SPECIFICATION

OF

LIQUID CRYSTAL DISPLAY MODULE

UNITED RADIANT TECHNOLOGY CORP. 光聯科技 Oct-28-2019 品管部 QC DEPT.

CUSTOMER : URT-STD

Model No. : UMOH-9400MD-6T

Model version : 0

Document Revision : 0

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	Oct-28-2019
APPROVED	CHECKED	PREPARED	Date

COMPANY : No. 2,Fu-hsing Road,Taichung Econamic Processing Zone,Tantzu,Taichung,Taiwan,R.O.C.
TEL: 886-4-25314277 FAX: 886-4-25313067

Revision record

Document Revision	Model No. Version No.	Description	Revision by
0	UMOH-9400MD-6T Version No. 0	1. Add the capacitive touch panel. 2. Modify the module number from UMOH-9400MD-T to UMOH-9400MD-6T.	Hugh Ko Y.C. Lin 28-Oct-2019

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)	255.0 x 163.0 x 8.66	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	490±10%	g

1.1.1 Touch Panel Mechanical specifications:

Items	Nominal Dimension	Unit
Touch Panel Size	10.1”	inch
Module Size (WxH)	255.0 x 163.0	mm.
Active Area (WxH)	218.46 x 136.6	mm.
Thickness	2.2 (without protective film)	mm.

1.1.2 Mechanical Characteristics:

Items	Descriptions	Note
FPC Strength (Vertical)	Strength ≧ 600g/cm	-
FPC Bending	Min. 10 times for each side	Normal performance after Bending 90° test, no damaged on FPC
Static Load	10 kg within 10cm φ area for 30 sec	No mechanical damaged.

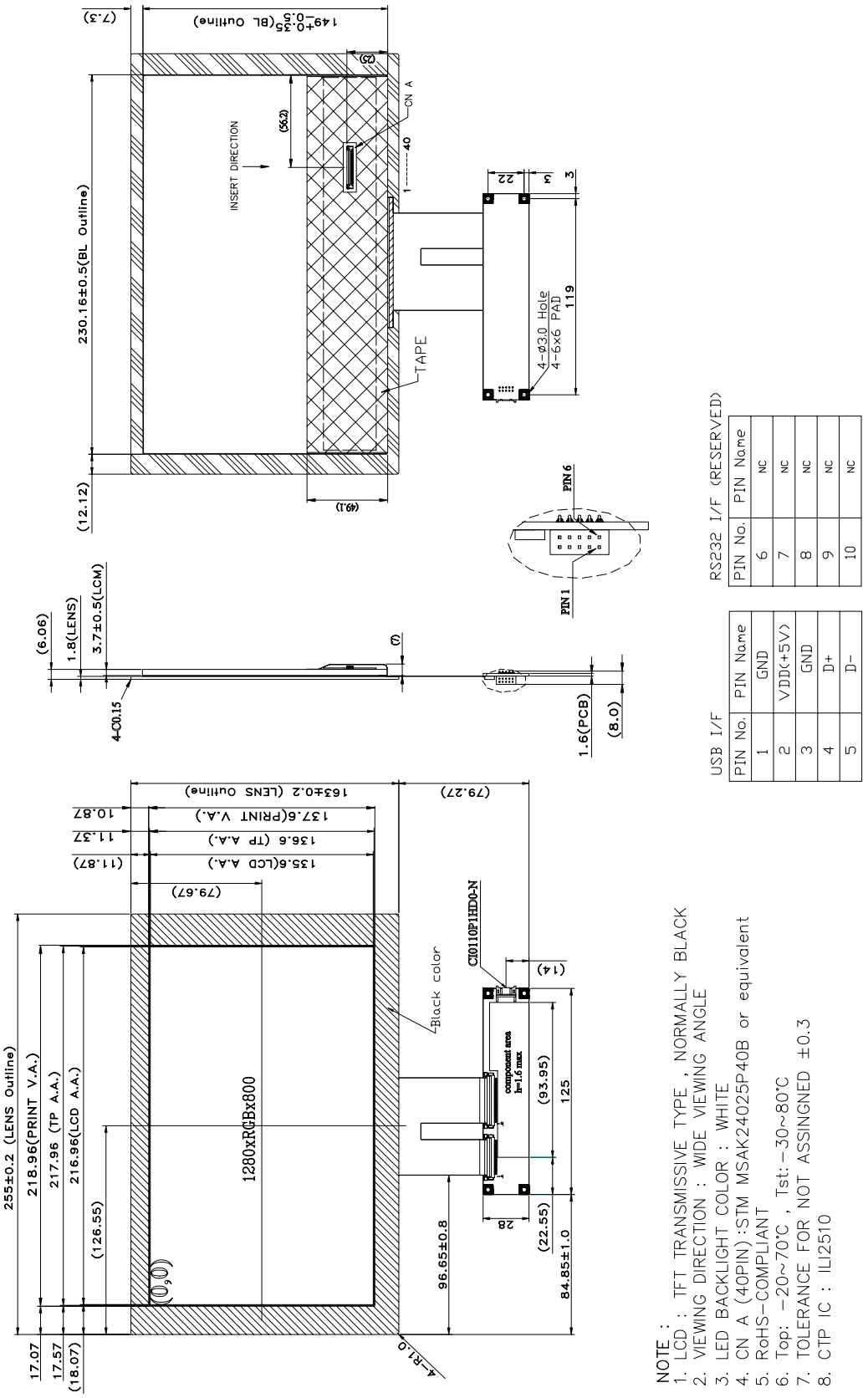
1.2 Display Specifications:

