CONFIDENTIAL(B)

SPECIFICATION

OF

LIQUID CRYSTAL DISPLAY MODULE

UNITED RADIANT TECHNOLOGY CORP. 光聯科技 Jan-23-2025 品管部 QC DEPT.

CUSTOMER : URT-STD

Model No. : UMOH-8065MD-19T(REVT)

Model version : 0

Document Revision : 1

CUSTOMER APPROVED SIGNATURE			

This specification need to be signed by purchaser or customer as a specification of products production and delivery from URT. Without signature of this specification , any purchase order for this model no. will be treated and considered that this specification is automatically acknowledged and accepted by purchaser or customer.

U.R.T. UNITED RADIANT TECHNOLOGY CORPORATION

Joe Wu	Ashin Chiu	Jenny Wang	Jan-23-2025
APPROVED	CHECKED	PREPARED	Date

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Revision record

Document Revision	Model No. Version No.	Description	Revision by
0	UMSH-8065MD-19T(REVT) Version No. 0	3.5” TFT .	William Dom U.S.Huang 17-May-2017
1	UMOH-8065MD-19T(REVT) Version No. 0	1. Change TFT LCD & Driver IC 2. Modify Module Number from UMSH-8065MD-19T(REVT) To UMOH-8065MD-19T(REVT).	William Dom Eric Wang 23-Jan-2025

CONTENTS:

1. BASIC SPECIFICATION

1.1 Mechanical specifications

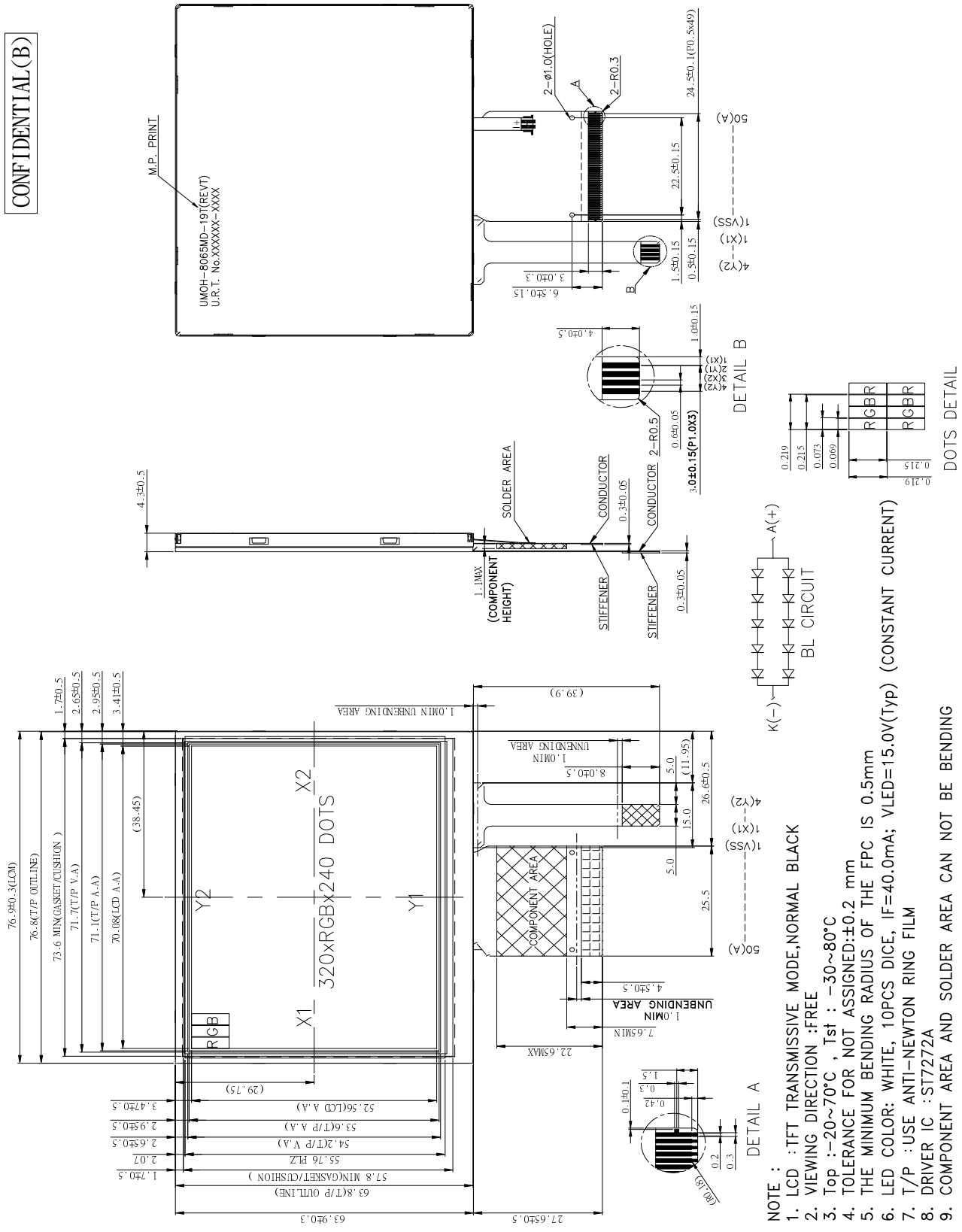
Items	Nominal Dimension	Unit
Active screen size	3.5” diagonal	-
Dot Matrix	320*RGB*240	Pixel
Module Size (W x H x T)	76.9 x 63.9 x 4.3	mm.
Active Area (W x H)	70.08 x 52.56	mm.
Dot Pitch (W x H)	0.219 x 0.219	mm.
Color depth	16.7M	color
Controller	ST7272A	-
Interface	RGB Interface	-
Driving IC Package	COG	-
Module Weight	40±10%	g

1.2 Display specification

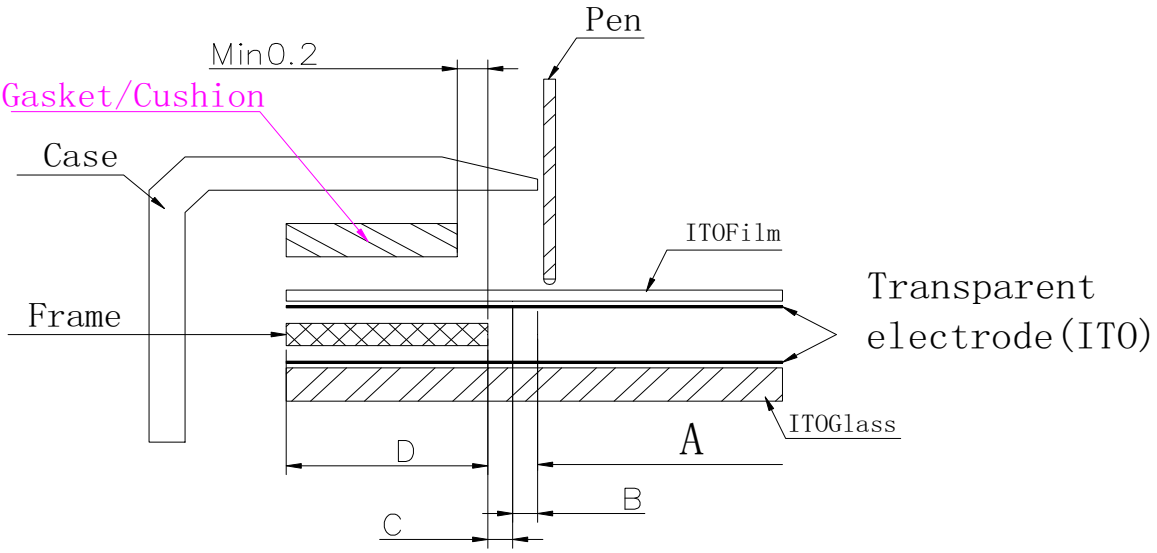
Display	Descriptions	Note
LCD Type	a-Si TFT	-
LCD Mode	Normally Black	-
Polarizer Surface	Glare	-
Pixel arrangement	RGB-stripe	-
Backlight Type	LED	-
Viewing Direction	FREE	-
Back Light	White LEDS	-

*Color tone is slightly changed by temperature and driving voltage.

1.3 Outline dimension



Structure and Area definition



A:Active area

The area which guarantees a touch panel operation withthefollowing characteristics when passed.
(1)Operation force, (2)Electric characteristics,
(3)Tapping durability, (4)Pen sliding durability.

B:operatiom non-guaranteed area

The area which 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 pensliding durability becomes about one-tenth compared with theactive area(Area-(a) as guaranteed area) and its operation forcerequires about double. About 0.5mm outside from a boundary of the active corresponds to this area.

