SPECIFICATION

OF

LIQUID CRYSTAL DISPLAY MODULE

UNITED RADIANT TECHNOLOGY CORP. 光聯科技 Feb-20-2020 品管部 QC DEPT.

CUSTOMER : URT-STD

Model No. : UMOH-9400MD-T

Model version : 2

Document Revision : 2

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	Feb-20-2020
APPROVED	CHECKED	PREPARED	Date

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Revision record

Document Revision	Model No. Version No.	Description	Revision by
0	UMOH-9400MD-T Version No. 0	10.1” TFT.	Hugh Ko Y.C. Lin 21-Nov-2019
1	UMOH-9400MD-T Version No. 1	Add image sticking test condition.	Hugh Ko Y.C. Lin 25-Dec-2019
2	UMOH-9400MD-T Version No. 2	Modify the standard of visual inspection.	Hugh Ko Y.C. Lin 20-Feb-2020

CONTENTS:

1. BASIC SPECIFICATION

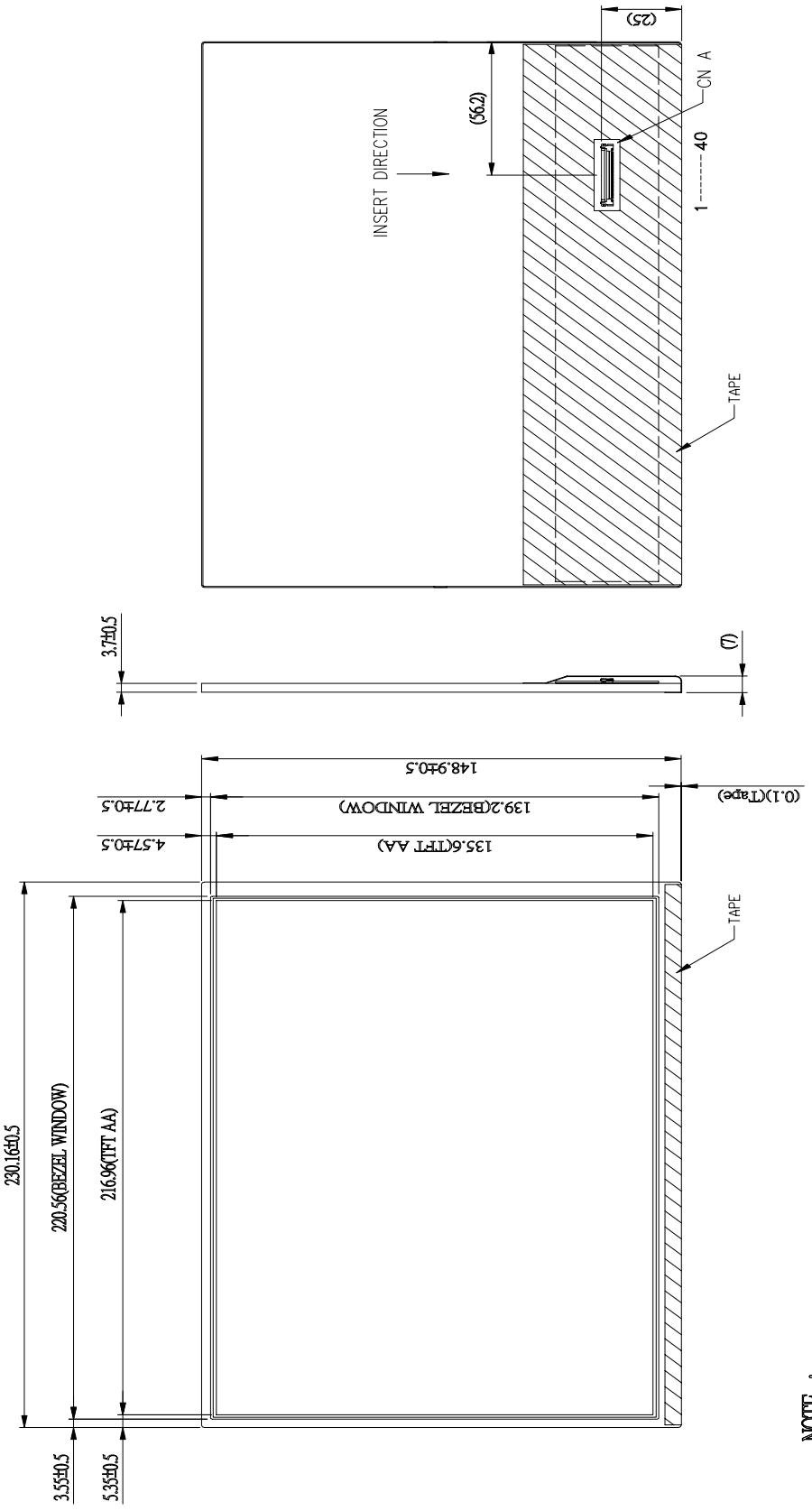
1.1 Mechanical specifications

Items	Nominal Dimension	Unit
Active screen size	10.1” diagonal	-
Dot Matrix	1280 x RGB x 800	Pixel
Module Size (W x H x T)	230.16 x 148.9 x 7	mm.
Active Area (W x H)	216.96 x 135.6	mm.
Pixel Size (W×H)	0.1695 x 0.1695	mm.
Color depth	262K	color
Interface	LVDS	-
Driving IC Package	COG	-
Module Weight	260±10%	g

