			Fig.1
Transmittance(TR%)	-	5.38	5.98	-	%	
Brightness Uniformity	-	80		-	%	Full White Pattern, Fig.1,2
NTSC	-	82	84.2	-	%	
Crosstalk	-	-	-	2	%	
Gamma Curves	-	1.9	2.2	2.5		
Brightness	-	-	350		cd/m <sup>2</sup>	Note 7
Response Time	Tr + Tf	-	TBD	25	ms	Fig.3
Color Coordinate	RED	Rx	0.666	-		@C-light CF
		Ry	0.327	-		
	GREEN	Gx	0.263	-		
		Gy	0.642	-		
	BLUE	Bx	0.140	-		
		By	0.077	-		
WHITE	Wx	0.293	-	-		
	Wy	0.298	-	-		
view angle	θl	70	85	-	Degree	Fig.4 Center (C/R>10)
	θr	70	85	-		
	θu	70	85	-		
	θd	70	85	-		

Note: 1. Contrast Ratio(CR) is defined mathematically as :

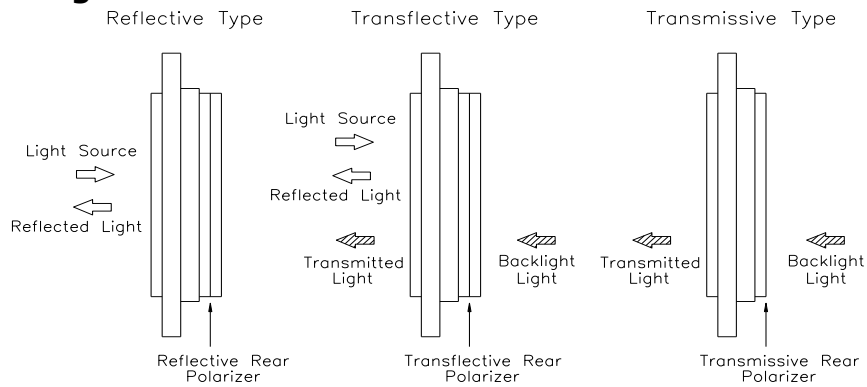
$$\text{Contrast Ratio} = \frac{\text{Average Surface Luminance with all pixels white}(P_1, P_2, P_3, P_4, P_5, P_6, P_7, P_8, P_9)}{\text{Average Surface Luminance with all pixels black}(P_1, P_2, P_3, P_4, P_5, P_6, P_7, P_8, P_9)}$$

- Brightness is the LCM's luminance from the surface with all pixels white. For more information see FIG 1.
- Brightness Uniformity represents the consistency of LCM's Brightness, signed for δ<sub>BRIGHTNESS</sub>. δ<sub>BRIGHTNESS</sub> is determined by measuring luminance at each test point 1 to 9, then got the maximum and minimum luminance of 9 point. For more information, see Fig 2.

$$\delta_{\text{BRIGHTNESS}} = \frac{\text{Minimum Surface Luminance with all pixels white}(P_1, P_2, P_3, P_4, P_5, P_6, P_7, P_8, P_9)}{\text{Maximum Surface Luminance with all pixels white}(P_1, P_2, P_3, P_4, P_5, P_6, P_7, P_8, P_9)}$$

- Response time is the time required for the display to transit from black to white (Rise Time, Tr) and from white to black (Decay Time, Tf). For additional information see FIG 3.
- Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG 4.
- Optimum contrast is obtained by adjusting the LCD Threshold voltage (Vth & Vsat)
- All input terminals LCD panel must be ground while measuring the center area of the panel. The LED driving condition is IL=20mA.

## 8. Viewing Modes



## 9. Electro-Optical Characteristics Test Method

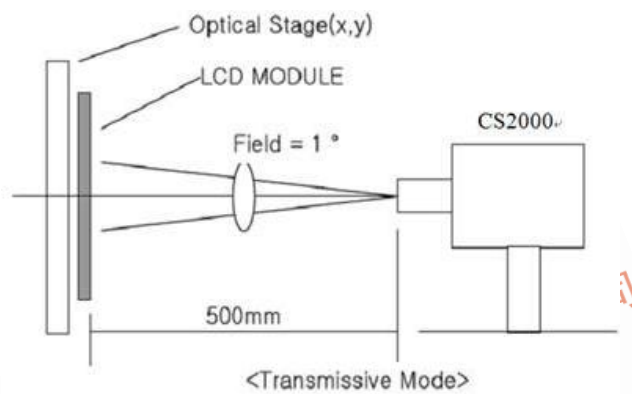
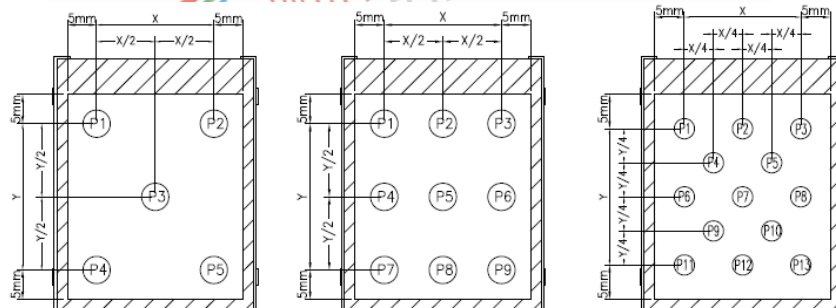


FIG.1. Optical Characteristic Measurement Equipment and Method



- Note: 1. When  $LCM < 2.0''$ , 5points measurement; when  $2.0 \leq LCM < 3.0''$ , 9points measurement; when  $LCM \geq 3.0''$ , 13points measurement  
 2. The height of measuring is 500mm; the diameter of light spot is 7.78mm.

