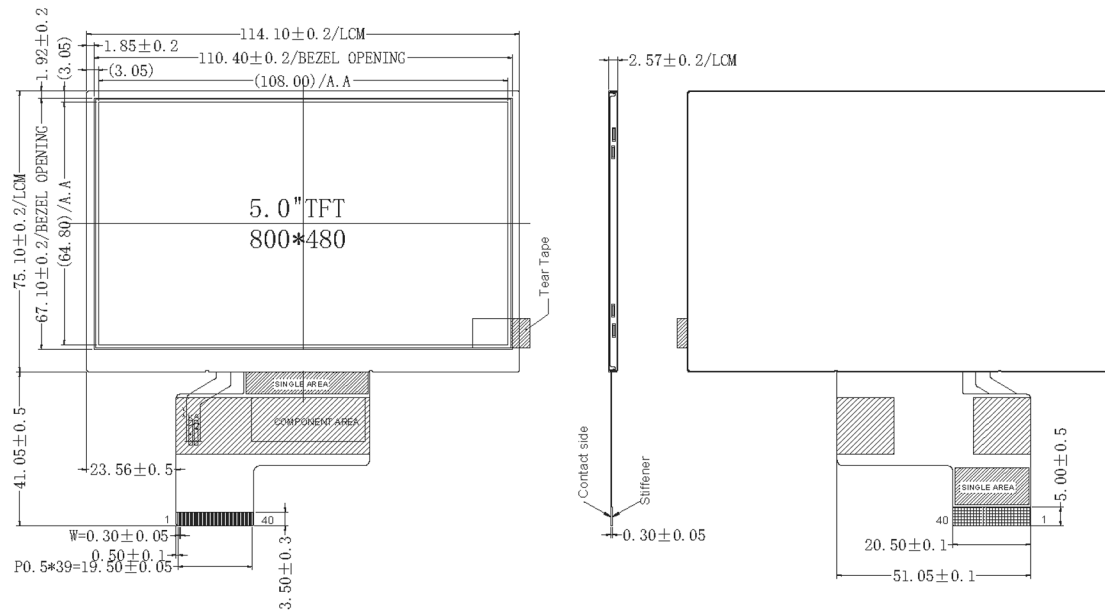


PIN	
1	BL-
2	BL+
3	GND
4	VDD
5	R0
6	R1
7	R2
8	R3
9	R4
10	R5
11	R6
12	R7
13	G0
14	G1
15	G2
16	G3
17	G4
18	G5
19	G6
20	G7
21	B0
22	B1
23	B2
24	B3
25	B4
26	B5
27	B6
28	B7
29	GND
30	DCLK
31	DISP
32	HSYNC
33	VSYNC
34	DE
35	RESET
36	GND
37	SCL
38	SDA
39	CS
40	OTP

NOTES:
1. Display size: 5.0" TFT IPS
2. Viewing direction: full view
3. Display mode: Transmissive/Normal Black/Glare
4. Operation temperature: -20° C ~ +70° C
5. Storage temperature: -30° C ~ +80° C
6. Driver IC: ST7265
7. Power supply voltage: 3.3 V
8. Backlight : White (12LED) / 18.6 (TYP) V / 40mA
9. LCM Luminance: 360 (TYP) cd/m²
10. Interface type: RGB
11. RoHS must be complied
* The dimension with mark brackets "()" just for reference

General Tolerance ±				
DIM	Level	1	2	3
0-5	0.05	0.1	0.1	0.2
5-10	0.05	0.1	0.1	0.2
10-50	0.05	0.1	0.2	0.3
50-100	0.1	0.2	0.3	0.5
100-150	0.1	0.2	0.5	0.8
Level	Backed			Ⓢ

Compliance: RohS III (2015/863/EU)

Tolerances:		Date	Name	YDP LCD I 500 R	
		12/24	dr		
				knitter-switch	
				30 56 11	
				Page	
				1/30	
Modifications	Date	Name			

PRODUCT SPECIFICATION

5.0” IPS TFT LCD MODULE

MODEL: YDP LCD I 500 R **Ver:1.0**



- < ◇ > Preliminary Specification
- < ◆ > Finally Specification

CUSTOMER’S APPROVAL	
CUSTOMER :	
SIGNATURE:	DATE:

APPROVED BY	PM REVIEWED	PD REVIEWED	PREPARED BY
TFT X. B 20240104	TFT S. G. H 20240104	TFT 周福云 20240104	TFT L. Q 20240104

Revision History

Revision	Date	Originator	Detail	Remarks
1.0	2024.01.04	LQ	Initial Release	

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1. General Description

The specification is a transmissive type color active matrix liquid crystal display (LCD) which uses amorphous thin film transistor (TFT) as switching devices. This product is composed of a TFT-LCD panel, driver ICs and a backlight unit.

2. Module Parameter

Features	Details	Unit
Display Size(Diagonal)	5.0"	
LCD type	IPS TFT	
Display Mode	Normal black/Transmissive	
Resolution	800 RGB x 480	Pixels
View Direction	Full view	Best Image
Module Outline	114.10 (H) x 75.10(V) x 2.57(T) (Note1)	mm
Active Area	108 (H) x 64.8(V)	mm
Pixel Size	135 (H) x 135(V)	um
Pixel Arrangement	RGB Vertical Stripe	
Display Colors	16.7M	
Driver IC	ST7265	-
Interface	24-bit RGB	
With or Without Touch Panel	Without	
Operating Temperature	-20~70	°C
Storage Temperature	-30~80	°C
Weight	TBD	g

Note 1: Exclusive hooks, posts, FFC/FPC tail etc.

3. Absolute Maximum Ratings

GND=0V, Ta=25°C

Item	Symbol	Min.	Max.	Unit
Supply Voltage	VDD	-0.3	4.0	V
Storage temperature	T _{STG}	-30	80	°C
Operating temperature	T _{OP}	-20	70	°C

Note 1: If Ta below 50°C, the maximal humidity is 90%RH, if Ta over 50°C, absolute humidity should be less than 60%RH.

Note 2: The response time will be extremely slow when the operating temperature is around -10°C, and the back ground will become darker at high temperature operating.

4. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	VDD	3.1	3.3	3.6	V
Logic Low input voltage	V _{IL}	GND	-	0.3*VDD	V
Logic High input voltage	V _{IH}	0.7*VDD	-	VDD	V
Output low voltage	V _{OL}	GND	-	GND+0.4	V
Output high voltage	V _{OH}	VDD-0.4	-	VDD	V
Current Consumption All white	I _{DD}	-	TBD	-	mA

5. BLU DC Characteristic

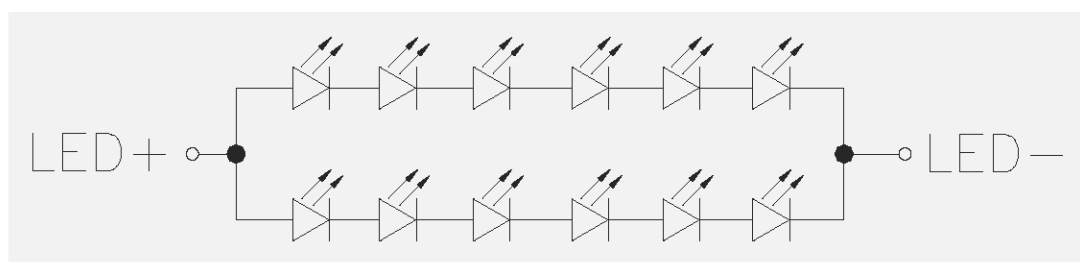
5.1. Backlight Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Backlight Voltage	V _{LED}	Ta=25 °C, I _F =20mA/LED	16.8	18.6	20.4	V
Backlight Current	I _{LED}	Ta=25 °C, V _F =3.1V/LED	-	40	-	mA
Power dissipation	P _D		-	744	-	mW
Uniformity	Avg		-	80	-	%
LED working life(25°C)	-		-	30000	-	Hrs
Drive method	Constant current					
LED Configuration	12 White LEDs (6 LEDs in one string and 2 groups in parallel)					

Note1: LED life time defined as follows: The final brightness is at 50% of original brightness.

The environmental conducted under ambient air flow, at Ta=25±2 °C, 60%RH±5%, I_F=20mA/LED.

