

Display Elektronik GmbH

DATA SHEET

TFT- MODULE

DEM 640480G VRH

3,5" refl. TFT

Product Specification

Ver.: 2

02.02.2024

Revision History

Revision	Date	Originator	Detail	Remarks
0	19.12.2023	LQ	Initial Release	
1	21.12.2023	LQ	Modifty PIN Definition Modifty Outline Drawing(B)	P11 P28
2	02.02.2024	LQ	Add Weight Add Current Consumption	P4 P5

Table of Contents

No.	Item	Page
1.	General Description	4
2.	Module Parameter	4
3.	Absolute Maximum Ratings	4
4.	DC Characteristics	5
5.	Optical Characteristics	6
5.1.	Optical Characteristics	6
5.2.	Definition of Response Time	6
5.3.	Definition of Contrast Ratio	7
5.4.	Definition of Viewing Angles	7
5.5.	Definition of Color Appearance	7
5.6.	Definition of Surface Luminance, Uniformity and Transmittance	8
6.	Block Diagram and Power Supply	9
7.	Interface Pins Definition	10
8.	AC Characteristics	12
8.1.	System Bus Timing for 3-wire SPI Interface	12
8.2.	System Bus Timing for RGB Interface	12
8.3.	Parallel 24-bit RGB Input Timing Table	14
8.4.	Reset Timing	17
9.	Quality Assurance	18
9.1.	Purpose	18
9.2.	Standard for Quality Test	18
9.3.	Nonconforming Analysis & Disposition	18
9.4.	Agreement Items	18
9.5.	Standard of the Product Visual Inspection	18
9.6.	Inspection Specification	19
9.7.	Classification of Defects	23
9.8.	Identification/marketing criteria	23
9.9.	Packing	23
10.	Reliability Specification	24
11.	Precautions and Warranty	25
11.1.	Safety	25
11.2.	Handling	25
11.3.	Storage	25
11.4.	Metal Pin (Apply to Products with Metal Pins)	25
11.5.	Operation	26
11.6.	Static Electricity	26
11.7.	Limited Warranty	26
12.	Outline Drawing	27

1. General Description

The specification is a reflective 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.

2. Module Parameter

Features	Details	Unit
Display Size(Diagonal)	3.5"	
Display Mode	Reflective /Normally white	
Resolution	640 RGB x 480	Pixels
Module Outline	74.04(H) x 58.50(V) x 0.85(T) (Note1)	mm
Active Area	71.04(H) x 53.28(V)	mm
Pixel Pitch	111(H) x 111(V)	um
Pixel Arrangement	RGB Vertical Stripe	
Polarizer Surface Treatment	Anti-Glare	
Display Colors	16.7M	
Interface	RGB interface	
Driver IC	ST7263	-
With or Without Touch Panel	Without	
Operating Temperature	-20~70	°C
Storage Temperature	-30~80	°C
Weight	~ 8	g

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

3. Absolute Maximum Ratings

$V_{SS}=0V, T_a=25^{\circ}C$

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

Note 1: If T_a below $50^{\circ}C$, the maximal humidity is 90%RH, if T_a over $50^{\circ}C$, absolute humidity should be less than 60%RH.

Note 2: The response time will be extremely slow when the operating temperature is around $-10^{\circ}C$, 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
	VDDI	3.1	3.3	3.6	V
Low input voltage	V _{IL}	GND	-	0.3*VDDI	V
High input voltage	V _{IH}	0.7*VDDI	-	VDDI	V
Low output voltage	V _{OL}	GND	-	GND+0.4	V
High output voltage	V _{OH}	VDD-0.4	-	VDDI	V
Current Consumption All black	I _{DD} + I _{DDI}	-	67	-	mA

5. Optical Characteristics

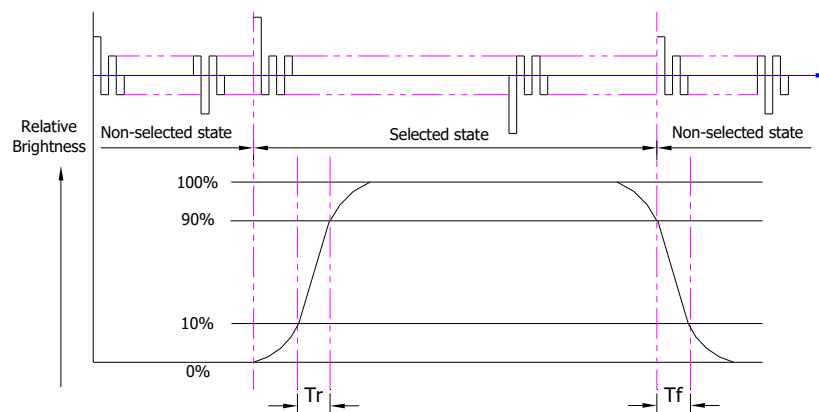
5.1. Optical Characteristics

Ta=25°C, VDD=3.3V

	Item	Symbol	Condition	Specification			Unit	
				Min.	Typ.	Max.		
Backlight On (Transmissive Mode)	Luminance on TFT	Lv	Normally viewing angle $\theta_x = \phi_y = 0^\circ$	-	-	-	cd/m ²	
	Contrast ratio(See 5.3)	CR		-	15	-		
	Response time (See 5.2)	Tr Tf		-	5	7	ms	
	Chromaticity Transmissive (See 5.5)	Red	Xr	Center CR≥10	-	-	-	
			Yr		-	-	-	
		Green	Xg		-	-	-	
			Yg		-	-	-	
		Blue	Xb		-	-	-	
			Yb		-	-	-	
	White	Xw	-	-	-			
		Yw	-	-	-			
	Viewing Angle (See 5.4)	Horizontal	θ_{x+}	Center CR≥10	-	60	-	Deg.
			θ_{x-}		-	60	-	
Vertical		ϕ_{y+}	-		60	-		
		ϕ_{y-}	-		60	-		
NTSC Ratio(Gamut)				-	7	-	%	

5.2. Definition of Response Time

5.2.1. Normally Black Type (Negative)

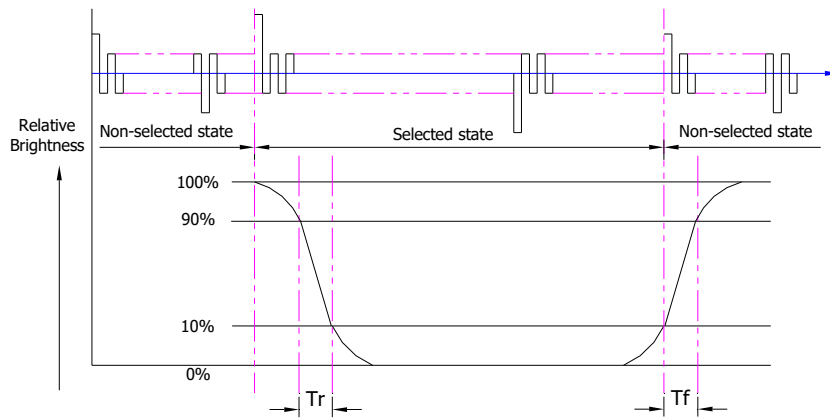


Tr is the time it takes to change from non-selected stage with relative luminance 10% to selected state with relative luminance 90%;

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

5.2.2. Normally White Type (Positive)



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

Tf 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

5.3. Definition of Contrast Ratio

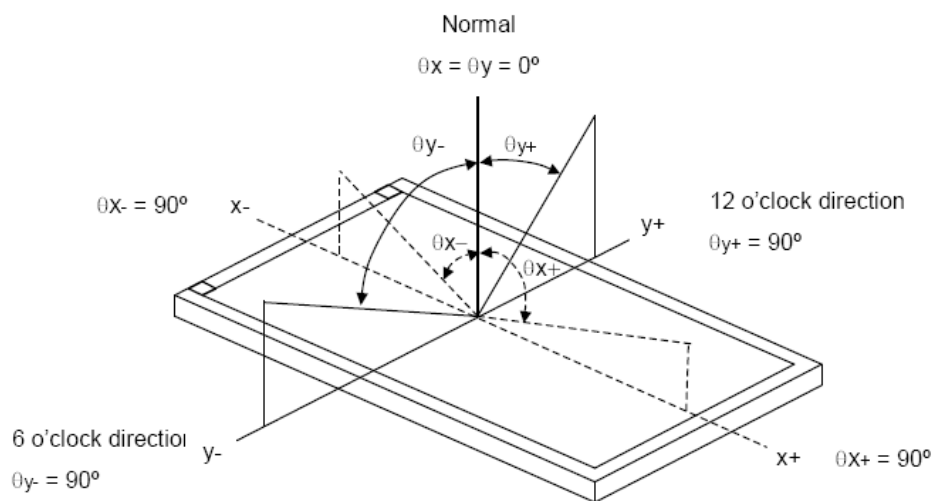
Contrast is measured perpendicular to display surface in reflective and transmissive mode.