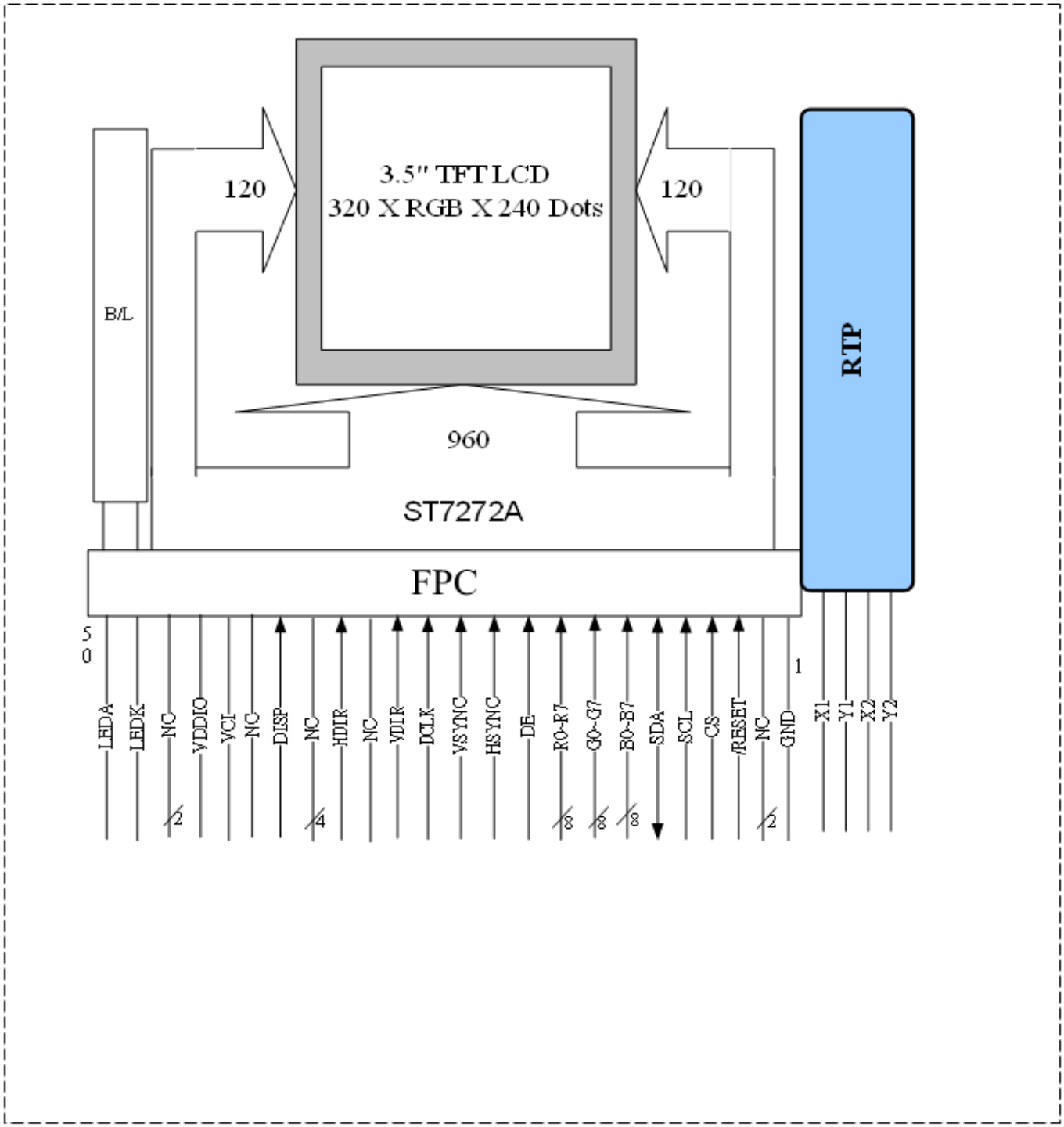
C:Pressing prohibition area.

The area which forbids pressing,because an excessive load is applied a transparent electrode and a serious damage is given to touch panel function by pressing.

D:Non-Active area

The area which does not activate even if passed.

1.4 Block diagram:



1.5 Interface Pin : LCM

<table>
<tr><th>Pin No.</th><th>Pin Symbol</th><th>I/O</th><th>Description</th></tr>
<tr><td>1</td><td>GND</td><td>P</td><td>Ground.</td></tr>
<tr><td>2~3</td><td>NC</td><td>-</td><td>No Connector</td></tr>
<tr><td>4</td><td>/RESET</td><td>I</td><td>Reset signal input terminal, active at ‘L’</td></tr>
<tr><td>5</td><td>CS</td><td>I</td><td>SPI interface data enable signal</td></tr>
<tr><td>6</td><td>SCL</td><td>I</td><td>This pin is used serial interface clock in SPI</td></tr>
<tr><td>7</td><td>SDA</td><td>I/O</td><td>Serial input signal in SPI I/F.</td></tr>
<tr><td>8~15</td><td>B0~B7</td><td>I</td><td>Blue data bus</td></tr>
<tr><td>16~23</td><td>G0~G7</td><td>I</td><td>Green Data bus.</td></tr>
<tr><td>24~31</td><td>R0~R7</td><td>I</td><td>Red Data bus</td></tr>
<tr><td>32</td><td>DE</td><td>I</td><td>Data enable input. Active high to enable the input data bus.</td></tr>
<tr><td>33</td><td>HSYNC</td><td>I</td><td>Horizontal sync input in RGB mode.</td></tr>
<tr><td>34</td><td>VSYNC</td><td>I</td><td>Vertical sync input in RGB mode</td></tr>
<tr><td>35</td><td>DCLK</td><td>I</td><td>Pixel clock input pin</td></tr>
<tr><td>36</td><td>VDIR</td><td>I</td><td>Vertical scan direction control pin. This pin must be connected to “H” or “L” according to system application.
<table>
<tr><th>VDIR</th><th>Function Description</th></tr>
<tr><td>L</td><td>From down to up.</td></tr>
<tr><td>H</td><td>From up to down.</td></tr>
</table></td></tr>
<tr><td>37</td><td>NC</td><td>-</td><td>No Connector</td></tr>
<tr><td>38</td><td>HDIR</td><td>I</td><td>Horizontal scan direction control pin. This pin must be connected to “H” or “L” according to system application.
<table>
<tr><th>HDIR</th><th>Function Description</th></tr>
<tr><td>L</td><td>From right to left</td></tr>
<tr><td>H</td><td>From left to right</td></tr>
</table></td></tr>
<tr><td>39~42</td><td>NC</td><td>-</td><td>No Connector</td></tr>
<tr><td>43</td><td>DISP</td><td>I</td><td>DISP sets the display mode.
L Standby mode H Normal display mode</td></tr>
<tr><td>44</td><td>NC</td><td>-</td><td>No Connector</td></tr>
<tr><td>45</td><td>VCI</td><td>P</td><td>Power Supply for Analog Circuits.</td></tr>
<tr><td>46</td><td>VDDIO</td><td>P</td><td>Voltage input pin for I/O logic.</td></tr>
<tr><td>47~48</td><td>NC</td><td>-</td><td>No Connector</td></tr>
<tr><td>49</td><td>LEDK</td><td>P</td><td>Cathode input for LED backlight.</td></tr>
<tr><td>50</td><td>LEDA</td><td>P</td><td>Anode input for LED backlight.</td></tr>
</table>

Touch screen panel pin:

1	X1	-	Touch screen.
2	Y1	-	Touch screen.
3	X2	-	Touch screen.
4	Y2	-	Touch screen.

2. ELECTRICAL CHARACTERISTICS

2.1 Absolute Maximum Ratings

Items	Symbol	Min.	Max.	Unit	Note
Power Supply voltage	VCI	-0.3	+4.0	V	1,2
IO Supply voltage	VDDIO	-0.3	+4.0	V	1,2
Operating temperature range	T_{OP}	-20	+70	℃	4,5
Storage temperature range	T_{ST}	-30	+80	℃	

Notes:

1. If the module is above these absolute maximum ratings. It may become permanently damaged. Using the module within the following electrical characteristic conditions are also exceeded, the module will malfunction and cause poor reliability.
2. VCI & VDDIO>GND must be maintained.
3. Please be sure users are grounded when handing LCD Module
4. The response time will become lower when operated at low temperature.
5. Background color changes slightly depending on ambient temperature.
   The phenomenon is reversible.

2.2 DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Condition
Power Supply voltage	VCI	3.0	3.3	3.6	V	
IO Supply voltage	VDDIO	1.65	3.3	3.6	V	
Input high level voltage	V_{IH}	0.7VDDIO	-	VDDIO	V	-
Input low level voltage	V_{IL}	GND	-	0.3 VDDIO	V	-
Output high level voltage	V_{OH}	VDDIO -0.4		VDDIO		
Output low level voltage	V_{OL}	GND		GND+0.4		
Power supply current	$I_{VCI}+I_{VDDIO}$	-		50	mA	NOTE

NOTE :

Measuring Condition :

Standard Value MAX.