5.2. Backlighting circuit



6. Optical Characteristics

6.1. Optical Characteristics

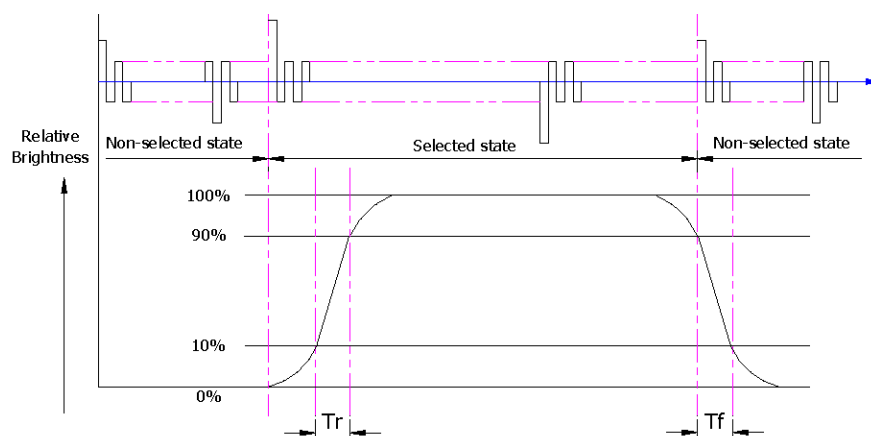
$T_a=25^{\circ}\text{C}$, $V_{DD}=3.3\text{V}$

Backlight On (Transmissive Mode)	Item		Symbol	Condition	Specification			Unit
					Min.	Typ.	Max.	
	Luminance on TFT(I_f =20mA/LED)		Lv	Normally viewing angle $\theta x = \varphi y = 0^{\circ}$	288	360	-	cd/m ²
	Contrast ratio(See 6.3)		CR		1000	1200	-	
	Response time (See 6.2)		Tr+Tf		-	30	40	ms
	Chromaticity Transmissive (See 6.5)	Red	Xr		-	TBD	-	
			Yr		-	TBD	-	
		Green	Xg		-	TBD	-	
			Yg		-	TBD	-	
		Blue	Xb		-	TBD	-	
			Yb		-	TBD	-	
		White	Xw		-	TBD	-	
			Yw		-	TBD	-	
	Viewing Angle (See 6.4)	Horizontal	$\theta x+$	Center CR≥10	70	80	-	Deg.
			$\theta x-$		70	80	-	
		Vertical	$\varphi y+$		70	80	-	
$\varphi y-$			70		80	-		
NSTC			$\Theta=0^{\circ}$	50	55		%	

Note1: When Temperature= -30°C , $T_R+T_F = 16.7\text{ms}+16.7\text{ms MAX.}$

6.2. Definition of Response Time

6.2.1. Normally Black Type (Negative)

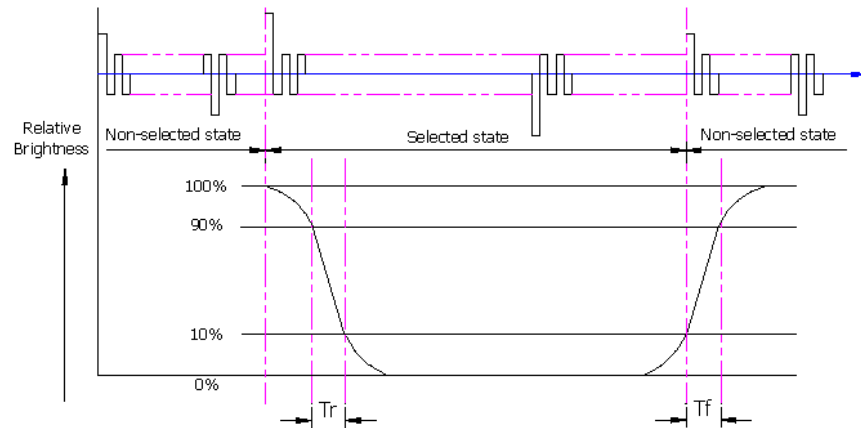


T_r is the time it takes to change from non-selected state with relative luminance 10% to selected state with relative luminance 90%;

Tf is the time it takes to change from selected state with relative luminance 90% to non-selected state with relative luminance 10%

Note : Measuring machine: LCD-5100

6.2.2. Normally White Type (Positive)



T_r is the time it takes to change from non-selected stage with relative luminance 90% to selected state with relative luminance 10%;

T_f is the time it takes to change from selected state with relative luminance 10% to non-selected state with relative luminance 90%;

Note : Measuring machine: LCD-5100 or EQUI

6.3. Definition of Contrast Ratio

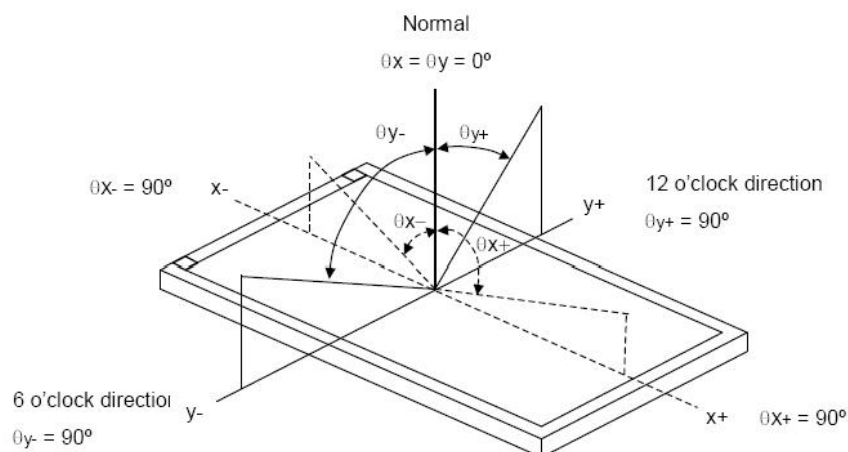
Contrast is measured perpendicular to display surface in reflective and transmissive mode.

The measurement condition is:

Measuring Equipment	Eldim or Equivalent
Measuring Point Diameter	3mm/1mm
Measuring Point Location	Active Area centre point
Test pattern	A: All Pixels white
	B: All Pixel black
Contrast setting	Maximum

Definitions: CR (Contrast) = Luminance of White Pixel / Luminance of Black Pixel

6.4. Definition of Viewing Angles



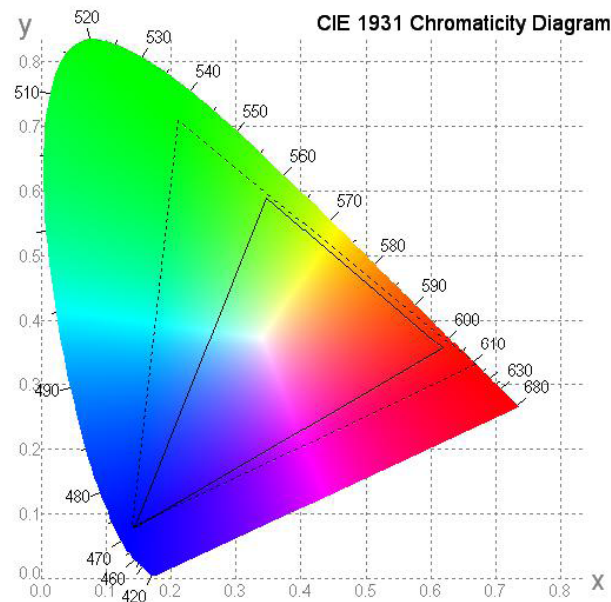
Measuring machine: LCD-5100 or EQUI

6.5. Definition of Color Appearance

R,G,B and W are defined by (x, y) on the IE chromaticity diagram

NTSC=area of RGB triangle/area of NTSC triangleX100%

Measuring picture: Red, Green, Blue and White (Measuring machine: BM-7)



6.6. Definition of Surface Luminance, Uniformity and Transmittance

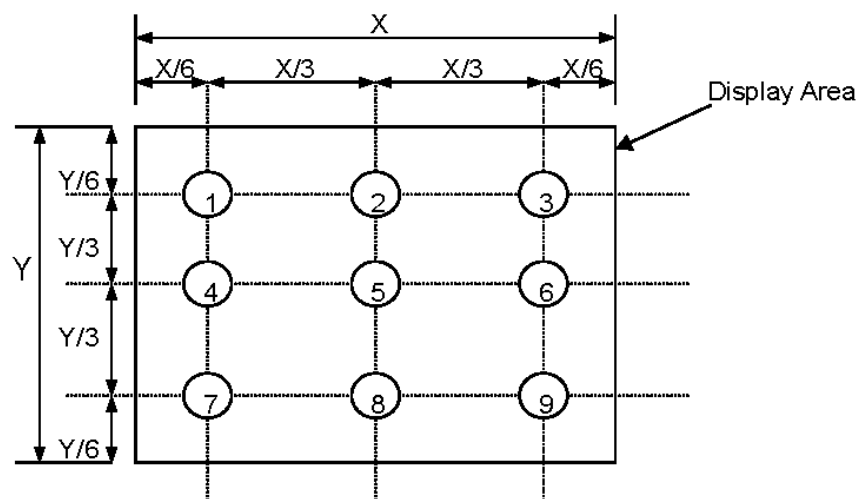
Using the transmissive mode measurement approach, measure the white screen luminance of the display panel and backlight.