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

1.2.1 Touch Panel Specifications:

Display	Descriptions	Note
Type	Capacitive Touch Panel	-
Structure	Cover Glass : T = 1.8 mm	-
	ITO Film : T = 0.4 mm	
Surface Hardness	≧7H	7H pencil , pressure 500g/45 degree (JIS-K5600)
Touch Detection	Finger	-
Connector Type	Wafer Horizontal SMT Type	-
Resolution	1280(H) x 800(V)	Adjustable
Operating System	Linux, Windows 8.1/ 10, WinCE 6.0	-

1.3 Outline dimension



RS232 I/F (RESERVED)

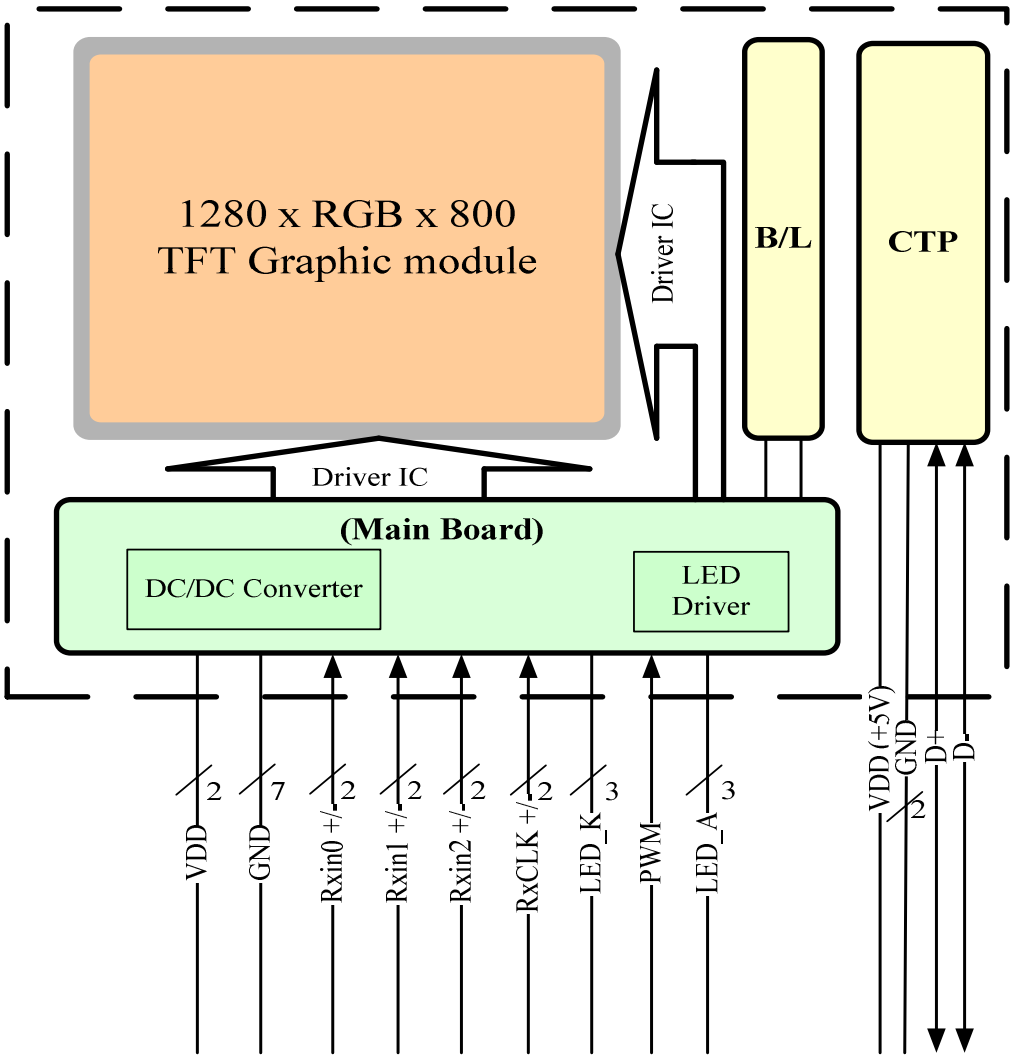
PIN No.	PIN Name
6	NC
7	NC
8	NC
9	NC
10	NC

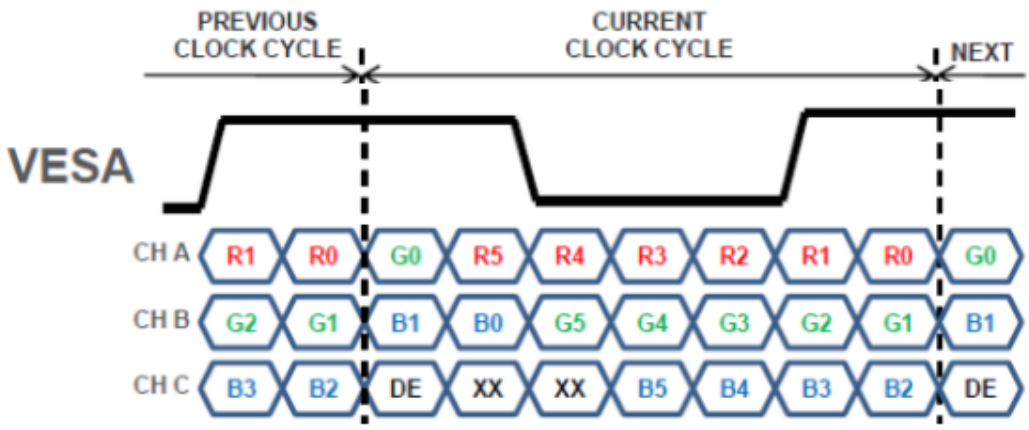
USB I/F

PIN No.	PIN Name
1	GND
2	VDD(+5V)
3	GND
4	D+
5	D-

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. RoHS-COMPLIANT
6. Top: -20~70°C , Tst: -30~80°C
7. TOLERANCE FOR NOT ASSINGNED ±0.3
8. CTP IC : ILI2510

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 supply for LED B/L's Cathode.
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 B/L's Anode.