1.2 Display specification

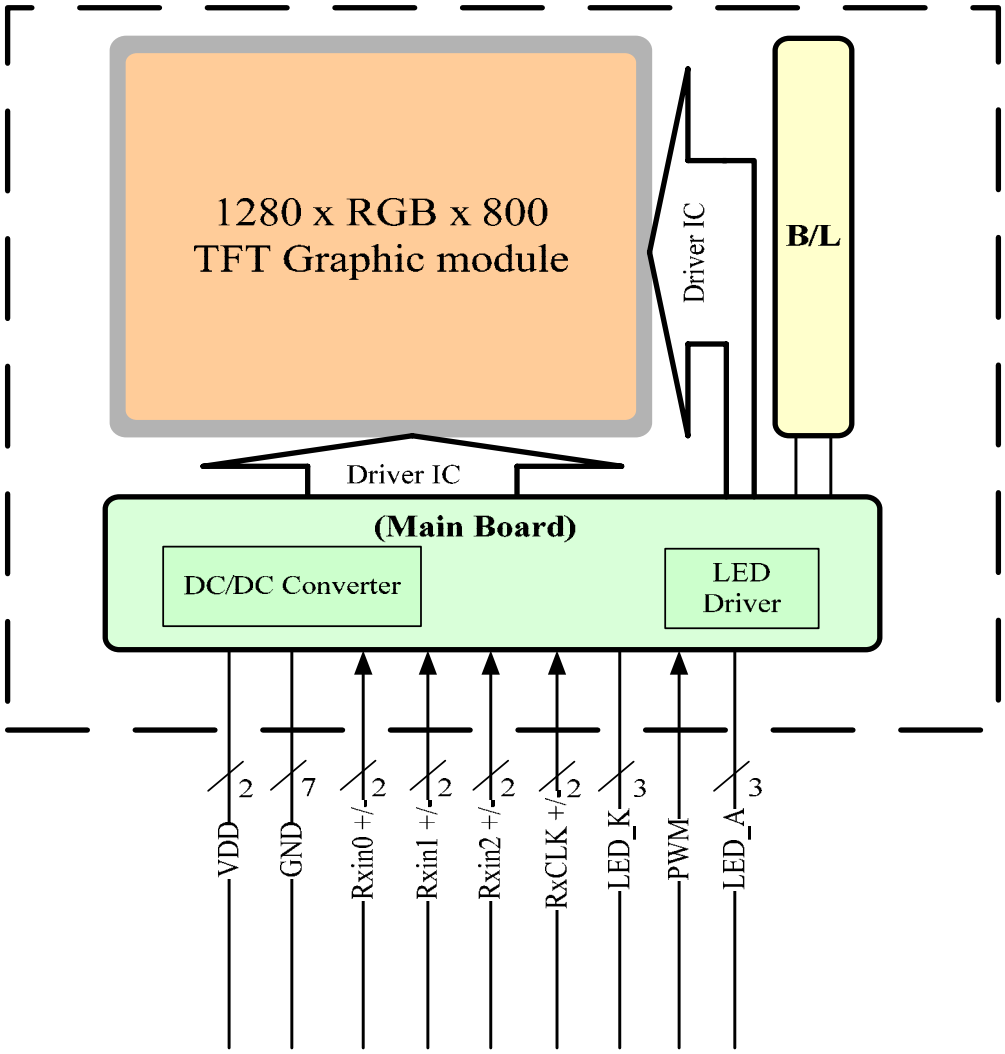
Display	Descriptions	Note
LCD Type	SFT	-
LCD Mode	Normal Black	-
Polarizer Mode	Transmissive	-
Polarizer Surface	Anti-glare	-
Pixel arrangement	RGB-stripe	-
Backlight Type	LED	-
Viewing Direction	All Direction	-

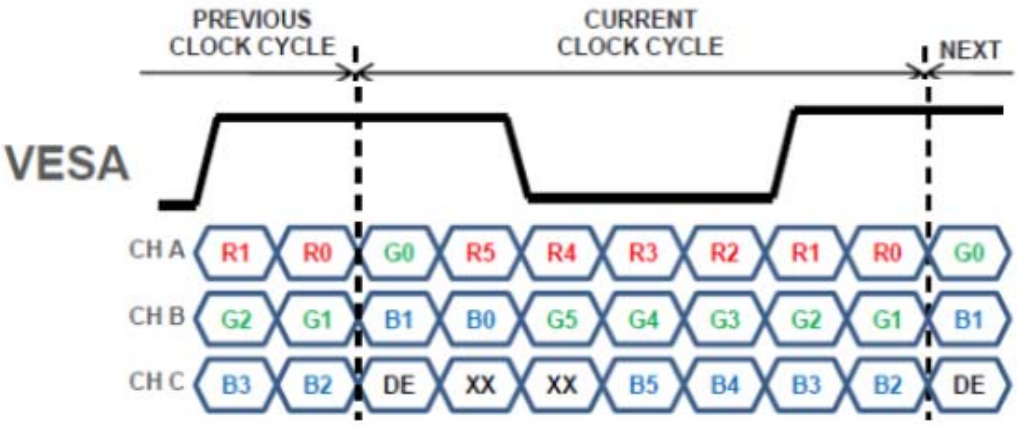
1.3 Outline dimension



NOTE :
1. LCD : TFT TRANSMISSIVE TYPE , NORMALLY BLACK
2. VIEWING DIRECTION : WIDE VIEWING ANGLE
3. LED BACKLIGHT COLOR : WHITE
4. CN A (40PIN) : STM MSAK24025P40B or equivalent
5. Top: -20~70°C , Tst:-30~80°C
6. TOLERANCE FOR NOT ASSIGNED ±0.3
7. RoHS-COMPLIANT

1.4 Block diagram:





1.5 Interface Pin Connection

Pin No.	Pin Symbol	I/O	Description
1	NC	-	No Connection.
2~3	VDD	P	Power supply for logic circuit.
4~7	NC	-	No connection.
8	Rxin0 -	I	-LVDS differential data input.
9	Rxin0 +	I	+LVDS differential data input.
10	GND	P	Ground.
11	Rxin1 -	I	-LVDS differential data input.
12	Rxin1 +	I	+LVDS differential data input.
13	GND	P	Ground.
14	Rxin2 -	I	-LVDS differential data input.
15	Rxin2 +	I	+LVDS differential data input.
16	GND	P	Ground.
17	RxCLK -	I	-LVDS differential data input.
18	RxCLK +	I	+LVDS differential data input.
19	GND	P	Ground.
20~21	NC	-	No connection.
22	GND	P	Ground.
23~24	NC	-	No connection.
25	GND	P	Ground.
26~27	NC	-	No connection.
28	GND	P	Ground.
29~30	NC	-	No connection.
31~33	LED_K	P	Power ground for LED driver.
34	NC	-	No connection.
35	PWM	I	Adjust the LED B/L brightness.
36~37	NC	-	No connection.
38~40	LED_A	P	Power supply for LED driver.

2. ELECTRICAL CHARACTERISTICS

2.1 Absolute Maximum Ratings

Items	Symbol	Min.	Max.	Unit
Supply Voltage	VDD	-0.3	4.0	V
Supply Voltage for LED B/L	LED_A	-0.3	10.0	V
Supply Voltage for LED B/L PWM	VPWM	--	LED_A	V
Operate temperature range	TOP	-20	70	℃
Storage temperature range	TST	-30	80	℃