FIG.2. The Definition of Measure Points

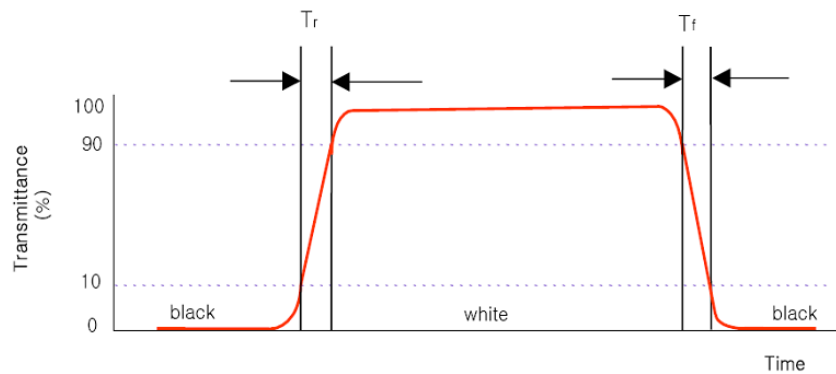


FIG.3. The Definition of Response Time

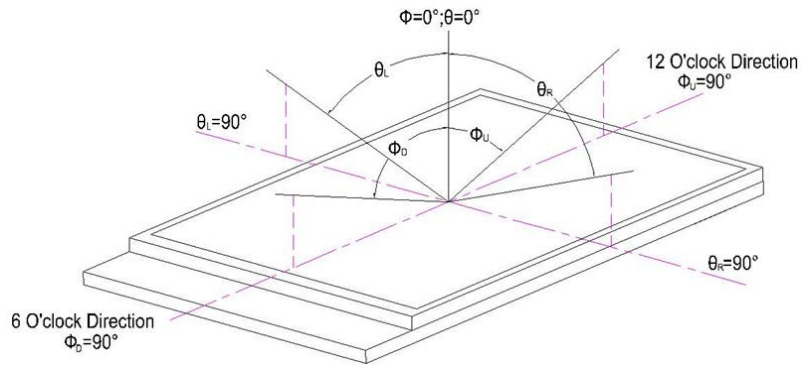
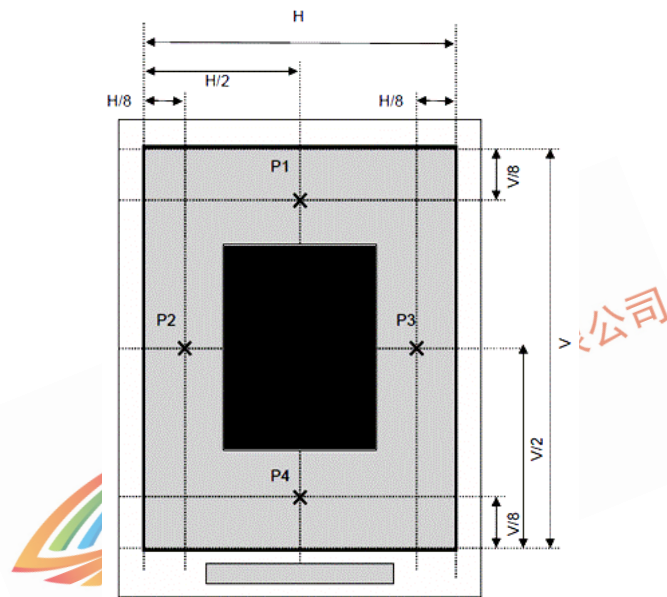


FIG.4. The Definition of Viewing Angle



Note: A: Luminance for P1~P4 with all 127gray pixels;

B: Luminance for P1~P4 with 127gray pixels when the White or Black box is applied.

$$\text{Crosstalk [\%]} = \text{Maximum} \left[ \text{Absolute} \left( \frac{A - B}{A} \right) \right]$$

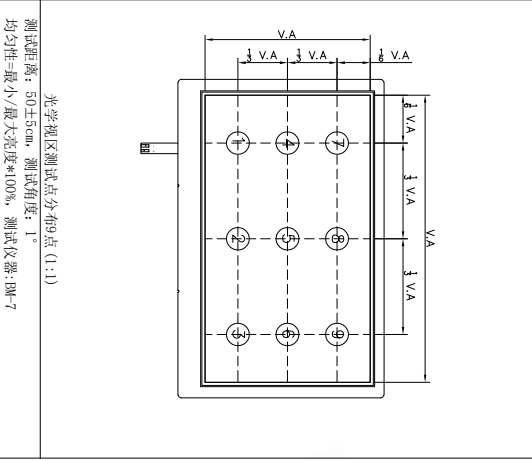
FIG.5. Crosstalk Test Method

# 10. Outline Dimension & Hardware Item

A	B	C	D	E	F	G	H	I	J	
第三角法	DATE 日期	2021-3-3	PAGE 页数	1/1	MARK	REV.	REASON FOR CHANGE	CHANGE CONTENT	REVISED	DATE
					—	A0	—	新购规格	YSJ	2021-3-3