6.6.1. Surface Luminance: $L_v = \text{average } (L_{P1}:L_{P9})$

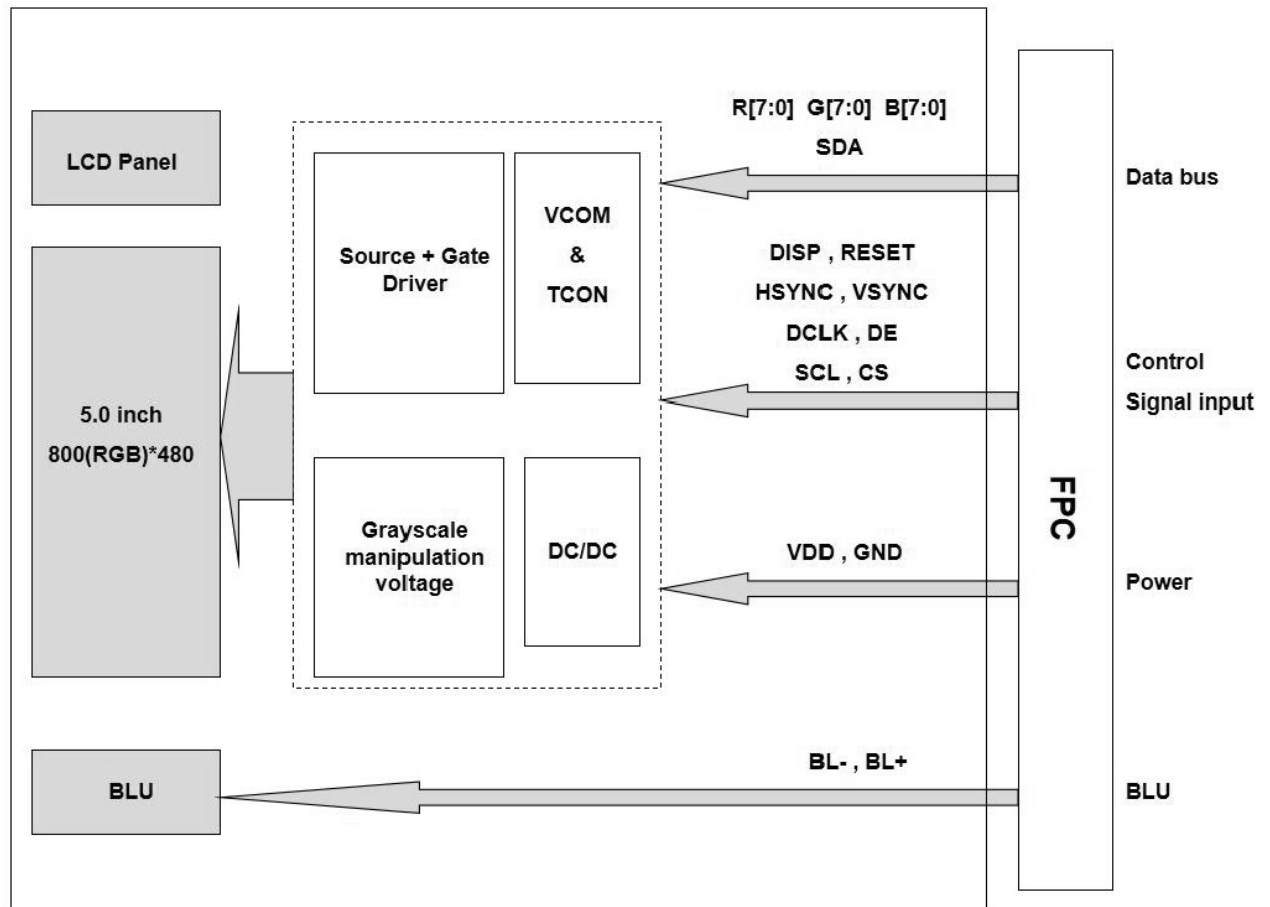
6.6.2. Uniformity = $\text{Minimal } (L_{P1}:L_{P9}) / \text{Maximal } (L_{P1}:L_{P9}) * 100\%$

6.6.3. Transmittance = $L_v \text{ on LCD} / L_v \text{ on Backlight} * 100\%$

Note : Measuring machine: BM-7



7. Block Diagram and Power Supply



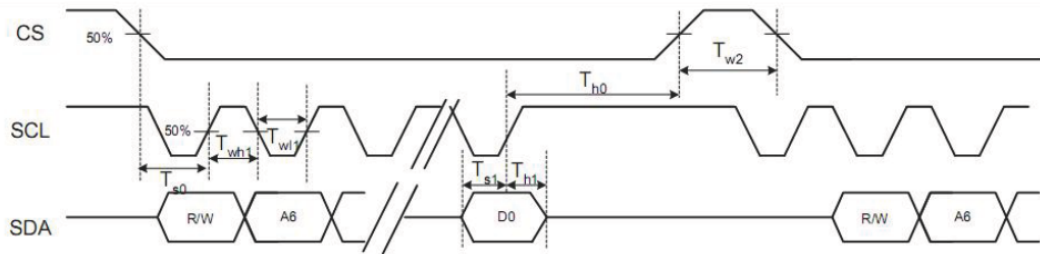
8. Interface Pins Definition

No.	Symbol	Function
1	BL-	LED Cathode
2	BL+	LED Anode
3	GND	Ground
4	VDD	Power supply
5	R0	Red data
6	R1	Red data
7	R2	Red data
8	R3	Red data
9	R4	Red data
10	R5	Red data
11	R6	Red data
12	R7	Red data
13	G0	Green data
14	G1	Green data
15	G2	Green data
16	G3	Green data
17	G4	Green data
18	G5	Green data
19	G6	Green data
20	G7	Green data
21	B0	Blue data
22	B1	Blue data
23	B2	Blue data
24	B3	Blue data
25	B4	Blue data
26	B5	Blue data
27	B6	Blue data
28	B7	Blue data
29	GND	Ground
30	DCLK	Sample clock
31	DISP	DISP sets the display mode DISP=" H" Normal display mode; DISP=" L" Standby mode
32	HSYNC	Horizontal Sync Input
33	VSYNC	Vertical Sync Input
34	DE	Data Input Enable
35	RESET	Reset pin.
36	GND	Ground
37	SCL	Serial communication clock input.
38	SDA	Serial communication data input and output.
39	CS	Serial communication chip selection.

40	OTP	OTP trim function control pin. When normal display,OTP should be set to "H" and the value in the OTP will be downloaded automatically L:Disable auto-refresh function H:Enable auto-refresh function(Default)
----	-----	---

9. AC Characteristics

9.1. System Bus Timing for 3-Wire SPI Interface

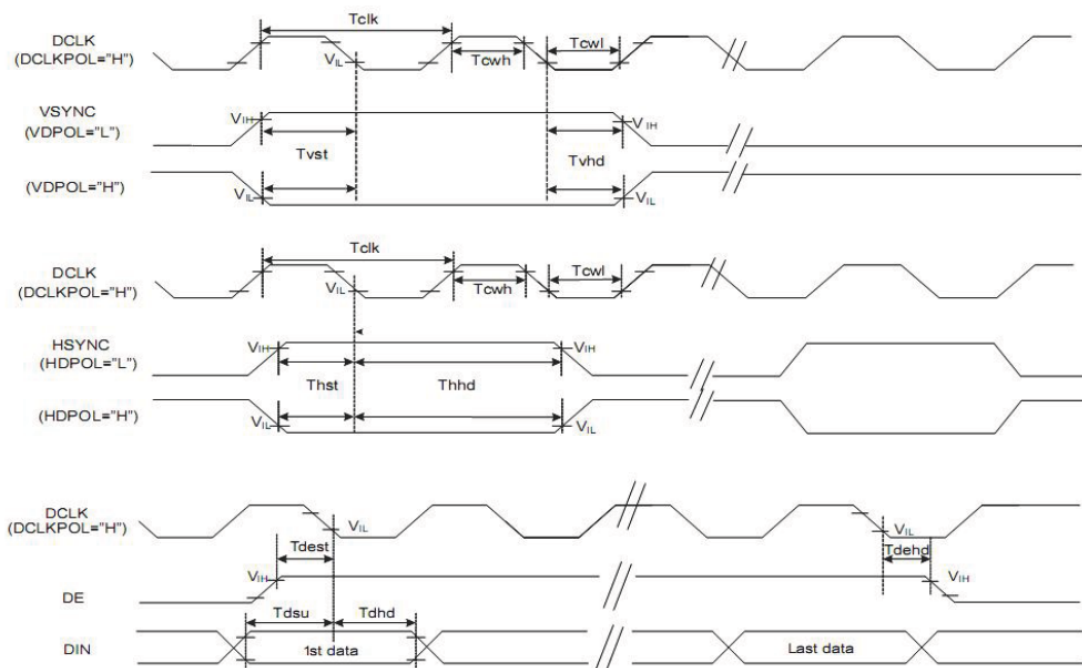


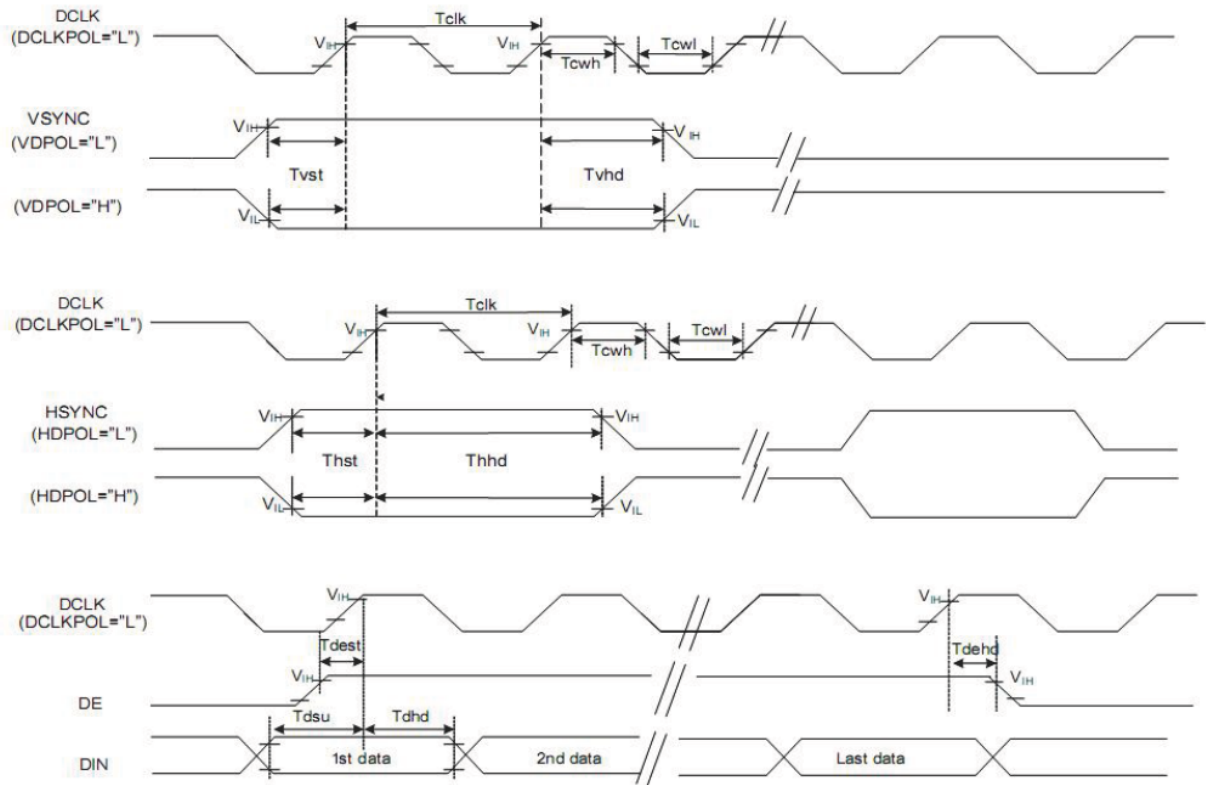
DC Electrical Characteristics (PVDD=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C, Bare Chip).