The measurement condition is:

Measuring Equipment	Eldim or Euvelent
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

5.4. Definition of Viewing Angles



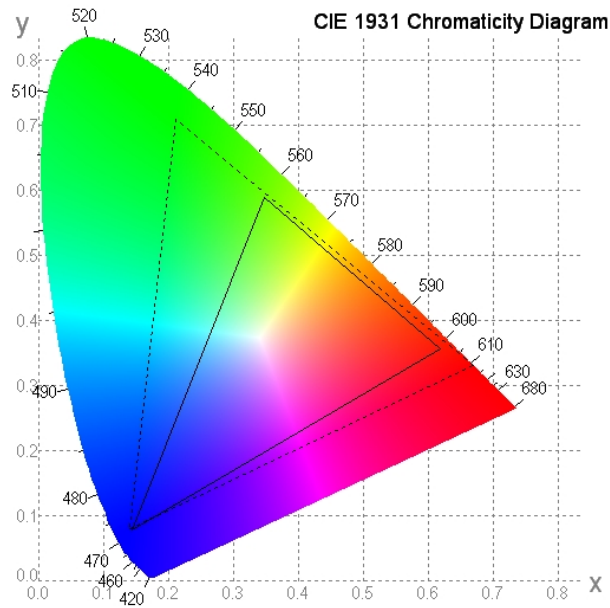
Measuring machine: LCD-5100 or EQUI

5.5. 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)



5.6. Definition of Surface Luminance, Uniformity and Transmittance

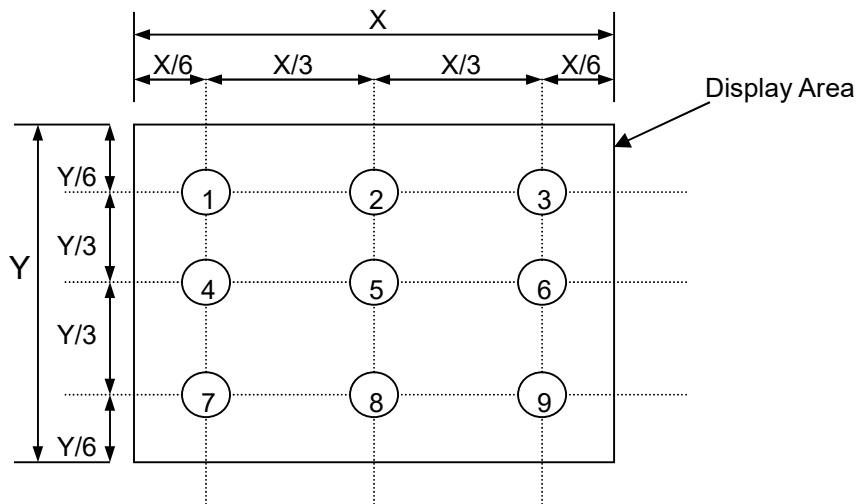
Using the transmissive mode measurement approach, measure the white screen luminance of the display panel and backlight.

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

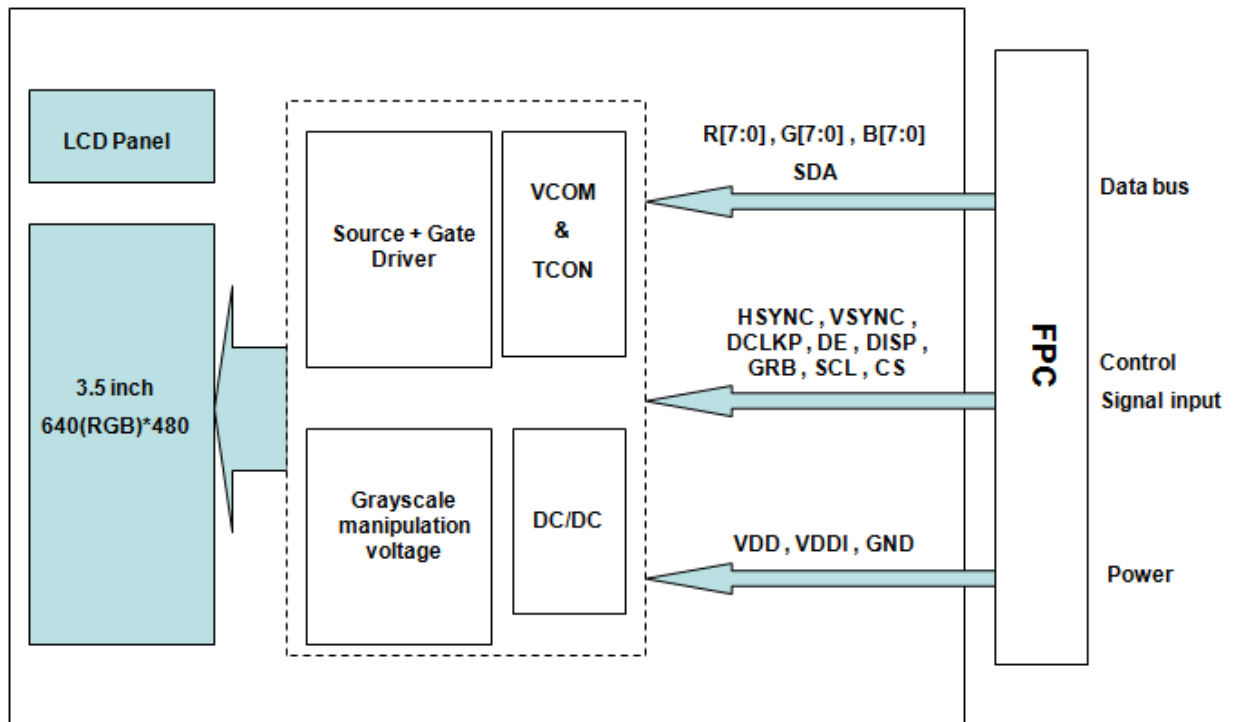
5.6.2. Uniformity = $\text{Minimal } (L_{P1}:L_{P9}) / \text{Maximal } (L_{P1}:L_{P9}) * 100\%$