### 亮度测试点分布示意图

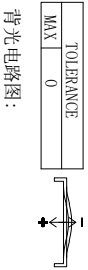


平坦度标准 (塞规测量)

TOLERANCE	
MAX	0.3

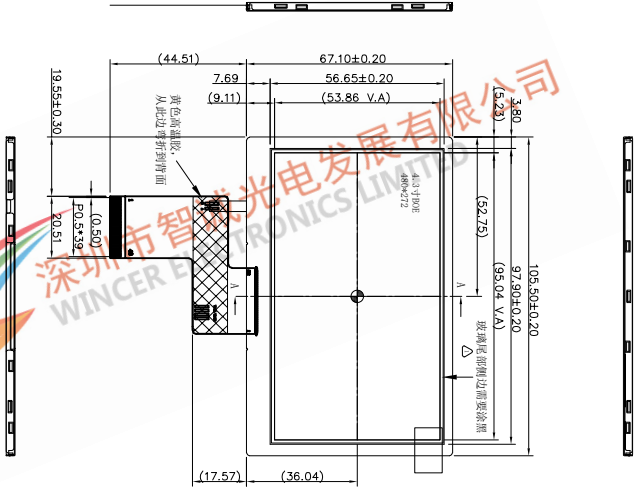
TOLERANCE	
MAX	0

背光电路图:



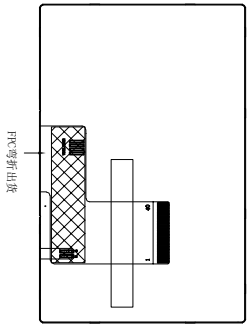
Notes:

- Unit:mm.
- Do not scale drawing. I说明:
- Modification rev. number.
- Without tolerance is ±0.20
- Critical dimension** : ( ) **Reference dimension** :
- Circuit Diagram
- 所有的材料都要符合RoHS标准
- 平整度控制到0.40MAX
- 同一-BL Δx/Δy的偏差以视觉效果为准



喷码内容:

PC0431A25-B9.1 —— 客户料号  
 YYMMDD —— 6位生产日期年月日



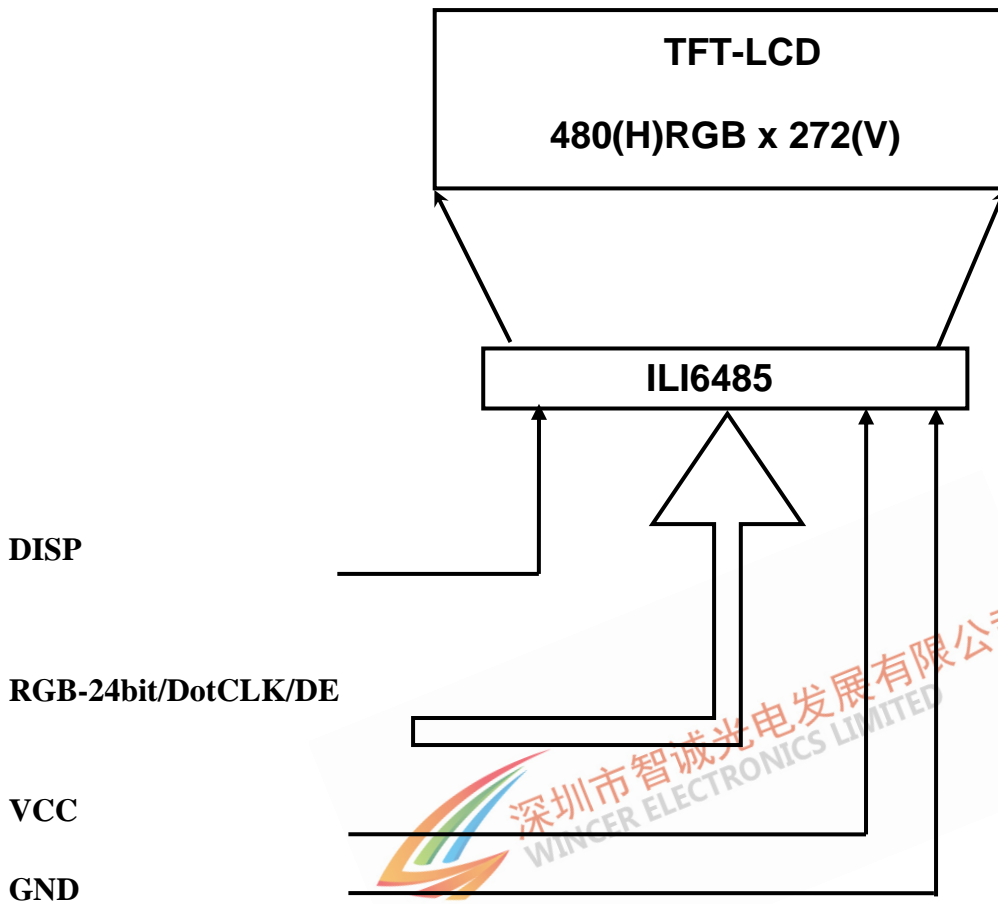
  

<b>深圳市智诚光电发展有限公司</b>			
CUSTOMER'S CODE	CUSTOMER'S NAME	CUSTOMER'S CODE	CUSTOMER'S NAME
客户型号	客户名称	PC0431A25-B9.1	客户名称
Supplier's CODE	EDITION	EDITION	DESIGN
供应商型号	版本	A0	设计
	EDITION	A0	CHECK
	版本	A0	审核
			REVIEW
			确认



## 11. Block Diagram

LCM:



BLU:

None, wending pads reserved.

