

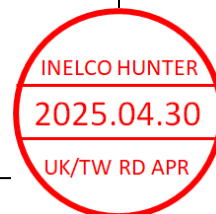


SPECIFICATIONS

CUSTOMER	:	-
SAMPLE CODE	:	SJXT480272T016-ZBB03
MASS PRODUCTION CODE	:	JXT480272T016-ZBB03
SAMPLE VERSION	:	01
SPECIFICATIONS EDITION	:	001
DRAWING NO. (Ver.)	:	LMD-JXT480272T016-ZBB03 (Ver.001)
PACKAGING NO. (Ver.)	:	-

Customer Approved

Date:



Approved	Checked	Designer
Rex Liao	Howard Chen	Yantong Su

- ☒ Preliminary specification for design input
☐ Specification for sample approval



History of Version

<u>Date</u> (mm / dd / yyyy)	<u>Ver.</u>	<u>Edi.</u>	<u>Description</u>	<u>Page</u>	<u>Design</u> <u>by</u>
11/12/2024	01	001	Preliminary.	-	Yantong



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1. SPECIFICATIONS

1.1 Features

<u>Item</u>	<u>Standard Value</u>
Display Resolution	480 *3 (RGB) * 272 Dots
LCD Type	Full Viewing Angle , Normally Black , Transmissive type
Screen size(inch)	4.3 inch
Surface treatment	Anti-Glare
Color configuration	R.G.B. Vertical Stripe
Weight	-
Interface	24 Bits RGB Interface
Driver IC	SC7283-G4
ROHS	THIS PRODUCT CONFORMS TO ROHS



1.2 Mechanical Specifications

<u>Item</u>	<u>Standard Value</u>	<u>Unit</u>
Outline Dimension	105.5 (W) * 67.2 (L) * 4.85 (H)	mm

LCD panel

<u>Item</u>	<u>Standard Value</u>	<u>Unit</u>
Active Area	95.04 (W) * 53.856 (L)	mm

Touch panel

<u>Item</u>	<u>Standard Value</u>	<u>Unit</u>
Viewing Area	99.5 (W) * 58.0 (L)	mm
Active Area	97.0 (W) * 55.8 (L)	mm

Note : For detailed information please refer to LCM drawing.

1.3 Absolute Maximum Ratings

Module

<u>Item</u>	<u>Symbol</u>	<u>Condition</u>	<u>Min.</u>	<u>Max.</u>	<u>Unit</u>
Power Supply for TFT Panel	V _{DD}	GND=0V	-0.3	4.0	V
Operating Temperature	T _{OP} (Ts)	Note 1	-20	+70	°C
Storage Temperature	T _{ST} (Ta)	Note 2	-30	+80	°C
Storage Humidity	H _D	Ta < 60 °C	-	90	%RH

The absolute maximum rating values of this product are not allowed to be exceeded at any time. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

Note 1 : Ts is the temperature of panel's surface.

Note 2 : Ta is the ambient temperature of samples.

1.4 DC Electrical Characteristics

Module

GND = 0V, Ta = 25°C

<u>Item</u>	<u>Symbol</u>	<u>Condition</u>	<u>Min.</u>	<u>Typ.</u>	<u>Max.</u>	<u>Unit</u>
Power Supply for TFT Panel	V _{DDIO}	GND=0V	3.0	3.3	3.6	V
Input Voltage for TFT Panel	V _{IH}	GND=0V	0.7V _{DDIO}	-	V _{DDIO}	V
	V _{IL}	GND=0V	0	-	0.3V _{DDIO}	V
Supply Current for TFT Panel	I _{DDIO}	I _{DDIO} @V _{DDIO} =3.3V	-	30	45	mA



1.5 Optical Characteristics

VDDIO=3.3V, Ta=25°C

Item		Symbol	Condition	Min.	Typ.	Max.	unit	-
Response time		Tr + Tf	-	-	38	57	ms	Note2
Viewing angle	Top	θ+	CR ≥ 10	-	80	-	Deg.	Note4
	Bottom	θ-		-	80	-		
	Left	θL		-	80	-		
	Right	θR		-	80	-		
Contrast ratio		CR	-	650	800	-	-	Note3
Color of CIE Coordinate	White	X	IF= 20mA	-	(0.31)	-	-	Note1
		Y		-	(0.34)	-		
	Red	X		-	(0.61)	-		
		Y		-	(0.35)	-		
	Green	X		-	(0.37)	-		
		Y		-	(0.58)	-		
	Blue	X		-	(0.14)	-		
		Y		-	(0.10)	-		
Average Brightness Pattern=white display (LCD & BL) *1		IV	IF= 20mA	-	(300)	-	cd/m ²	
Uniformity (LCD & BL) *2		△B		70	-	-	%	

Note 1:

*1 : $\Delta B = B(\min) / B(\max) * 100\%$

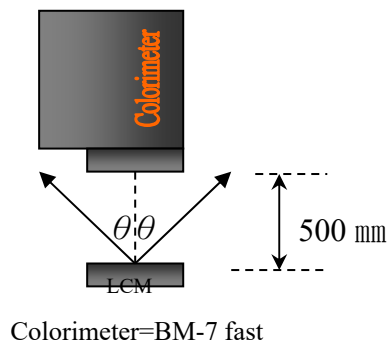
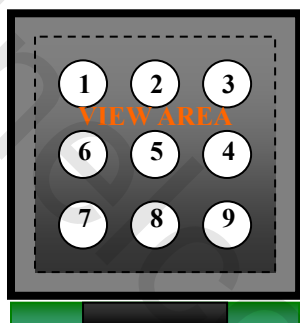
*2 : Measurement Condition for Optical Characteristics:

a : Environment: $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ / $60 \pm 20\% \text{R.H}$, no wind , dark room below 10 Lux at typical lamp current and typical operating frequency.

b : Measurement Distance: $500 \pm 50 \text{ mm}$, ($\theta = 0^{\circ}$)

c : Equipment: TOPCON BM-7 fast , (field 1°) , after 10 minutes operation.

d : The uncertainty of the C.I.E coordinate measurement ± 0.01 , Average Brightness $\pm 4\%$



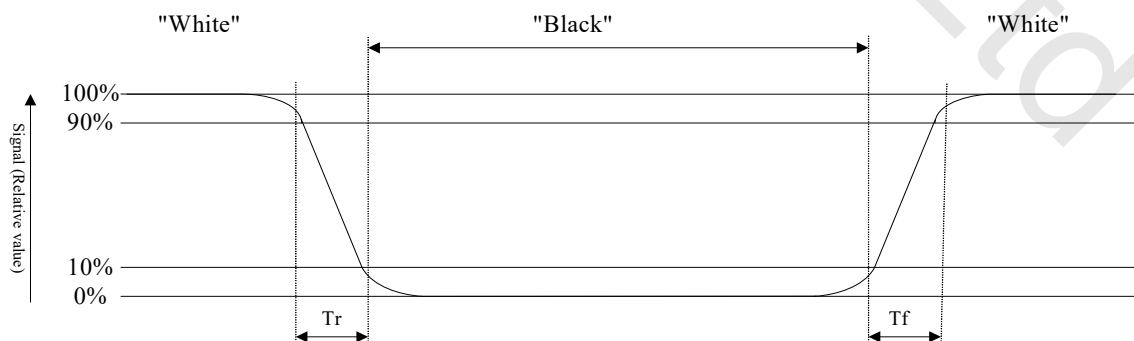
To be measured at the center area of panel with a viewing cone of 1° by Topcon luminance meter BM-7, after 10 minutes operation (module)

Note2: Definition of response time:

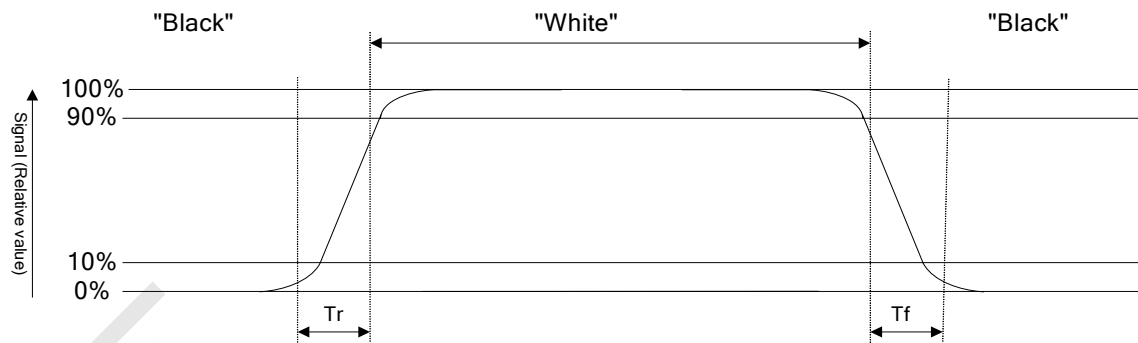
The output signals of photo detector are measured when the input signals are changed from "black" to "white"(falling time) and from "white" to "black"(rising time), respectively. The response time is defined as the time interval between the 10% and 90% of Amplitudes.