5.6.3. Transmittance = $L_V \text{ on LCD} / L_V \text{ on Backlight} * 100\%$

Note : Measuring machine: BM-7



6. Block Diagram and Power Supply



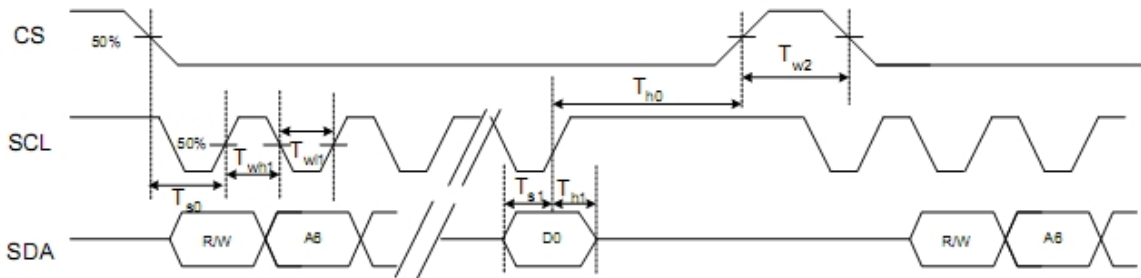
7. Interface Pins Definition

No.	Symbol	Function	Remark
1	GND	Ground	
2	GND	Ground	
3	VDD	Power supply for analog circuit.	
4	VDDI	Power supply for digital I/O pins.	
5	R7	8 bit data bus display red data.	
6	R6		
7	R5		
8	R4		
9	R3		
10	R2		
11	R1		
12	R0		
13	G7	8 bit data bus display green data.	
14	G6		
15	G5		
16	G4		
17	G3		
18	G2		
19	G1		
20	G0		
21	B7	8 bit data bus display blue data.	
22	B6		
23	B5		
24	B4		
25	B3		
26	B2		
27	B1		
28	B0		
29	GND	Ground	
30	DCLKP	Pixel clock input pin	
31	GRB	Global reset pin. When GRB is "L", internal initialization procedure is executed	
32	HSYNC	Horizontal sync signal applied to the RGB interface	
33	VSYNC	Vertical sync signal applied to the RGB interface.	
34	DE	Data input enable applied to the RGB interface.	
35	NC	No connection	
36	NC	No connection	
37	NC	No connection	
38	DISP	DISP sets the display mode. "L": Standby mode(Default) ; "H": Normal display mode	
39	NC	No connection	

40	NC	No connection	
41	NC	No connection	
42	GND	Ground	
43	SCL	Serial communication clock input.	
44	SDA	Serial communication data input and output	
45	CS	Serial communication chip selection.	
46	GND	Ground	
47	NC	No connection	
48	NC	No connection	
49	NC(LED A)	No connection	
50	NC(LED K)	No connection	

8. AC Characteristics

8.1. System Bus Timing for 3-wire SPI Interface



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

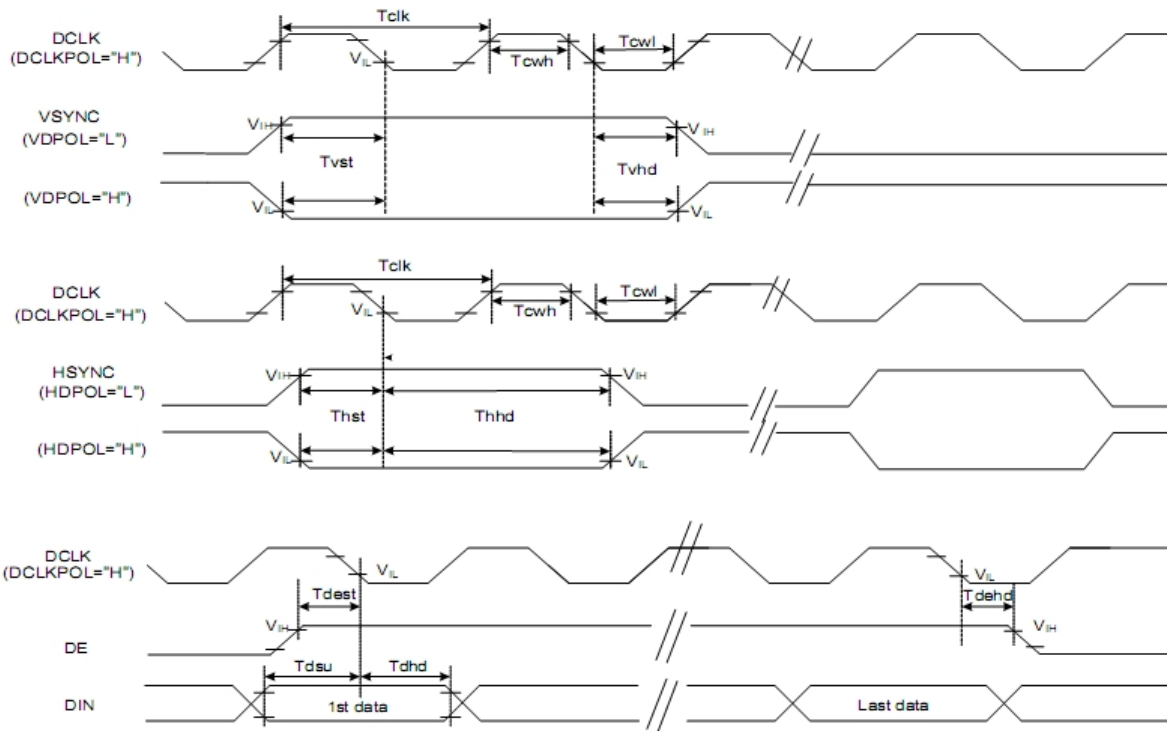
Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
CS Input Setup Time	T_{so}	50	-	-	ns	
Serial Data Input Setup Time	T_{s1}	50	-	-	ns	
CS Input Hold Time	T_{h0}	50	-	-	ns	
Serial Data Input Hold Time	T_{h1}	50	-	-	ns	
SCL Write Pulse High Width	T_{wh1}	50	-	2000	ns	
SCL Write Pulse Low Width	T_{wl1}	50	-	2000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

8.2. System Bus Timing for RGB Interface

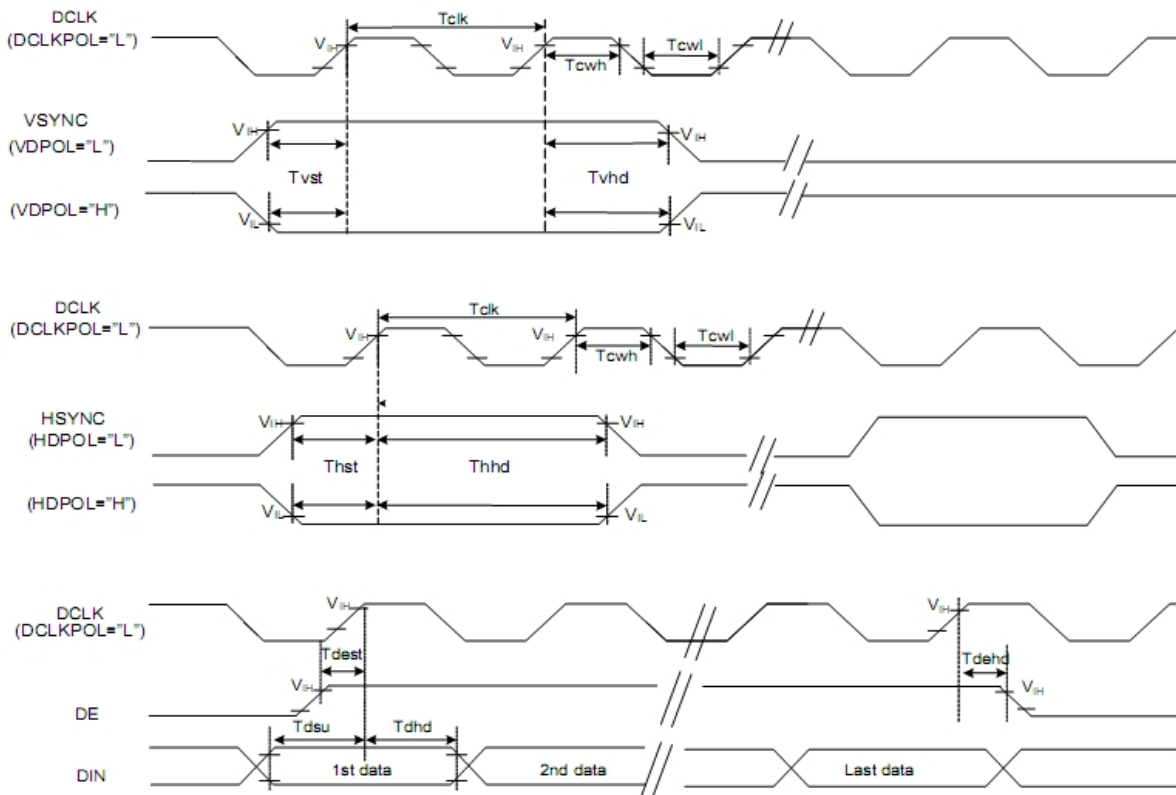
DC Electrical Characteristics (PVDD=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C, Bare Chip)