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
CS Input Setup Time	T_{s0}	50	-	-	ns	
Serial Data Input Setup Time	T_{s1}	50	-	-	ns	
CS Input Hold Time	T_{h0}	50	-	-	ns	
Serial Data Input Hold Time	T_{h1}	50	-	-	ns	
SCL Write Pulse High Width	T_{wh1}	50	-	2000	ns	
SCL Write Pulse Low Width	T_{wl1}	50	-	2000	ns	
SCL Read Pulse High Width	T_{rh1}	300	-	2000	ns	
SCL Read Pulse Low Width	T_{rl1}	300	-	2000	ns	
CS Pulse High Width	T_{w2}	400	-	-	ns	

9.2. System Bus Timing for RGB Interface

DCLK Negative Polarity (DCLKPOL="H")



DCLK Positive Polarity (DCLKPOL="L")

DC Electrical Characteristics (PVDD=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C, Bare Chip).

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLK Pulse Duty	T_{cw}	40	50	60	%	
VSYNC Setup Time	T_{vst}	10	-	-	ns	
VSYNC Hold Time	T_{vhd}	10	-	-	ns	
HSYNC Setup Time	T_{hst}	10	-	-	ns	
HSYNC Hold Time	T_{hhd}	10	-	-	ns	
Data Setup Time	T_{dsu}	10	-	-	ns	
Data Hold Time	T_{dhd}	10	-	-	ns	
DE Setup Time	T_{dest}	10	-	-	ns	
DE Hold Time	T_{dehd}	10	-	-	ns	

9.3. Parallel 24-bit RGB Input Timing Table

Parallel 24-bit RGB Input Timing (PVDD=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C)

Parallel 24-bit RGB Interface Timing Table						
Item	Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency	Fclk	23	25	27	MHz	.
HSYNC	Period Time	Th	808	816	848	DCLK
	Display Period	Thdisp	800			DCLK
	Back Porch	Thbp	4	8	24	DCLK
	Front Porch	Thfp	4	8	24	DCLK
	Pulse Width	Thw	2	4	8	DCLK
VSYNC	Period Time	Tv	496	512	528	HSYNC
	Display Period	Tvdisp	480			HSYNC
	Back Porch	Tvbp	8	16	24	HSYNC
	Front Porch	Tvfp	8	16	24	HSYNC
	Pulse Width	Tvw	2	4	8	HSYNC

Note: 1. The minimum blanking time depends on the GIP timing of the panel specification

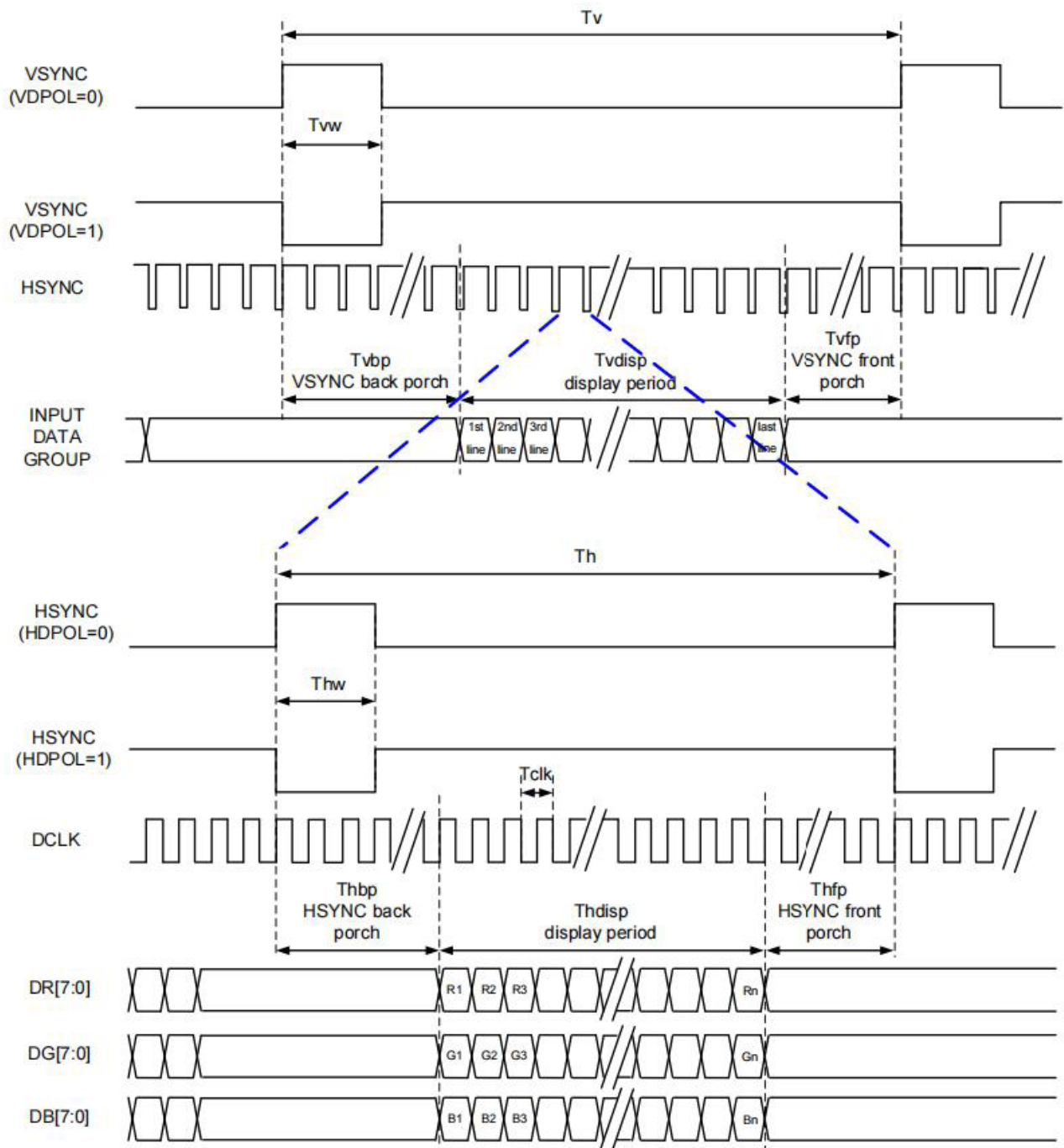
2. To ensure the compatibility of different panels, it is recommended to use the typical setting.

3. It is necessary to keep Tvbp =16 and Thbp =8 in sync mode. DE mode is unnecessary to keep it.

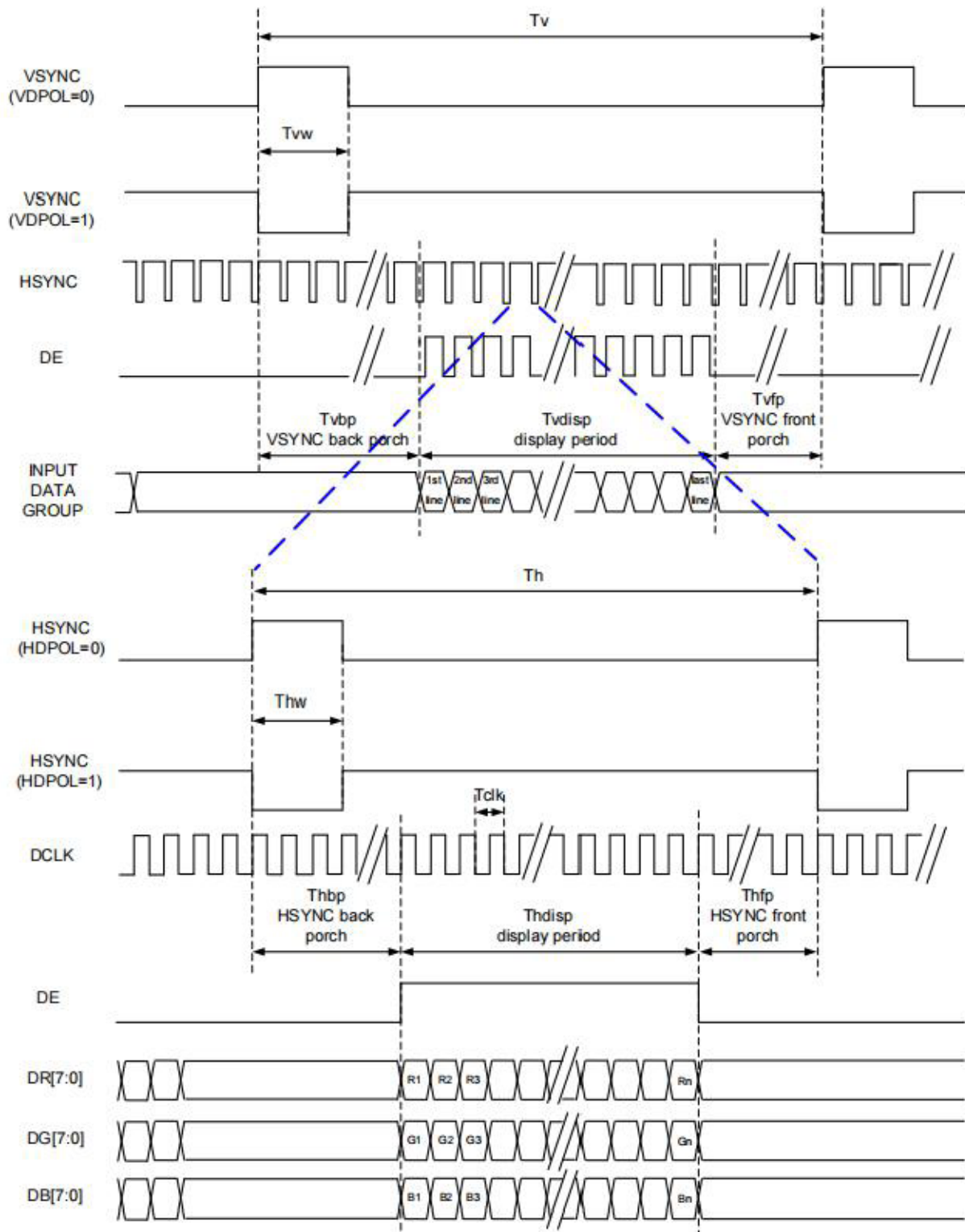
RGB Mode Selection Table	DCLK	HSYNC	VSYNC	DE
SYNC - DE Mode	Input	Input	Input	Input
SYNC Mode	Input	Input	Input	GND
DE Mode	Input	GND	GND	Input