Note1: VDD: Digital I/O Data

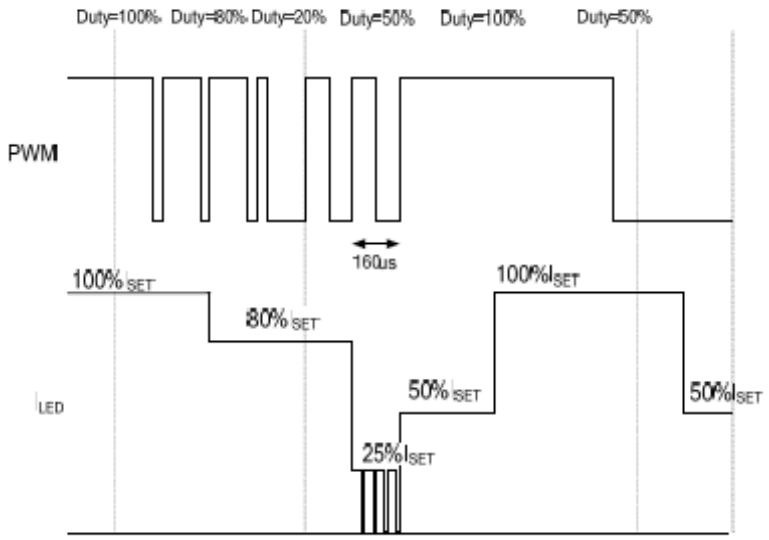
Note2: Functional operation should be restricted under ambient temperature (25℃)

Note3: Maximum ratings are those values beyond which damages to the device may occur. Functional operation should be restricted to the limits in the Electrical Characteristics chapter.

2.2 DC Characteristics:

Items	Symbol	Min.	Typ.	Max.	Unit	Condition
Power supply voltage	VDD	3.0	3.3	3.6	V	
LED Power supply voltage	LED_A	5.0	--	10.0	V	
PWM High Threshold	VPWMH	1.8	--	--	V	
PWM Low Threshold	VPWML	--	--	0.6	V	
PWM Frequency	FPWM	100	--	20k	Hz	
PWM Duty Cycle	TD	20	--	100	%	Note1
Current for Power supply	IDD	--	450	900	mA	White pattern
Current for Power supply	ILED	--	--	1300	mA	Note2

Note1: PWM Duty Cycle



Note2:

Base on the power conversion efficiency, different power consumption will be caused by different applied voltage.

LED_A	ILED (Typ.)
5.0 V	650 mA
6.0 V	520 mA
7.0 V	420 mA
8.0 V	350 mA
9.0 V	300 mA
10.0 V	270 mA

2.3 LED B/L Characteristics:

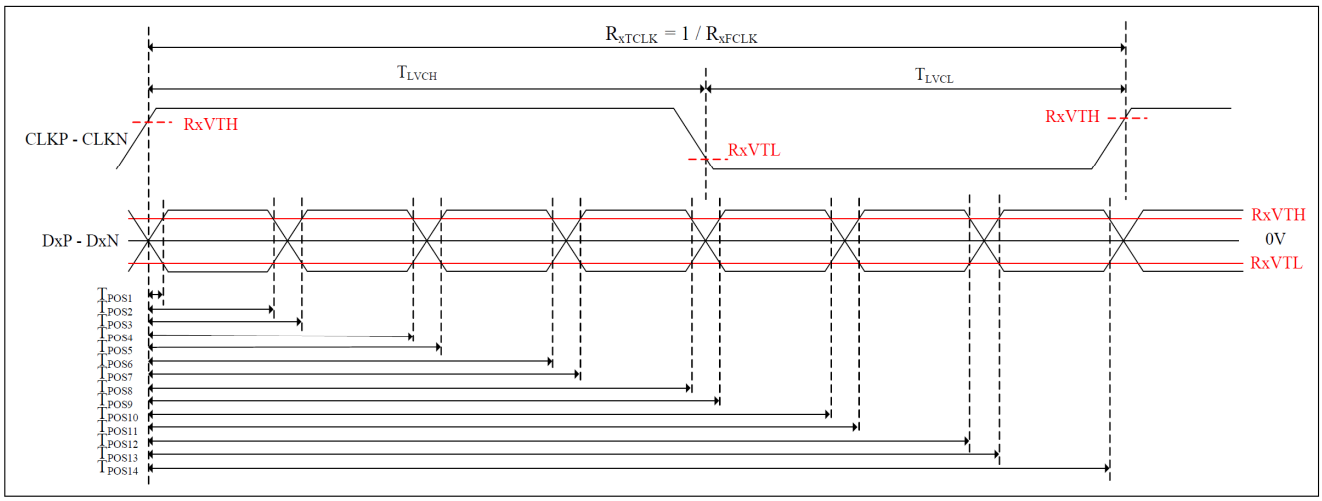
PARAMETER	SYMBOL	MIN	TYP	MAX	Unit	Test Condition	NOTE
Supply Current	If	-	184	-	mA	Ta=25℃	-
Supply Voltage	VLED	11	-	15	V	Ta=25℃	-
Half-Life Time	Lf	-	50000	-	hrs	Ta=25℃	1

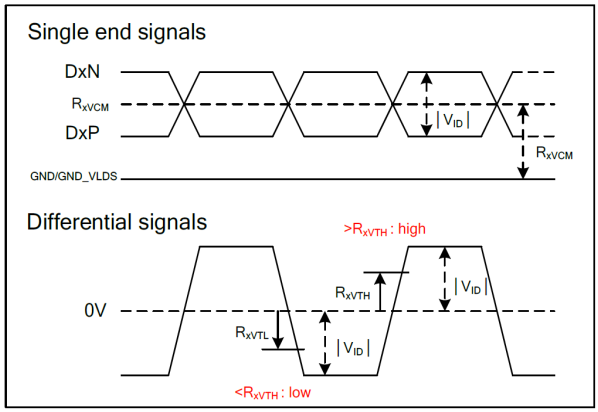
Note 1：The "Half-Life Time" is defined as the LED chip brightness decreases to 50% than original brightness, Based on Ta 25±2℃,60±10% RH condition.

2.4 AC Characteristics

LVDS AC characteristic (VDD=VDD_LVDS=3.0~3.6V, GND=GND_LVDS=0V, TA=-20~85℃)

Parameter	Symbol	Min	Typ.	Max.	Unit	Conditions
Clock Frequency	R_{xFCLK}	20		80	MHz	
Clock Period	R_{xTCLK}	12.5		50	ns	
1 data bit time	UI	-	1/7	-	R_{xTCLK}	
Clock high time	T_{LVCH}		4		UI	
Clock low time	T_{LVCL}		3		UI	
Position 1	T_{POS1}	-0.25	0	0.25	UI	
Position 2	T_{POS2}	0.75	-	1.25	UI	
Position 3	T_{POS3}	0.75	1	1.25	UI	
Position 4	T_{POS4}	1.75	-	2.25	UI	
Position 5	T_{POS5}	1.75	2	2.25	UI	
Position 6	T_{POS6}	2.75	-	3.25	UI	
Position 7	T_{POS7}	2.75	3	3.25	UI	
Position 8	T_{POS8}	3.75	-	4.25	UI	
Position 9	T_{POS9}	3.75	4	4.25	UI	
Position 10	T_{POS10}	4.75	-	5.25	UI	
Position 11	T_{POS11}	4.75	5	5.25	UI	
Position 12	T_{POS12}	5.75	-	6.25	UI	
Position 13	T_{POS13}	5.75	6	6.25	UI	
Position 14	T_{POS14}	6.75	-	7.25	UI	
Input eye width	T_{EYEW}	0.5	-	-	UI	
Input eye border	T_{EX}	-	-	0.25	UI	
PLL wake-up time	TenPLL			150	us	