Refer to figure as below:

Normally White



Normally Black



Note3: Definition of contrast ratio:

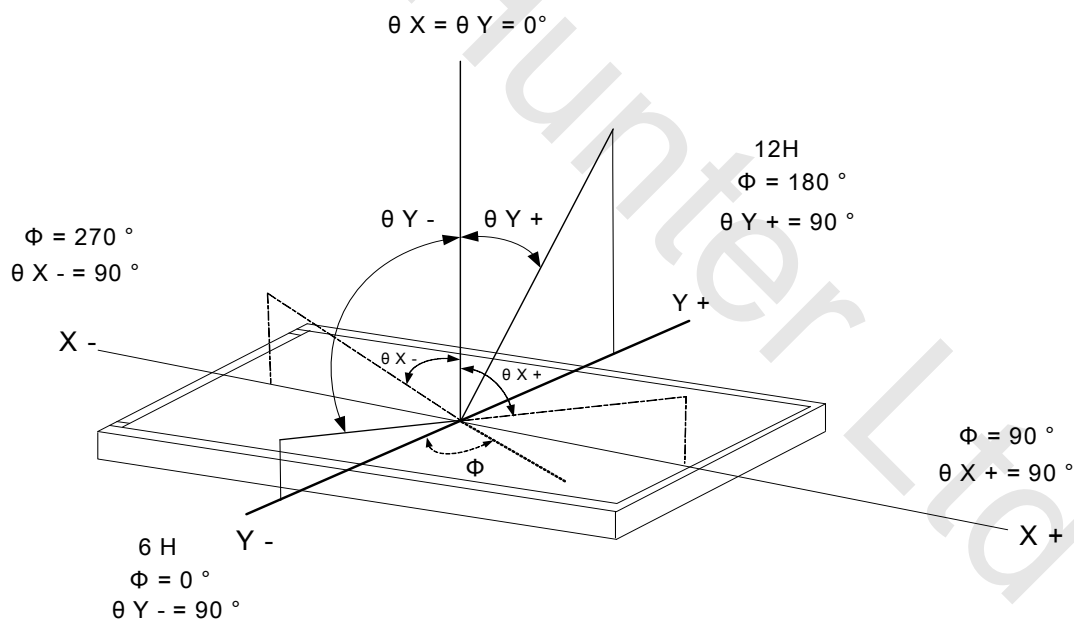
Contrast ratio is calculated with the following formula

Photo detector output when LCD is at "White" state

$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector output when LCD is at "Black" state}}$$

Note4: Definition of viewing angle:

Refer to figure as below:



1.6 Backlight Characteristics

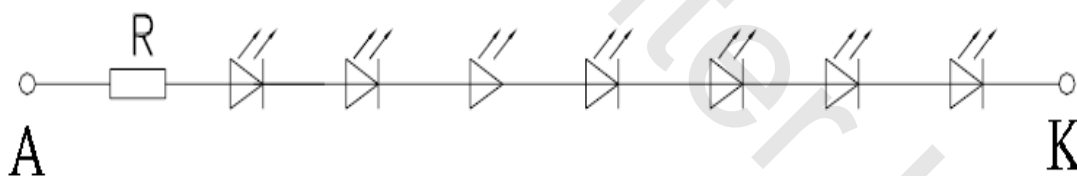
Maximum Ratings

<u>Item</u>	<u>Symbol</u>	<u>Conditions</u>	<u>Min.</u>	<u>Max.</u>	<u>Unit</u>
LED Forward Current	IF	Ta =25°C	-	30	mA
LED Reverse Voltage (Each LED)	VR	Ta =25°C	-	5	V
Power Dissipation	PD	Ta =25°C	-	735	mW

Electrical / Optical Characteristics

<u>Item</u>	<u>Symbol</u>	<u>Conditions</u>	<u>Min.</u>	<u>Typ.</u>	<u>Max.</u>	<u>Unit</u>
Forward Voltage	VF	IF= 20mA	19.6	22.8	24.5	V
Average Brightness (Without LCD &T/P)	IV		6250	7500	10000	cd/m ²
CIE Color Coordinate (Without LCD &T/P)	X		0.23	0.28	0.30	-
	Y		0.23	0.28	0.30	
Color	White					

Circuit diagram:



Other Description

<u>Item</u>	<u>Conditions</u>	<u>Description</u>
Life Time	Ta =25°C IF= 20 mA	20000 hrs



1.7 Touch Panel Characteristics

1.7.1 Optical Characteristics

<u>Item</u>	<u>Specification</u>
1. Transparency	80% Min

1.7.2 Mechanical Characteristics

<u>Item</u>	<u>Specification</u>
1. Input Method	Finger or stylus pen
2. Hardness of surface	3H -pressure 500g of ,45deg.
3. FPC peeling strength	500gf min(Peeling upward by 90°)
4. Activation Force	50gf (TYP. 20gf) less individual point with stylus pen (R0.8) Activation force guarantee area: 5.0mm inside of Active Area.
5. Linearity Force	100gf less input with stylus pen (R0.8) Linearity force guarantee area: 3.0mm inside of Active Area.

1.7.3 Electrical Characteristics

<u>Item</u>	<u>Specification</u>
1. Rated Voltage	DC 5V(DC 7V Max)
2. Resistance Between Terminals	Direction X (Glass side): 350Ω~1240Ω
	Direction Y (Film side): 160Ω~640Ω
3. Insulation Resistance	20 MΩ or more (DC 25V 1min)
4. Linearity	$\leq \pm 1.5\%$ Linearity(%)= $\Delta V / (EV - SV) \times 100$ ΔV : The difference between the ideal voltage and measured voltage on the each measuring line. SV: Voltage of starting Points EV: Voltage of Ending Points
5. Bouncing	<10ms (Tip R 3.75mm, hardness 10°~20° ,silicon rubber ,500gf operation : 40 mm/sec)



1.7.4 Reliability Characteristic

<u>NO</u>	<u>Test Item</u>	<u>Test Condition</u>	<u>Test Result</u>
1	Hitting Durability	1,000,000times min. (R 8 mm Silicon Rubber Hardness 60°250gf 2times/sec).	Follow 1.7.3 item2 and item4
2	Pen Sliding Durability	100,000 times min. (Tip R0.8mm).	Follow 1.7.3 item2 and item4.
3	Impact Resistance	Ψ 9mm steel ball is dropped on the surface from 30 cm height at 1 time.	No Crack
4	Flexible pattern Bending Resistance	Bending 3 times by bending radius R1.0 mm	Follow 1.7.3 item2.
5.	Flexible Pattern Insert/Pull Out Resistance	5times at least .	-

1.7.5 Touch Panel Design/Handling Guide

(1) Keep the gap, for example 0.2 to 0.3mm, between bezel edge and T/P edge.

The reason is to avoid the bezel edge from contacting T/P surface that may cause “short” with bottom layer

(2) Insertion a cushion material is recommended.

(3) The cushion material should be limited on the busbar insulation paste area. If it is over the transparent insulation paste area, a “short” may be occurred.

(4) Do not to use an adhesive tape to bond it on the front of T/P and hang it to the housing bezel.