Note: "Input" means these signals are driven by host side

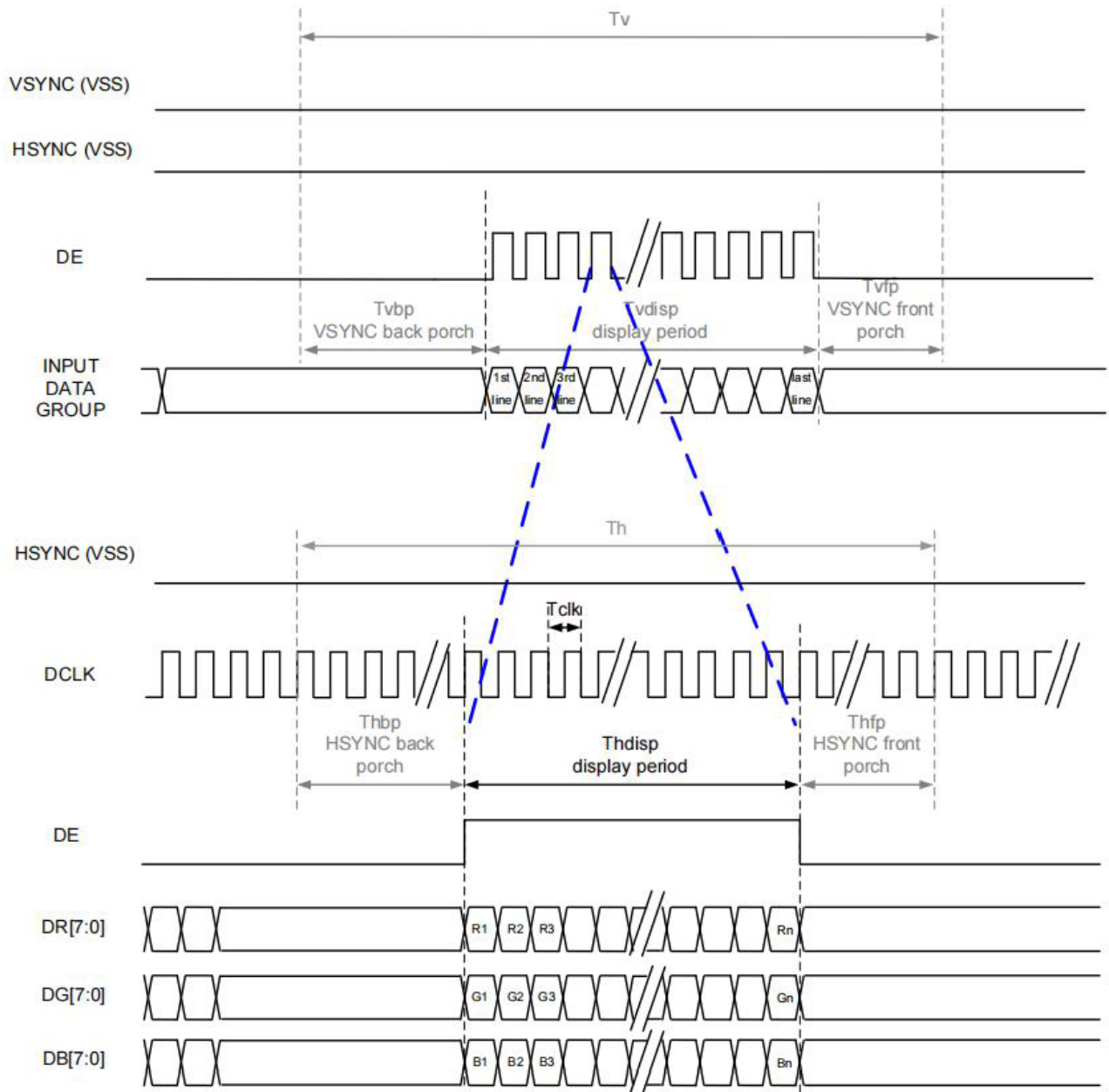
1) SYNC Mode



2) SYNC-DE Mode



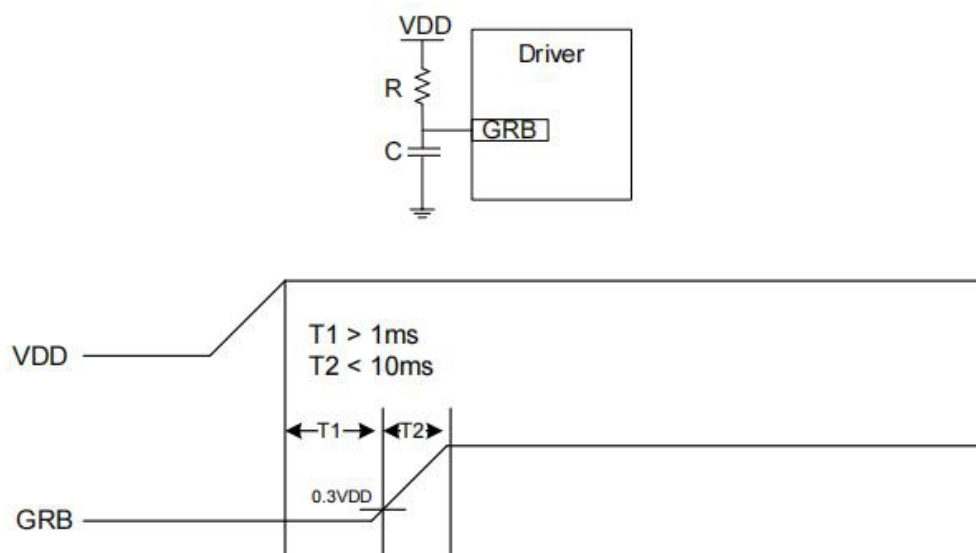
3) DE Mode



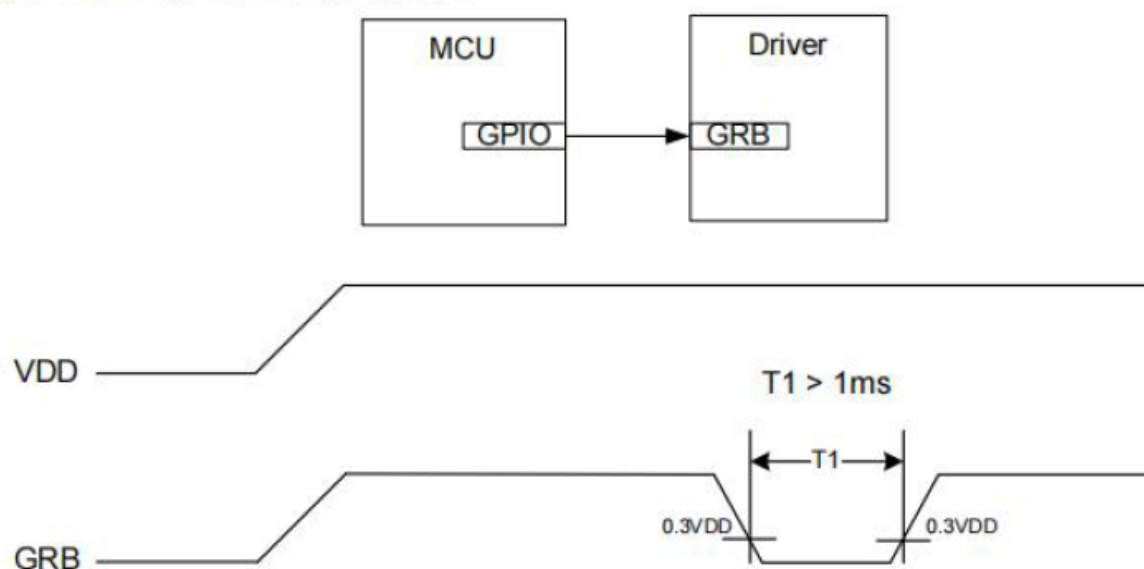
9.4. Reset timing

Setting GRB pin to "L" (hardware reset) can initialize internal function. Initialized by GRB pin is essential before operating. There are two suggestions for hardware reset connection.