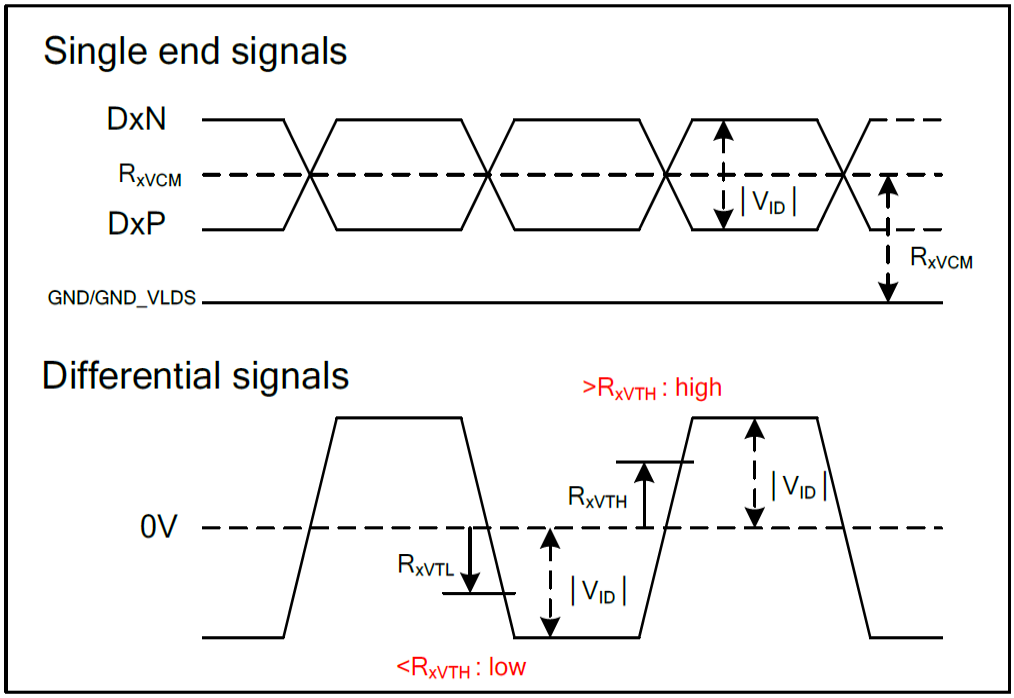




2.5 LVDS Interface

LVDS receiver characteristic (Receiver Differential Input：D0P~D3P, D0N~D3N, CLKP, CLKN)
(VDD=VDD_LVDS=3.0~3.6V, GND=GND_LVDS=0V, TA=-20~85℃)

Parameter	Symbol	Min	Typ.	Max.	Unit	Conditions
Differential input high threshold voltage	R_{xVTH}			0.1	V	R_{xVCM} = 1.2V
Differential input low threshold voltage	R_{xVTL}	-0.1			V	
Input voltage range (singled-end)	R_{xVIN}	0		VDD-1.0	V	
Differential input common mode voltage	R_{xVCM}	0.6	1.2	2.4-| V_{ID} | /2	V	
Differential input voltage	| V_{ID} |	0.2	0.4	0.6	V	
Differential input leakage current	RV_{xliz}	-10		10	uA	
LVDS Digital Operating Current	I_{VDD_LVDS}	-	10	15	mA	F_{CLK}=65 MHz , VDD_LVDS=3.3V Data pattern=55/H → AA/H (loop)
LVDS Digital Stand-by Current	I_{STBD_LVDS}	-	10	50	uA	RSTB=0 or STBYB=0 All functions are stopped CLKx & D0x connect to GND



2.6 Input signal timing

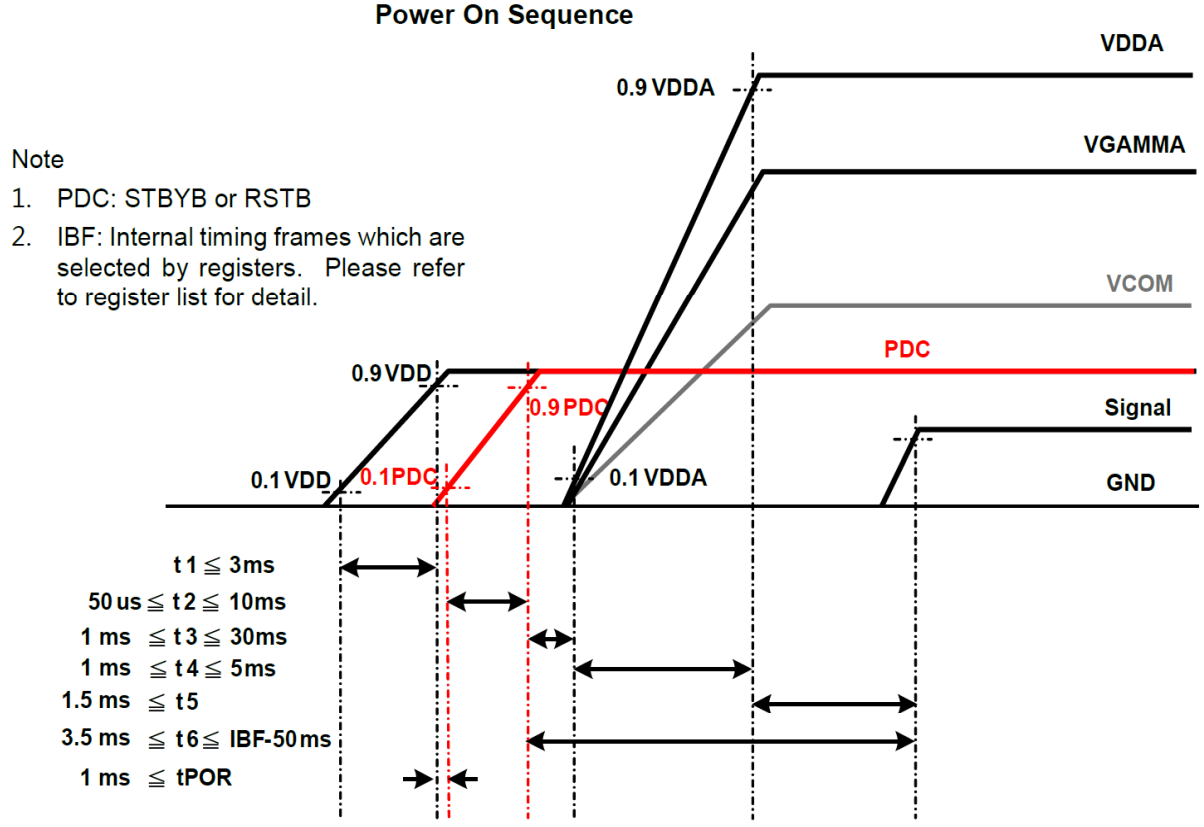
1280x800 (RES[3:0] = 0010)