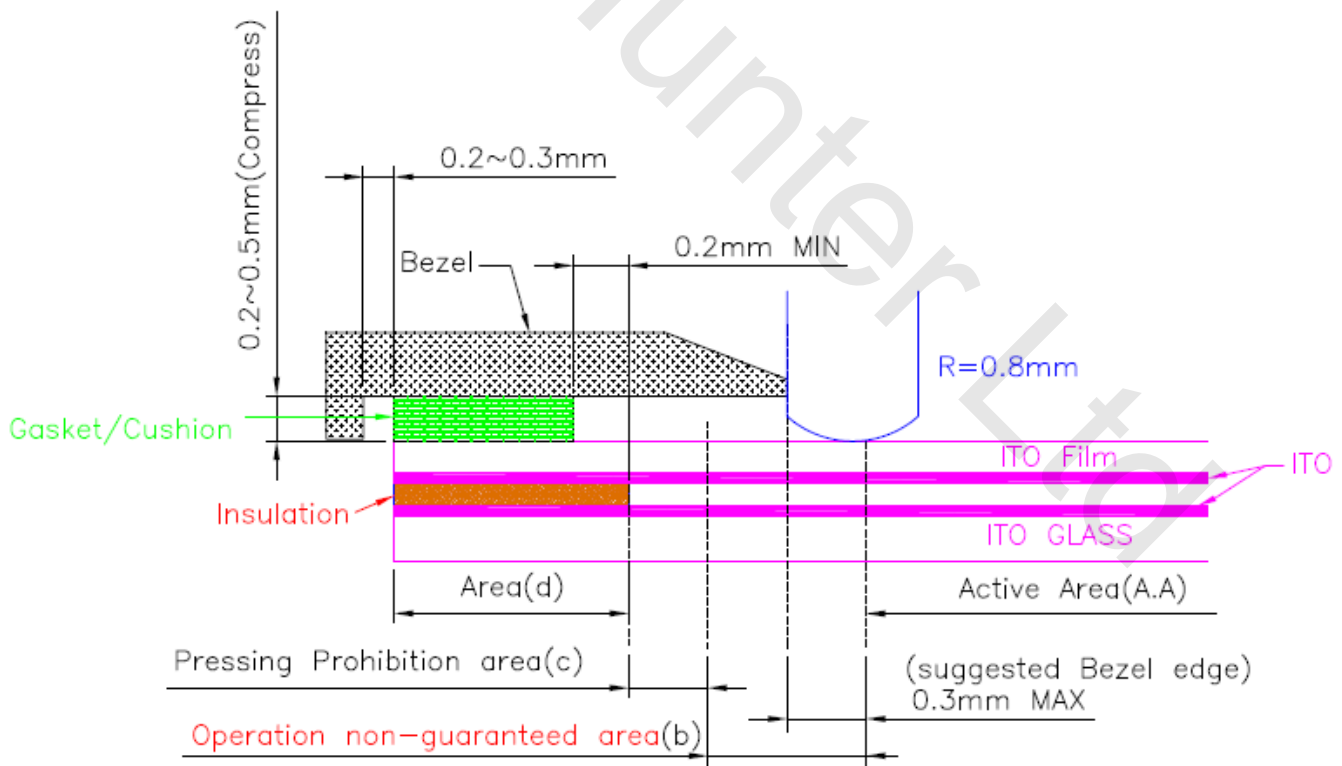
(5) Never expand the T/P top layer (PET Film) like a balloon by internal air pressure. The life of the T/P will extremely decreasing.

(6) Top layer, PET, dimension is changing base on environment temperature and humidity. Please avoid a stress from housing bezel to top layer, because it may cause “waving”.

(7) The input to the Touch Panel sometimes distorts touch panel itself.

(8) To use the stylus pen or fingernail sliding at the edge of the housing is prohibited. It would cause the cracking of the ITO coating and damage the touch panel. It also request not to press this area while assembling

(9) Purpose: In order to prevent accidental use and performance deterioration, please keep the following precautions.



In order to prevent unusual performance degradation and malfunction of a touch panel, please carry out the set case designing and a touch panel assembling method after surely considering the definition of each area illustrated in above figure.



Area (a): Active area

The active area is guaranteed the position data detectable precision, operation force and other operations. It is strongly recommended to place the operation button or menu keys within the active area. Due to structure, the active area is less durable at the edge or close to the edge.

Area (b): Operation non-guaranteed area

This area does not guarantee a touch panel operation and its function. When this area is pressed, touch panel shows degradation of its performance and durability such as a pen sliding durability becomes about one-tenth compared with the active area (area-(a) as guaranteed area) and its operation force requires about double. About 0.5 mm outside from a boundary of the active area corresponds to this area.

Area (c): Pressing prohibition area

The area which forbids pressing, because an excessive load is applied to a transparent electrode (ITO) and a serious damage is given to a touch panel function by pressing. About 0.5 mm outside from operation non-guaranteed area.

Area (d): Non-Active area

The area does not activate even if pressed.