## 12. Table of Pin Assignment

FPC Connector is used for the module electronics interface. The recommended model is "FH19SC-40S-0.5SH" manufactured by HIROSE.

1	VLED-	P	Power for LED backlight cathode. (Reserved for BLU-)
2	VLED+	P	Power for LED backlight anode.( Reserved for BLU+)
3	GND	P	Ground.
4	VDD_3.3V	P	Power supply +3.3V Input
5	R0	I	RGB-24bit Bus: Red data0 (LSB)
6	R1	I	...
7	R2	I	...
8	R3	I	...
9	R4	I	...
10	R5	I	...
11	R6	I	...
12	R7	I	Red data7 (MSB)
13	G0	I	Green data0 (LSB)
14	G1	I	...
15	G2	I	...
16	G3	I	...
17	G4	I	...
18	G5	I	...
19	G6	I	...
20	G7	I	Green data7 (MSB)
21	B0	I	Blue data0 (LSB)
22	B1	I	...
23	B2	I	...
24	B3	I	...
25	B4	I	...
26	B5	I	...
27	B6	I	...
28	B7	I	Blue data7 (MSB)
29	GND	P	Ground.
30	CLK	I	RGB Bus: Pixel clock, negative polarity, data latch at <b>falling edge</b> .
31	DISP	I	Display on/off, DISP= "High" : Display on. DISP= "LOW" : Display off.
32	HSYNC	I	Horizontal Sync signal
33	VSYNC	I	Vertical Sync signal
34	DE	I	RGB Bus: Data Enable, "High" data valid.
35	NC	-	No connection
36	GND	P	Ground
37	NC	-	Reserved, Resistive TP scan input/output: YU.
38	NC	-	Reserved, Resistive TP scan input/output: XL.
39	NC	-	Reserved, Resistive TP scan input/output: YD.
40	NC	-	Reserved, Resistive TP scan input/output: XR.

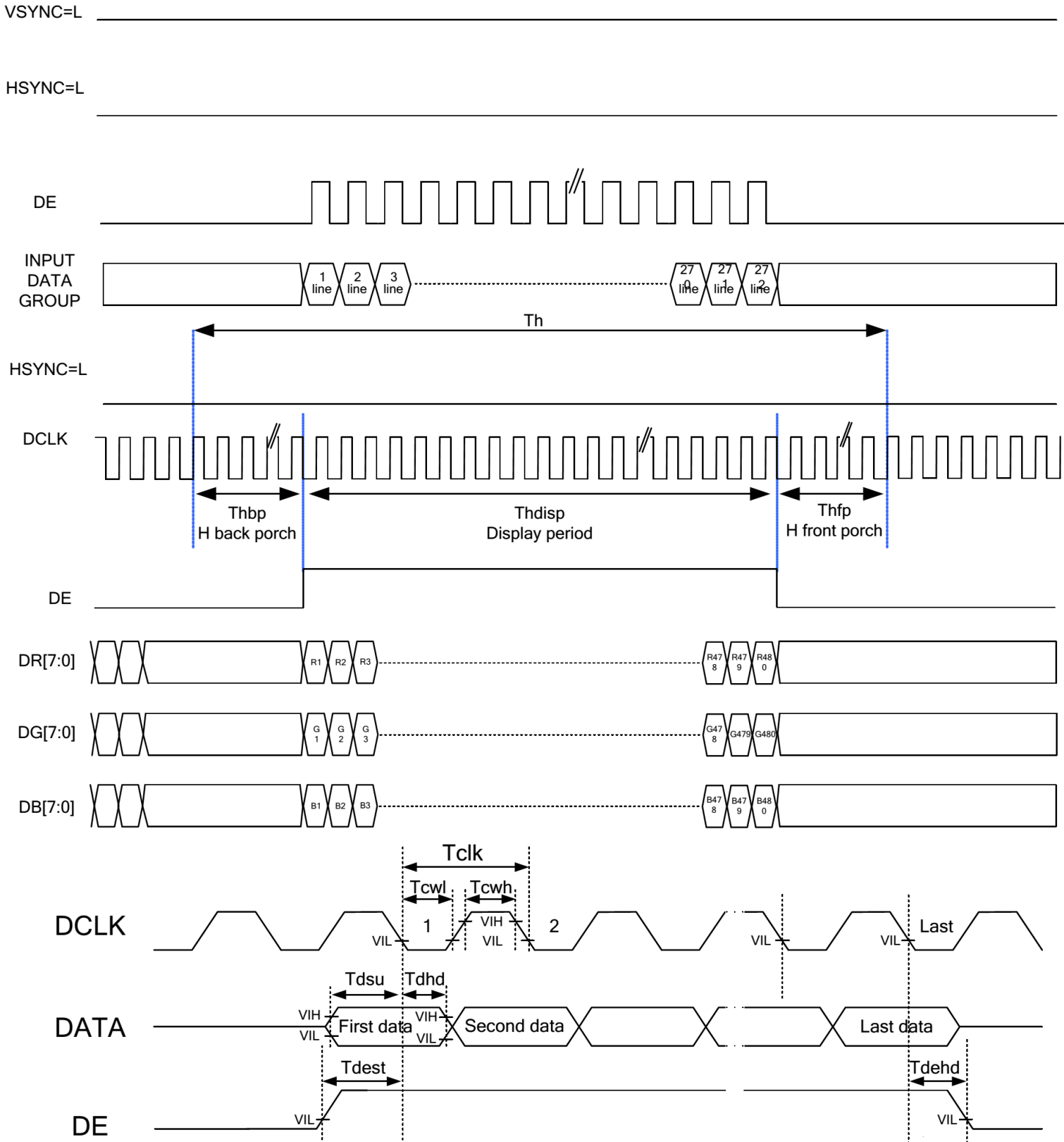
### 13. Interface Timing

LCD:

RGB-24bit Bus input.