(1) The GRB pin with external RC circuit.

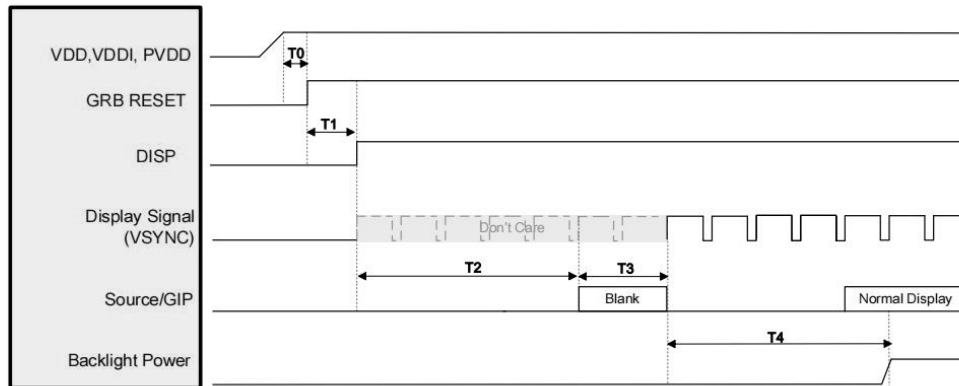


(2) The GRB pin controlled by MCU.



9.5. Power on/off Sequence

1) Power On Sequence



Symbol	Description	Time	Unit
T0	System power stability to GRB RESET signal	≥ 1	ms
T1	GRB RESET= "High" to DISP="High"	≥ 10	ms
T2	DISP="High" to Source/GIP scan blank	85	ms
T3	IC scan blanking signal	≥ 33	ms
T4	Display signal input to Backlight power on (base on Display Signal Frame Rate 60Hz)	≥ 100	ms

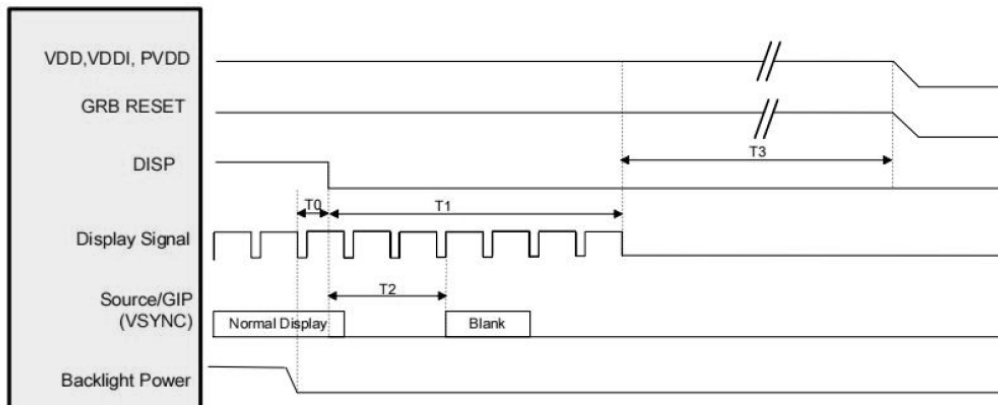
Note: 1. When DISP pull "H" or "L", IC will execute the internal power on or power off procedures. Please be careful about the timing of

DISP and do not interrupt it during power on or power off procedure, otherwise unexpected errors will occur.

2. RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0].

3. LVDS interface Display signal: DCLK P/N; RX[3:0] P/N.

2) Power Off Sequence



Symbol	Description	Time	Unit
T0	Backlight Power off to DISP="Low"	≥ 1	ms
T1	DISP="Low" to IC internal voltage discharge complete	≥ 100	ms
T2	DISP="Low" to Source/GIP scan blank (base on Display Signal Frame Rate 60Hz)	≤ 50	ms
T3	IC internal voltage discharge is completed to VDD/VDDI/PVDD off	≥ 0	ms

Note: 1. When DISP pull "H" or "L", IC will execute the internal power on or power off procedures. Please be careful about the timing of

DISP and do not interrupt it during power on or power off procedure, otherwise unexpected errors will occur.

2. RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0].

3. LVDS interface Display signal: DCLK P/N; RX[3:0] P/N.

10. Quality Assurance

10.1.Purpose

This standard for Quality Assurance assures the quality of LCD module products supplied to customer.

10.2.Standard for Quality Test

10.2.1. Sampling Plan:

GB2828.1-2012

Single sampling, general inspection level II

10.2.2. Sampling Criteria:

Visual inspection: AQL 1.5

Electrical functional: AQL 0.65.

10.2.3. Reliability Test:

Detailed requirement refer to Reliability Test Specification.

10.3.Nonconforming Analysis & Disposition

10.3.1. Nonconforming analysis:

10.3.1.1. Customer should provide overall information of non-conforming sample for their complaints.

10.3.1.2. After receipt of detailed information from customer, the analysis of nonconforming parts usually should be finished in one week.

10.3.1.3. If cannot finish the analysis on time, customer will be notified with the progress status.

10.3.2. Disposition of nonconforming:

10.3.2.1. Non-conforming product over PPM level will be replaced.

10.3.2.2. The cause of non-conformance will be analyzed. Corrective action will be discussed and implemented.

10.4.Agreement Items

Shall negotiate with customer if the following situation occurs:

10.4.1. There is any discrepancy in standard of quality assurance.

10.4.2. Additional requirement to be added in product specification.

10.4.3. Any other special problem.

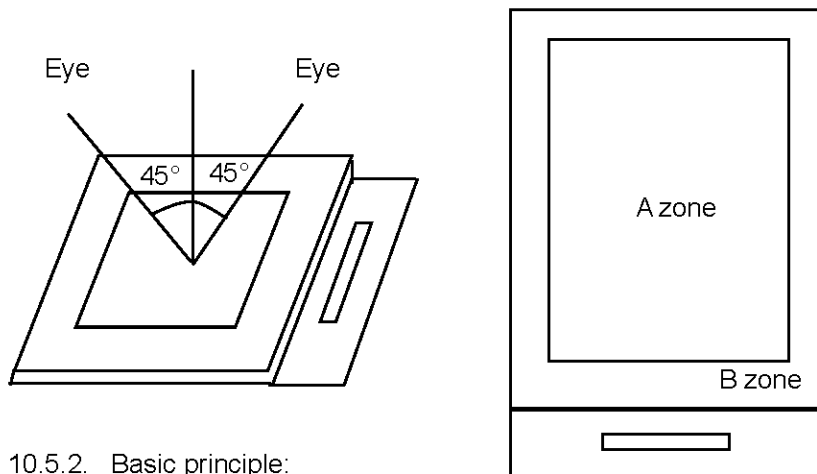
10.5.Standard of the Product Visual Inspection

10.5.1. Appearance inspection:

10.5.1.1. The inspection must be under illumination about 1000 – 1500 lx, and the distance of view must be at 30cm ± 2cm.

10.5.1.2. The viewing angle should be 45° from the vertical line without reflection light or follows customer's viewing angle specifications.

10.5.1.3. Definition of area: A Zone: Active Area, B Zone: Viewing Area,

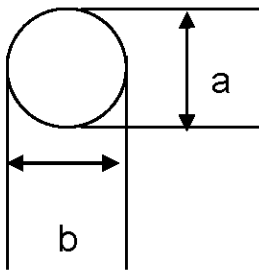


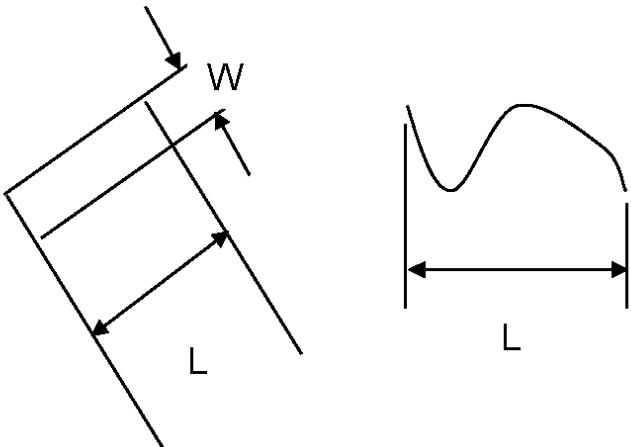
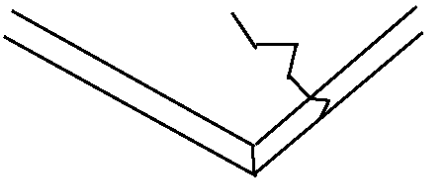
10.5.2. Basic principle:

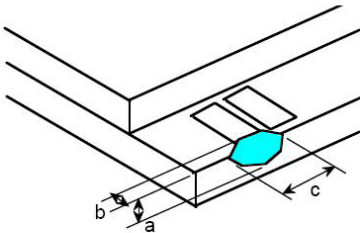
10.5.2.1. A set of sample to indicate the limit of acceptable quality level must be discussed by both us and customer when there is any dispute happened.