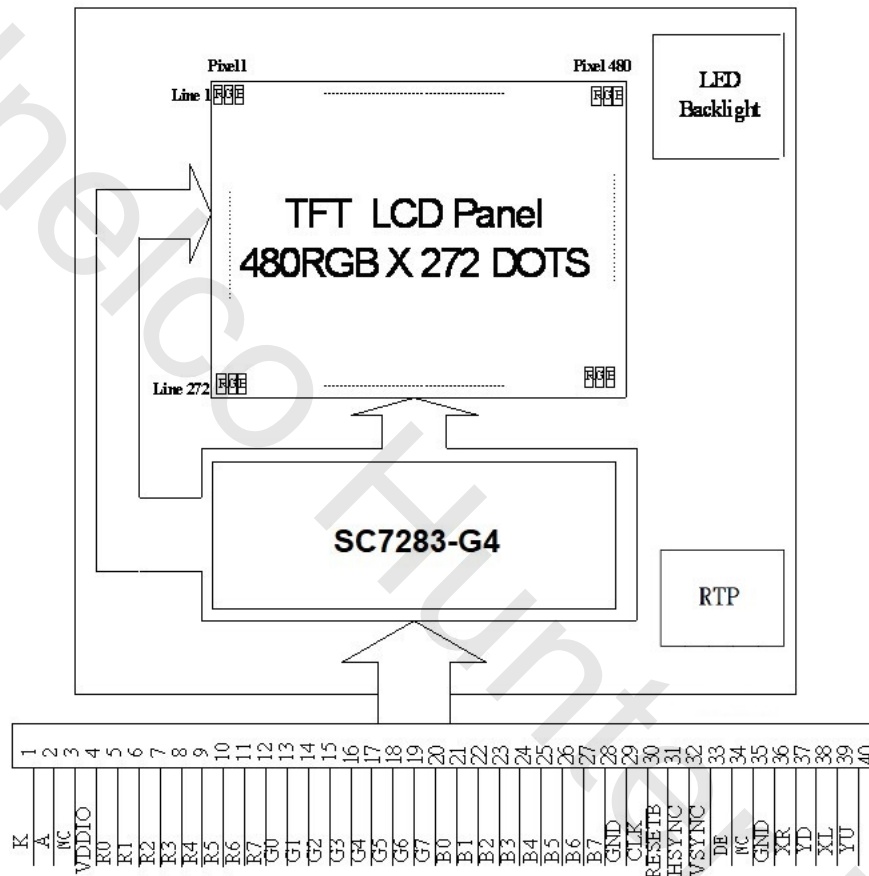
2. MODULE STRUCTURE

2.1 Counter Drawing

2.1.1 LCM Mechanical Diagram

* See Appendix

2.1.2 Block Diagram





2.2 Interface Pin Description

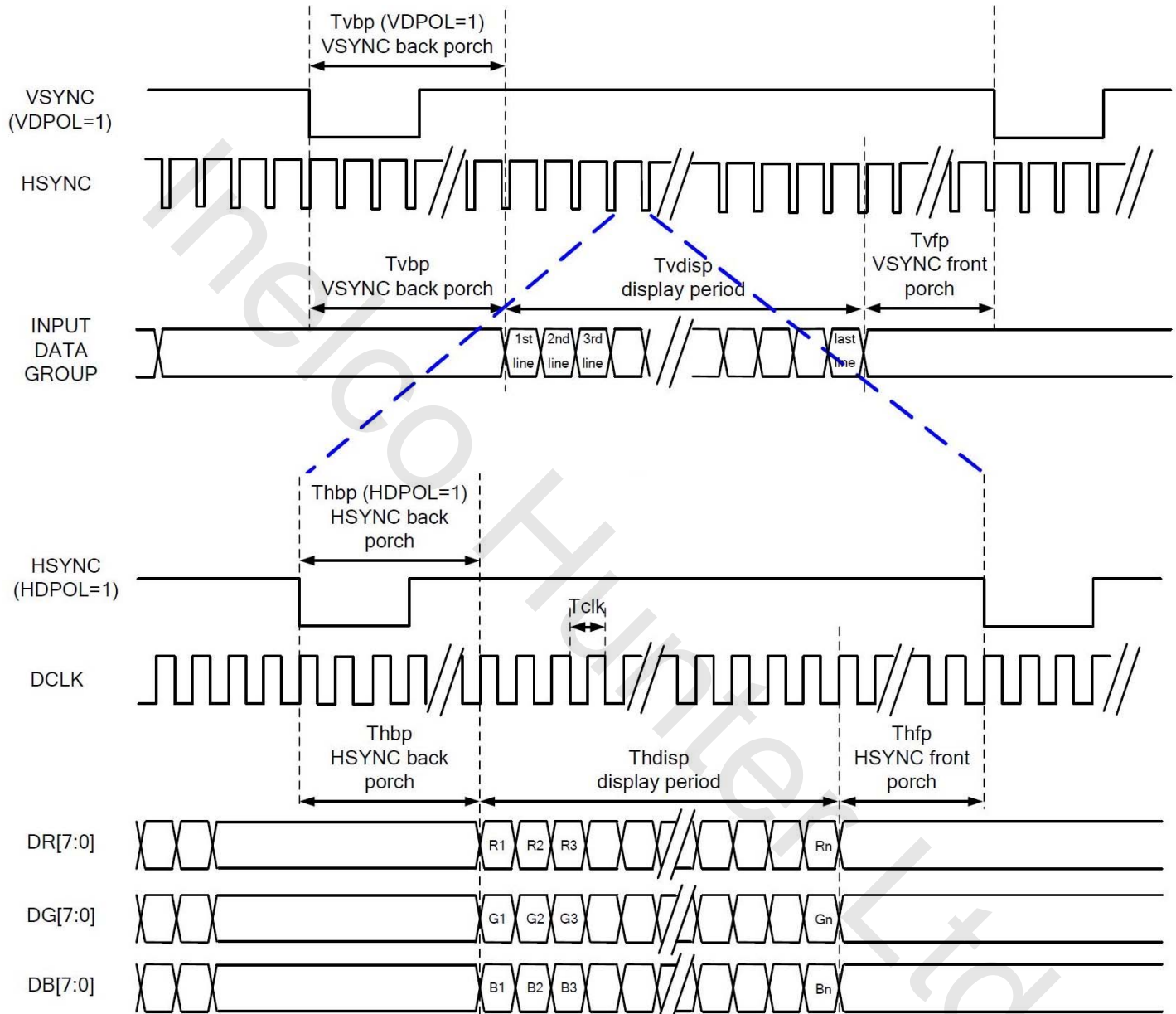
<u>Pin No.</u>	<u>Symbol</u>	<u>Function</u>
1	K	Power supply for LED Backlight cathode input
2	A	Power supply for LED Backlight anode input
3	NC	Not Connect.
4	VDDIO	Digital power
5	DR0	Red data bit 0
6	DR1	Red data bit 1
7	DR2	Red data bit 2
8	DR3	Red data bit 3
9	DR4	Red data bit 4
10	DR5	Red data bit 5
11	DR6	Red data bit 6
12	DR7	Red data bit 7
13	DG0	Green data bit 0
14	DG1	Green data bit 1
15	DG2	Green data bit 2
16	DG3	Green data bit 3
17	DG4	Green data bit 4
18	DG5	Green data bit 5
19	DG6	Green data bit 6
20	DG7	Green data bit 7
21	DB0	Blue data bit 0
22	DB1	Blue data bit 1
23	DB2	Blue data bit 2
24	DB3	Blue data bit 3
25	DB4	Blue data bit 4
26	DB5	Blue data bit 5
27	DB6	Blue data bit 6
28	DB7	Blue data bit 7



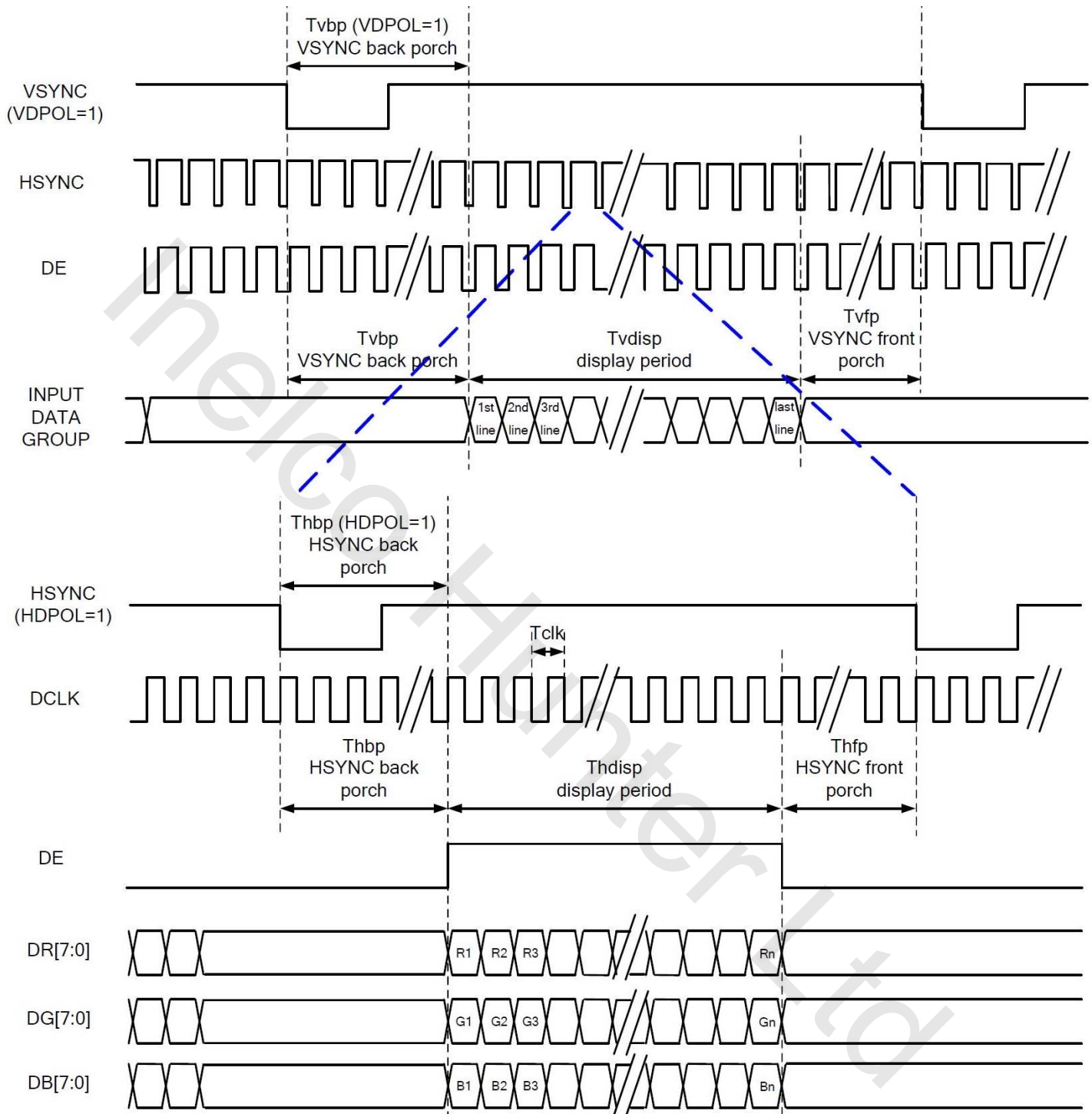
29	GND	Ground
30	DCLK	Dot data clock. DCLK polarity: negative.
31	RESETB	Active low global reset signal input.
32	HSYNC	Horizontal sync input. HSYNC polarity: negative
33	VSYNC	Vertical sync input. VSYNC polarity: negative
34	DE	Data input enable. Active High to enable the data input. If not used, please leave it floating.
35	NC	Not Connect.
36	GND	Ground
37	XR	Right side of touch panel.
38	YD	Bottom side of touch panel.
39	XL	Left side of touch panel.
40	YU	Up side of touch panel.