Pls see the IC SPEC for details.

#### DE Mode Timing Diagram:



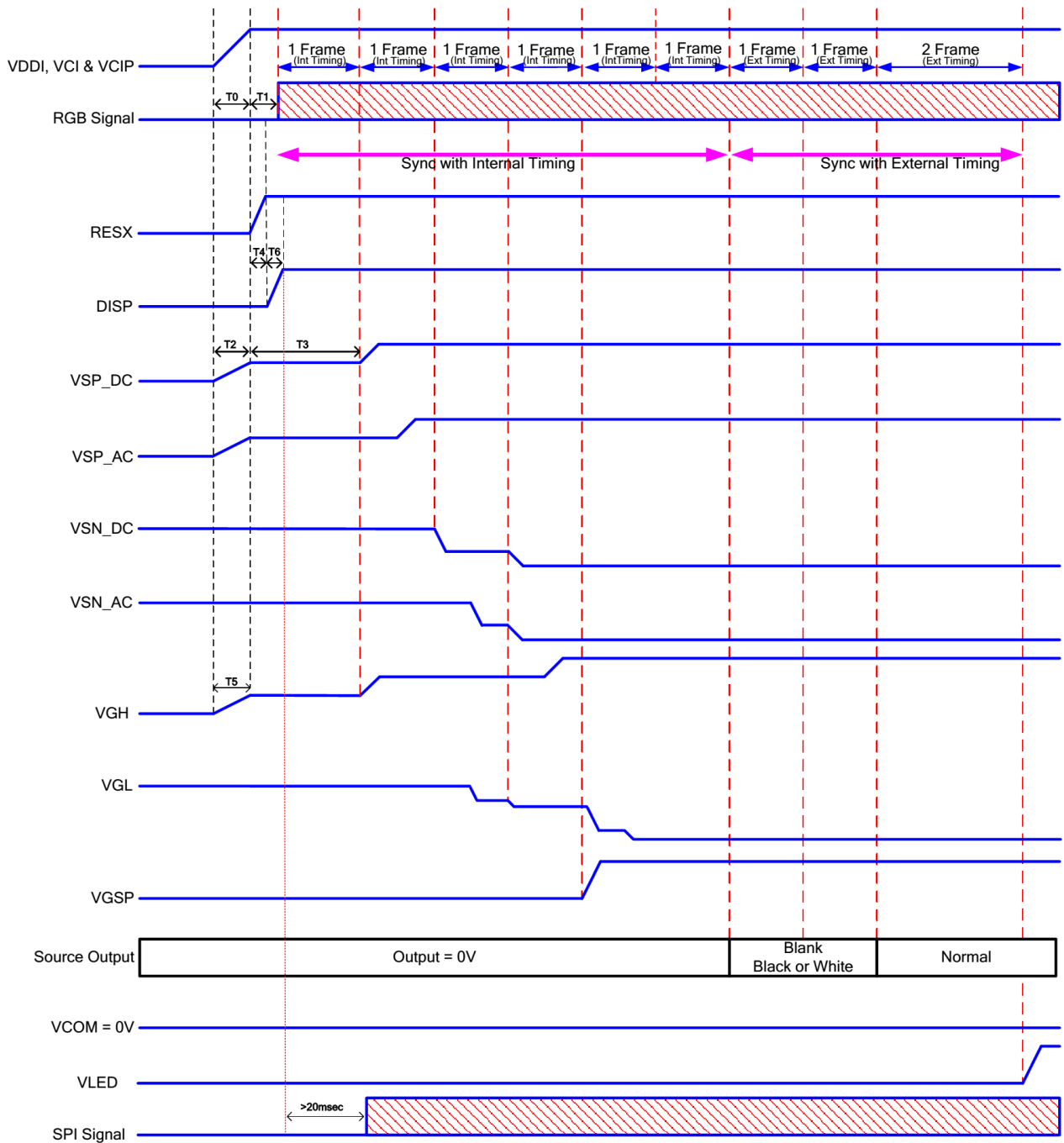
AC Electrical Characteristics (VCIP=VCI=VDDI= 3.3V, VSSA= 0V, TA=25°C).