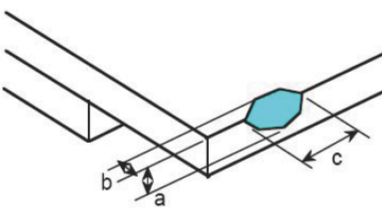
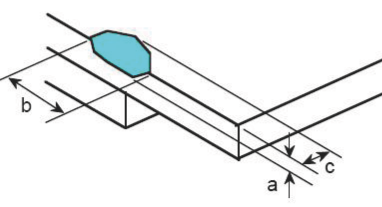
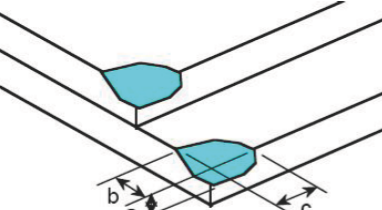
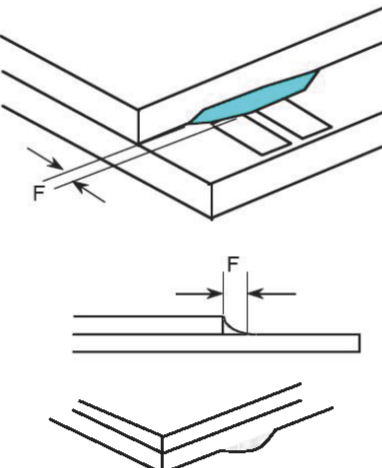
10.5.2.2. New item must be added on time when it is necessary.

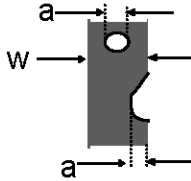
10.6. Inspection Specification

No.	Item	Criteria (Unit: mm)																		
01	Black / White spot Foreign material (Round type) Pinholes Stain Particles inside cell. (Minor defect)	 $\varphi = (a + b) / 2$	<table><tr><th>Size \ Area</th><th>Acc. Qty</th></tr><tr><td>$\varphi \leq 0.20$</td><td>Ignore</td></tr><tr><td>$0.20 < \varphi \leq 0.50$</td><td>$N \leq 3$</td></tr><tr><td>$0.50 < \varphi$</td><td>0</td></tr></table>		Size \ Area	Acc. Qty	$\varphi \leq 0.20$	Ignore	$0.20 < \varphi \leq 0.50$	$N \leq 3$	$0.50 < \varphi$	0								
			Size \ Area	Acc. Qty																
$\varphi \leq 0.20$	Ignore																			
$0.20 < \varphi \leq 0.50$	$N \leq 3$																			
$0.50 < \varphi$	0																			
		Distance between 2 defects should more than 5mm apart.																		
02	Electrical Defect (Minor defect)	<table><tr><th rowspan="2">Bright dot</th><th>Display Area</th><th>Total</th><th rowspan="4">Note1</th></tr><tr><th>$N \leq 2$</th><th>$N \leq 2$</th></tr><tr><th>Dark dot</th><th>$N \leq 4$</th><th>$N \leq 4$</th></tr><tr><th>Total dot</th><th>$N \leq 4$</th><th>$N \leq 4$</th></tr><tr><th>Mura</th><td colspan="2">Not visible through 5% ND filters.</td><th>Note 2</th></tr></table>			Bright dot	Display Area	Total	Note1	$N \leq 2$	$N \leq 2$	Dark dot	$N \leq 4$	$N \leq 4$	Total dot	$N \leq 4$	$N \leq 4$	Mura	Not visible through 5% ND filters.		Note 2
		Bright dot	Display Area	Total		Note1														
$N \leq 2$	$N \leq 2$																			
Dark dot	$N \leq 4$	$N \leq 4$																		
Total dot	$N \leq 4$	$N \leq 4$																		
Mura	Not visible through 5% ND filters.		Note 2																	
		Remark: 1. Bright dot caused by scratch and foreign object accords to item 1.																		

03	Black and White line Scratch Foreign material (Line type) (Minor defect)	 <table border="1" data-bbox="550 745 1177 1010"> <thead> <tr> <th>Length</th><th>Width</th><th>Acc. Qty</th></tr> </thead> <tbody> <tr> <td>/</td><td>$W \leq 0.1$</td><td>Ignore</td></tr> <tr> <td>$L \leq 2.5$</td><td>$0.1 < W \leq 0.2$</td><td>3</td></tr> <tr> <td>$L > 2.5$</td><td>$0.2 < W$</td><td>0</td></tr> <tr> <td colspan="2">Total</td><td>3</td></tr> </tbody> </table> Distance between 2 defects should more than 3mm apart. Scratches not viewable through the back of the display are acceptable.	Length	Width	Acc. Qty	/	$W \leq 0.1$	Ignore	$L \leq 2.5$	$0.1 < W \leq 0.2$	3	$L > 2.5$	$0.2 < W$	0	Total		3
Length	Width	Acc. Qty															
/	$W \leq 0.1$	Ignore															
$L \leq 2.5$	$0.1 < W \leq 0.2$	3															
$L > 2.5$	$0.2 < W$	0															
Total		3															
04	Glass Crack (Minor defect)	 Crack is potential to enlarge, any type is not allowed.															

05	Glass Chipping Pad Area: (Minor defect)		<table><tr><th>Length and Width</th><th>Acc. Qty</th></tr><tr><td>$c > 3.0, b < 1.0$</td><td>1</td></tr><tr><td>$c < 3.0, b < 1.0$</td><td>3</td></tr><tr><td colspan="2">$a < \text{Glass Thickness}$</td></tr></table>	Length and Width	Acc. Qty	$c > 3.0, b < 1.0$	1	$c < 3.0, b < 1.0$	3	$a < \text{Glass Thickness}$	
	Length and Width	Acc. Qty									
$c > 3.0, b < 1.0$	1										
$c < 3.0, b < 1.0$	3										
$a < \text{Glass Thickness}$											

06	Glass Chipping Rear of Pad Area: (Minor defect) 	<table><tr><th>Length and Width</th><th>Acc. Qty</th></tr><tr><td>$c > 3.0, b < 1.0$</td><td>1</td></tr><tr><td>$c < 3.0, b < 1.0$</td><td>2</td></tr><tr><td>$c < 3.0, b < 0.5$</td><td>4</td></tr><tr><td colspan="2">$a < \text{Glass Thickness}$</td></tr></table>	Length and Width	Acc. Qty	$c > 3.0, b < 1.0$	1	$c < 3.0, b < 1.0$	2	$c < 3.0, b < 0.5$	4	$a < \text{Glass Thickness}$	
Length and Width	Acc. Qty											
$c > 3.0, b < 1.0$	1											
$c < 3.0, b < 1.0$	2											
$c < 3.0, b < 0.5$	4											
$a < \text{Glass Thickness}$												
07	Glass Chipping Except Pad Area: (Minor defect) 	<table><tr><th>Length and Width</th><th>Acc. Qty</th></tr><tr><td>$c > 3.0, b < 1.0$</td><td>1</td></tr><tr><td>$c < 3.0, b < 1.0$</td><td>2</td></tr><tr><td>$c < 3.0, b < 0.5$</td><td>4</td></tr><tr><td colspan="2">$a < \text{Glass Thickness}$</td></tr></table>	Length and Width	Acc. Qty	$c > 3.0, b < 1.0$	1	$c < 3.0, b < 1.0$	2	$c < 3.0, b < 0.5$	4	$a < \text{Glass Thickness}$	
Length and Width	Acc. Qty											
$c > 3.0, b < 1.0$	1											
$c < 3.0, b < 1.0$	2											
$c < 3.0, b < 0.5$	4											
$a < \text{Glass Thickness}$												
08	Glass Corner Chipping: (Minor defect) 	<table><tr><th>Length and Width</th><th>Acc. Qty</th></tr><tr><td>$c < 3.0, b < 3.0$</td><td>Ignore</td></tr><tr><td colspan="2">$a < \text{Glass Thickness}$</td></tr></table>	Length and Width	Acc. Qty	$c < 3.0, b < 3.0$	Ignore	$a < \text{Glass Thickness}$					
Length and Width	Acc. Qty											
$c < 3.0, b < 3.0$	Ignore											
$a < \text{Glass Thickness}$												
09	Glass Burr: (Minor defect) 	<table><tr><th>Length</th><th>Acc. Qty</th></tr><tr><td>$F < 1.0$</td><td>Ignore</td></tr></table> Glass burr don't affect assemble and module dimension.	Length	Acc. Qty	$F < 1.0$	Ignore						
Length	Acc. Qty											
$F < 1.0$	Ignore											

10	FPC Defect: (Minor defect) 	10.1 Dent, pinhole width $a < w/3$. (w: circuitry width.) 10.2 Open circuit is unacceptable. 10.3 No oxidation, contamination and distortion.								
11	Bubble on Polarizer (Minor defect)	<table><tr><th>Diameter</th><th>Acc. Qty</th></tr><tr><td>$\varphi \leq 0.30$</td><td>Ignore</td></tr><tr><td>$0.30 < \varphi \leq 0.50$</td><td>$N \leq 2$</td></tr><tr><td>$0.50 < \varphi$</td><td>$N = 0$</td></tr></table>	Diameter	Acc. Qty	$\varphi \leq 0.30$	Ignore	$0.30 < \varphi \leq 0.50$	$N \leq 2$	$0.50 < \varphi$	$N = 0$
Diameter	Acc. Qty									
$\varphi \leq 0.30$	Ignore									
$0.30 < \varphi \leq 0.50$	$N \leq 2$									
$0.50 < \varphi$	$N = 0$									
12	Dent on Polarizer (Minor defect)	<table><tr><th>Diameter</th><th>Acc. Qty</th></tr><tr><td>$\varphi \leq 0.25$</td><td>Ignore</td></tr><tr><td>$0.25 < \varphi \leq 0.50$</td><td>$N \leq 4$</td></tr><tr><td>$0.50 < \varphi$</td><td>None</td></tr></table>	Diameter	Acc. Qty	$\varphi \leq 0.25$	Ignore	$0.25 < \varphi \leq 0.50$	$N \leq 4$	$0.50 < \varphi$	None
Diameter	Acc. Qty									
$\varphi \leq 0.25$	Ignore									
$0.25 < \varphi \leq 0.50$	$N \leq 4$									
$0.50 < \varphi$	None									
13	Bezel	13.1 No rust, distortion on the Bezel. 13.2 No visible fingerprints, stains or other contamination.								
14	PCB	14.1 No distortion or contamination on PCB terminals. 14.2 All components on PCB must same as documented on the BOM/component layout. 14.3 Follow IPC-A-600F.								
15	Soldering	Follow IPC-A-610C standard								
16	Electrical Defect (Major defect)	The below defects must be rejected. 16.1 Missing vertical / horizontal segment, 16.2 Abnormal Display. 16.3 No function or no display. 16.4 Current exceeds product specifications. 16.5 LCD viewing angle defect. 16.6 No Backlight. 16.7 Dark Backlight. 16.8 Touch Panel no function.								