Ta = 25℃

VCI=VDDIO = +3.3V

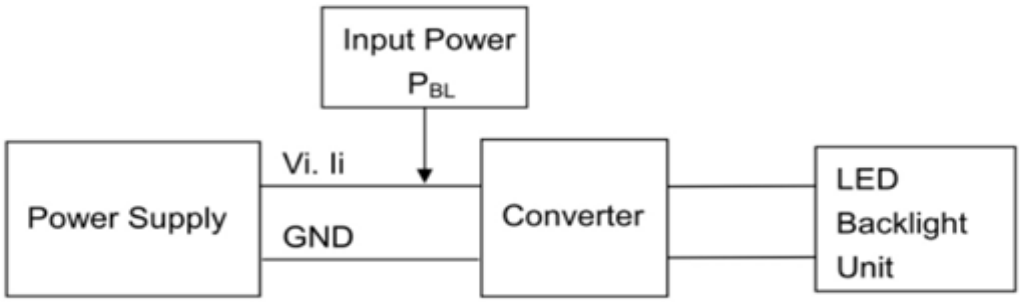
Display Pattern

2.3 Back-light only Specification :

PARAMETER	SYMBOL	MIN	TYP	MAX	Unit	Test Condition	NOTE
Supply Current	If	-	40	-	mA	Ta=25°C	1
Supply Voltage	Vf	13.5	15.0	16.5	V	Ta=25°C If=40mA	
Half-Life Time	Lf	-	(30000)	-	Hr	Ta=25°C	2

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25°C and If=40mA.

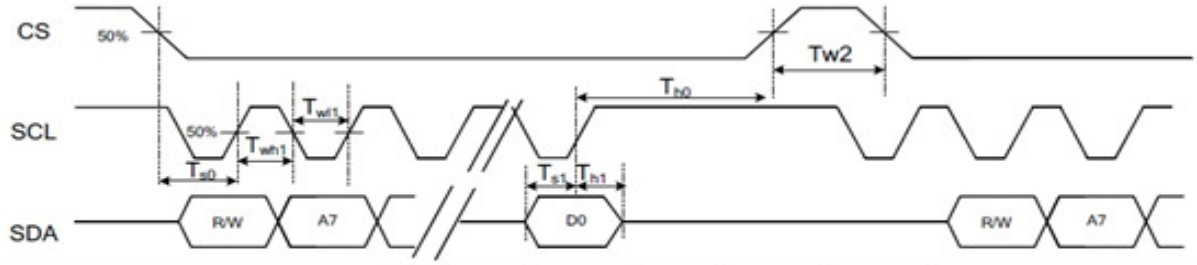
Note 2: LED current is measured by utilizing a high frequency current meter as shown below:



Note3: The " Half-Life Time" is defined as the LED chip brightness decreases to 50% than original brightness, Based on Ta 25±2°C,60±10% RH condition ..

2.4 AC Characteristics

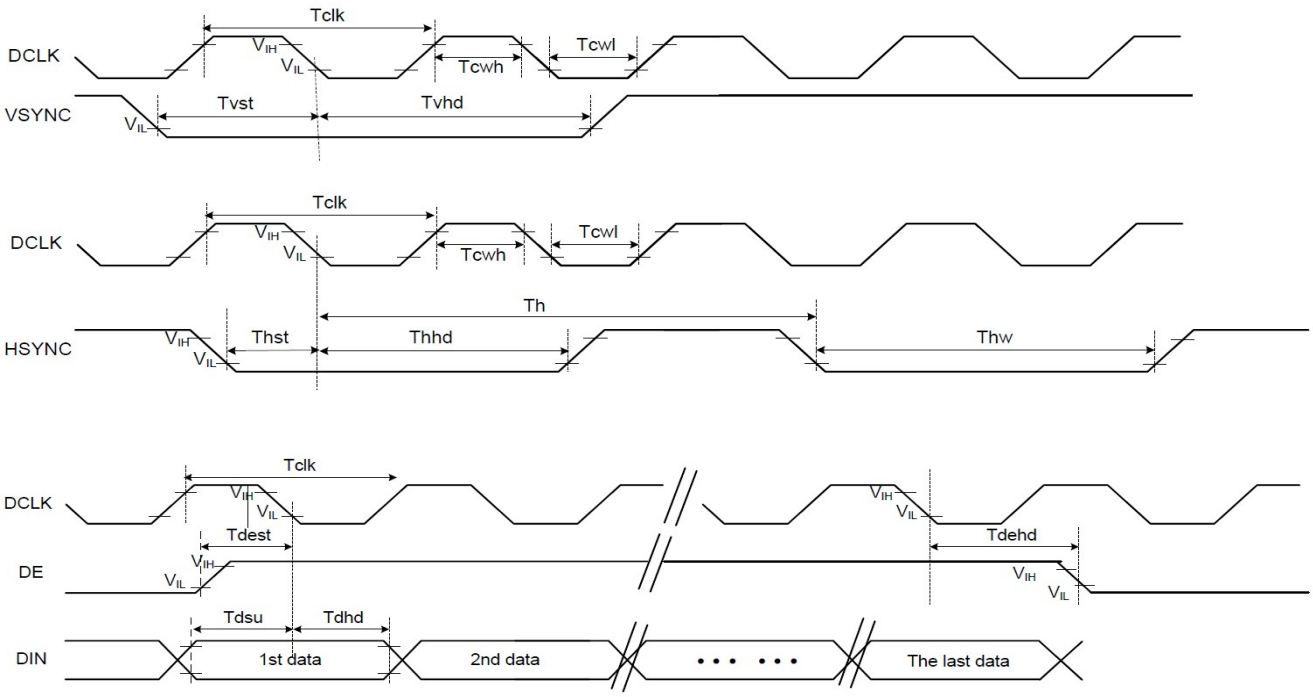
2.4.1 3-line serial Interface Timing Characteristics.



Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
CS Input Setup Time	Ts0	50	-	-	ns	
Serial Data Input Setup Time	Ts1	50	-	-	ns	
CS Input Hold Time	Th0	50	-	-	ns	
Serial Data Input Hold Time	Th1	50	-	-	ns	
SCL Write Pulse High Width	Twh1	50	-	-	ns	
SCL Write Pulse Low Width	Twl1	50	-	-	ns	
SCL Read Pulse High Width	Trh1	300			ns	
SCL Read Pulse Low Width	Trl1	300			ns	
CS Pulse High Width	Tw2	400	-	-	ns	

3-line serial Interface Timing Characteristics

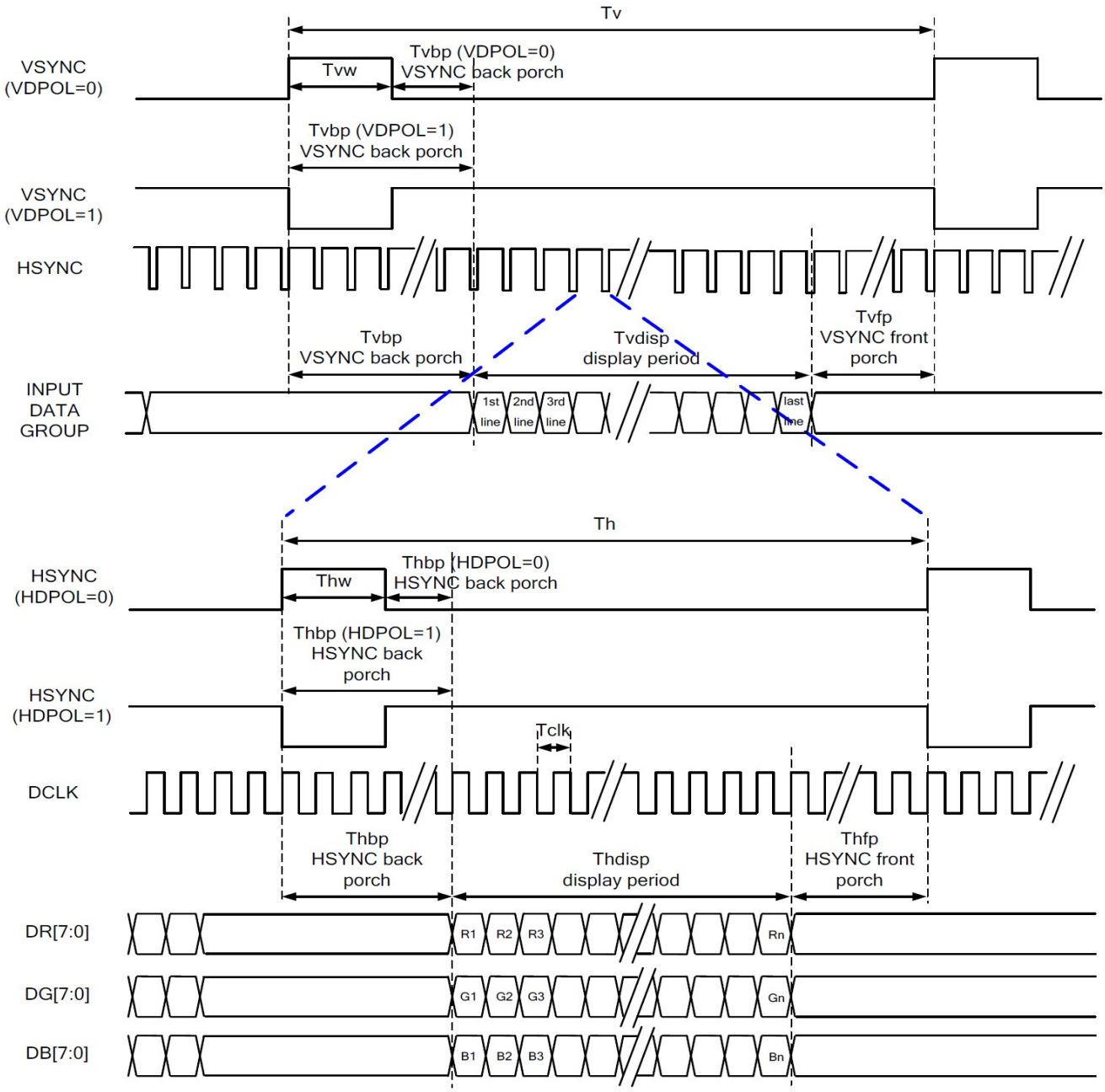
2.4.2 System Bus Timing for RGB Interface