2.3 Timing Characteristics

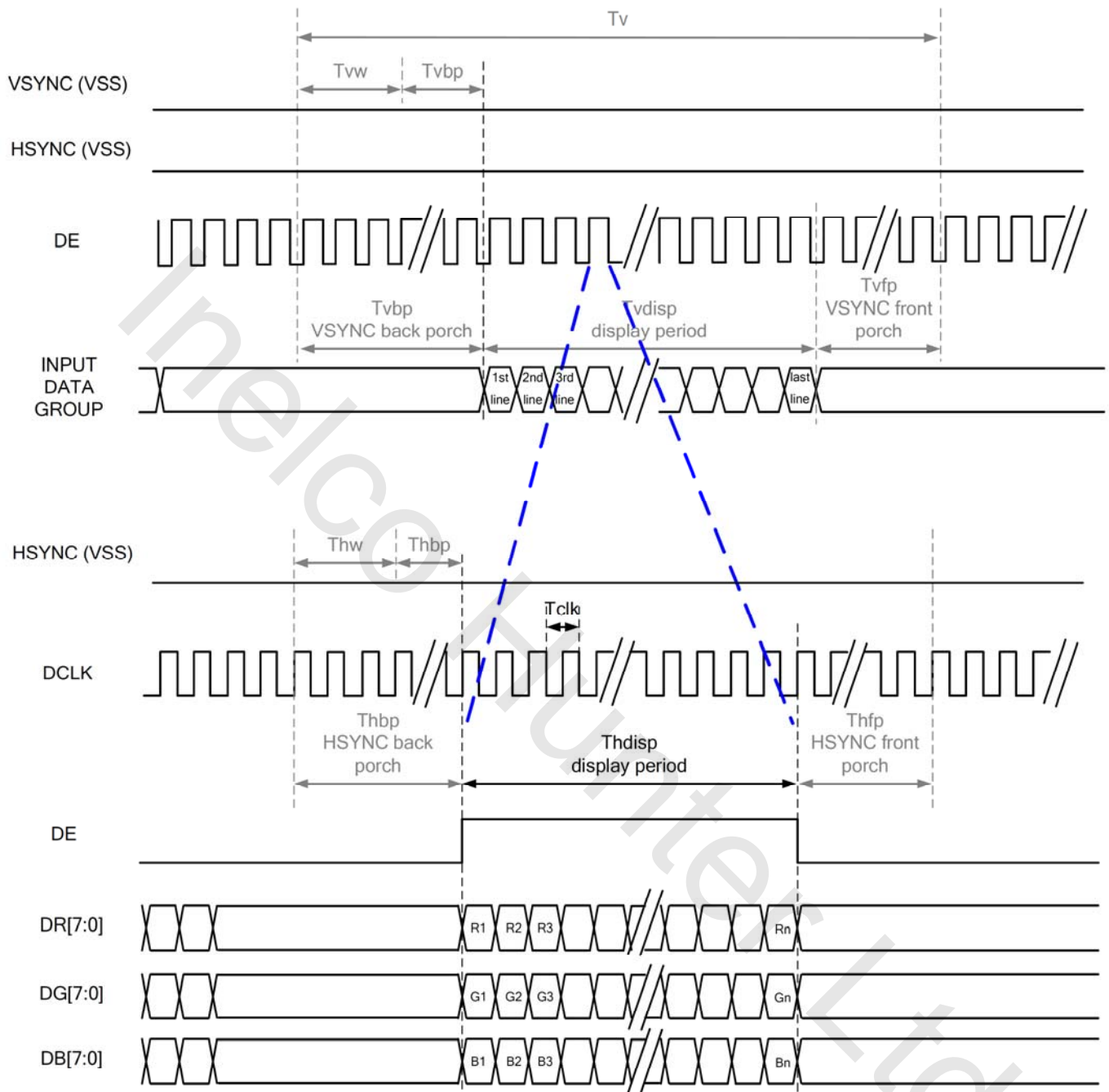
2.3.1 SYNC Mode



2.3.2 SYNC-DE Mode



2.3.3 DE Mode



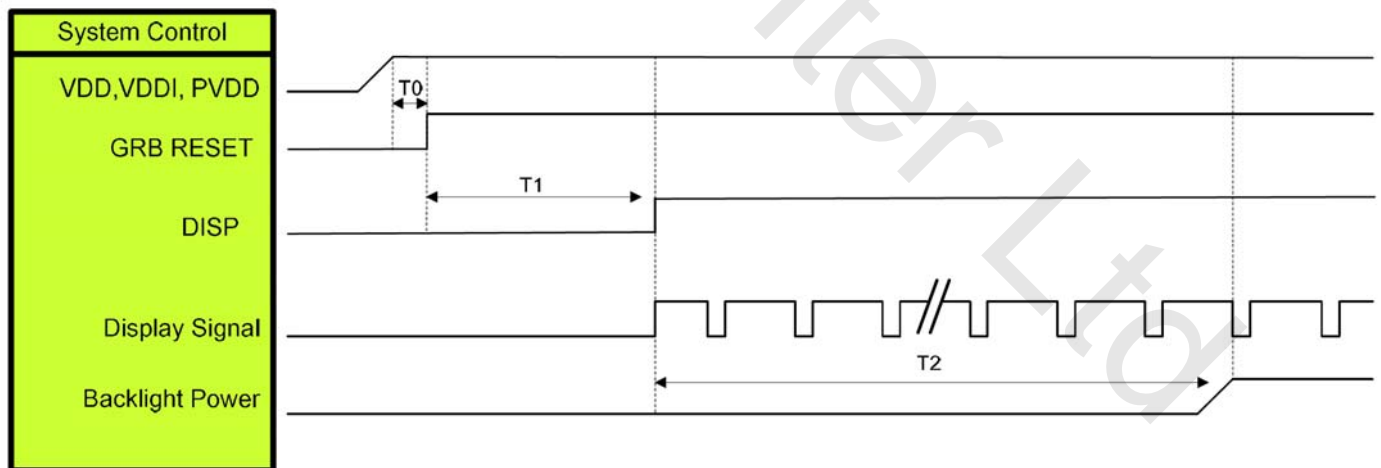
RGB Mode Selection Table	DCLK	HSYNC	VSYNC	DE
SYNC - DE Mode	Input	Input	Input	Input
SYNC Mode	Input	Input	Input	GND
DE Mode	Input	GND	GND	Input

2.3.4 Parallel 24-bit RGB Input Timing

Item		Symbol	Min	Typ.	Max	Unit	Note
DCLK Frequency		Fclk	8	9	12	MHz	
DCLK Period		Tclk	83	111	125	ns	
HSYNC	Period time	Th	485	531	598	DCLK	
	Display Period	Thdisp		480		DCLK	
	Back Porch	Thbp	3	43	43	DCLK	
	Front Porch	Thfp	2	8	75	DCLK	
	Pulse Width	Thw	2	4	43	DCLK	
VSYNC	Period time	Tv	276	292	321	HSYNC	
	Display Period	Tvdisp		272		HSYNC	
	Back Porch	Tvbp	2	12	12	HSYNC	
	Front Porch	Tvfp	2	8	37	HSYNC	
	Pulse Width	Tvw	2	4	12	HSYNC	

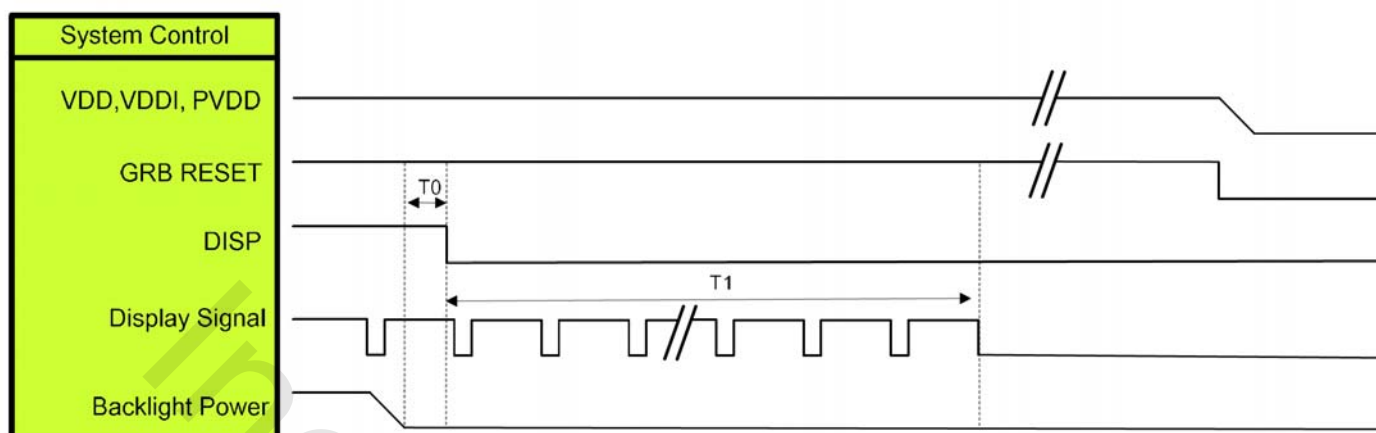
Note: It is necessary to keep Tvbp =12 and Thbp=43 in sync mode. DE mode is unnecessary to keep it.