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
System operation timing						
VCI power source slew time	TPOR	-	-	20	ms	From 0V to 99% VCI
RESX pulse width	tRSTW	10	50	-	us	R=10Kohm, C=1uF
Input/ Output timing						
CLK pulse duty	Tcw	40	50	60	%	
Hsync width	Thw	2	-	-	DCLK	
Hsync period	Th	55	60	65	us	
Vsync setup time	Tvst	12	-	-	ns	
Vsync hold time	Tvhd	12	-	-	ns	
Hsync setup time	Thst	12	-	-	ns	
Hsync hold time	Thhd	12	-	-	ns	
Data setup time	Tdsu	12	-	-	ns	
Data hold time	Tdhd	12	-	-	ns	
DE setup time	Tdest	10	-	-	ns	
DE setup time	Tdehd	10	-	-	ns	

480RGB X 272 Resolution Timing Table							
Item	Symbol	Min.	Typ.	Max.	Unit	Remark	
DCLK Frequency	Fclk	8	9	12	MHz		
DCLK Period	Tclk	125	111	83	ns		
HSYNC	Period Time	Th	487	531	598	DCLK	
	Display Period	Thdisp	-	480	-	DCLK	
	Back Porch	Thbp	3	43	43	DCLK	By H_Blanking setting
	Front Porch	Thfp	4	8	75	DCLK	
	Pulse Width	Thw	2	4	75	DCLK	
VSYNC	Period Time	Tv	276	292	321	H	
	Display Period	Tvdisp	-	272	-	H	
	Back Porch	Tvbp	2	12	12	H	By V_Blanking setting
	Front Porch	Tvfp	2	8	37	H	
	Pulse Width	Tvw	2	4	37	H	

## POWER ON/OFF SEQUENCE

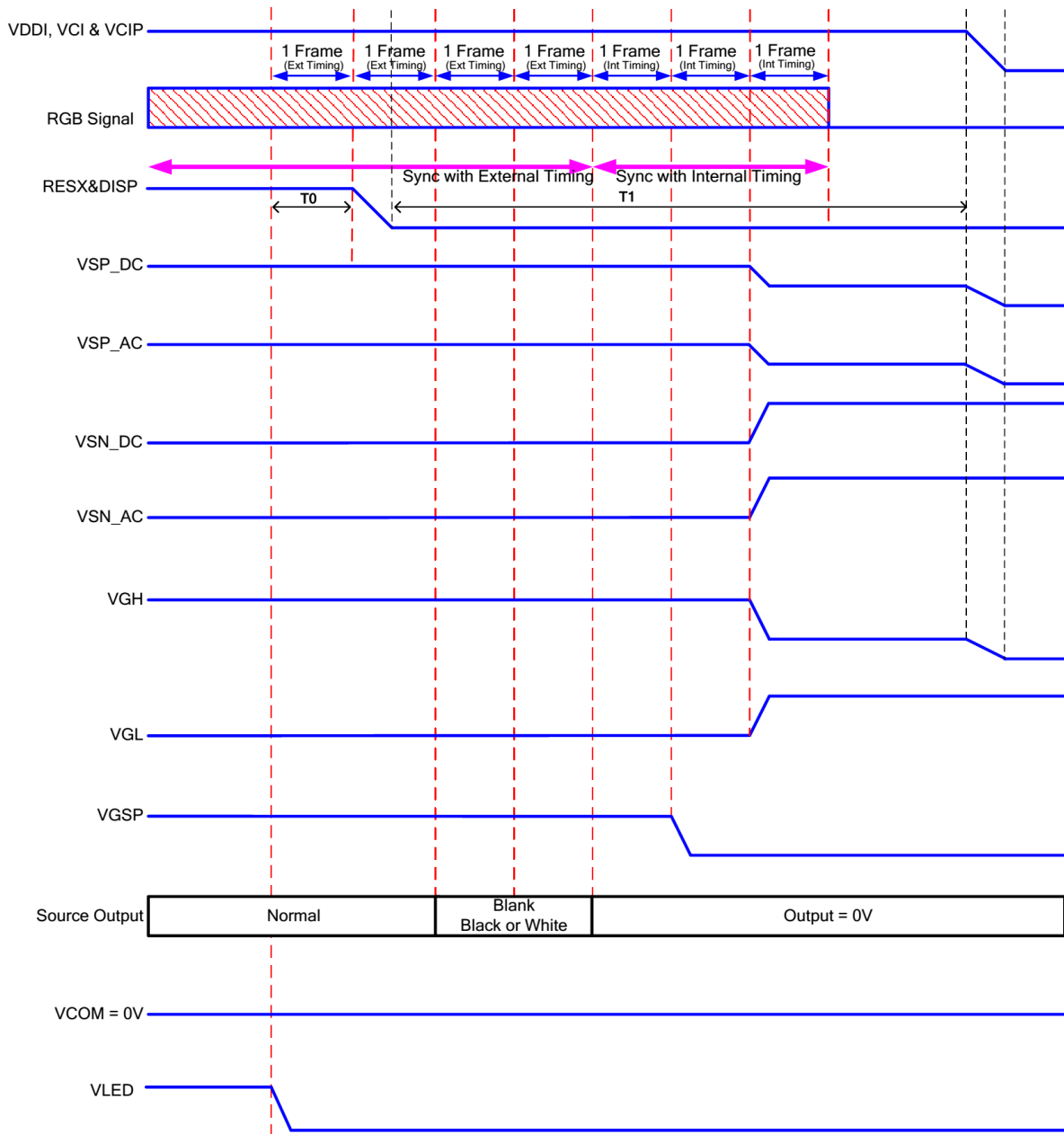
### 1/ Power On Sequence



Item	Description	Min. Time
T0	Determined by the external power.	
T1	Time from stable VDDI, VCI, VCIP set-up to the first frame.	T1=0
T2	Time from VSP_DC=0V to VSP_DC=3.3V.	T2=T0
T3	Time from VSP_DC =3.3V to VSP_DC =6.0V.	T3=T1+ (1*Frame)
T4	Time from stable VDDI, VCI, VCIP set-up to RESX asserted.	T4=0
T5	Time from VGH=0V to VGH=3.3V.	T5=T0
T6	Time from stable RESX set-up to DISP.	T6=0