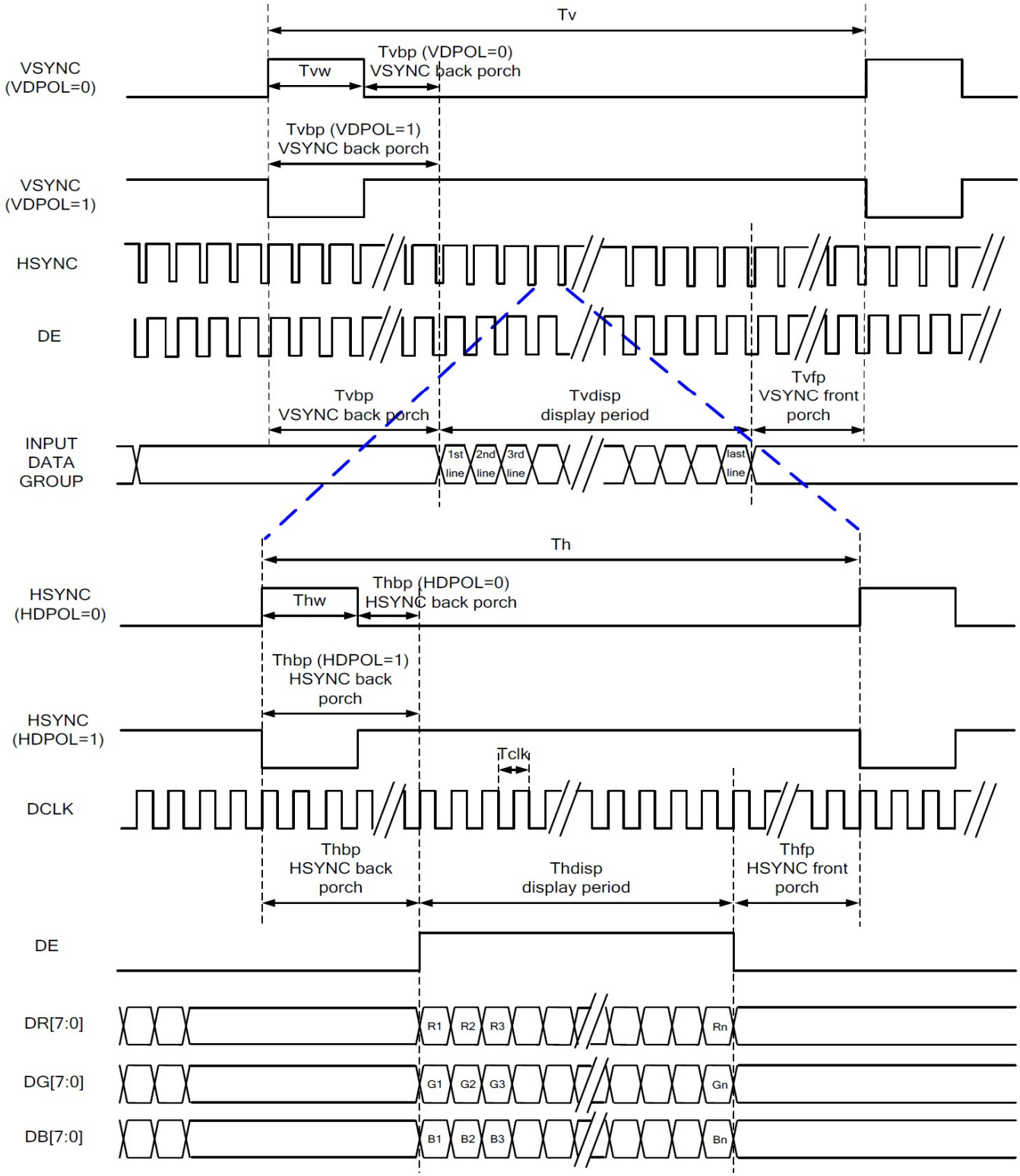
Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
CLK Pulse Duty	Tclk	40	50	60	%	
HSYNC Width	Thw	2	-	-	DCLK	
HSYNC Period	Th	55	60	65	us	
VSYNC Setup Time	Tvst	12	-	-	ns	
VSYNC Hold Time	Tvhd	12	-	-	ns	
HSYNC Setup Time	Thst	12	-	-	ns	
HSYNC Hold Time	Thhd	12	-	-	ns	
Data Setup Time	Tdsu	12	-	-	ns	
Data Hold Time	Tdhd	12	-	-	ns	
DE Setup Time	Tdest	12	-	-	ns	
DE Hold Time	Tdehd	12	-	-	ns	

2.5 RGB Interface

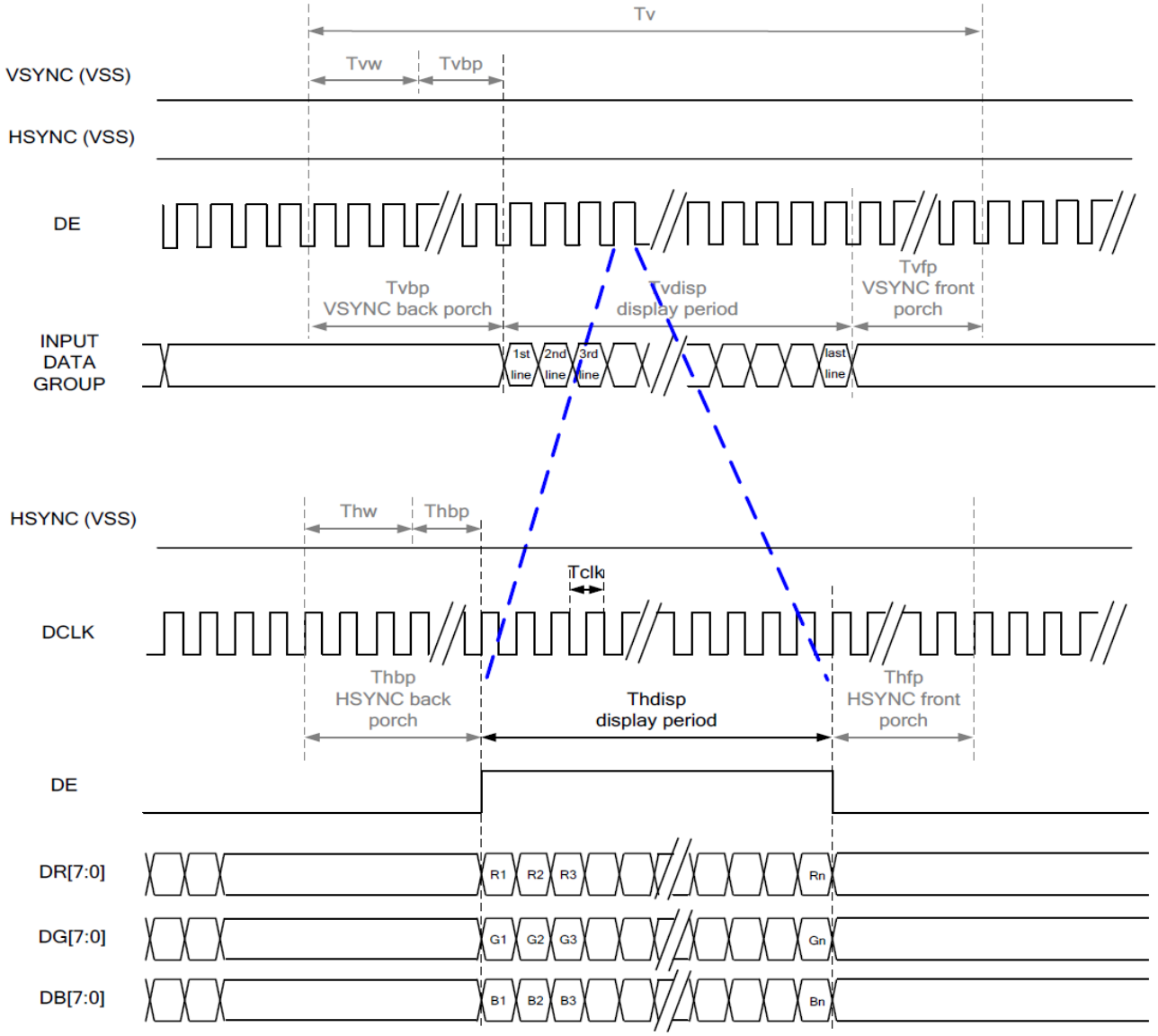
2.5.1 SYNC MODE



2.5.2 SYNC-DE Mode



2.5.3 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

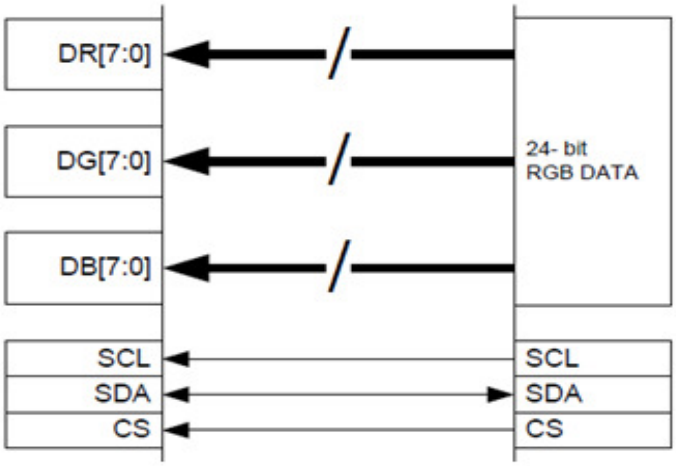
Note: "Input" means these signals are driven by host side.