2.3.5 Power ON Sequence



Symbol	Description	Min. Time	Unit
T0	System power stability to GRB RESET signal	0	ms
T1	GRB RESET= "High" to DISP= "High"	10	ms
T2	Display signal output to backlight power on	250	ms

2.3.6 Power Off Sequence

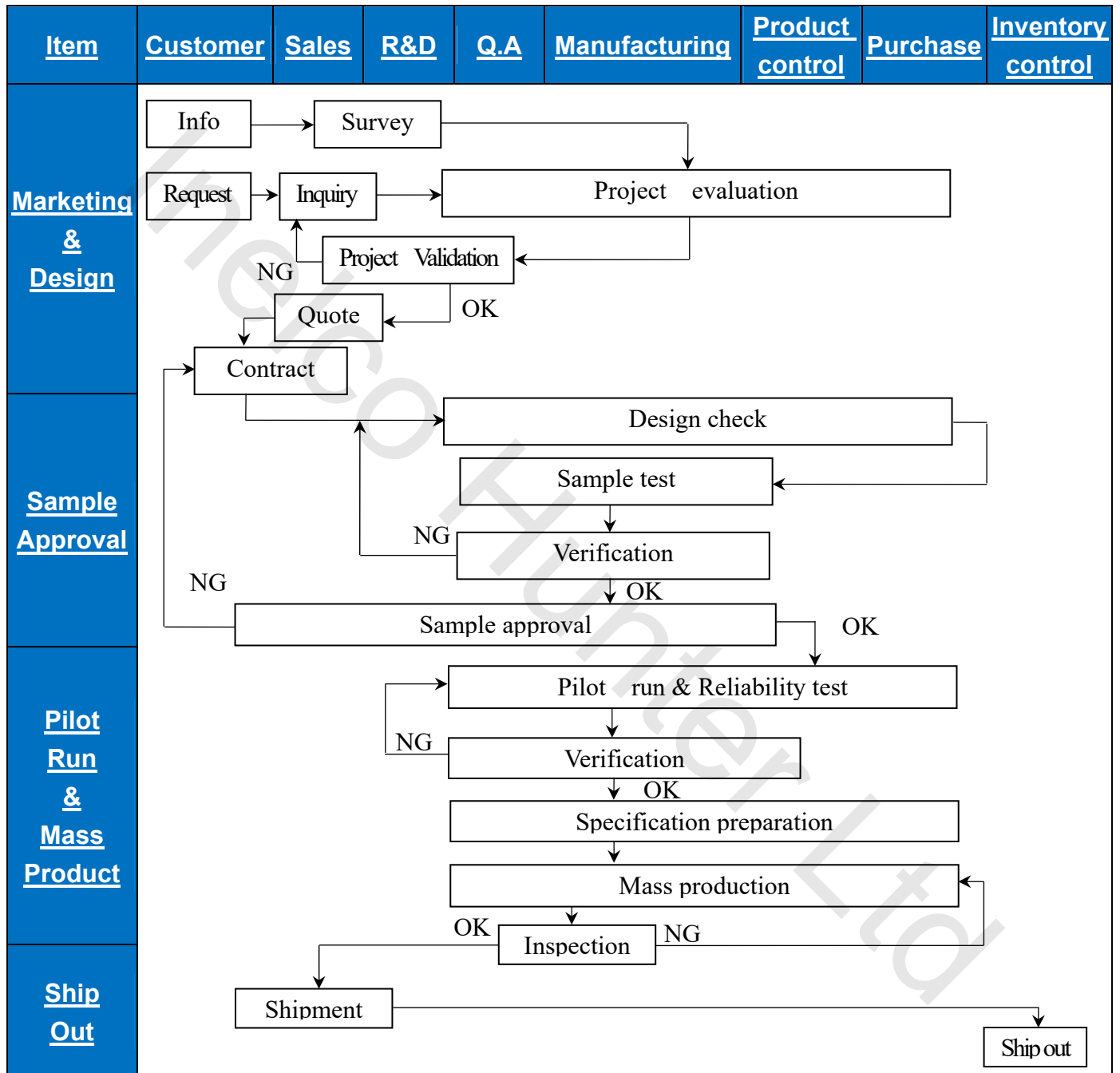


Symbol	Description	Min. Time	Unit
T0	Backlight Power off to DISP= "Low"	5	ms
T1	DISP= "Low" to IC internal voltage discharge complete	80	ms



3. QUALITY ASSURANCE SYSTEM

3.1 Quality Assurance Flow Chart





Item	Customer	Sales	R&D	Q.A	Manufacturing	Product control	Purchase	Inventory control
Sales Service	<pre> graph TD Info[Info] --> Claim[Claim] Claim --> Failure[Failure analysis] Claim --> Report[Analysis report] Failure --> Action[Corrective action] Action --> Tracking[Tracking] </pre>							
Q.A Activity	1. ISO 9001 Maintenance Activities 3. Equipment calibration 5. Standardisation Management				2. Process improvement proposal 4. Education and Training Activities			

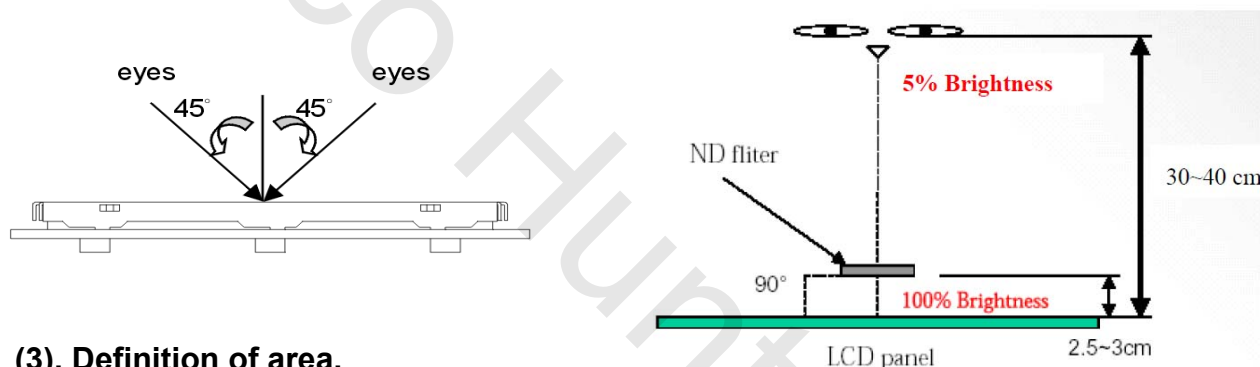
3.2. Inspection Specification

- ◆Scope: The document shall be applied to TFT-LCD Module for 3.5"-20" (Ver.B01).
- ◆Inspection Standard: MIL-STD-105E Table Normal Inspection Single Sampling Level II.
- ◆Equipment: Gauge, MIL-STD, IHL Tester, Sample
- ◆Defect Level: Major Defect AQL: 0.4; Minor Defect AQL: 1.5
- ◆OUT Going Defect Level: Sampling.
- ◆Standard of the product appearance test:

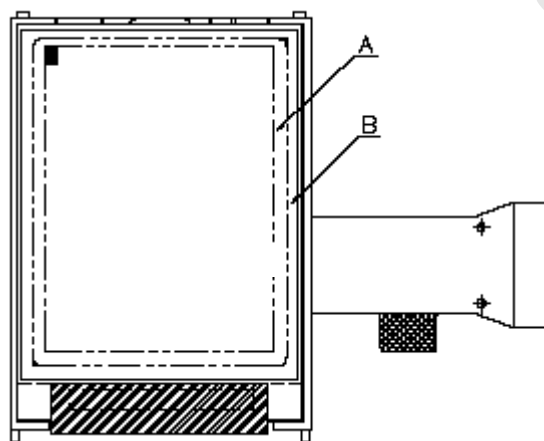
a. Manner of appearance test:

(1). The test best be under 20W×2 fluorescent light(about 300lux ~500lux)
, and distance of view must be at 30~40 cm.

(2). The test direction is base on about around 45° of vertical line.



(3). Definition of area.



A area: viewing area

B area: Outside of viewing area

(4). Standard of inspection : (Unit : mm)

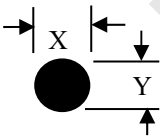
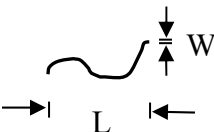
◆Specification for TFT-LCD Module 3.5"~20":

(Ver.B01)

NO	Item	Criterion	Level												
01	Product condition	1.1The part number is inconsistent with work order of production.	Major												
		1.2 Mixed product types.	Major												
		1.3 Assembled in inverse direction.	Major												
02	Quantity	2.1 The quantity is inconsistent with work order of production.	Major												
03	Outline dimension	3.1 Product dimension and structure must conform to structure diagram.	Major												
04	Electrical Testing	4.1 Missing line character and icon.	Major												
		4.2 No function or no display.	Major												
		4.3 Display malfunction.	Major												
		4.4 LCD viewing angle defect.	Major												
		4.5 Current consumption exceeds product specifications.	Major												
		4.6Mura cannot be seen through 5% ND filter at 50% Gray , should be judged by the viewing angle of 90 degree.	Minor												
05	Dot defect (Bright dot, Dark dot) On -display	<table><tr><th></th><th>Item</th><th>Acceptance (Q'ty)</th></tr><tr><td rowspan="4">Dot Defect</td><td>Bright Dot</td><td>≤ 4</td></tr><tr><td>Dark Dot</td><td>≤ 5</td></tr><tr><td>Joint Dot</td><td>≤ 3</td></tr><tr><td>Total</td><td>≤ 7</td></tr></table>		Item	Acceptance (Q'ty)	Dot Defect	Bright Dot	≤ 4	Dark Dot	≤ 5	Joint Dot	≤ 3	Total	≤ 7	Minor
			Item	Acceptance (Q'ty)											
Dot Defect	Bright Dot	≤ 4													
	Dark Dot	≤ 5													
	Joint Dot	≤ 3													
	Total	≤ 7													
5.1 Inspection pattern: full white, full black, Red, Green and blue screens. 5.2 It is defined as dot defect if defect area > 1/2 dot. 5.3 The distance between two dot defect ≥5 mm. 5.4 Bright dot : Dots appear bright and unchanged in visible with 5% ND filter is defined. 5.5 Tiny bright dot: bright dot area ≤1/2 dot. a. Dots appear bright and unchanged in visible with 5% ND filter is defined defect and is judged in accordance with 6.1 b. Dots invisible with 5% ND Filter is Ignored.															