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	

DCLK Neagive Polarity (DCLKPOL="H")



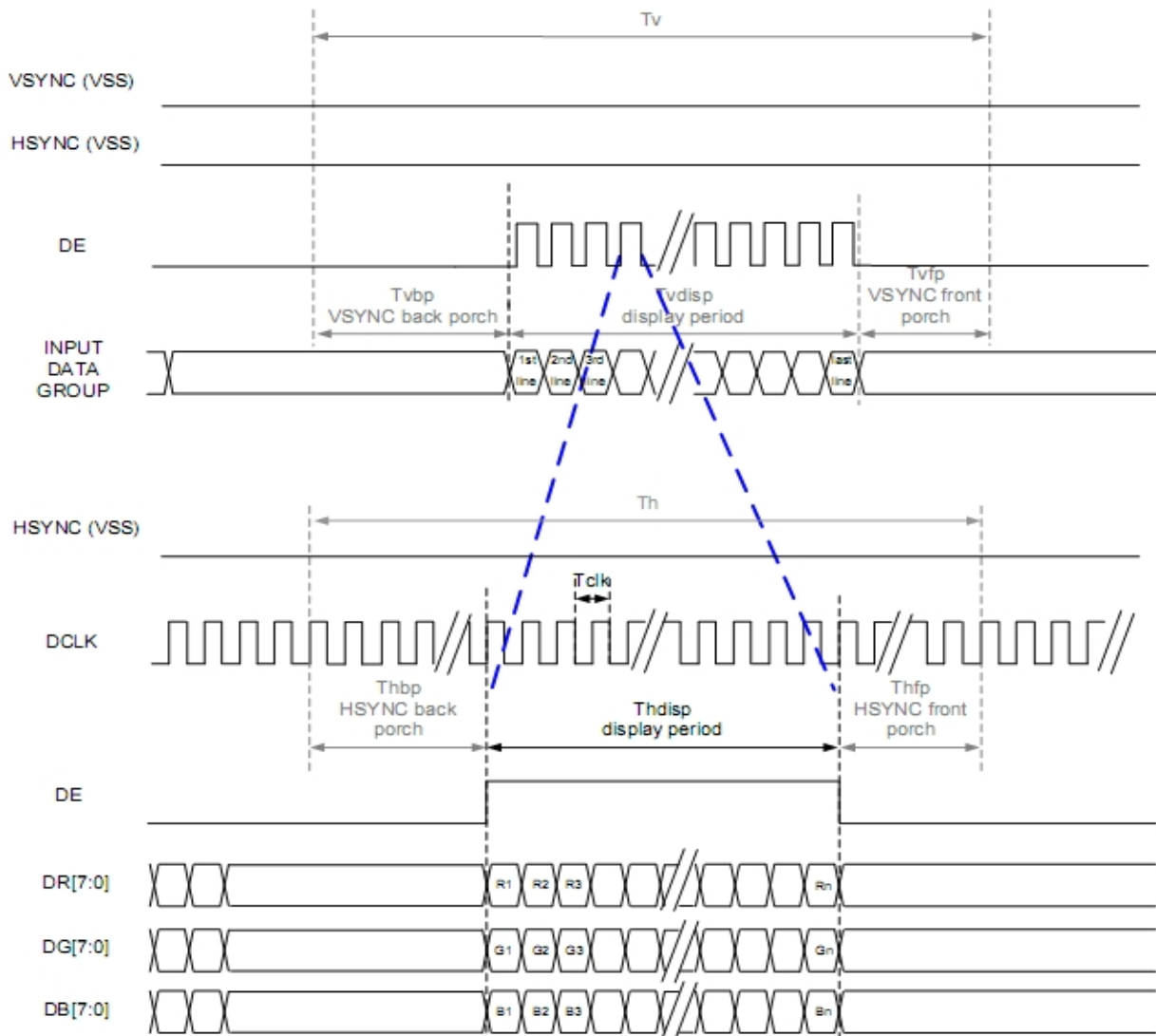
DCLK Positive Polarity (DCLKPOL="L")



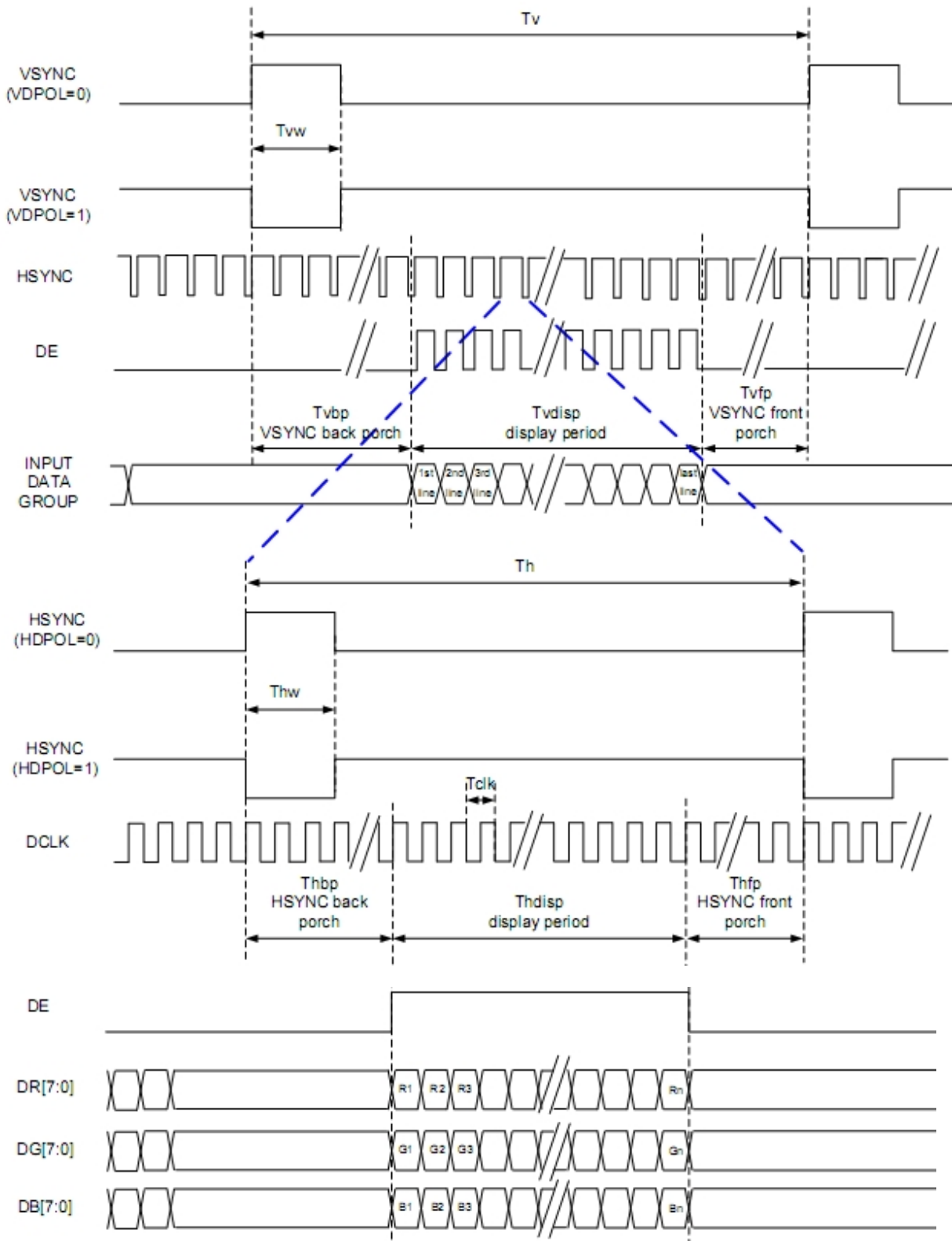
8.3. Parallel 24-bit RGB Input Timing Table