2.5.4 Parallel 24-bit RGB Input Timing Table

Parallel 24-bit RGB Input Timing (VCC3.3V, AGND= 0V, TA=25℃)

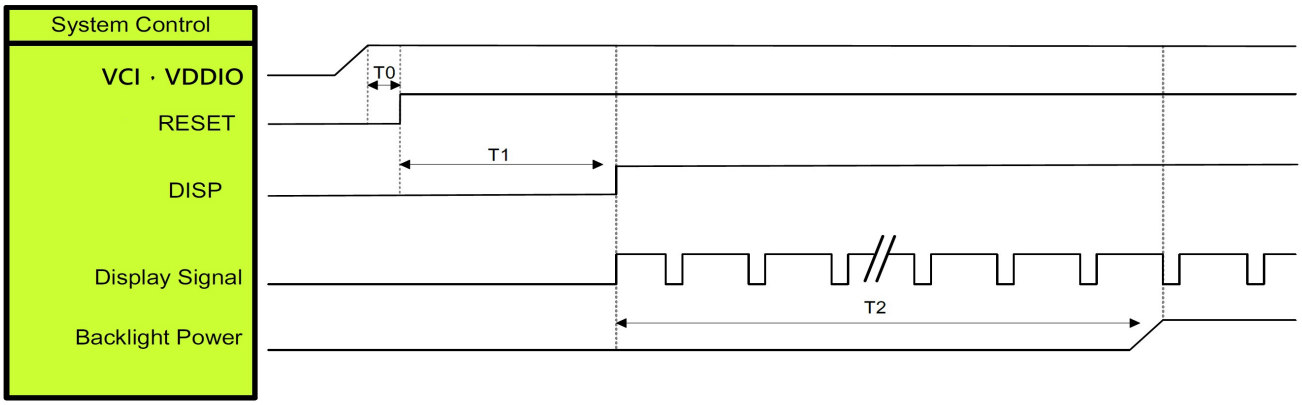
Parallel 24-bit RGB Input Timing Table							
Item		Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency		Fclk	5	6	8	MHz	
DCLK Period		Tclk	125	167	200	ns	
HSYNC	Period Time	Th	325	371	438	DCLK	
	Display Period	Thdisp		320		DCLK	
	Back Porch	Thbp	3	43	43	DCLK	By H_BLANKING setting
	Front Porch	Thfp	2	8	75	DCLK	
	Pulse Width	Thw	2	4	43	DCLK	
VSYNC	Period Time	Tv	244	260	289	HSYNC	
	Display Period	Tvdisp		240		HSYNC	
	Back Porch	Tvbp	2	12	12	HSYNC	By V_BLANKING setting
	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.



2.6 Power ON/OFF Sequence

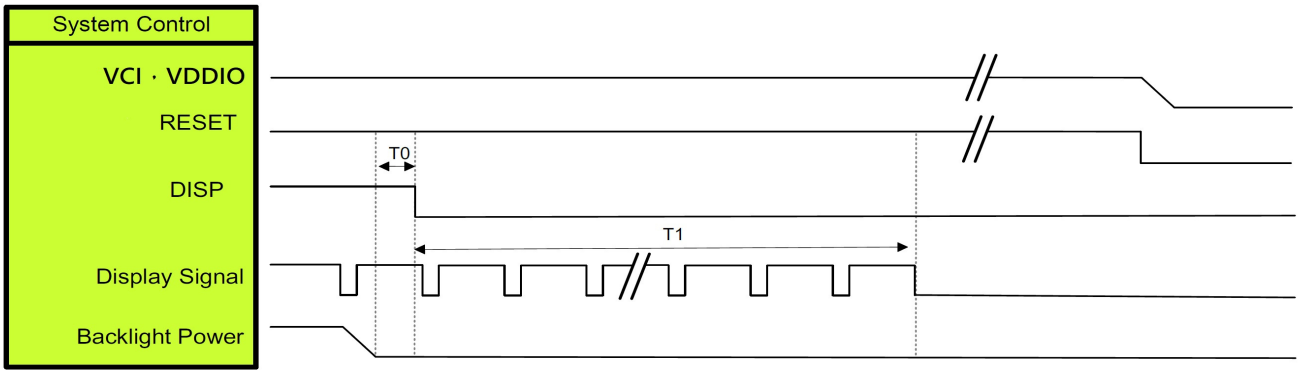
Power On Sequence



Symbol	Description	Min. Time	Unit
T0	System power stability to RESET signal	0	ms
T1	GRB RESET= “High” to DISP=”High”	10	ms
T2	Display Signal output to Backlight Power on	250	ms

Note: Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0]

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

Note: Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0]

2.7 Touch Panel Specifications

Display	Descriptions	Note
Type	4-wires Analog Resistive Touch Panel	-
Structure	ITO Film：T=0.188mm；400~640Ω/□	-
	ITO Glass：T=0.7mm；400~600Ω/□	-
Surface Hardness	≧ 3H	3H pencil, pressure 500g/45° (JIS-K5600)
Input mode	Stylus or Finger	-
Minimum Active Force	100 gf	Stylus R0.8mm
Connector Type	FPC	-

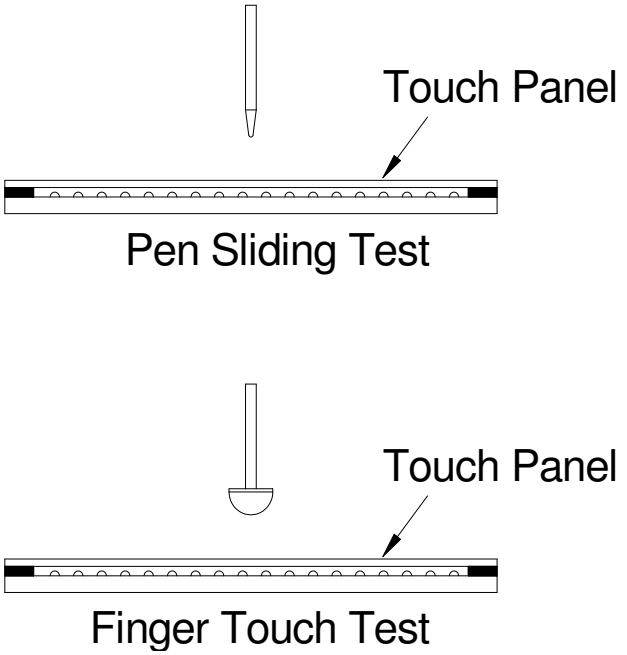
2.7.1 Electric Characteristics

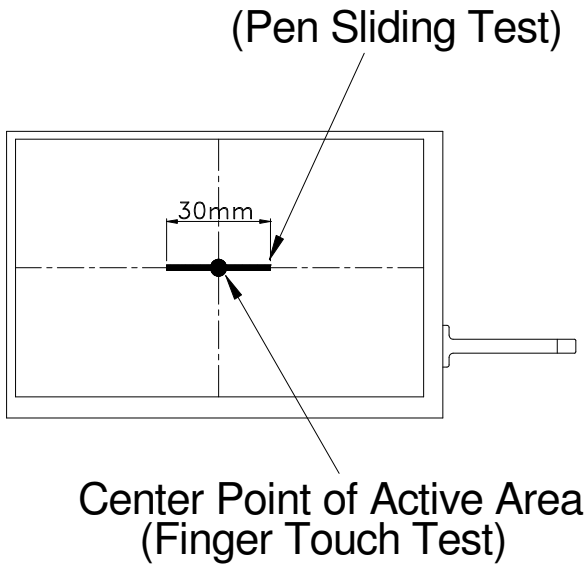
Items	Descriptions	Note
Linearity	X-axis≦1.5%	Active Area toward inner 2mm
	Y-axis≦1.5%	
Terminal Resistance	X-axis：50～677Ω	-
	Y-axis：400～1000Ω	-

2.7.2 Durability Test

Items	Condition
Finger Touch Test	Repeating impact the surface of touch panel 1,000k times by R8.0 silicon rubber under 250g loading and 2 times/sec speed.
Pen Sliding Test	Drawing line in 30mm length at same location of touch panel surface 100k times by R0.8mm plastic stylus under 250g loading and 60mm/sec moving speed.

