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SPECIFICATION FOR

NT050TN01V0-P

Project No.	**NT050TN01V0-P**
Customer	
Module No.	
Product type	Standard LCD Module 800(RGB)x 480 Pixels 5.0 " TFT LCD
Signature by customer:	

Prepared	Checked	Approved

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1.Document revisionhistory:

DOCUMENT REVISION	DATE	DESCRIPTION		
V00	2016.04.04	FirstRelease.	PREPARED BY CYY	APPROVED BY

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1. General Description

- 5.0 " (diagonal), 800 (RGB)x 480pixels, 16M colors, Transmissive, TFT LCDmodule.
- Viewing Direction:12O'clock.
- 24–bit RGBinterface
- Logic voltage: 3.0-3.6V(typ.).
- With touchpanel.

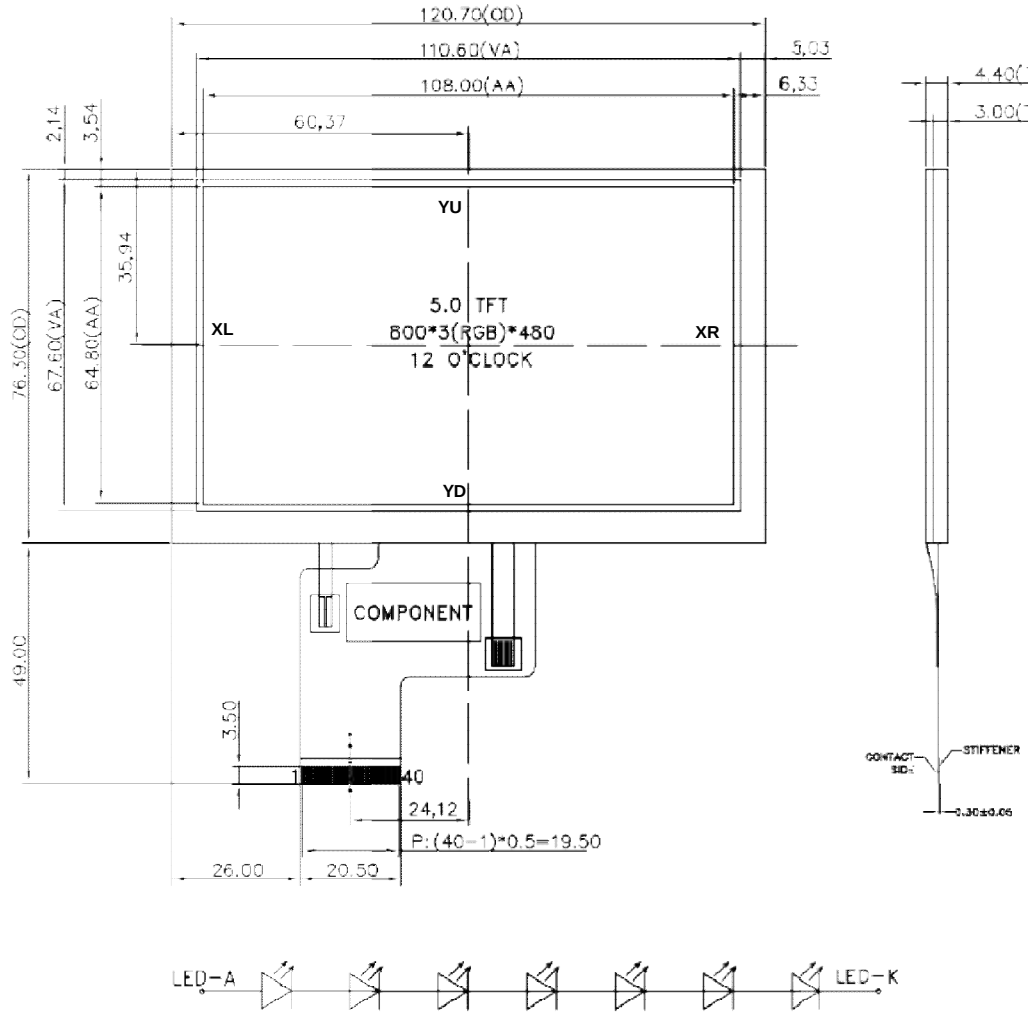
2. Mechanical Specifications

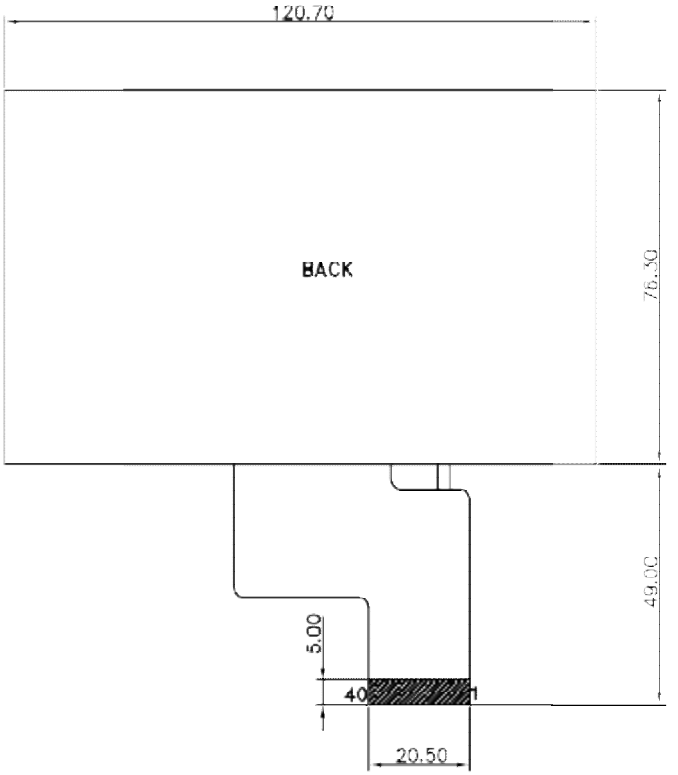
The mechanical detail is shown in Fig. 1 and summarized in Table 1 below.