1.5.1 CTP Interface Pin Connection:

Pin No.	Pin Symbol	I/O	Description
1	GND	P	Ground
2	VDD (+5V)	P	Power supply.(+5V)
3	GND	P	Ground
4	D+	I/O	USB differential signal line.
5	D-	I/O	USB differential signal line.
6	NC	-	Reserved for RS232 interface. (Ground)
7	NC	-	Reserved for RS232 interface. (Power)
8	NC	-	Reserved for RS232 interface. (Ground)
9	NC	-	Reserved for RS232 interface. (Tx)
10	NC	-	Reserved for RS232 interface. (Rx)

2. ELECTRICAL CHARACTERISTICS

2.1 Absolute Maximum Ratings

Items	Symbol	Min.	Max.	Unit
Supply Voltage	VDD	-0.3	4.0	V
Touch Panel Supply Voltage	VDD (+5V)	-0.3	5.5	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

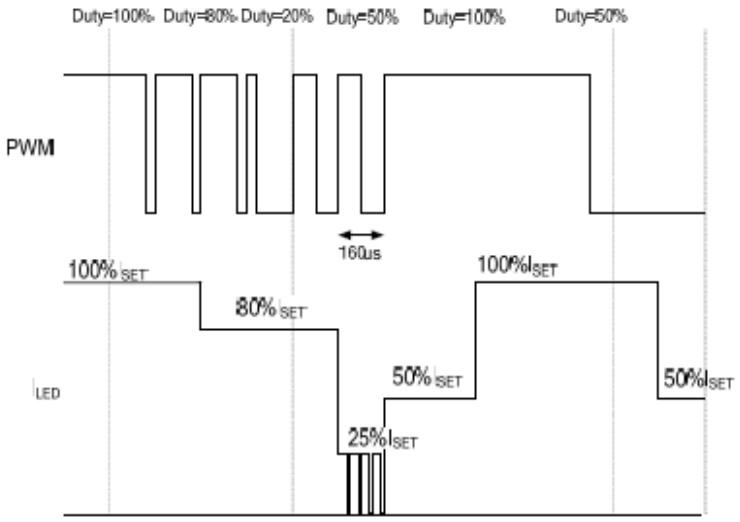
Note2: Functional operation should be restricted under ambient temperature (25℃)

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	
Touch panel power supply voltage	VDD (+5V)	4.4	5.0	5.5	V	
LED Power supply voltage	LED_A	5.0	--	10.0	V	Note2
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 LCM power supply	IDD	--	450	900	mA	White pattern
Current for touch panel power supply	IDD (+5V)	--	85	170	mA	
Current for LED B/L 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:

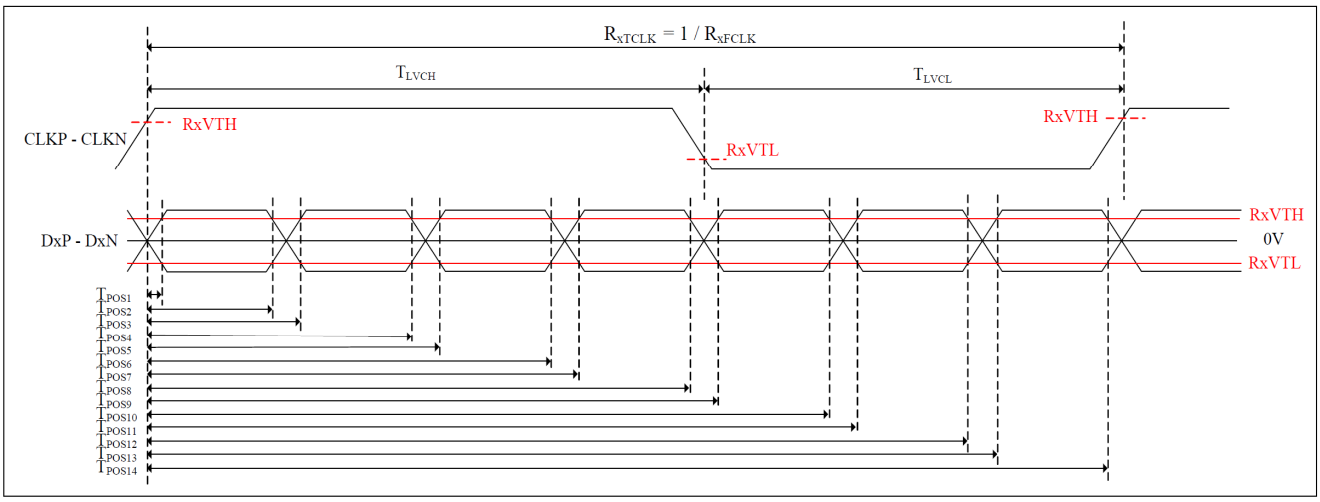
PARAMETER	SYMBOL	MIN	TYP	MAX	Unit	Test Condition	NOTE
Supply Current	If	-	184	-	mA	Ta=25℃	-
Supply Voltage	VLED	11	-	15	V	Ta=25℃	-
Half-Life Time	Lf	-	50000	-	hrs	Ta=25℃	1