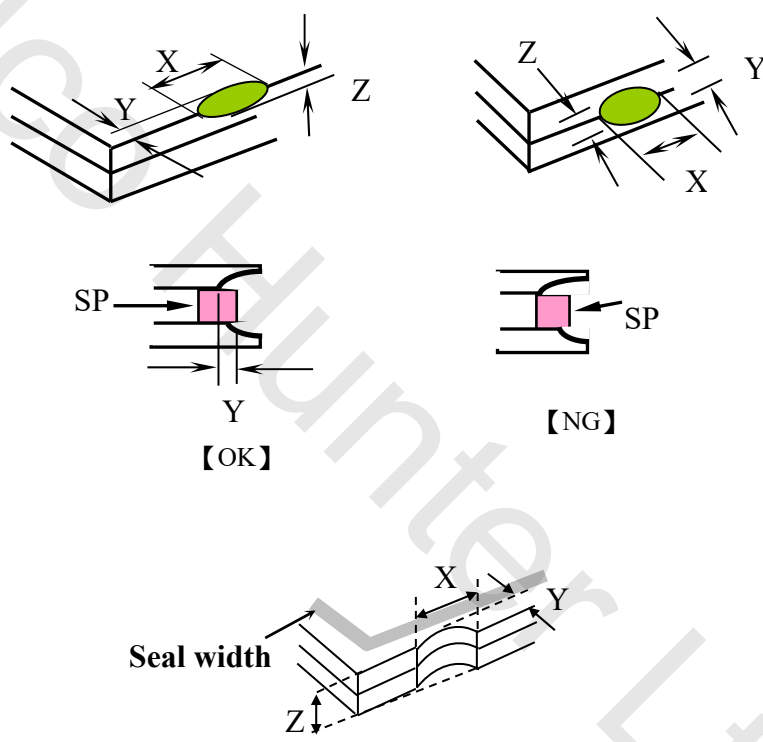
◆Specification for TFT-LCD Module 3.5" ~20" :

(Ver.B01)

NO	Item	Criterion	Level																																																					
06	Black or white Dot, scratch, contamination Round type  $\Phi = (x + y) / 2$ Line type 	6.1 Round type (Non-display or display): <table><thead><tr><th rowspan="2">Dimension (diameter: Φ)</th><th colspan="2">Acceptance (Q'ty)</th></tr><tr><th>A area</th><th>B area</th></tr></thead><tbody><tr><td>$\Phi \leq 0.25$</td><td>Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>$0.25 < \Phi \leq 0.50$</td><td>5</td></tr><tr><td>$\Phi > 0.50$</td><td>0</td></tr><tr><td>Total</td><td>5</td></tr></tbody></table> 6.2 Line type(Non-display or display): <table><thead><tr><th rowspan="2">module size</th><th rowspan="2">Length (L)</th><th rowspan="2">Width (W)</th><th colspan="2">Acceptance (Q'ty)</th></tr><tr><th>A area</th><th>B area</th></tr></thead><tbody><tr><td rowspan="5">3.5" to less 9"</td><td>---</td><td>$W \leq 0.03$</td><td>Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>$L \leq 10.0$</td><td>$0.03 < W \leq 0.05$</td><td>4</td></tr><tr><td>$L \leq 5.0$</td><td>$0.05 < W \leq 0.10$</td><td>2</td></tr><tr><td>---</td><td>$W > 0.10$</td><td>As round type</td></tr><tr><td colspan="2">Total</td><td>5</td><td></td></tr><tr><td rowspan="4">9" to 20"</td><td>---</td><td>$W \leq 0.05$</td><td>Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>$L \leq 10.0$</td><td>$0.05 < W \leq 0.10$</td><td>5</td></tr><tr><td>---</td><td>$W > 0.10$</td><td>As round type</td></tr><tr><td colspan="2">Total</td><td>5</td></tr></tbody></table>	Dimension (diameter: Φ)	Acceptance (Q'ty)		A area	B area	$\Phi \leq 0.25$	Ignore	Ignore	$0.25 < \Phi \leq 0.50$	5	$\Phi > 0.50$	0	Total	5	module size	Length (L)	Width (W)	Acceptance (Q'ty)		A area	B area	3.5" to less 9"	---	$W \leq 0.03$	Ignore	Ignore	$L \leq 10.0$	$0.03 < W \leq 0.05$	4	$L \leq 5.0$	$0.05 < W \leq 0.10$	2	---	$W > 0.10$	As round type	Total		5		9" to 20"	---	$W \leq 0.05$	Ignore	Ignore	$L \leq 10.0$	$0.05 < W \leq 0.10$	5	---	$W > 0.10$	As round type	Total		5	Minor
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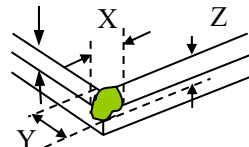
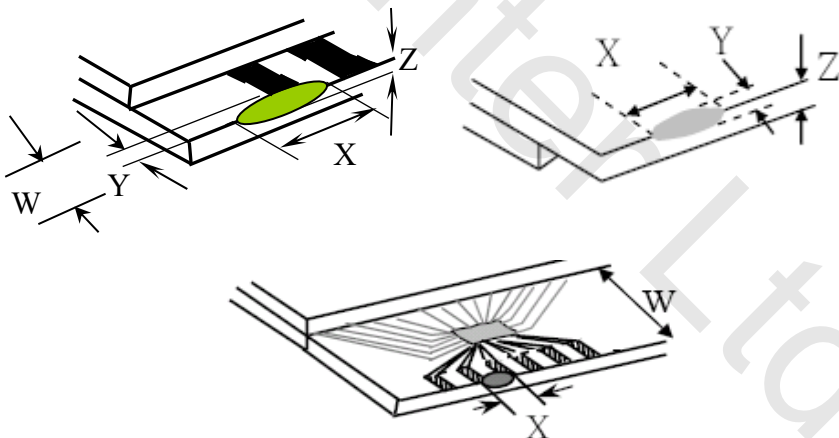
◆Specification for TFT-LCD Module 3.5" ~20" :

(Ver.B01)

NO	Item	Criterion	Level									
08	The crack of glass	Symbols : X: The length of crack Z: The thickness of crack T: The thickness of glass Y: The width of crack. W: terminal length a : LCD side length 8.1 General glass chip: 8.1.1 Chip on panel surface and crack between panels:  <table><tr><th><u>X</u></th><th><u>Y</u></th><th><u>Z</u></th></tr><tr><td>$\leq a$</td><td>Crack can't enter viewing area</td><td>$\leq 1/2 t$</td></tr><tr><td>$\leq a$</td><td>Crack can't exceed the half of SP width.</td><td>$1/2 t < Z \leq 2 t$</td></tr></table>	<u>X</u>	<u>Y</u>	<u>Z</u>	$\leq a$	Crack can't enter viewing area	$\leq 1/2 t$	$\leq a$	Crack can't exceed the half of SP width.	$1/2 t < Z \leq 2 t$	Minor
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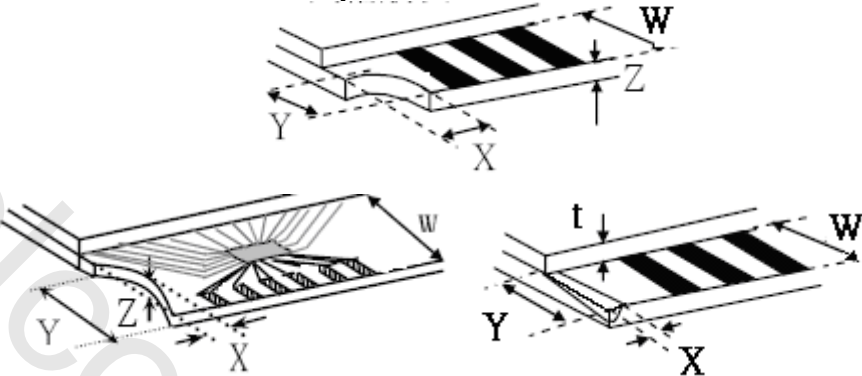
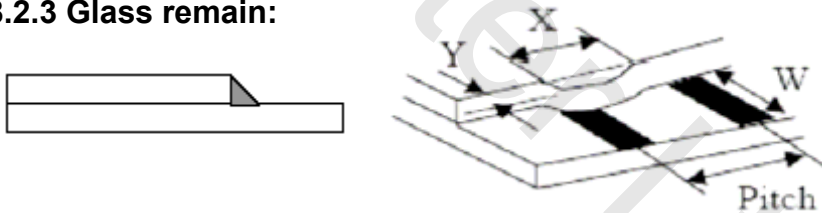
◆Specification for TFT-LCD Module 3.5" ~20" :