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
CLK frequency	t_{CLK}	68.4	71.9	78.1	Mhz	
Horizontal blanking time	t_{HBT}	136	144	164	t_{CLK}	t_{HBP} + t_{HFP}
Horizontal back porch	t_{HBP}	5	5	164- t_{HFP}	t_{CLK}	
Horizontal display area	t_{HD}	1280	1280	1280	t_{CLK}	
Horizontal front porch	t_{HFP}	131	139	159	t_{CLK}	
Horizontal period	t_{H}	1416	1424	1444	t_{CLK}	
Horizontal pulse width	t_{HPW}	1	1	256	t_{CLK}	
Vertical blanking time	t_{VBT}	5	42	101	t_{H}	t_{VBP} + t_{VFP}
Vertical back porch	t_{VBP}	2	2	101- t_{VFP}	t_{H}	
Vertical display area	t_{VD}	800	800	800	t_{H}	
Vertical front porch	t_{VFP}	3	40	99	t_{H}	
Vertical period	t_{V}	805	842	901	t_{H}	
Vertical pulse width	t_{VPW}	1	1	128	t_{H}	

2.7 Power ON/OFF Sequence：

When ST5821's Tcon mode is selected, and customers don't want to enable ST5821 internal power circuit to generate all voltages, In order to prevent IC damage from abnormal power on or off sequence, please follow below timings.

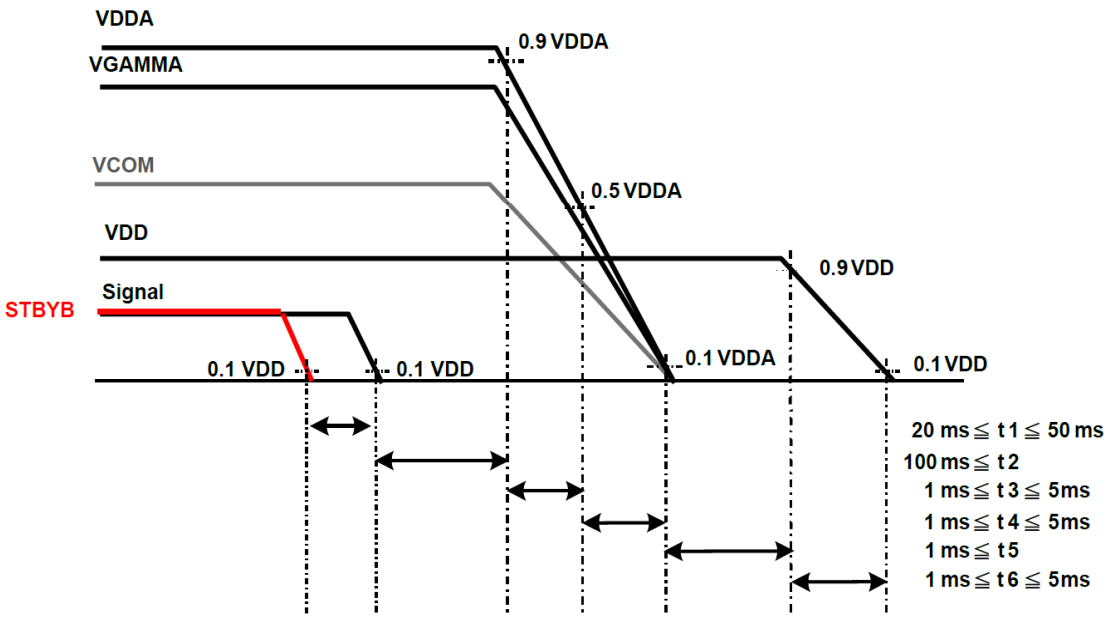
Power On Sequence



Note

1. PDC: STBYB or RSTB
2. IBF: Internal timing frames which are selected by registers. Please refer to register list for detail.

Power Off (standby) Sequence



3. OPTICAL CHARACTERISTICS

3.1 Characteristics

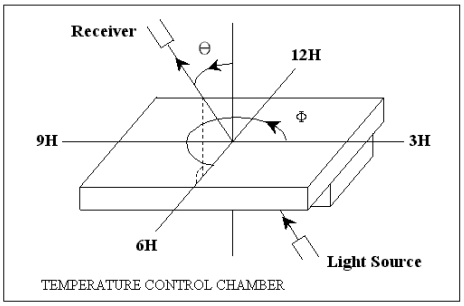
Electrical and Optical Characteristics

No.	Item			symbol / temp.		Min.	Typ.	Max.	Unit	Note
1	Response Time			Tr+Tf	25 ℃	-	25	40	ms	2
2	Viewing Angle	Hor.	Cr≧10	θ_{2+}	Φ = 0°	75	85	-	degree	3
				θ_{2-}	Φ = 180°	75	85	-		
		Ver.		θ_{1+}	Φ = 270°	75	85	-		
				θ_{1-}	Φ = 90°	75	85	-		
3	Contrast Ratio			Cr	25 ℃	600	800	-	-	4
4	Red x-code			Rx	25 ℃	0.550	0.600	0.650	-	5
	Red y-code			Ry		0.279	0.329	0.379		
	Green x-code			Gx		0.307	0.357	0.407		
	Green y-code			Gy		0.540	0.590	0.640		
	Blue x-code			Bx		0.101	0.151	0.201		
	Blue y-code			By		0.078	0.128	0.178		
	White x-code			Wx		0.273	0.323	0.373		
	White y-code			Wy		0.311	0.361	0.411		
	Brightness			Y		430	500	-	cd/m^2	
5	Brightness Uniformity				25 ℃	80	85	-	%	6

3.2 Definition of optical characteristics

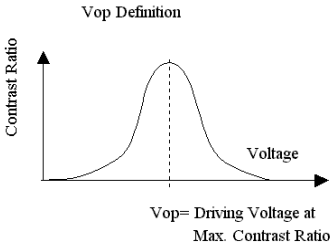
Measurement condition :