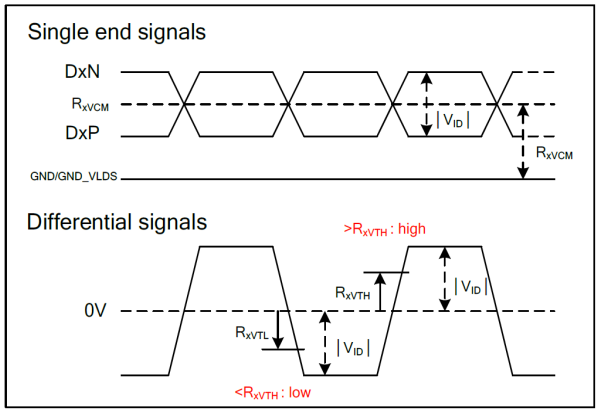
Note 1：The "Half-Life Time" is defined as the LED chip brightness decreases to 50% than original brightness, Based on Ta 25±2℃,60±10% RH condition.

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	

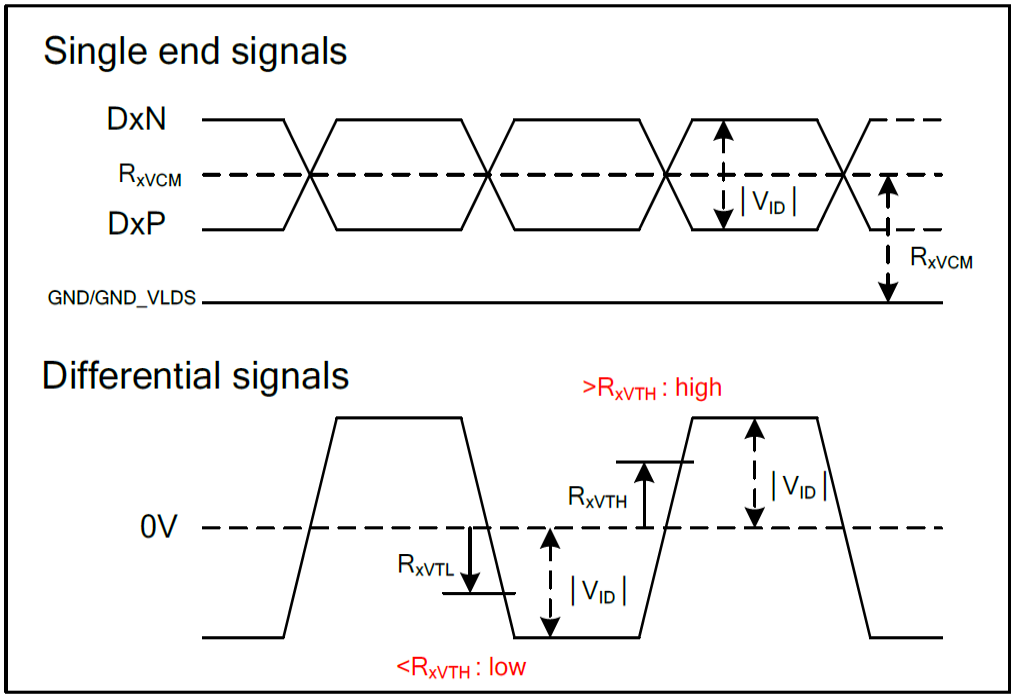




2.5 LVDS Interface

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

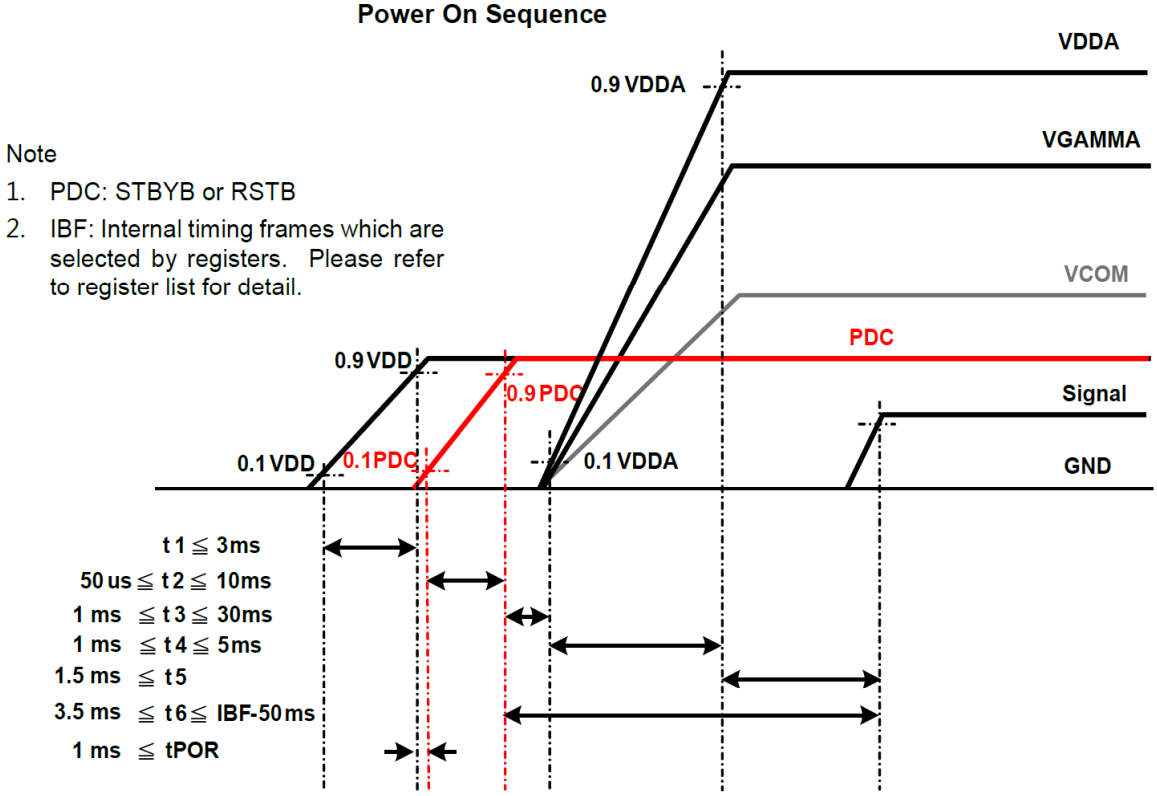
1280x800 (RES[3:0] = 0010)