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency	Fclk	20	25	30	MHz	.
HSYNC	Period Time	Th	648	768	800	DCLK
	Display Period	Thdisp	640			DCLK
	Back Porch	Thbp	4	64	80	DCLK
	Front Porch	Thfp	4	64	80	DCLK
	Pulse Width	Thw	2	4	8	DCLK
VSYNC	Period Time	Tv	496	544	560	HSYNC
	Display Period	Tvdisp	480			HSYNC
	Back Porch	Tvbp	8	32	40	HSYNC
	Front Porch	Tvfp	8	32	40	HSYNC
	Pulse Width	Tvw	2	4	8	HSYNC

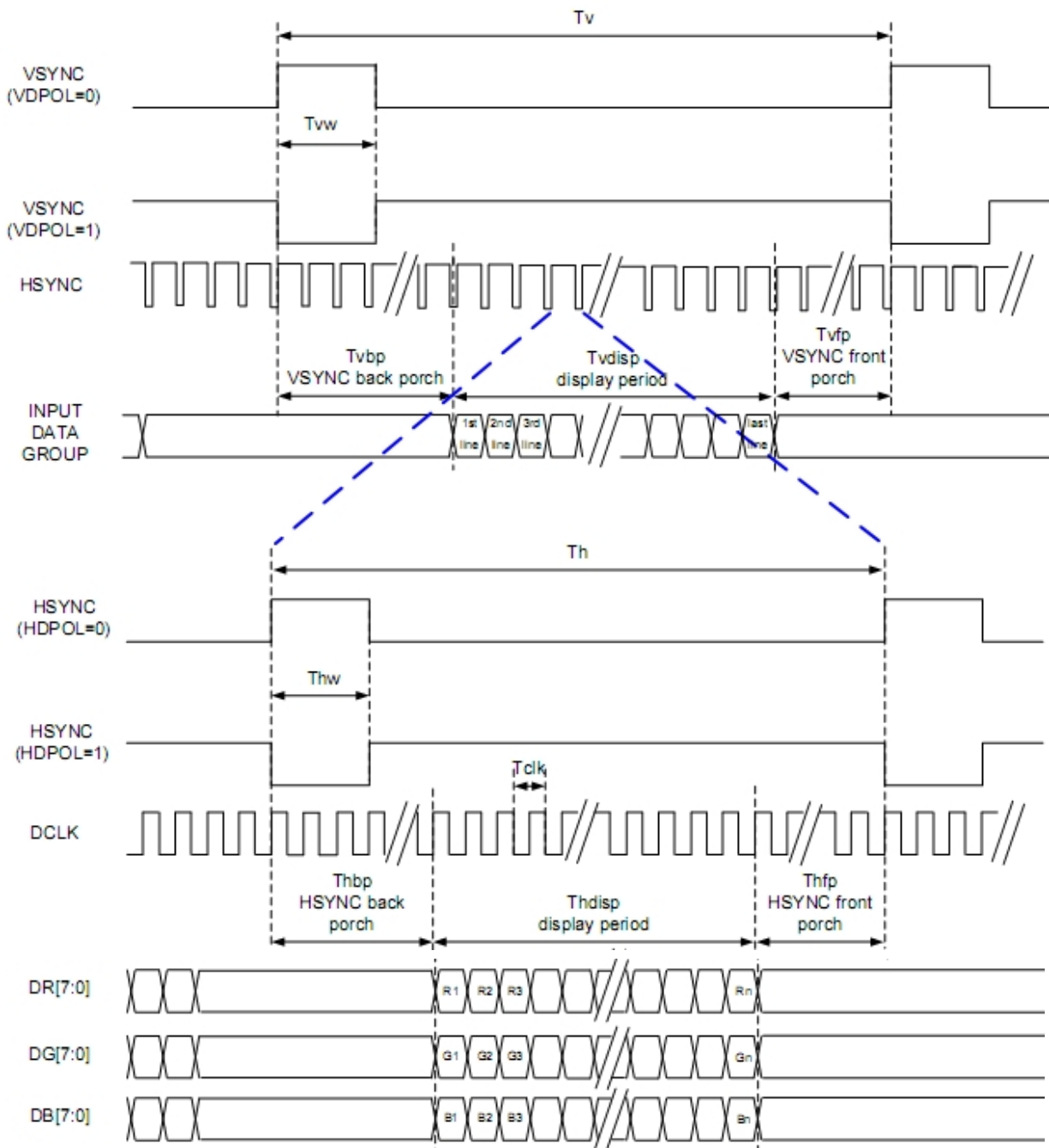
DE mode



SYNC Mode



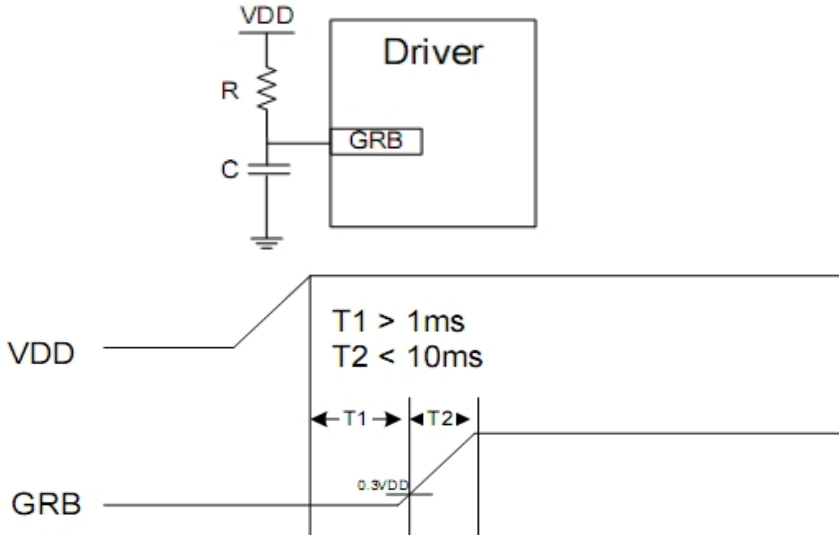
SYNC-DE Mode



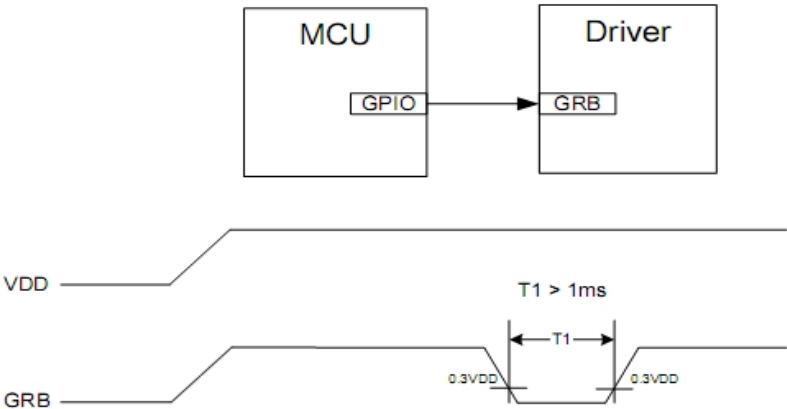
8.4. Reset Timing

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. Quality Assurance

9.1. Purpose

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

9.2. Standard for Quality Test

9.2.1. Sampling Plan:

GB2828.1-2012

Single sampling, general inspection level II

9.2.2. Sampling Criteria:

Visual inspection: AQL 1.5

Electrical functional: AQL 0.65.