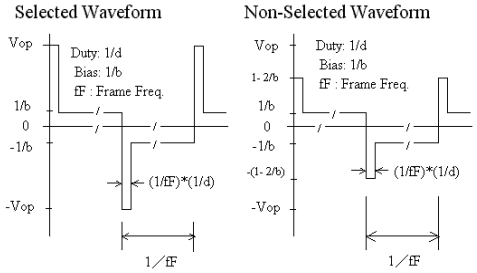
Transmissive and Transflective type



PHOTAL LCD-5000

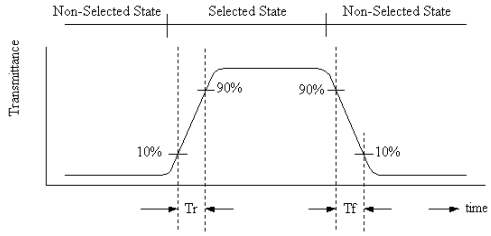
[Note 1] Definition of LCD Driving Vop and Waveform :



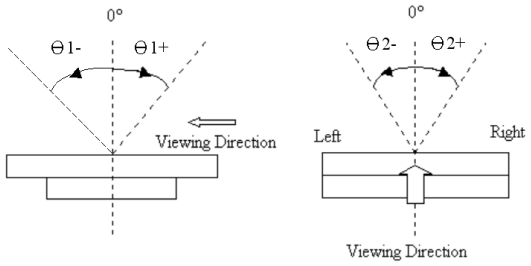


[Note 2] Definition of Response Time

for Negative type :

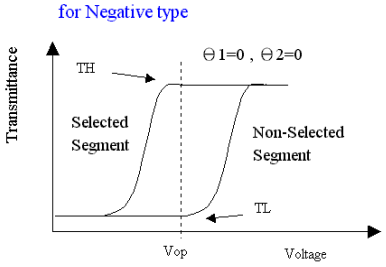


[Note 3] Definition of Viewing Angle :



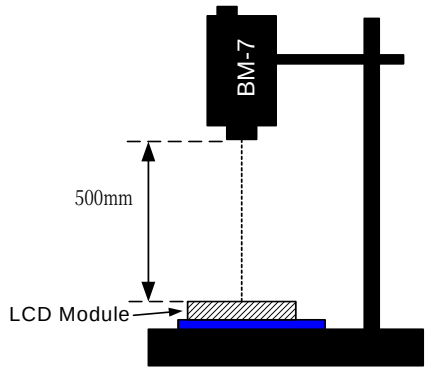
[Note 4] Definition of Contrast Ratio :

for Negative type

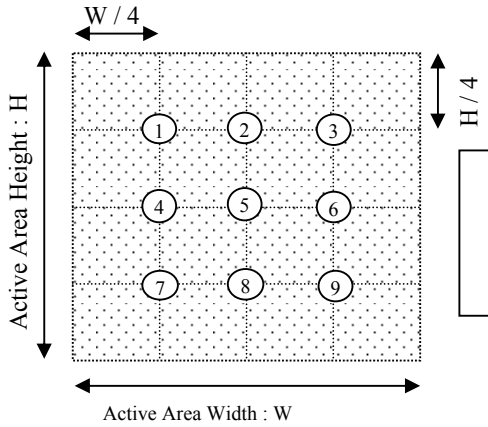


$$\text{Contrast Ratio} = \frac{TH}{TL}$$

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

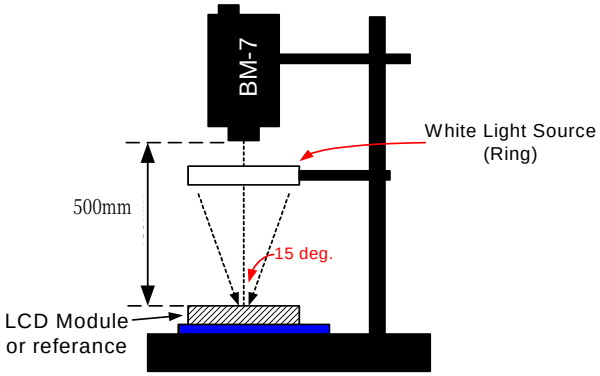


[Note 6] Definition of Brightness Uniformity

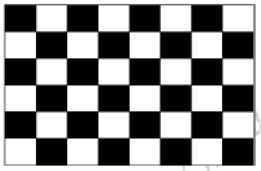


$$\text{Brightness Uniformity} = \frac{\text{Minimum Brightness of Point 1~9}}{\text{Maximum Brightness of Point 1~9}}$$

[Note 7] Definition of Measurement of Reflectance



4. RELIABILITY :

Item No	Items	Condition	Note
1	High temperature operating	70 ℃ , 200 hours	1
2	Low temperature operating	-20 ℃ , 200 hours	1
3	High temperature storage	80 ℃ , 200 hours	1
4	Low temperature storage	-30 ℃ , 200 hours	1
5	High temperature & humidity storage	60℃, 90%RH, 100 hours	2
6	Thermal Shock storage	-30℃, 30min.<=> 80℃, 30min. 10 Cycles	1
7	Drop test	Packed, 60 cm free fall, 6 sides, 1 corner, 3edges	
8	Image Sticking Test	25 ± 2℃ Operation with test pattern sustained for 2 hrs, then change to gray pattern immediately. After 5 mins, the mura must be disappeared completely .  Image Sticking –pattern  Mid-Gray pattern	

Note1: Ta is the ambient temperature of sample.

Note2: Before cosmetic and function test, the product must have enough recovery time, at least 24 hours at room temperature.

Note3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

Note4: Test after assembling the FPC and the backlight, etc.

5. PRODUCT HANDLING AND APPLICATION

☐ 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.
- Pay attention to the humidity of the work shop, 50~60%RH is satisfactory.
- Use a non-leak iron for soldering LCM.
- Do not touch the display surface or connection terminals area with bare hands.Smudges on the display surface reduce the insulation between terminals.
- Cautions for soldering to LCM:

  Condition for soldering I/O terminals:
  Temperature at iron tip :350℃±15℃.
  Soldering time : 3~4sec./ terminals.
  Type of solder : Eutectic solder(rosin flux filled).

☐ PRECAUTION IN USE OF LCM

- Do not contact or scratch the front surface and the contact pads of a LCM with hard materials such as metal or glass or with one's nail.
- To 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 , also avoid them in high-temperature & high humidity environment for a long period.
- Do not drive LCM by DC voltage.
- Do not expose LCM to organic solvent.
- 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.

☐ PRECAUTION FOR STORING AND USE OF LCM

- To avoid degradation of the device , do not store the module under the conditions of direct sunlight , high temperature or high humidity . Keep the module in bags designed to prevent static electricity charging under low temperature / normal humidity conditions(avoid high temperature / high humidity and low temperature below 0℃)
- Never use the LCD , LCM under 45 Hz , the liquid crystal will decomposition and cause permently damage on display !!