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.

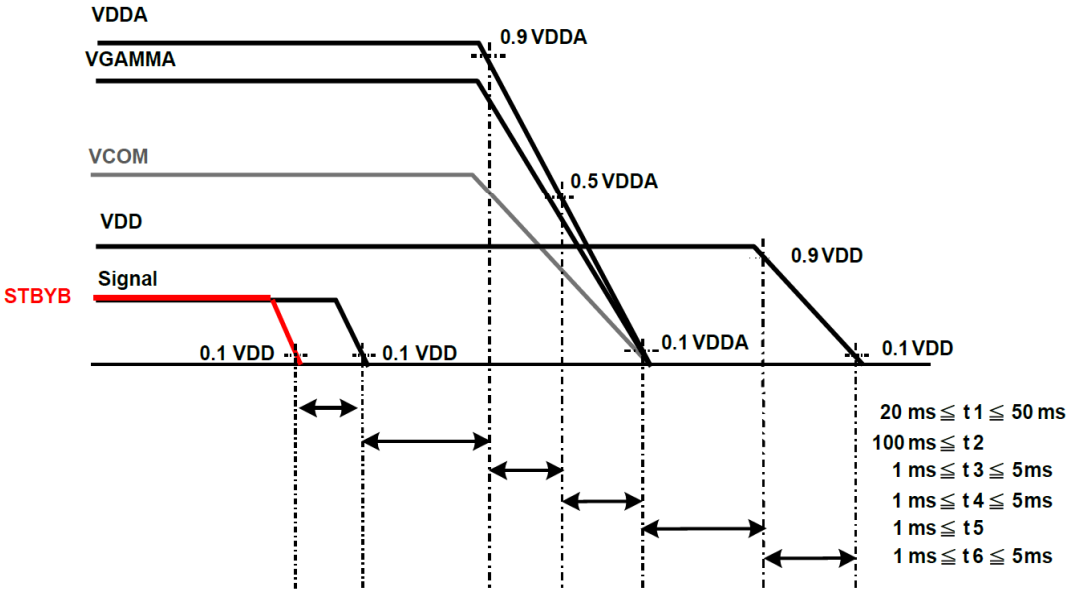
Power On Sequence



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



2.8 Touch Performance Specification：

NO	Test Item	Description	Judgement
1	Linearity copper stick diameter9 mm	Outside 3.5mm from edges	≦ 1mm
		Within 3.5mm of all edges	≦ 2mm
2	Accuracy copper stick diameter9 mm	Outside 3.5mm from edges	≦ 1mm
		Within 3.5mm of all edges	≦ 2mm
3	Finger Separation copper stick diameter9 mm	Edge to edge	≧ 8mm
4	Report Rate	Ten-point detection	80Hz
5	Ball drop	225.6 g, 40 cm-height	No damaged

3. OPTICAL CHARACTERISTICS

3.1 Characteristics

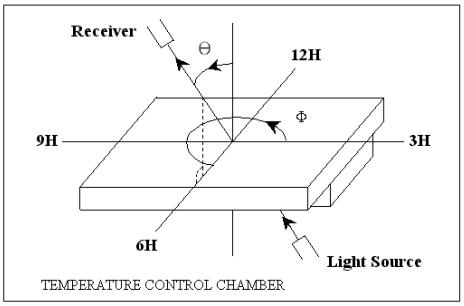
Electrical and Optical Characteristics

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		0.316	0.366	0.416		
	Brightness			Y		350	450	-	cd/m^2	
5	Brightness Uniformity				25 ℃	80	85	-	%	6

3.2 Definition of optical characteristics

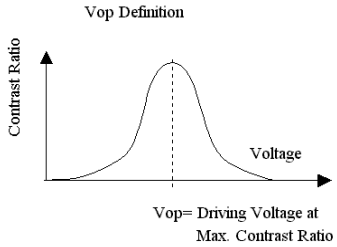
Measurement condition :