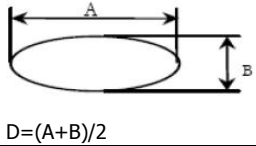
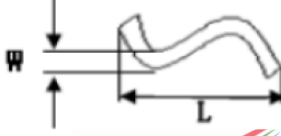
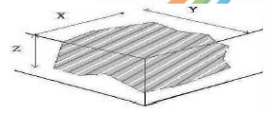
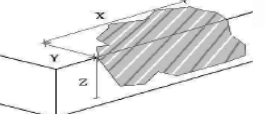

Note: Recommend the LCM power on rise time T0= 0~ 1ms.

# 1/ Power Off Sequence



Item	Description	Min. Time
T0	Time from backlight power off to DISP="L".	1*Frame
T1	Time from DISP="L" to LCM Power off.	5*Frame

## 14. Inspection Criteria (TBD)

Item NO.	Inspection Item	Inspection Standard		Classification of defects
1	LCD Electrical function testing	1) No display 3) No backlight 5) black/blue display 7) visual angle is wrong	2) Missing line 4) shadow 6) Irregular operating	Major
2	CTP function test:	No open and No short for ALL X/Y sensors, test of accuracy/ linearity/ sensitivity/ separation/ Jitter/ anti-moisture is OK		Major
3	Outline dimension	All outline dimension beyond the drawing is not allowed		Major
4	White/Black spot (in LCD or Backlight)  $D=(A+B)/2$	$D \leq 0.10\text{mm}$	ignore	Minor
		$0.10\text{mm} < D \leq 0.2\text{mm}$	To be max 2points. (defects is no closer than 5mm to each other)	
		$D > 0.2\text{mm}$	Not allowed.	
5	Color/bright/dark dot	as same as White/Black spot		Minor
6	Dirt in CTP	as same as White/Black spot		Minor
7	Dent at CTP	as same as White/Black spot		Minor
8	Bubble	as same as White/Black spot		Minor
9	Scratch /Lines defect: 	$W \leq 0.03$	Ignore.	Minor
		$0.03\text{mm} < W \leq 0.05\text{mm};$ $L \leq 2.00\text{mm}$	To be max 5 lines.	
		$0.05\text{mm} < W \leq 0.1\text{mm};$ $L \leq 2.00\text{mm}$	To be max 2 lines.	
		$W > 0.10\text{mm}$	Not allowed.	
10	Conner Chipping: 	Length $X < 1.0\text{ mm}$ Width $Y < 1.0\text{ mm}$ Thickness $Z \leq \text{Glass thickness}$ (Sealant area could not be broken)		Minor
11	Edge Chipping: 	Length $X < 1.5\text{ mm}$ Width $Y < 1.5\text{ mm}$ Thickness $Z \leq \text{Glass thickness}$ (Sealant area could not be broken)		Minor
12	Crack: 	Not allowed.		Minor

- Note: 1. Viewing distance: 30 +/- 2 cm  
 2. Inspection angle: 45 degrees in 6 o'clock direction (all defects in viewing area should be inspected from this direction), Rotate 30° about the vertical axis.  
 3. Light Source: 500~700Lux +/- 20%, black background.

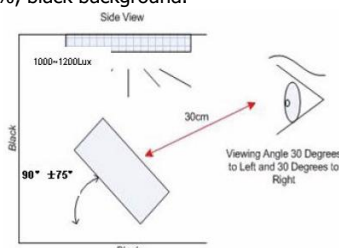


Fig.15. Inspection Method

## 15. Reliability (TBD)

No.	Items.	Condition	Criterion
1	Higt temp chess test	70°C , 240h	After test, remain in normal temp and humidity for 2H before inspection; It should be no light dot after test ; It may overlook other problem.
2	High Temp Operation	70 °C, 168H;	After test, remain in normal temp and humidity for 24H before inspection: The mechanical, electrical and optical characteristics requirement shall be satisfied.
3	Low Temp Test Operation	-20 °C, 168H;	
4	High heat & humidity and push test	60 °C, 90% RH, 168H;	
5	Thermal Shock Test	-30 °C (60min)→5min→80 °C (60min), 40 cycles;	

## 16. Mechanical Strength (TBD)

No.	Items.	Condition	Criterion
1.	Ball drop impact test:	1. Steel ball weight : 130g±1.5% 2. Coverlens is 0.7t, Height is 20cm 3. impact area : 1 point in VA center& 4 points on top 10mm away from VA edges.	1. Before and after test, Product function is OK. 2. No crack after test.
2.	Surface Hardness:	1. Pencil Hardness : 6H; 2. Line distance : at least 5mm; 3. Load : 750g; 4. Moving speed: 0.5mm/s;	JIS-K5600.
3.	Sweep Vibration:	20 m/s <sup>2</sup> , 10 Hz to 55 Hz (1 min), X, Y and Z direction, 30min/direction; Test with handset.	After test, electric and mechanical performance should be satisfied.
4.	FPC Bonding strength:	1. Peeling speed : 50mm/min 2. Peeling direction : Vertical 90° by bonding area.	>600g/cm.
5.	FPC Bending	1. Radius : R=1mm 2. Angel : 180° 3. Area : At assembly bending area 4. Bending : >=20cycles	After test, mechanical and electric performance should be satisfied.