☐ 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**

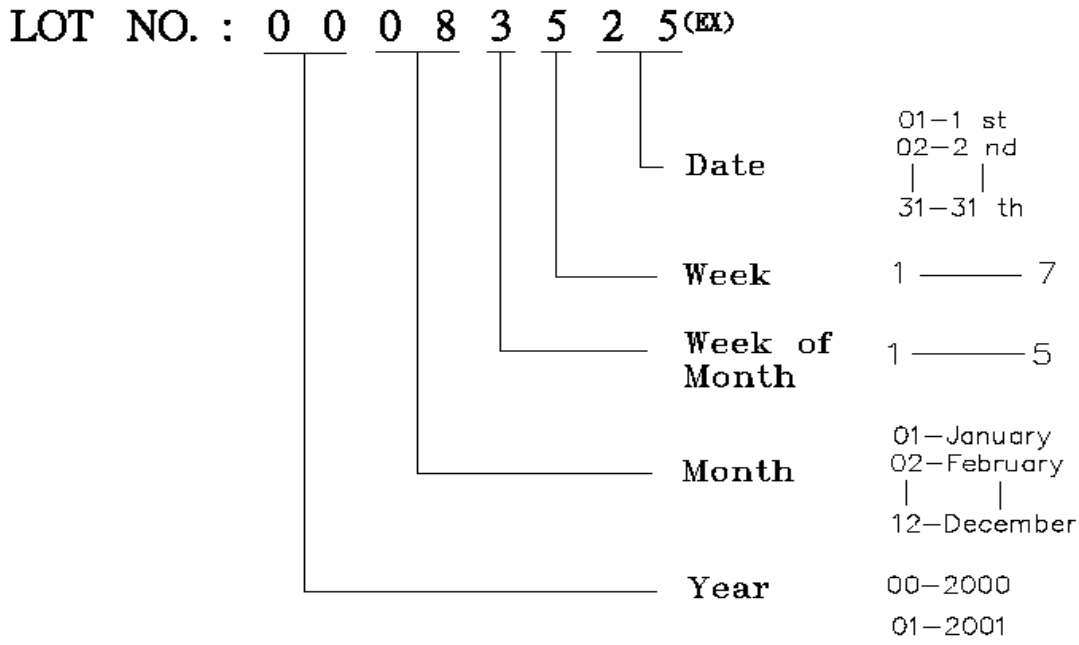
  Year Month Day - Serial no.

- Example: 121108 - 0003 ==> Year 2012, November,8th , Serial no.0003

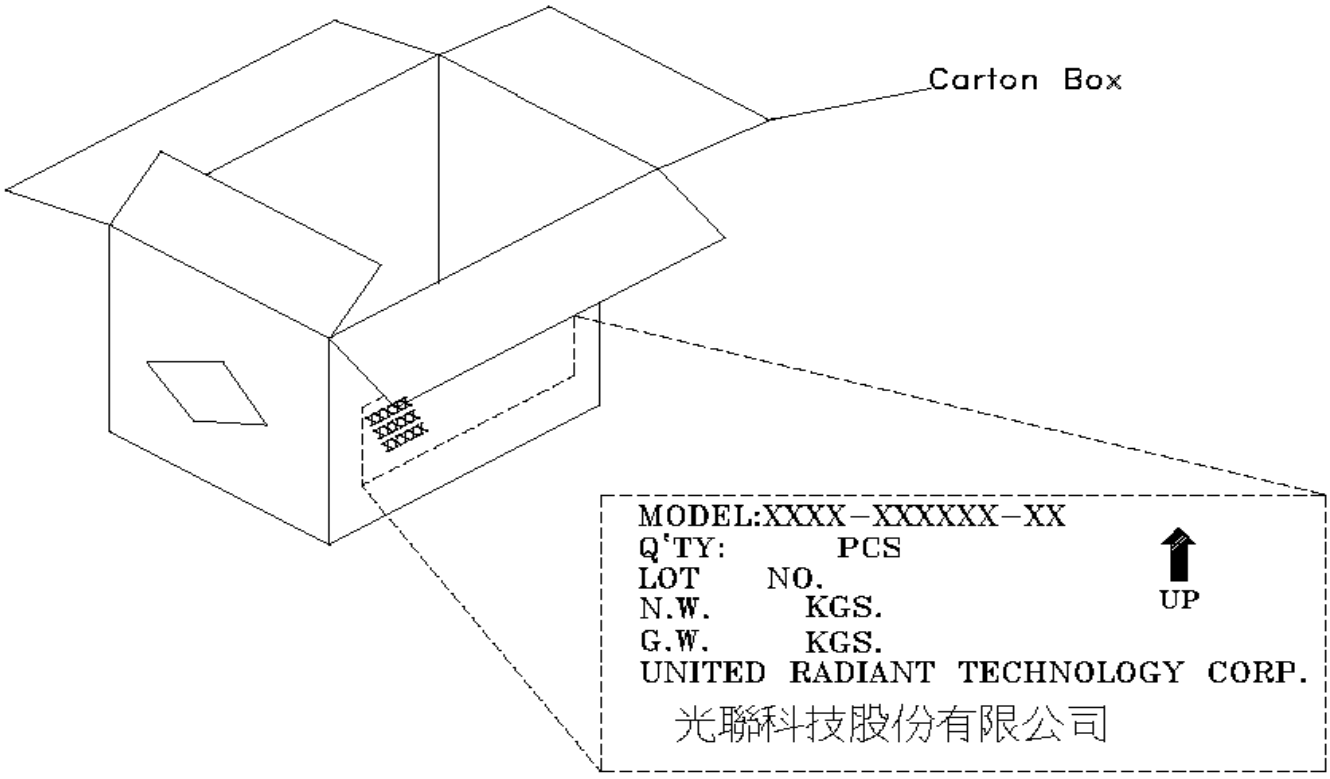
Note ： The lot no. attached on the packing box will be used for tracking once the part is too small to print the date code.

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(%)
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. CHECKING DIRECTION SHALL BE IN THE 45 DEGREE AREA TO FACE THE SAMPLE.

8.2.2. CHECKER SHALL SEE OVER 300±50 mm. WITH BARE EYES FAR FROM SAMPLE AND USING 2 PCS. OF 20W FLUORESCENT LAMP.

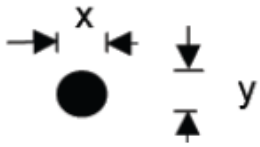
8.3 Standard Of Visual Inspection

Defects are classified as major defects and minor defects according to the degree of defectiveness defined herein.