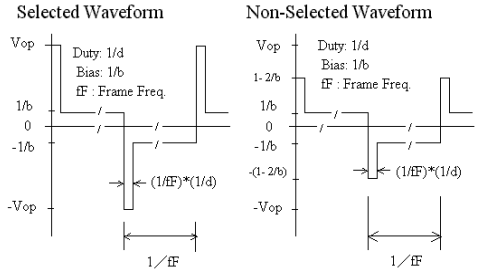
Transmissive and Transflective type



PHOTAL LCD-5000

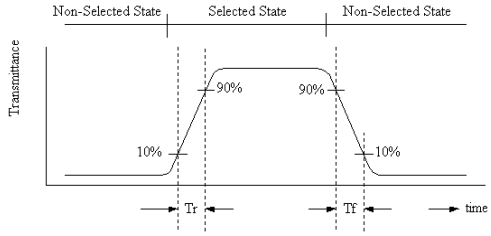
[Note 1] Definition of LCD Driving Vop and Waveform :



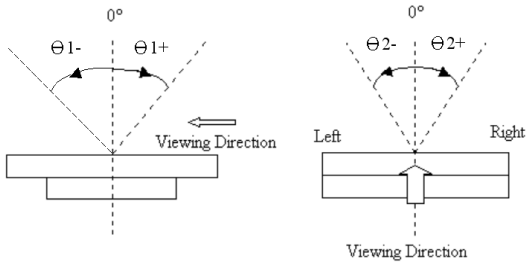


[Note 2] Definition of Response Time

for Negative type :

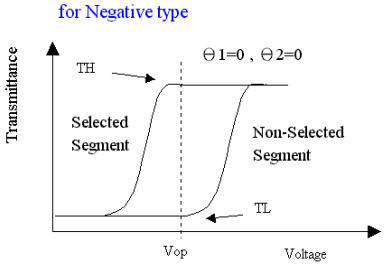


[Note 3] Definition of Viewing Angle :



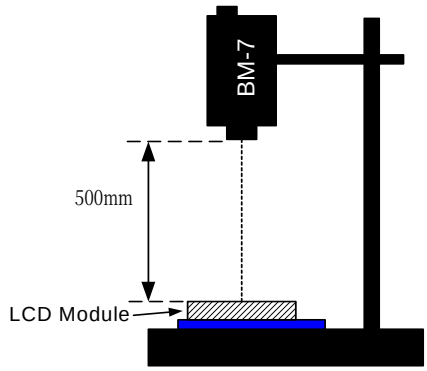
[Note 4] Definition of Contrast Ratio :

for Negative type

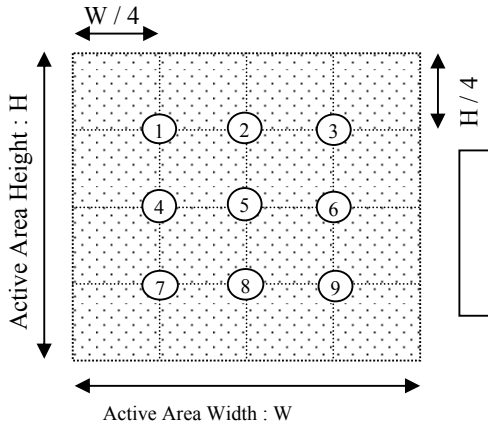


$$\text{Contrast Ratio} = \frac{TH}{TL}$$

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

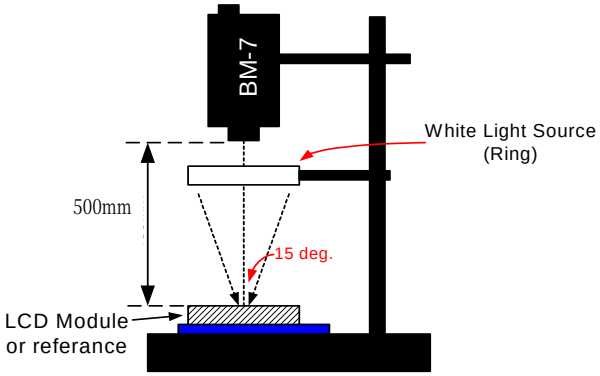


[Note 6] Definition of Brightness Uniformity



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

[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, 60cm free fall, 6 sides, 1 corner, 3edges	
8	Vibration test	10 => 55 =>10 => 55 => 10 Hz , within 1 minute Amplitude : 1.5mm. 15 minutes for each Direction (X,Y,Z)	

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

☐ 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**

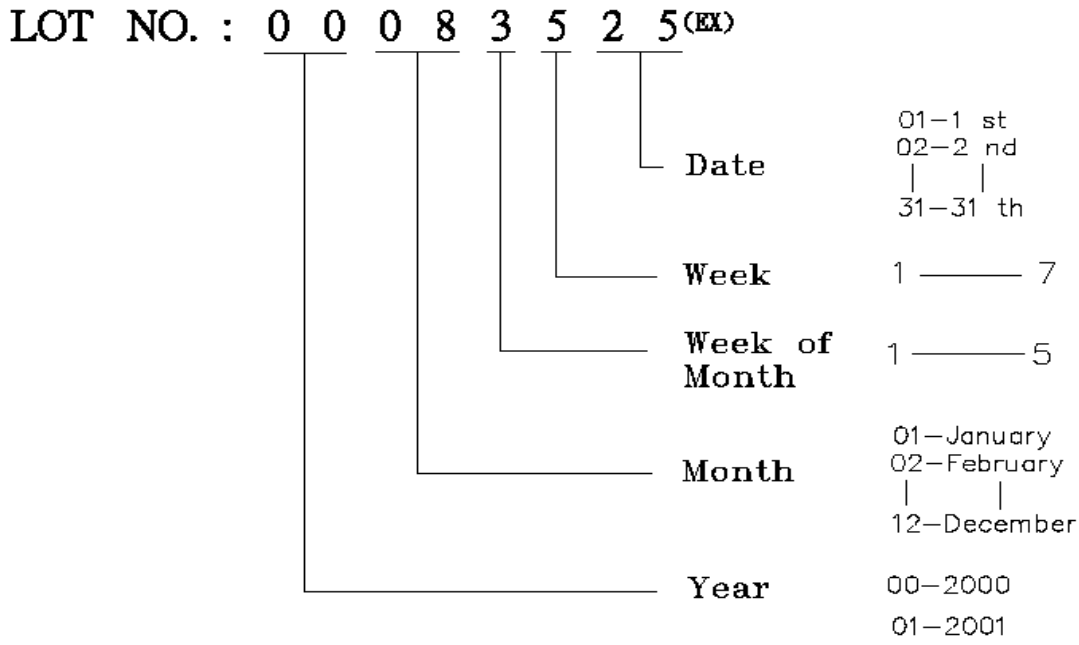
  Year Month Day - Serial no.