9.2.3. Reliability Test:

Detailed requirement refer to Reliability Test Specification.

9.3. Nonconforming Analysis & Disposition

9.3.1. Nonconforming analysis:

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

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

9.3.1.3. If can not finish the analysis on time, customer will be notified with the progress status.

9.3.2. Disposition of nonconforming:

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

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

9.4. Agreement Items

Shall negotiate with customer if the following situation occurs:

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

9.4.2. Additional requirement to be added in product specification.

9.4.3. Any other special problem.

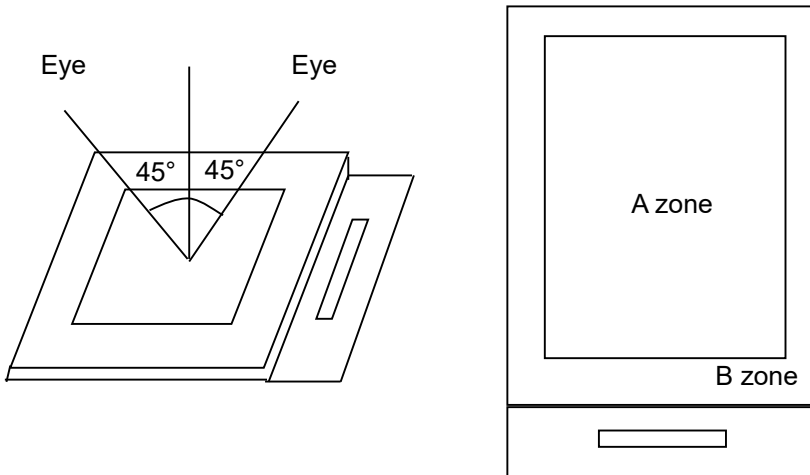
9.5. Standard of the Product Visual Inspection

9.5.1. Appearance inspection:

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

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

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

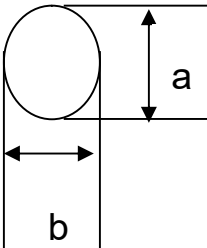


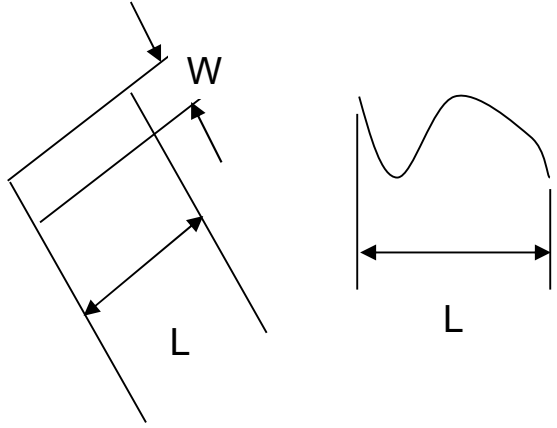
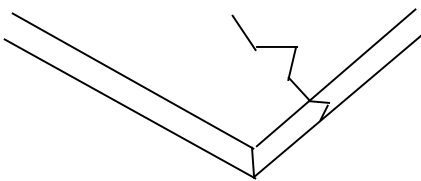
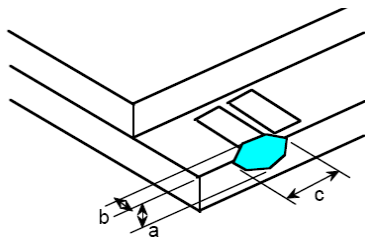
9.5.2. Basic principle:

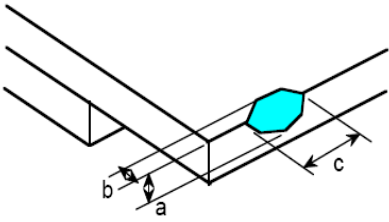
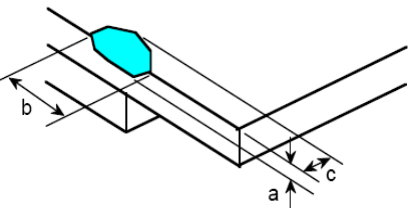
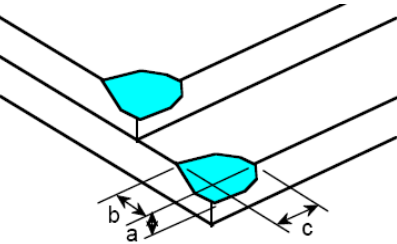
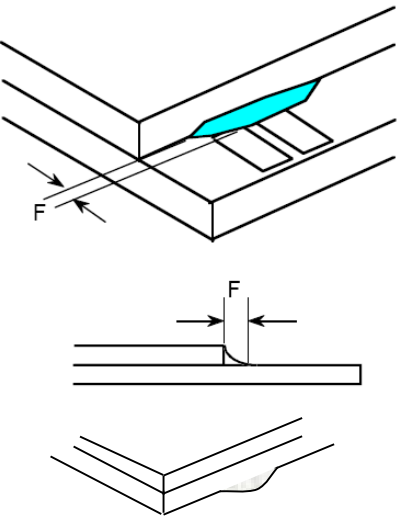
9.5.2.1. A set of sample to indicate the limit of acceptable quality level must be discussed by both us and customer when there is any dispute happened.

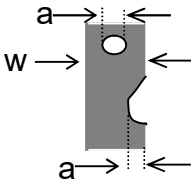
9.5.2.2. New item must be added on time when it is necessary.

9.6. Inspection Specification

No.	Item	Criteria (Unit: mm)																		
01	Black / White spot Foreign material (Round type) Pinholes Stain Particles inside cell. (Minor defect)	 <table border="1" data-bbox="901 1198 1396 1534"> <thead> <tr> <th>Size</th> <th>Area</th> <th>Acc. Qty</th> </tr> </thead> <tbody> <tr> <td>$\varphi \leq 0.10$</td> <td></td> <td>Ignore</td> </tr> <tr> <td>$0.10 < \varphi \leq 0.15$</td> <td></td> <td>2</td> </tr> <tr> <td>$0.15 < \varphi \leq 0.25$</td> <td></td> <td>1</td> </tr> <tr> <td>$0.25 < \varphi$</td> <td></td> <td>0</td> </tr> <tr> <td>Total</td> <td></td> <td>2 no include $\varphi \leq 0.10$</td> </tr> </tbody> </table> <p>$\varphi = (a + b) / 2$ Distance between 2 defects should more than 3mm apart.</p>	Size	Area	Acc. Qty	$\varphi \leq 0.10$		Ignore	$0.10 < \varphi \leq 0.15$		2	$0.15 < \varphi \leq 0.25$		1	$0.25 < \varphi$		0	Total		2 no include $\varphi \leq 0.10$
Size	Area	Acc. Qty																		
$\varphi \leq 0.10$		Ignore																		
$0.10 < \varphi \leq 0.15$		2																		
$0.15 < \varphi \leq 0.25$		1																		
$0.25 < \varphi$		0																		
Total		2 no include $\varphi \leq 0.10$																		
02	Electrical Defect (Minor defect)	<table border="1" data-bbox="550 1646 1380 1870"> <thead> <tr> <th></th> <th>Display Area</th> <th>Total</th> <th></th> </tr> </thead> <tbody> <tr> <td>Bright dot</td> <td>0</td> <td>0</td> <td rowspan="3">Note1</td> </tr> <tr> <td>Dark dot</td> <td>$N \leq 2$</td> <td>$N \leq 2$</td> </tr> <tr> <td>Total dot</td> <td>$N \leq 2$</td> <td>$N \leq 2$</td> </tr> <tr> <td>Mura</td> <td colspan="2">Not visible through 5% ND filters.</td> <td>Note 2</td> </tr> </tbody> </table> <p>Remark: 1. Bright dot caused by scratch and foreign object accords to item 1.</p>		Display Area	Total		Bright dot	0	0	Note1	Dark dot	$N \leq 2$	$N \leq 2$	Total dot	$N \leq 2$	$N \leq 2$	Mura	Not visible through 5% ND filters.		Note 2
	Display Area	Total																		
Bright dot	0	0	Note1																	
Dark dot	$N \leq 2$	$N \leq 2$																		
Total dot	$N \leq 2$	$N \leq 2$																		
Mura	Not visible through 5% ND filters.		Note 2																	