8.3.1 Major defect-- Features

Item No	Items to be inspected	Inspection Standard
1	All functional defects	1) No display 2) Display abnormally 3) line defect
2	Missing	Missing function component
3	Crack	Glass Crack

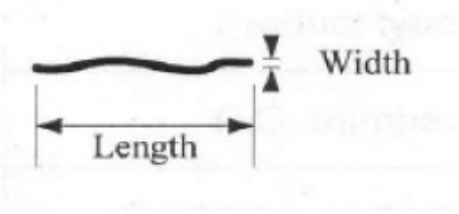
8.3.2 Minor defect --- Display

<table>
<tr><th>Item No</th><th>Items to be inspected</th><th colspan="2">Inspection standard</th></tr>
<tr><td rowspan="5">1</td><td>Spot Defect
Including:
Black spot
White spot
Foreign particle</td><td colspan="2">For dark/white spot is defined
$\varphi=(x+y)/2$
 

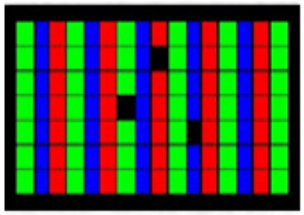
Φ＞0.2mm dots distance≥5mm</td></tr>
<tr><td rowspan="4">Polarizer dirt
Cell particle</td><td>Size φ(mm)</td><td>Acceptable Quantity</td></tr>
<tr><td>Φ<0.2mm</td><td>Ignore</td></tr>
<tr><td>0.2mm≤φ≤0.4mm</td><td>3</td></tr>
<tr><td>0.4mm < φ</td><td>Not allowed</td></tr>
</table>

<table>
<tr><td rowspan="5">2</td><td rowspan="5">Line Defect
Including
Black line

White line

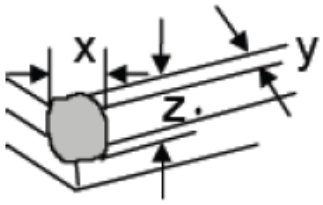
Scratch</td><td colspan="2">Define:
 

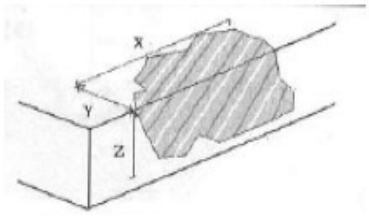
Line defect distance ⩾5mm</td></tr>
<tr><td>Width(mm)
Length(mm)</td><td>Acceptable Quantity</td></tr>
<tr><td>W≤0.05mm</td><td>Ignore</td></tr>
<tr><td>0.05mm < W≤0.1mm
L≤10mm</td><td>3</td></tr>
<tr><td>10mm<L 0.1mm < W</td><td>Not allowed</td></tr>
<tr><td rowspan="6">3</td><td rowspan="6">Electrical Dot
Defect</td><td colspan="2">Bright and Black dot define:
 

and
 </td></tr>
<tr><td>Item</td><td>Acceptable Quantity</td></tr>
<tr><td>Dark dot defect</td><td>4</td></tr>
<tr><td>Bright dot defect</td><td>2</td></tr>
<tr><td>Total Dot</td><td>4</td></tr>
<tr><td>Distance between bright dot</td><td>⩾15mm</td></tr>
<tr><td rowspan="2"></td><td rowspan="2"></td><td>Distance between dark dot
and bright dot</td><td>⩾5mm</td></tr>
<tr><td>Distance between dark dot</td><td>⩾5mm</td></tr>
</table>

<table>
<tr><td rowspan="5">4</td><td rowspan="5">Polarizer foreign particle
Cell foreign particle
(bright)</td><td>Size φ(mm)</td><td>Acceptable Quantity</td></tr>
<tr><td>φ≤0.25</td><td>Ignore</td></tr>
<tr><td>0.25 < φ≤0.50</td><td>4</td></tr>
<tr><td>0.50 < φ</td><td>Not allowed</td></tr>
<tr><td colspan="2">Φ＞0.25mm dots distance≥5mm</td></tr>
<tr><td>5</td><td>Tiny bright dot
Dense tiny highlights</td><td colspan="2">Definition of Tiny bright dot：Φ＜0.1mm，
ND 6% judgment
clustered is not allowed(N≦5,D≦5mm)</td></tr>
<tr><td>6</td><td>Mura</td><td colspan="2">Black/Gray screen is not visible with ND2% coverage, other screens are not allowed ,if necessary, building limited sample</td></tr>
</table>

8.3.3 Minor defect --- Exterior

<table>
<tr><td rowspan="4">1</td><td rowspan="4">Polarizer Dent/Bubble</td><td colspan="2">Size φ(mm)</td><td>Acceptable Quantity</td></tr>
<tr><td colspan="2">φ≤0.2mm</td><td>Ignore</td></tr>
<tr><td colspan="2">0.2mm < φ≤0.5mm</td><td>3</td></tr>
<tr><td colspan="2">0.5mm < φ</td><td>Not allowed</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Protective film</td><td colspan="2">Top injury、scratch、Wear scar</td><td>Undamaged Polarizer，ignore</td></tr>
<tr><td colspan="2">dirt, particle</td><td>ignore</td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">Glass defect</td><td colspan="3">1.Corner Fragment:
 
</td></tr>
<tr><td>Size(mm)</td><td colspan="2">Acceptable Quantity</td></tr>
<tr><td colspan="3"></td></tr>
</table>

<table>
<tr><td rowspan="4">3</td><td rowspan="4"></td><td>X≤2.0mm
Y≤2.0mm
Z≤T</td><td>Ignore
T：Glass thickness
X: Length Y: Width
Z: thickness</td></tr>
<tr><td colspan="2">2. Side Fragment:  </td></tr>
<tr><td>Size(mm)</td><td>Acceptable Quantity</td></tr>
<tr><td>X≤5.0mm
Y ≤0.8mm
Z≤T</td><td>Ignore
T：Glass thickness
X: Length Y: Width
Z: thickness</td></tr>
</table>

Note: 1. Dot defect is defined as the defective area of the dot area is larger than 50% of the dot area.

2. Polarizer bubble is defined as the bubble appears on active display area. The defect of polarizer bubble shall be ignored if the polarizer bubble appears on the outside of active display area.
3. ND application method: the parallel vertical distance between ND and panel is 3~5cm， the distance of eyes look squarely to the panel is 30±5cm
4. Foreign particle on the surface of the LCM should be ignored.
5. Displaying foreign points are judged by single eye with eyepiece.
6. AA (Active Area) area, the display area, ie, the effective product display area, is a poor type of control area for the electrical measurement display. VA (View Area) area, viewable area, that is, the area that can be visually seen after the product is installed on the customer's entire machine.