(Durability Test Position)





3. OPTICAL CHARACTERISTICS

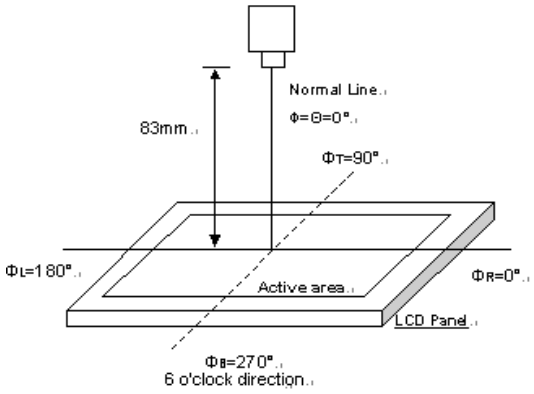
3.1 Characteristics

Electrical and Optical Characteristics

No.	Item			symbol / temp.		Min.	Typ.	Max.	Unit	Note
1	Response Time			Tr+Tf	25 ℃	-	25	35	ms	2
2	Viewing Angle	Hor.	CR>10	θ_{2+}	Φ= 0°	70	80	-	degree	3
				θ_{2-}	Φ=180°	70	80	-		
		Ver.		θ_{1+}	Φ=270°	70	80	-		
				θ_{1-}	Φ=90°	70	80	-		
3	Contrast Ratio			Cr	25 ℃	800	1000	-	-	4
4	Red x-code			Rx	25 ℃	0.572	0.622	0.672	-	5
	Red y-code			Ry		0.308	0.358	0.408		
	Green x-code			Gx		0.299	0.349	0.399		
	Green y-code			Gy		0.539	0.589	0.639		
	Blue x-code			Bx		0.094	0.144	0.194		
	Blue y-code			By		0.011	0.061	0.111		
	White x-code			Wx		0.278	0.328	0.378		
	White y-code			Wy		0.301	0.351	0.401		
	Brightness			Y		650	800	-	cd/m^2	
5	Brightness Uniformity				25 ℃	80	-	-	%	6

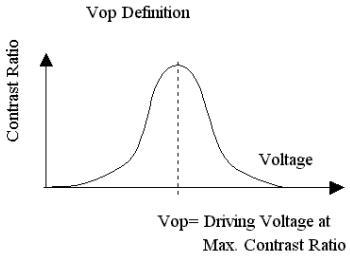
3.2 Definition of optical characteristics

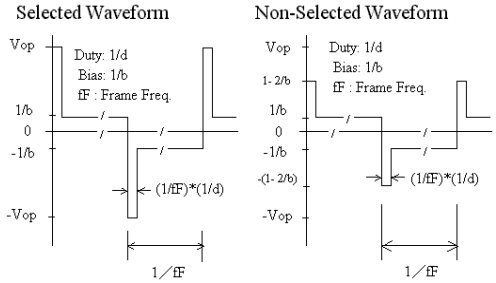
Measurement condition : Transmissive mode optical measurement system



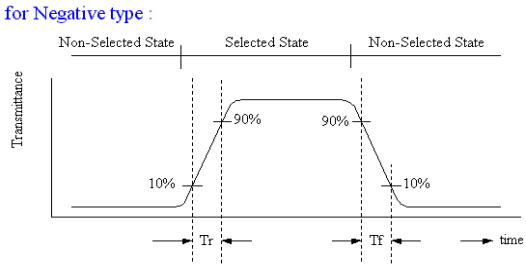
LCD Evaluation System : DMS-803
Light Source : Halogen Lamp.

[Note 1] Definition of LCD Driving Vop and Waveform :

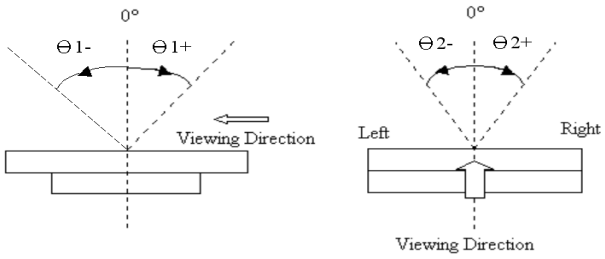




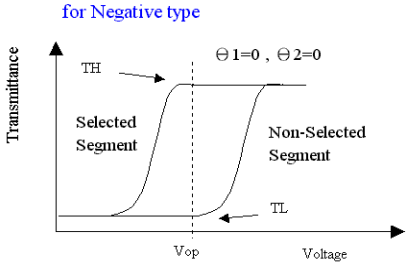
[Note 2] Definition of Response Time



[Note 3] Definition of Viewing Angle :

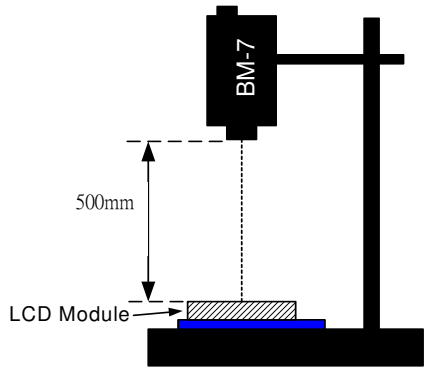


[Note 4] Definition of Contrast Ratio :

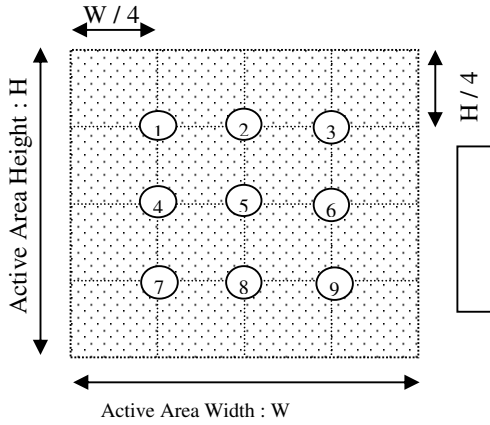


$$\text{Contrast Ratio} = \frac{TH}{TL}$$

[Note 5] Definition of measurement of Color Chromaticity and Brightness



[Note 6] Definition of Brightness Uniformity



$$\text{Brightness Uniformity} = \frac{\text{Minimum Brightness of Point 1~9}}{\text{Maximum Brightness of Point 1~9}}$$

4. RELIABILITY :

Item No	Items	Condition	Note
1	High temperature operating	70 ℃ , 200 hours	IEC60068-2-2 Note 1
2	Low temperature operating	-20 ℃ , 200 hours	IEC60068-2-1 Note 1
3	High temperature storage	80 ℃ , 200 hours	IEC60068-2-2 Note 1
4	Low temperature storage	-30 ℃ , 200 hours	IEC60068-2-1 Note 1
5	High temperature & humidity storage	60℃, 90%RH, 100 hours	IEC60068-2-78 Note 2
6	Thermal Shock storage	-30℃, 30min.<=> 80℃, 30min. 10 Cycles	IEC60068-2-14 Note 1
7	Vibration test	10 => 55 =>10 => 55 => 10 Hz , within 1 minute Amplitude : 1.5mm. 15 minutes for each Direction (X,Y,Z)	IEC60068-2-6
8	Drop test	>10Kg : 60 cm ; ≤10Kg : 80 cm 6 sides, 1 corner, 3edges, Free fall.	IEC60068-2-32
9	Life time	50,000 hours 25℃ , 60%RH , specification condition driving	

Note 1：The product move into the room temperature for at least 2 hours with no condensation.

Note 2：The product move into the room temperature for at least 24 hours with no condensation.

Note 3 : Please change the display picture (autorun) during operating mode. Avoid displaying static images to avoid image sticking , and the image sticking is accelerated by temperature.

* One single product test for only one item.
* Judgment after test : keep in room temperature for more than 2 hours.
  - Current consumption < 2 times of initial value
  - Function : work normally

5. PRODUCT HANDLING AND APPLICATION

5.1 PRECAUTION FOR HANDLING LCM

- The LCD module contains a C-MOS LSI. People who operate the LCM should wear ESD protection eguipement to prevent ESD hurt on products.
- Do not input any signal before power is turned on.
- Do not take LCM from its packaging bag until it is assembled.
- Peel off the LCM protective film slowly since static electricity may be generated.
- Hand Soldering : Soldering temperature less than 260℃,within 5 sec, at 5 mm. Away from pin connection.
- Do not touch the display surface or connection terminals area with bare hands.Smudges on the display surface reduce the insulation between terminals.
- Do not twist or bend the modules and also avoid any inappropriate external force on display surface during assembly.
- Do not expose LCM to organic solvent. IF clean the surface , wipe it gently with soft cloth dampened by alcohol.
- Do not attempt to wiped off the contact pads.
- Keep LCM panels away from direct sunlight or fluorescent light, , also avoid them in high-temperature & high humidity environment for a long period.
- It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage then the limit cause the shorter LCD life.
- Do not drive LCM by DC voltage & avoid displaying at certain pattern for a long time otherwise it might cause image sticking.
- Response time will be extremely delayed at lower temperature then the operating temperature range and on the other hand at higher temperature LCD's how dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operation temperature.
- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- Never use the LCD , LCM under 45 Hz , the liquid crystal will decomposition and cause permently damage on display !!
- Liquid in LCM is hazardous substance. In case a contact with liquid crystal material is occured, be sure to immediately wash such material away by soap and water.
- The polarizer is easily damaged and should be handle with special care. Don't press or rub it with hard objects.