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

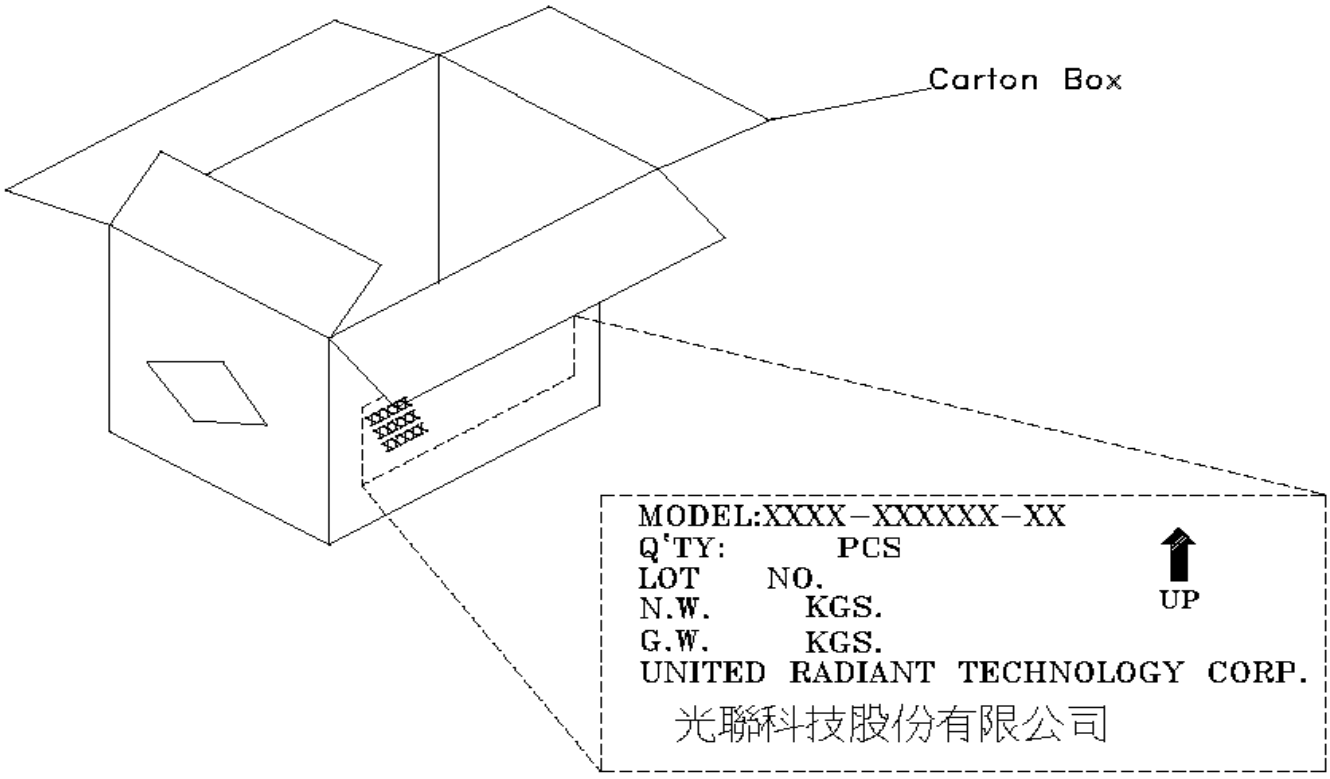
Note ： The lot no. attached on the packing box will be used for tracking once the part is too small to print the date code.

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 ℃ TO 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

ISO2859-1 (SAME AS MIL-STD-105E) , LEVEL Ⅱ SINGLE PLAN.

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

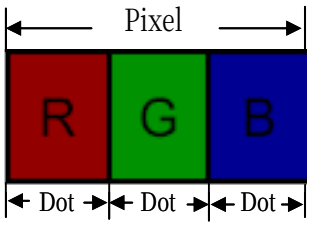
8.2.1. CHECKING DIRECTION SHALL BE IN THE 45 DEGREE AREA TO FACE THE SAMPLE.