<p>03</p>	<p>Black and White line Scratch Foreign material (Line type) (Minor defect)</p>	 <table border="1" data-bbox="614 694 1236 996"> <thead> <tr> <th>Length</th> <th>Width</th> <th>Acc. Qty</th> </tr> </thead> <tbody> <tr> <td>/</td> <td>$W \leq 0.03$</td> <td>Ignore</td> </tr> <tr> <td>$L \leq 2.5$</td> <td>$0.03 < W \leq 0.05$</td> <td>3</td> </tr> <tr> <td>$L \leq 2.5$</td> <td>$0.05 < W \leq 0.10$</td> <td>2</td> </tr> <tr> <td>/</td> <td>$0.1 < W$</td> <td>0</td> </tr> <tr> <td colspan="2">Total</td> <td>3</td> </tr> </tbody> </table> <p>Distance between 2 defects should more than 3mm apart. Scratches not viewable through the back of the display are acceptable.</p>	Length	Width	Acc. Qty	/	$W \leq 0.03$	Ignore	$L \leq 2.5$	$0.03 < W \leq 0.05$	3	$L \leq 2.5$	$0.05 < W \leq 0.10$	2	/	$0.1 < W$	0	Total		3
Length	Width	Acc. Qty																		
/	$W \leq 0.03$	Ignore																		
$L \leq 2.5$	$0.03 < W \leq 0.05$	3																		
$L \leq 2.5$	$0.05 < W \leq 0.10$	2																		
/	$0.1 < W$	0																		
Total		3																		
<p>04</p>	<p>Glass Crack (Minor defect)</p>	 <p>Crack is potential to enlarge, any type is not allowed.</p>																		
<p>05</p>	<p>Glass Chipping Pad Area: (Minor defect)</p> 	<table border="1" data-bbox="829 1534 1300 1713"> <thead> <tr> <th>Length and Width</th> <th>Acc. Qty</th> </tr> </thead> <tbody> <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> </tbody> </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																			
$a < \text{Glass Thickness}$																				

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

10	<p>FPC Defect:(Minor defect)</p> 	<p>10.1 Dent, pinhole width $a < w/3$. (w: circuitry width.) 10.2 Open circuit is unacceptable. 10.3 No oxidation, contamination and distortion.</p>										
11	<p>Bubble on Polarizer (Minor defect)</p>	<table border="1"> <thead> <tr> <th>Diameter</th> <th>Acc. Qty</th> </tr> </thead> <tbody> <tr> <td>$\varphi \leq 0.20$</td> <td>Ignore</td> </tr> <tr> <td>$0.20 < \varphi \leq 0.30$</td> <td>4</td> </tr> <tr> <td>$0.30 < \varphi \leq 0.50$</td> <td>1</td> </tr> <tr> <td>$0.50 < \varphi$</td> <td>None</td> </tr> </tbody> </table>	Diameter	Acc. Qty	$\varphi \leq 0.20$	Ignore	$0.20 < \varphi \leq 0.30$	4	$0.30 < \varphi \leq 0.50$	1	$0.50 < \varphi$	None
Diameter	Acc. Qty											
$\varphi \leq 0.20$	Ignore											
$0.20 < \varphi \leq 0.30$	4											
$0.30 < \varphi \leq 0.50$	1											
$0.50 < \varphi$	None											
12	<p>Dent on Polarizer (Minor defect)</p>	<table border="1"> <thead> <tr> <th>Diameter</th> <th>Acc. Qty</th> </tr> </thead> <tbody> <tr> <td>$\varphi \leq 0.20$</td> <td>Ignore</td> </tr> <tr> <td>$0.20 < \varphi \leq 0.30$</td> <td>4</td> </tr> <tr> <td>$0.30 < \varphi \leq 0.50$</td> <td>1</td> </tr> <tr> <td>$0.50 < \varphi$</td> <td>None</td> </tr> </tbody> </table>	Diameter	Acc. Qty	$\varphi \leq 0.20$	Ignore	$0.20 < \varphi \leq 0.30$	4	$0.30 < \varphi \leq 0.50$	1	$0.50 < \varphi$	None
Diameter	Acc. Qty											
$\varphi \leq 0.20$	Ignore											
$0.20 < \varphi \leq 0.30$	4											
$0.30 < \varphi \leq 0.50$	1											
$0.50 < \varphi$	None											
13	<p>Bezel</p>	<p>13.1 No rust, distortion on the Bezel. 13.2 No visible fingerprints, stains or other contamination.</p>										
14	<p>PCB</p>	<p>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.</p>										
15	<p>Soldering</p>	<p>Follow IPC-A-610C standard</p>										
16	<p>Electrical Defect (Major defect)</p>	<p>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.</p>										

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

9.7. Classification of Defects

9.7.1. Visual defects (Except no / wrong label) are treated as minor defect and electrical defect is major.

9.7.2. Two minor defects are equal to one major in lot sampling inspection.

9.8. Identification/marketing criteria

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

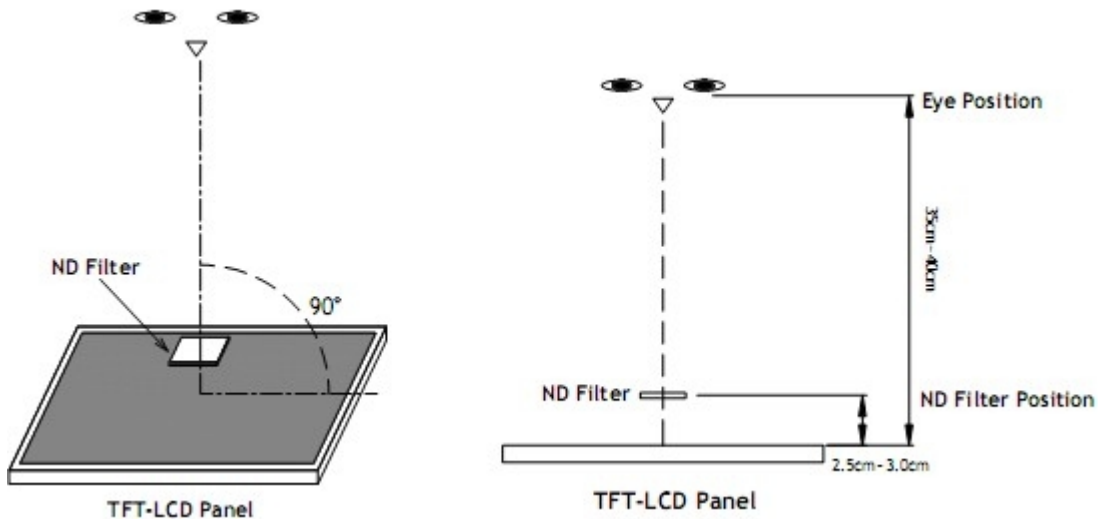
9.9. Packing

9.9.1. There should be no damage of the outside carton box, each packaging box should have one identical label.

9.9.2. Modules inside package box should have compliant mark.

9.9.3. 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 350mm±50mm.

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 350mm±50mm.