(Ver.B01)

NO	Item	Criterion	Level												
08	The crack of glass	Symbols : X: The length of crack Z: The thickness of crack t: The thickness of glass Y: The width of crack. W: terminal length a: LCD side length													
		8.1.2 Corner crack:  <table> <tr> <th><u>X</u></th> <th><u>Y</u></th> <th><u>Z</u></th> </tr> <tr> <td>$\leq 1/5 a$</td> <td>Crack can't enter viewing area</td> <td>$Z \leq 1/2 t$</td> </tr> <tr> <td>$\leq 1/5 a$</td> <td>Crack can't exceed the half of SP width.</td> <td>$1/2 t < Z \leq 2 t$</td> </tr> </table>	<u>X</u>	<u>Y</u>	<u>Z</u>	$\leq 1/5 a$	Crack can't enter viewing area	$Z \leq 1/2 t$	$\leq 1/5 a$	Crack can't exceed the half of SP width.	$1/2 t < Z \leq 2 t$				
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		8.2 Protrusion over terminal: 8.2.1 Chip on electrode pad:  <table> <tr> <th></th> <th><u>X</u></th> <th><u>Y</u></th> <th><u>Z</u></th> </tr> <tr> <td><u>Front</u></td> <td>$\leq a$</td> <td>$\leq 1/2 W$</td> <td>$\leq t$</td> </tr> <tr> <td><u>Back</u></td> <td>$\leq a$</td> <td>$\leq W$</td> <td>$\leq 1/2 t$</td> </tr> </table>		<u>X</u>	<u>Y</u>	<u>Z</u>	<u>Front</u>	$\leq a$	$\leq 1/2 W$	$\leq t$	<u>Back</u>	$\leq a$	$\leq W$	$\leq 1/2 t$	Minor
	<u>X</u>	<u>Y</u>	<u>Z</u>												
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◆Specification for TFT-LCD Module 3.5" ~20" :

(Ver.B01)

NO	Item	Criterion	Level												
08	The crack of glass	Symbols: X: The length of crack Z: The thickness of crack t: The thickness of glass Y: The width of crack. W: terminal length a: LCD side length 8.2.2 Non-conductive portion:  <table><tr><th><u>X</u></th><th><u>Y</u></th><th><u>Z</u></th></tr><tr><td>$\leq 1/3 a$</td><td>$\leq W$</td><td>$\leq t$</td></tr></table> ⊙ If the chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications 8.2.3 Glass remain:  <table><tr><th><u>X</u></th><th><u>Y</u></th><th><u>Z</u></th></tr><tr><td>$\leq a$</td><td>$\leq 1/3 W$</td><td>$\leq t$</td></tr></table> 8.2.4 Cracking:  Not Allowed	<u>X</u>	<u>Y</u>	<u>Z</u>	$\leq 1/3 a$	$\leq W$	$\leq t$	<u>X</u>	<u>Y</u>	<u>Z</u>	$\leq a$	$\leq 1/3 W$	$\leq t$	Minor
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◆Specification for TFT-LCD Module 3.5" ~20" :

(Ver.B01)

<u>NO</u>	<u>Item</u>	<u>Criterion</u>	<u>Level</u>
09	Backlight elements	9.1 Backlight can't work normally.	Major
		9.2 Backlight doesn't light or color is wrong.	Major
		9.3 Illumination source flickers when lit.	Major
10	General appearance	10.1 Pin type, quantity, dimension must match type in structure diagram.	Major
		10.2 No short circuits in components on PCB or FPC.	Major
		10.3 Parts on PCB or FPC must be: no wrong parts, missing parts or excess parts.	Major
		10.4 Product packaging must the same as specified on packaging specification sheet.	Minor
		10.5 The folding and peeled off in polarizer are not acceptable.	Minor
		10.6 The PCB or FPC between B/L assembled distance(PCB or FPC) is ≤ 1.5 mm.	Minor

4. RELIABILITY TEST

4.1 Reliability Test Condition

(Ver.B01)

NO.	TEST ITEM	TEST CONDITION	
1	High Temperature Storage Test	Keep in 80 ±5℃ 240 hrs	
2	Low Temperature Storage Test	Keep in -30 ±5℃ 240 hrs	
3	High Temperature / High Humidity Storage Test	Keep in 60 °C / 90% R.H duration for 240 hrs (Excluding the polarizer)	
4	Temperature Cycling Storage Test	-30℃ → +25℃ → 80℃ → +25℃ (30mins) (5mins) (30mins) (5mins) ← 20 Cycle →	
5	ESD Test	Air Discharge: Apply 2 KV with 5 times Discharge for each polarity +/-	Contact Discharge: Apply 250 V with 5 times discharge for each polarity +/-
		1. Temperature ambience: 15℃~35℃ 2. Humidity relative: 30%~60% 3. Energy Storage Capacitance(Cs+Cd): 150pF±10% 4. Discharge Resistance(Rd): 330Ω±10% 5. Discharge, mode of operation: Single Discharge (time between successive discharges at least 1 sec) (Tolerance if the output voltage indication: ±5%)	
6	Vibration Test (Packaged)	1. Sine wave 10~55 Hz frequency (1 min/sweep) 2. The amplitude of vibration: 1.5 mm 3. Each direction (X, Y, Z) duration for 2 hrs	
7	Drop Test (Packaged)		
		Packing Weight (Kg)	Drop Height (cm)
		0 ~ 45.4	122
		45.4 ~ 90.8	76
		90.8 ~ 454	61
Over 454	46		
		Drop Direction :※1 corner / 3 edges / 6 sides each 1time	

◎Result Evaluation Criteria :

Under the display quality test conditions with normal operations with normal operation state.
Do not change these conditions as such changes may affect practical display function.
(Normal operation state)

Temperature : +20~30℃

Humidity : 50~70%

Atmospheric pressure : 86~106Kpa



5. PRECAUTION RELATING PRODUCT HANDLING

5.1 SAFETY

- 5.1.1 If the LCD panel breaks, be careful not to get the liquid crystal to touch your skin.
- 5.1.2 If the liquid crystal touches your skin or clothes, please wash it off immediately by using soap and water.

5.2 HANDLING

- 5.2.1 Avoid any strong mechanical shock which can break the glass.
- 5.2.2 Avoid static electricity which can damage the CMOS LSI—When working with the module, be sure to ground your body and any electrical equipment you may be using.
- 5.2.3 Do not remove the panel or frame from the module.
- 5.2.4 The polarizing plate of the display is very fragile. So, please handle it very carefully, do not touch, push or rub the exposed polarizing with anything harder than an HB pencil lead (glass, tweezers, etc.)
- 5.2.5 Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
- 5.2.6 Do not touch the display area with bare hands, this will stain the display area.
- 5.2.7 Do not use ketonic solvent & aromatic solvent. Use with a soft cloth soaked with a cleaning naphtha solvent.
- 5.2.8 To control temperature and time of soldering is $320 \pm 10^{\circ}\text{C}$ and 3 ~ 5 sec.
- 5.2.9 To avoid liquid (include organic solvent) stained on LCM.
- 5.2.10 Caution! (LCM products with Capacitive Touch Panel)
Strong EMI-sources such as switch-mode power supplies (SPS) can lead to touch malfunction (e.g., ghost-touches). Therefore, the touch needs to be thoroughly tested inside the target application.
- 5.2.11 CAUTION: Continuously displaying same static image will result in high possibility of image sticking/image burn-in effect due to TFT panel characteristic.
- 5.2.12 Double-sided tape designed to be attached with the customer's mechanical device, please follow up the rules and regulations published by the original manufacturer of double-side tape for the attachment operation.

5.3 STORAGE

- 5.3.1 Store the panel or module in a dark place where the temperature is $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and the humidity is below 65% RH.
- 5.3.2 Do not place the module near organics solvents or corrosive gases.
- 5.3.3 Do not crush, shake, or jolt the module.

5.4 TERMS OF WARRANTY

- 5.4.1 Applicable warrant period
The period is within thirteen months since the date of shipping out under normal using and storage conditions.
- 5.4.2 Unaccepted responsibility
This product has been manufactured to your company's specification as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment, we cannot take responsibility if the product is used in nuclear power control equipment, aerospace equipment, fire and security systems or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required.