8.2.2. CHECKER SHALL SEE OVER 400±25 mm. WITH BARE EYES FAR FROM SAMPLE AND USING 2 PCS. OF 20W FLUORESCENT LAMP.

8.3. INSPECTION PLAN :

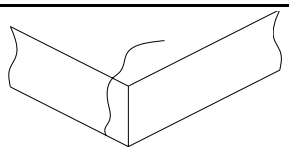
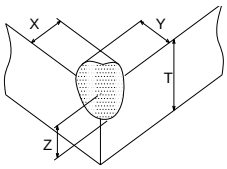
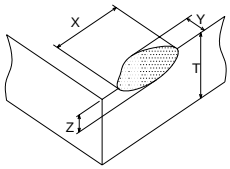
CLASS	ITEM	JUDGEMENT	CLASS
PACKING & INDICATE	1. OUTSIDE AND INSIDE PACKAGE	"MODEL NO." , "LOT NO." AND "QUANTITY" SHOULD INDICATE ON THE PACKAGE.	Minor
	2. MODEL MIXED AND QUANTITY	OTHER MODEL MIXED.....REJECTED QUANTITY SHORT OR OVER.....REJECTED	Critical
	3. PRODUCT INDICATION	"MODEL NO." SHOULD INDICATE 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	NO DISPLAY、WRONG PATTERN DISPLAY、CURRENT CONSUMPTION OUT OF SPECIFICATION..... REJECTED	Critical
	13. DOT DEFECT (FOR COLOR AND TFT)	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 ≦ 0.25</td><td>DISREGARD</td></tr>
<tr><td>0.25 < Φ ≦ 0.35</td><td>5 (Distance>5mm)</td></tr>
<tr><td>0.35 < 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>5 (Distance>5mm)</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>3 (Distance>5mm)</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 > 5mm)</td></tr>
<tr><td>Dark dot</td><td>N≦ 4 (Distance > 5mm)</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>
<tr><td>8.4.4</td><td>MINOR</td><td>Mura & Light Leakage</td><td>Inspection at ND-Filter 5% .</td></tr>
</table>

8.5 INSPECTION STANDARD OF TOUCH PANEL

<table>
<tr><th>NO.</th><th>CLASS</th><th colspan="2">ITEMS</th><th colspan="4">JUDGEMENT</th></tr>
<tr><td>8.5.1</td><td>MAJOR</td><td colspan="2">Touch Panel
Crack</td><td colspan="4"> 
Reject</td></tr>
<tr><td rowspan="2">8.5.2</td><td rowspan="2">MINOR</td><td rowspan="2">Touch Panel
Chipping</td><td>Corner</td><td>  </td><td>Not CNC Products</td><td>X≦2mm, Y≦2mm,
Z＜1/2T</td><td>Accept</td></tr>
<tr><td></td><td></td><td>CNC Products</td><td>For CNC Outline Dimension</td><td>Accept</td></tr>
<tr><td></td><td></td><td>Edge</td><td>  </td><td>Not CNC Products</td><td>X≦3mm, Y≦3mm,
Z＜1/2T</td><td>Accept</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>CNC Products</td><td>For CNC Outline Dimension</td><td>Accept</td></tr>
<tr><td rowspan="3">8.5.3</td><td rowspan="3">MINOR</td><td colspan="2" rowspan="3">Scratch
Dust and Foreign Material
(Linear Type)</td><td colspan="3">W≦0.05, L≦10mm</td><td>Accept</td></tr>
<tr><td colspan="3">0.05mm<W≦0.07mm；L≦5.0mm
Distance between seratch＞5.0mm</td><td>Accept
5 ea Max.</td></tr>
<tr><td colspan="3">W>0.07mm</td><td>Reject</td></tr>
<tr><td rowspan="3">8.5.4</td><td rowspan="3">MINOR</td><td colspan="2" rowspan="3">Scratch
Dust and Foreign Material
(Round Type：Φ=(Length+Width)/2)</td><td colspan="3">Φ≦0.25mm</td><td>Accept</td></tr>
<tr><td colspan="3">0.25mm＜Φ≦0.35mm
Distance between spots＞5.0mm</td><td>Accept
5 ea Max.</td></tr>
<tr><td colspan="3">Φ＞0.35mm</td><td>Reject</td></tr>
<tr><td rowspan="3">8.5.5</td><td rowspan="3">MINOR</td><td colspan="2" rowspan="3">Touch Panel
Dent / Fish Eyes
(Φ=(Length+Width)/2)</td><td colspan="3">Φ≦0.35mm</td><td>Accept</td></tr>
<tr><td colspan="3">0.35mm＜Φ≦1.0mm
Distance ＞5.0mm</td><td>Accept
5 ea Max.</td></tr>
<tr><td colspan="3">Φ＞1.0mm</td><td>Reject</td></tr>
<tr><td rowspan="3">8.5.6</td><td rowspan="3">MINOR</td><td colspan="2" rowspan="3">Touch Panel
Air Bubble
(Φ=(Length+Width)/2)</td><td colspan="3">Φ≦0.2mm</td><td>Accept</td></tr>
<tr><td colspan="3">0.2mm＜Φ≦0.5mm
Distance between bubbles＞5.0mm</td><td>Accept
3 ea Max.</td></tr>
<tr><td colspan="3">Φ＞0.5mm</td><td>Reject</td></tr>
<tr><td rowspan="3">8.5.7</td><td rowspan="3">MINOR</td><td colspan="2" rowspan="3">Touch Panel
Printing area Scratch</td><td colspan="3">W≦0.03, L≦10mm</td><td>Accept</td></tr>
<tr><td colspan="3">0.03mm＜W≦0.05mm, L≦5mm
Distance between scratch＞5.0mm</td><td>Accept
3 ea Max.</td></tr>
<tr><td colspan="3">W＞0.05mm or L＞5mm
(W>0.05 Follow 8.5.4 Round type)</td><td>Reject</td></tr>
<tr><td>8.5.8</td><td>MINOR</td><td colspan="2">Touch Panel
White Haze Mark / Dust</td><td colspan="4">Can not be removed</td><td>Reject</td></tr>
</table>