## 17. For Safety



TLI module is generally designed with precise parts to achieve touch function. In using our TLI modules, make certain that you fully understand and put into practice the warnings and safety precautions detailed as bellowing.

### (1). SPECIAL PURPOSES

- a). TCL Display Technology's Standard TLI modules have not been customized for operation in extreme environments or for use in applications where performance failures could be life-threatening or otherwise catastrophic.
- b). Since TCL Display Technology's Standard TLI modules have not been designed for operation in extreme environments, they must never be used in devices that will be exposed to abnormally high levels of vibration or shock which exceed TCL Display Technology's published specification limits.
- c). In addition, since TCL Display Technology's Standard LCD modules have not been designed for use in applications where performance failures could be life-threatening or catastrophic, they must never be installed in aircraft navigation control systems (such as, but not limited to Traffic Collision Avoidance System and Air Traffic Indicator), in military defense or weapons systems, in critical industrial process-control systems (e.g., those involved in the production of nuclear energy), or in critical medical device or patient life-support systems.

### (2). Storage:

- a). Store TLI module under the temperature and humidity range pre-specified. Direct sunlight exposure or piling should be avoided.
- b). Ship Method must use legal couriers to transport products. Fragile products; beware of vibration and dropping during transit.
- c). Stacking method (i). Based on standard air/ocean freight regulation; (ii). Pallet use recommended for stacking; (iii). Monitor stack weight and height to prevent damage to bottom stack.

### (3). Unpack:

Unpack the box with the printed black arrow pointing up.

### (4). Handling:

- a). Use clean sacks or glove to prevent fingerprints and/or stains left on the panel. Extra attention and carefulness should be taken while handling the glass edge.
- b). Holding the panel instead of the tail at all time.

### (5). Cleaning:

- a). Use neutral detergent or isopropyl alcohol on a clean soft cloth to clean the panel surface.
- b). Prevent using any kind of chemical solvent, acidic or alkali solution.
- c). Foreign objects and prints that can be wiped off are not regulated under the specification, can be ignored.

### (6). Installing& Assembling:

- a). Excessive force or strain to the panel or tail is prohibited.
- b). Maintain a minimal 5R when bending tail to prevent dead fold or fold mark.
- c). Flaws in customer module design may cause functionality issues after assembly.

### (7). Operating:

- a). Touch the panel with your finger or stylus only to assure normal operation. Any sharp edged or hard objects are prohibited.
- b). Operate the panel in a steady environment. Abrupt variation on temperature and humidity may cause malfunction of the TLI module.
- c). Avoid applying excessive activation force or sudden impact on the TLI module surface.
- d). Do not exceed the absolute maximum rating values under the worst probable conditions caused by the supply voltage variation, input voltage variation, variation in parts' constants, environmental temperature, etc., otherwise the TLI module may be damaged. Employ protection circuit for power supply, whenever the specification or TD specifies it.

### (8). Others:

- a). Keep the panel surface clean. Prevent any kind of adhesive applied on the surface.
- b). Avoid high voltage and/or static charge.
- c). During the measurement, the brass finger must connect to ground.

- d). Do not disassemble or modify the TLI modules. Do not ingest liquid crystal material, Do not inhale this material, and Do not permit this material with skin, if LCD panel is broken and liquid crystal material spills out. If liquid crystal material comes into mouth or eyes, rinse mouth or eyes out with water immediately. If this material contact with skin or cloths, washes it off immediately with alcohol and rinse thoroughly with water.
- e). Be careful with chips of glass that may cause injuring fingers or skin, when the glass is broken.
- f). When disposing of the TLI module, obey to the applicable environmental regulations.

## 18. Packaging

A	B	C	D	E	F	G	H	I	J
第三角法		DATE 日期		2018-6-8		PAGE 页数		1/1	
						MARK		REV. REASON FOR CHANGE	
						—		A0	
								CHANGE CONTENT	
								新增规格	
								REVISER	
								YSJ	
								DATE	
								2018-06-08	

### 包装方式示意图:

将成品放在一个红色开口塑料袋中，将袋口卷折。

将2片产品、玻璃侧玻璃脚，铁框侧外放入纸板格子中，共计200pcs

将纸卡卡入刀卡的卡槽位2PCS

使用封口胶封口并贴附胶头

### Drawing Of Marks

100.00±0.5

客户名称	深圳市智诚光电发展有限公司
客户订单号	XXXXXXXX
规格型号	PC043***
物料类别	
单箱数量	200 PCS
生产日期	20**-*-*
备注	

60.00±0.5

### 客户说明:

- 客户订单号: 以业务提供为准;
- 规格型号: 4.3寸标准包装 (固定项)
- 物料类别: 业务提供为准
- 单箱数量: 按实际实包装数量;
- 生产日期: 以当日生产日期为准。

深圳市智诚光电发展有限公司			
CUSTOMER Approver	客户名称	智诚	DESIGN
CUSTOMER'S CODE	客户承认	版本	CHECK
Supplier'S CODE	成品型号	EDITION	REVIEW
	4.3寸105*67*3.0标准包装	EDITION	确认
		版本	