Remark: LCD Panel Broken shall be rejected. Defect out of LCD viewing area is acceptable.

10.7. Classification of Defects

- 10.7.1. Visual defects (Except no / wrong label) are treated as minor defect and electrical defect is major.
- 10.7.2. Two minor defects are equal to one major in lot sampling inspection.

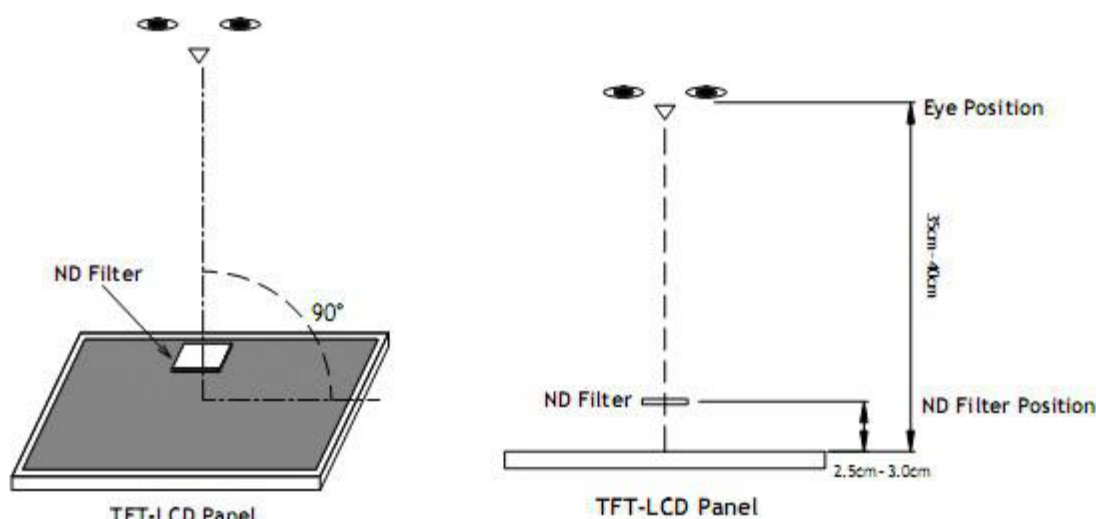
10.8. Identification/marketing criteria

Any unit with illegible / wrong /double or no marking/ label shall be rejected.

10.9. Packing

- 10.9.1. There should be no damage of the outside carton box, each packaging box should have one identical label.
- 10.9.2. Modules inside package box should have compliant mark.
- 10.9.3. All direct package materials shall offer ESD protection.

Note1: Bright dot is defined as the defective area of the dot is larger than 50% of one sub-pixel area.



Bright dot: The bright dot size defect at black display pattern. It can be recognized by 2% transparency of filter when the distance between eyes and panel is $350\text{mm} \pm 50\text{mm}$.

Dark dot: Cyan, Magenta or Yellow dot size defect at white display pattern. It can be recognized by 5% transparency of filter when the distance between eyes and panel is $350\text{mm} \pm 50\text{mm}$.

Note2: Mura on display which appears darker / brighter against background brightness on parts of display area

11. Reliability Specification

No	Item	Condition	Quantity	Criteria
1	High Temperature Operating	70°C, 96Hrs	2	GB/T2423.2-2008
2	Low Temperature Operating	-20°C, 96Hrs	2	GB/T2423.1-2008
3	High Humidity Storage	50°C, 90%RH, 96Hrs	2	GB/T2423.3-2016
4	High Temperature Storage	80°C, 96Hrs	2	GB/T2423.2-2008
5	Low Temperature Storage	-30°C, 96Hrs	2	GB/T2423.1-2008
6	Thermal Cycling Test Storage	-20°C, 60min~70°C, 60min, 20 cycles.	2	GB/T2423.22-2012
7	Packing vibration	Frequency range:10Hz~50Hz Acceleration of gravity:5G X, Y, Z 30 min for each direction.	-	GB/T5170.14-2009
8	Electrical Static Discharge	Air:±4KV 150pF/330 Ω 5 times Contact:±2KV 150pF/330 Ω 5 times	2	GB/T17626.2-2018
9	Drop Test (Packaged)	Height:80 cm,1 corner, 3 edges, 6 surfaces.	-	GB/T2423.8-1995

Note1. No defection cosmetic and operational function allowable.

Note2. Total current Consumption should be below double of initial value

12. Precautions and Warranty

12.1.Safety

- 12.1.1. The liquid crystal in the LCD is poisonous. Do not put it in your mouth. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water.
- 12.1.2. Since the liquid crystal cells are made of glass, do not apply strong impact on them. Handle with care.

12.2.Handling

- 12.2.1. Reverse and use within ratings in order to keep performance and prevent damage.
- 12.2.2. Do not wipe the polarizer with dry cloth, as it might cause scratch. If the surface of the LCD needs to be cleaned, wipe it swiftly with cotton or other soft cloth soaked with petroleum IPA, do not use other chemicals.

12.3.Storage

- 12.3.1. Do not store the LCD module beyond the specified temperature ranges.
- 12.3.2. Strong light exposure causes degradation of polarizer and color filter.

12.4.Metal Pin (Apply to Products with Metal Pins)

12.4.1. Pins of LCD and Backlight

- 12.4.1.1. Solder tip can touch and press on the tip of Pin LEAD during the soldering

12.4.1.2. Recommended Soldering Conditions

Solder Type: Sn96.3~94-Ag3.3~4.3-Cu0.4~1.1

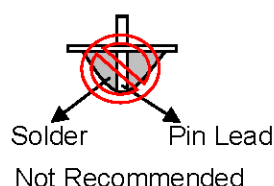
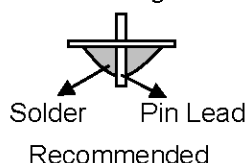
Maximum Solder Temperature: 370°C

Maximum Solder Time: 3s at the maximum temperature

Recommended Soldering Temp: 350±20°C

Typical Soldering Time: ≤3s

12.4.1.3. Solder Wetting



12.4.2. Pins of EL

- 12.4.2.1. Solder tip can touch and press on the tip of EL leads during soldering.

- 12.4.2.2. No Solder Paste on the soldering pad on the motherboard is recommended.

12.4.2.3. Recommended Soldering Conditions

Solder type: Nippon Alimit Leadfree SR-34, size 0.5mm

Recommended Solder Temperature: 270~290°C

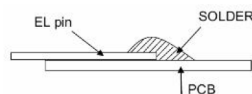
Typical Soldering Time: ≤2s

Minimum solder distance from EL lamp (body):2.0mm

- 12.4.2.4. No horizontal press on the EL leads during soldering.

- 12.4.2.5. 180° bend EL leads three times is not allowed.

12.4.2.6. Solder Wetting

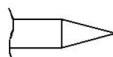


Recommended

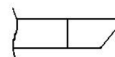


Not Recommended

12.4.2.7. The type of the solder iron:



Recommended



Not Recommended

12.4.2.8. Solder Pad



12.5. Operation

- 12.5.1. Do not drive LCD with DC voltage
- 12.5.2. Response time will increase below lower temperature
- 12.5.3. Display may change color with different temperature
- 12.5.4. Mechanical disturbance during operation, such as pressing on the display area, may cause the segments to appear "fractured".
- 12.5.5. Do not connect or disconnect the LCM to or from the system when power is on.
- 12.5.6. Never use the LCM under abnormal condition of high temperature and high humidity.
- 12.5.7. Module has high frequency circuits. Sufficient suppression to the electromagnetic interface shall be done by system manufacturers. Grounding and shielding methods may be important to minimize the interference.
- 12.5.8. *Do not display the fixed pattern for long time (we suggest the time not longer than one hour) because it will develop image sticking due to the TFT structure.*

12.6. Static Electricity

- 12.6.1. CMOS LSIs are equipped in this unit, so care must be taken to avoid the electro-static charge, by ground human body, etc.
- 12.6.2. The normal static prevention measures should be observed for work clothes and benches.
- 12.6.3. The module should be kept into anti-static bags or other containers resistant to static for storage.

12.7. Limited Warranty

- 12.7.1. Our warranty liability is limited to repair and/or replacement. We will not be responsible for any consequential loss.
- 12.7.2. If possible, we suggest customer to use up all modules in six months. If the module storage time over twelve months, we suggest that recheck it before the module be used.
- 12.7.3. After the product shipped, any product quality issues must be feedback within three months, otherwise, we will not be responsible for the subsequent or consequential events.

13. Packaging

TBD