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

10. 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/330Ω 5 times Contact: ±2KV 150pF/330Ω 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 deflection cosmetic and operational function allowable.

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

11. Precautions and Warranty

11.1.Safety

- 11.1.1. 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.
- 11.1.2. Since the liquid crystal cells are made of glass, do not apply strong impact on them. Handle with care.

11.2.Handling

- 11.2.1. Reverse and use within ratings in order to keep performance and prevent damage.
- 11.2.2. 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.

11.3.Storage

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

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

11.4.1. Pins of LCD and Backlight

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

11.4.1.2. Recommended Soldering Conditions

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

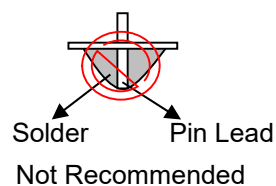
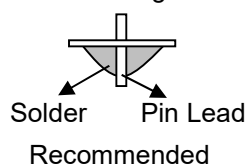
Maximum Solder Temperature: 370°C

Maximum Solder Time: 3s at the maximum temperature

Recommended Soldering Temp: 350±20°C

Typical Soldering Time: ≤3s

11.4.1.3. Solder Wetting



11.4.2. Pins of EL

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

11.4.2.2. No Solder Paste on the soldering pad on the motherboard is recommended.

11.4.2.3. Recommended Soldering Conditions

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

Recommended Solder Temperature: 270~290°C

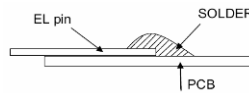
Typical Soldering Time: ≤2s

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

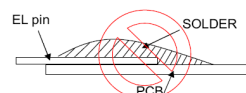
11.4.2.4. No horizontal press on the EL leads during soldering.

11.4.2.5. 180° bend EL leads three times is not allowed.

11.4.2.6. Solder Wetting

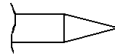


Recommended

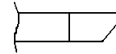


Not Recommended

11.4.2.7. The type of the solder iron:

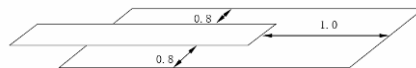


Recommended



Not Recommended

11.4.2.8. Solder Pad



11.5. Operation

- 11.5.1. Do not drive LCD with DC voltage
- 11.5.2. Response time will increase below lower temperature
- 11.5.3. Display may change color with different temperature
- 11.5.4. Mechanical disturbance during operation, such as pressing on the display area, may cause the segments to appear “fractured”.
- 11.5.5. Do not connect or disconnect the LCM to or from the system when power is on.
- 11.5.6. Never use the LCM under abnormal condition of high temperature and high humidity.
- 11.5.7. 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.
- 11.5.8. *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.*

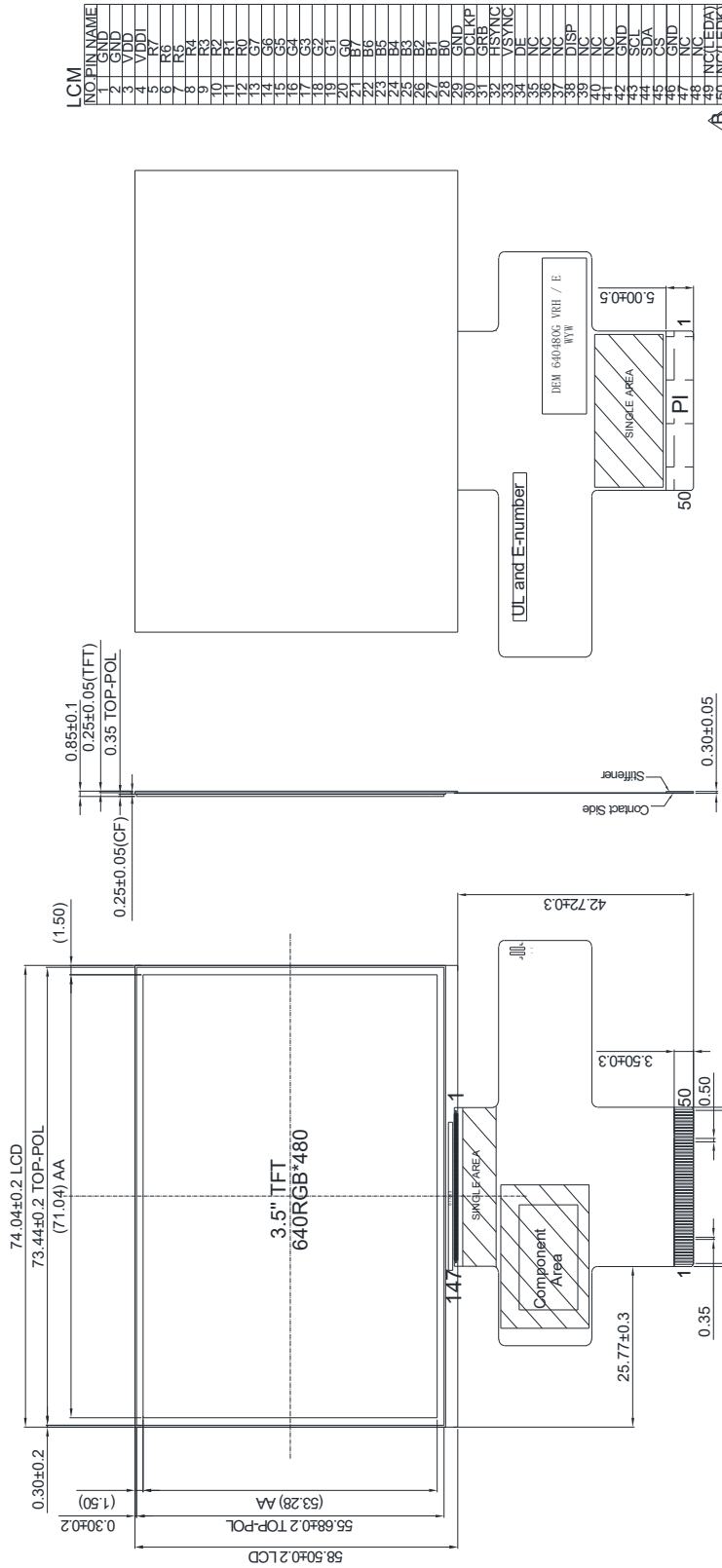
11.6. Static Electricity

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

11.7. Limited Warranty

- 11.7.1. Our warranty liability is limited to repair and/or replacement. We will not be responsible for any consequential loss.
- 11.7.2. 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
- 11.7.3. 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.

12. Outline Drawing



LCM	NO	PIN NAME
1	1	GND
2	2	GND
3	3	VDD
4	4	VDDI
5	5	R7
6	6	R6
7	7	R5
8	8	R4
9	9	R3
10	10	R2
11	11	R1
12	12	G7
13	13	G6
14	14	G5
15	15	G4
16	16	G3
17	17	G2
18	18	G1
19	19	G1
20	20	G0
21	21	B7
22	22	B6
23	23	B5
24	24	B4
25	25	B3
26	26	B2
27	27	B1
28	28	GND
29	29	DCLKP
30	30	DCLKP
31	31	GRFB
32	32	HSYNC
33	33	VSYNC
34	34	NC
35	35	NC
36	36	NC
37	37	NC
38	38	DISP
39	39	NC
40	40	NC
41	41	NC
42	42	GND
43	43	SCL
44	44	SDA
45	45	SDA
46	46	GND
47	47	NC
48	48	NC
49	49	NC(LED+)
50	50	NC(LED-)

- NOTES:
1. Display size: 3.5" TFT
 2. Display mode: Reflective/Normally White/Anti-glare
 3. Operation temperature: -20°C ~ +70°C
 4. Storage temperature: -30°C ~ +80°C
 5. Driver IC: ST7263
 6. Power supply voltage: 3.3V
 7. ROHS must be complied
- * Unspecification tolerance are ±0.2mm