5.2 PRECAUTION FOR STORING

- Store the module in a dark room where must keep at 25±10℃ and 65%RH or less.
- Do not store the module in surroundings containing organic solvent or corrosive gas
- Store the module in an anti-electrostatic container or bag.

5.3 USING ON MEDICAL CARE , SAFETY OR HAZARDOUS APPLICATION OR SYSTEM

- For the application in medical care, safety and hazardous prodcuts or systems, an authorization from URT is required. URT will not responsible for any damage or loss which caused by the products without any authorization given by URT.
- This product is not allowed to be designed and used for military application and/or purpose.
- The delivery of this product to the countries and/or regions where the embargoes are imposed by U.N. is prohibited.
- The application and delivery of this product must comply with Startegic High-Tech Commodities (SHTC) export control and the sales to the embargoed and/or sanctioned countries or regions are strictly prohibited.

6. DATE CODE OF PRODUCTS

- Date code will be shown on each product :

- **YY MM DD - XXXX**

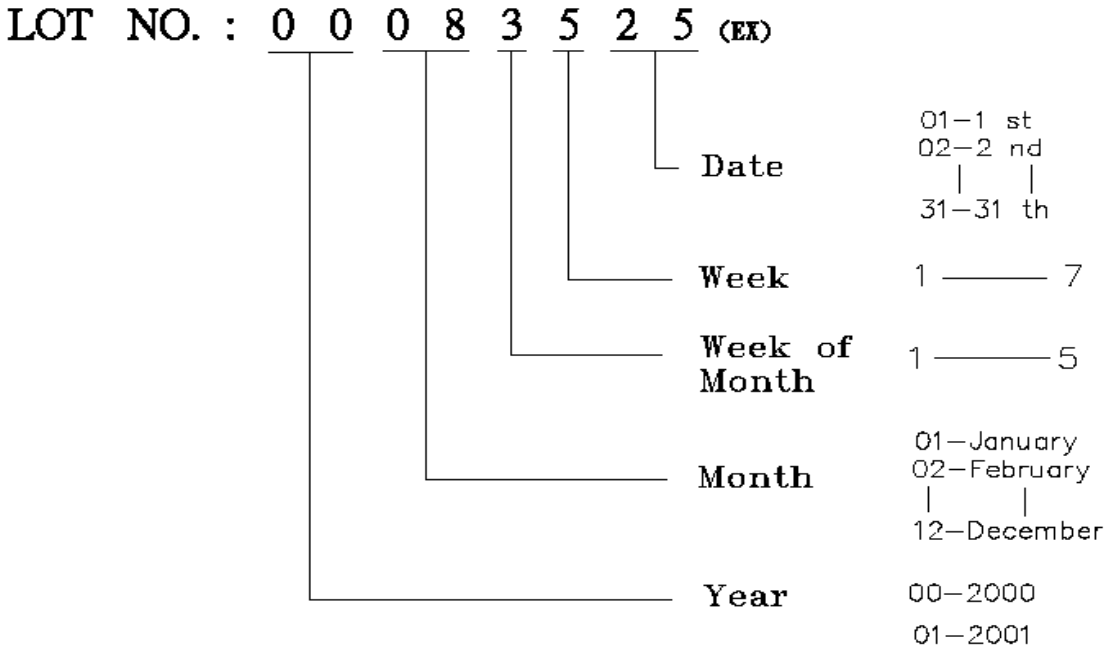
  Year Month Day - Production control number

- Example: 241108 - 0003 ==> Year 2024, November,8th ,
  Production control number no. 0003

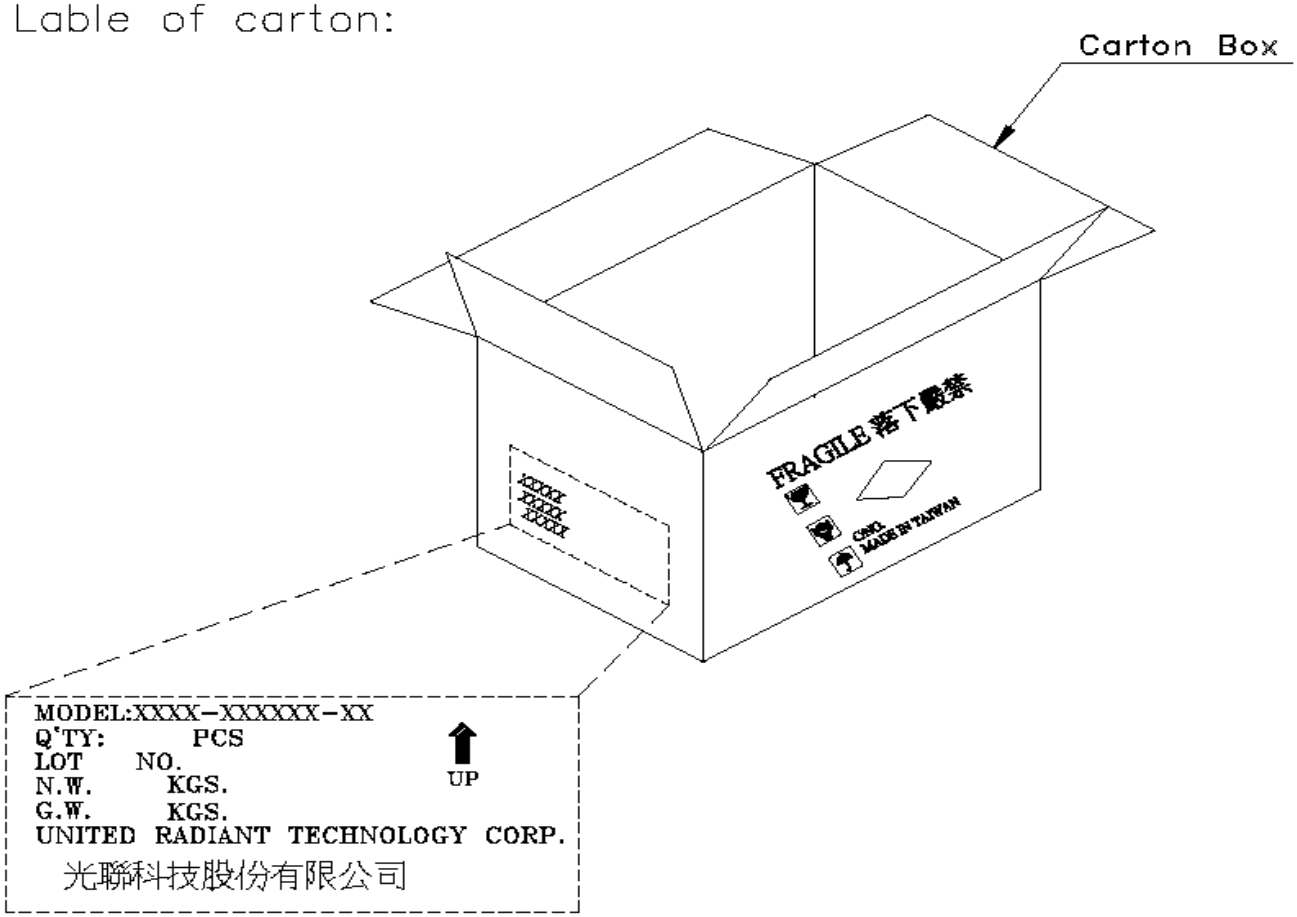
Note ： The lot no. attached on the packing box will be used for tracking once the part is too small to print the date code.

7. LOT NO.

Instruction of lot number:



Lable of carton:



8. INSPECTION STANDARD

8.1. QUALITY :

THE QUALITY OF GOODS SUPPLIED TO PURCHASER SHALL COME UP TO THE FOLLOWING STANDARD.

8.1.1. THE METHOD OF PRESERVING GOODS

AFTER DELIVERY OF GOODS FROM U.R.T. TO PURCHASER. PURCHASER SHALL CONTROL THE LCM AT -10 ℃ ～ 40 ℃ ,AND IT MIGHT BE DESIRABLE TO KEEP AT THE NORMAL ROOM TEMPERATURE AND HUMIDITY UNTIL INCOMING INSPECTION OR THROWING INTO PROCESS LINE.

8.1.2. INCOMING INSPECTION

(A) THE METHOD OF INSPECTION

IF PURCHASER MAKE AN INCOMING INSPECTION , A SAMPLING PLAN SHALL BE APPLIED ON THE CONDITION THAT QUALITY OF ONE DELIVERY SHALL BE REGARDED AS ONE LOT.

(B) THE STANDARD OF QUALITY

ISO-2859-1 (SAME AS MIL-STD-105E) , LEVEL Ⅱ SINGLE PLAN.

CLASS	AQL(%)
CRITICAL	0.4 %
MAJOR	0.65 %
MINOR	1.5 %

EVERY ITEM SHALL BE INSPECTED ACCORDING TO THE CLASS.

(C) MEASURE

IF AS THE RESULT OF ABOVE RECEIVING INSPECTION , A LOT OUT IS DISCOVERED. PURCHASER SHALL BE INFORM SELLER OF IT WITHIN SEVEN DAYS. BUT FIRST SHIPMENT WITHIN FOURTEEN DAYS.

8.1.3. WARRANTY POLICY

U.R.T. WILL PROVIDE ONE-YEAR WARRANTY FOR THE PRODUCTS ONLY IF UNDER SPECIFICATION OPERATING CONDITIONS. U.R.T. WILL REPLACE NEW PRODUCTS FOR THESE DEFECT PRODUCTS WHICH UNDER WARRANTY PERIOD AND BELONG TO THE RESPONSIBILITY OF U.R.T.

8.2. CHECKING CONDITION

8.2.1. VIEWING DISTANCE IS APPROXIMATELY：30 ± 5 CM.

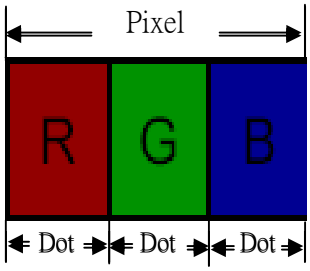
8.2.2. VIEWING ANGLE IS NORMAL TO THE LCD PANEL WITH 45°.

8.2.3. AMBIENT ILLUMINANCE：2 PCS OF 20W FLUORESCENT LAMPS(DISTANCE TO THE SAMPLE >100CM) OR 1000±200 LUX.

8.3. INSPECTION PLAN :

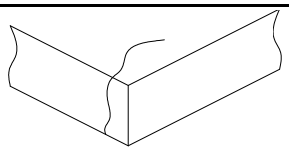
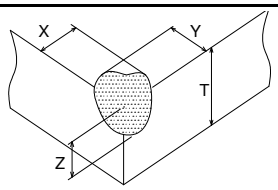
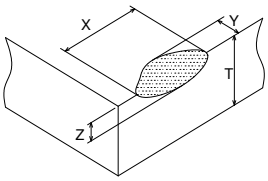
CLASS	ITEM	JUDGEMENT	CLASS
PACKING & INDICATE	1. OUTSIDE AND INSIDE PACKAGE	"MODEL NO." , "LOT NO." AND "QUANTITY" SHOULD INDICATE ON THE PACKAGE.	Minor
	2. MODEL MIXED AND QUANTITY	OTHER MODEL MIXED.....REJECTED QUANTITY SHORT OR OVER.....REJECTED	Critical
	3. PRODUCT INDICATION	"MODEL NO." SHOULD INDICATE ON THE PRODUCT	Major
ASSEMBLY	4. DIMENSION, LCD GLASS SCRATCH AND SCRIBE DEFECT.	ACCORDING TO SPECIFICATION OR DRAWING.	Major
APPEARANCE	5. VIEWING AREA	POLARIZER EDGE OR LCD'S SEALING LINE IS VISABLE IN THE VIEWING AREA ……..REJECTED	Minor
	6. BLEMISH、BLACK SPOT、 WHITE SPOT IN THE LCD AND LCD GLASS CRACKS	ACCORDING TO STANDARD OF VISUAL INSPECTION (INSIDE VIEWING AREA)	Minor
	7. BLEMISH、BLACK SPOT WHITE SPOT AND SCRATCH ON THE POLARIZER	ACCORDING TO STANDARD OF VISUAL INSPECTION (INSIDE VIEWING AREA)	Minor
	8. BUBBLE IN POLARIZER	ACCORDING TO STANDARD OF VISUAL INSPECTION (INSIDE VIEWING AREA)	Minor
	9. LCD'S RAINBOW COLOR	STRONG DEVIATION COLOR (OR NEWTON RING) OF LCD.....REJECTED. OR ACCORDING TO LIMITED SAMPLE (IF NEEDED, AND INSIDE VIEWING AREA)	Minor
ELECTRICAL	10. ELECTRICAL AND OPTICAL CHARACTERISTICS (CONTRAST、VOP、 CHROMATICITY … ETC)	ACCORDING TO SPECIFICATION OR DRAWING . (INSIDE VIEWING AREA)	Critical
	11.MISSING LINE	MISSING DOT、LINE、CHARACTER ....REJECTED	Critical
	12.SHORT CIRCUIT、 WRONG PATTERN DISPLAY	NON DISPLAY、WRONG PATTERN DISPLAY、CURRENT CONSUMPTION OUT OF SPECIFICATION..... REJECTED	Critical
	13. PIN HOLE、PATTERN DEFORMITY	ACCORDING TO STANDARD OF VISUAL INSPECTION	Minor

8.4. STANDARD OF VISUAL INSPECTION

<table>
<tr><th>NO.</th><th>CLASS</th><th>ITEM</th><th>JUDGEMENT</th></tr>
<tr><td>8.4.1</td><td>MINOR</td><td>BLACK AND WHITE SPOT
FOREIGN MATERIEL
DUST IN THE CELL
BLEMISH
SCRATCH</td><td>(A) ROUND TYPE: unit : mm.
<table><tr><th>DIAMETER (mm.)</th><th>ACCEPTABLE Q'TY</th></tr><tr><td>Φ ≦ 0.1</td><td>DISREGARD</td></tr><tr><td>0.1 < Φ ≦ 0.25</td><td>3(Distance>5.0mm)</td></tr><tr><td>0.25 < Φ</td><td>0</td></tr></table>NOTE: Φ=(LENGTH+WIDTH)/2
(B) LINEAR TYPE: unit : mm.
<table><tr><th>LENGTH</th><th>WIDTH</th><th>ACCEPTABLE Q'TY</th></tr><tr><td>------</td><td>W ≦0.03</td><td>DISREGARD</td></tr><tr><td>L ≦ 5.0</td><td>0.03 < W ≦0.07</td><td>3(Distance>5.0mm)</td></tr><tr><td>------</td><td>0.07 < W</td><td>FOLLOW ROUND TYPE</td></tr></table></td></tr>
<tr><td>8.4.2</td><td>MINOR</td><td>BUBBLE IN POLARIZER
DENT ON POLARIZER</td><td>unit : mm.
<table><tr><th>DIAMETER</th><th>ACCEPTABLE Q'TY</th></tr><tr><td>Φ ≦0.2</td><td>DISREGARD</td></tr><tr><td>0.2 < Φ ≦ 0.5</td><td>2(Distance>5.0mm)</td></tr><tr><td>0.5 < Φ</td><td>0</td></tr></table></td></tr>
<tr><td>8.4.3</td><td>MINOR</td><td>Dot Defect</td><td><table><tr><th>Items</th><th>ACC. Q'TY</th></tr><tr><td>Bright dot</td><td>N≦ 4 (Distance>5.0mm)</td></tr><tr><td>Dark dot</td><td>N≦ 4(Distance>5.0mm)</td></tr></table>Pixel Define :
 

Note 1: The definition of dot: The size of a defective dot over 1/2 of whole dot is regarded as one defective dot.
Note 2: Bright dot: Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.
Note 3: Dark dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green ,blue pattern.</td></tr>
</table>

8.5 INSPECTION STANDARD OF TOUCH PANEL

NO.	CLASS	ITEMS		JUDGEMENT	
8.5.1	MAJOR	Touch Panel Crack			Reject
8.5.2	MINOR	Touch Panel Chipping	Corner		X≦2mm, Y≦2mm, Z＜1/2T Accept
			Edge		X≦3mm, Y≦3mm, Z＜1/2T Accept
8.5.3	MINOR	Scratch Dust and Foreign material (Linear Type)		W≦0.05, L≦10mm	Accept
				0.05mm<W≦0.07mm ; L≦5.0mm	Accept 3 ea Max.
				W>0.07mm	Reject
8.5.4	MINOR	Scratch Dust and Foreign material (Round Type ： Φ=(Length+Width)/2)		Φ≦0.25mm	Accept
				0.25mm＜Φ≦0.35mm	Accept 5 ea Max.
				Φ＞0.35mm	Reject
8.5.5	MINOR	Touch Panel Dent / Fish Eyes		Φ≦0.35mm	Accept
				0.35mm＜Φ≦1.0mm Distance ＞5.0mm	Accept 3 ea Max.
				Φ＞1.0mm	Reject
8.5.6	MINOR	Touch Panel Air Bubble		Φ≦0.2mm	Accept
				0.2mm＜Φ≦0.5mm	Accept 3 ea Max.
				Φ＞0.5mm	Reject
8.5.7	MINOR	Touch Panel Printing area Scratch		W≦0.03, L≦10mm	Accept
				0.03mm＜W≦0.05mm, L≦5mm	Accept 3 ea Max.
				W＞0.05mm or L＞5mm (W>0.05 Follow 8.5.4 Round type)	Reject
8.5.8	MINOR	Touch Panel White Haze Mark / Dust		Can not be removed	Reject