Table 1

Parameter		Specifications	Unit
Outline dimensions		120.70(W) x76.30(H) x 4.4(D)	mm
	TP view area		mm
	TP active area		
	active area	108.00(W) x 64.80(H)	
	Display format	800 (RGB)x480	pixels
	Color configuration	RGB stripes	-
Weight		TBD	grams

REV:	DESCRIPTION:	BY	DATE
A0	First Design	LYC	2016-6-8





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

NOTES:

1. **5.0" Transmissive, Normally-whiteTFT-LCD**
2. **Reso lution: 800(RGB)x480**
3. **Viewing Driection: 12O'Clock**
4. **Driver IC: 24 bit RGBinterface**
5. **Backlight:7*1chipwhiteLED(22.4V20mA)**
6. **OPERATING TEMP:-10°C~60°C**
   STORAGETEMP:-20°C~70°C
7. **GENERAL TOLERANCE:±0.2**

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UNLESS OTHERWISE NOTED:		DRAWING TYPE: CD	REV: A0
UNITS	DECIMAL OVER / INCLUDING	DRAWING No.: NT050TN01V0-P	
MM	0 TO 6 ±0.1 6 TO 30 ±0.2 30 TO 100 ±0.3	CHECKED BY:	DATE:
ANGLES	PLATED THRU HOLES +0.08 −0.03	THIRD ANGLE PROJECTION	
±0.5°	NON-PLATED THRU HOLES +0.08 −0.03	SCALE 1 : 1	SHEET: 1 OF 1

4. Interfacesignals

Table 2: Pin assignment

Pin No.	Symbol	Description
1	LEDK	Backlight LED Cathode
2	LEDA	Backlight LED anode
3	GND	System Ground
4	VCC	Power supply for logic operation
5~12	R0~R7	Data bus
13~20	G0~G7	Data bus
21~28	B0~B7	Data bus
29	GND	System Ground
30	DCLK	Pixel clock signal
31	DISP	Display on/off control
32	HSYNC	Horizontal Sync signal
33	VSYNC	Vrtical Sync signal
34	DE	Data Enable
35	NC	NC
36	GND	System Ground
37	XR	Touch panel pin
38	YD	Touch panel pin
39	XL	Touch panel pin
40	YU	Touch panel pin

5. Absolute MaximumRatings

5.1 Electrical Maximum Ratings – for ICOnly

Table 3: Electrical Maximum Ratings – for IC

Parameter	Symbol	Min.	Max.	Unit	Note
Power supply voltage (VDD)	VCC	-0.3	+3.6	V	1

Note:

1. VCC, GND must bemaintained.
2. The modules may be destroyed if they are used beyond the absolute maximumratings.

6. Electrical Specifications

TypicalOperationConditions (At Ta = 25°C,)

Table4

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Digital Power Supply Voltage For	VCC	3	3.3	3.6	V	-

Backlight DrivingConditions

Table5

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Supply voltage of white LED backlight	VL	21	22.4	23.1	V	Note 1
Current for LED backlight	IL	15	20	25	mA	
Uniformity	△	75	80	-	%	
Luminance (on the module surface,BM-7)	LV	400	450	-	cd/m^2	
LED life time	-	20,000	-	-	Hr	Note 2

Note 1: The LED Supply Voltage is defined by the number of LED atTa=25℃ and IL=20mA.
Note2:The“LEDlifetime”isdefinedasthemodulebrightnessdecreaseto50%original brightness at Ta=25℃ and IL =20mA. The LED lifetime could be decreased if operating IL is lager than 40mA.

7. OpticalCharacteristics

Table 6: Optical specifications

Items		Symbol	Condition	Specifications			Unit	Note
				Min.	Typ.	Max.		
Contrast Ratio		CR		400	500		-	
Response Time		$T_{R+}T_F$		--	15	30	ms	
Chromaticity	Red	X_R		0.586	0.606	0.626	-	
		Y_R		0.305	0.325	0.345	-	
	Green	X_G		0.283	0.303	0.323	-	
		Y_G		0.547	0.567	0.587	-	
	Blue	X_B		0.127	0.147	0.167	-	
		Y_B		0.121	0.161	0.181	-	
	White	X_W		0.282	0.302	0.322	-	
		Y_W		0.318	0.338	0.358	-	
Viewing angle	Hor.	3 O'CLOCK	Center CR≥10	50	60		deg.	
		9 O'CLOCK		50	60			
	Ver.	12 O'CLOCK		55	65			
		6 O'CLOCK		35	45			
NTSC ratio				-	-	-	%	

Note 1: Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L63 / L0

L63: Luminance of gray level 63

L0: Luminance of gray level 0

CR = CR (10)

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note 5.

Note 2: Definition of Response Time (TR, TF):

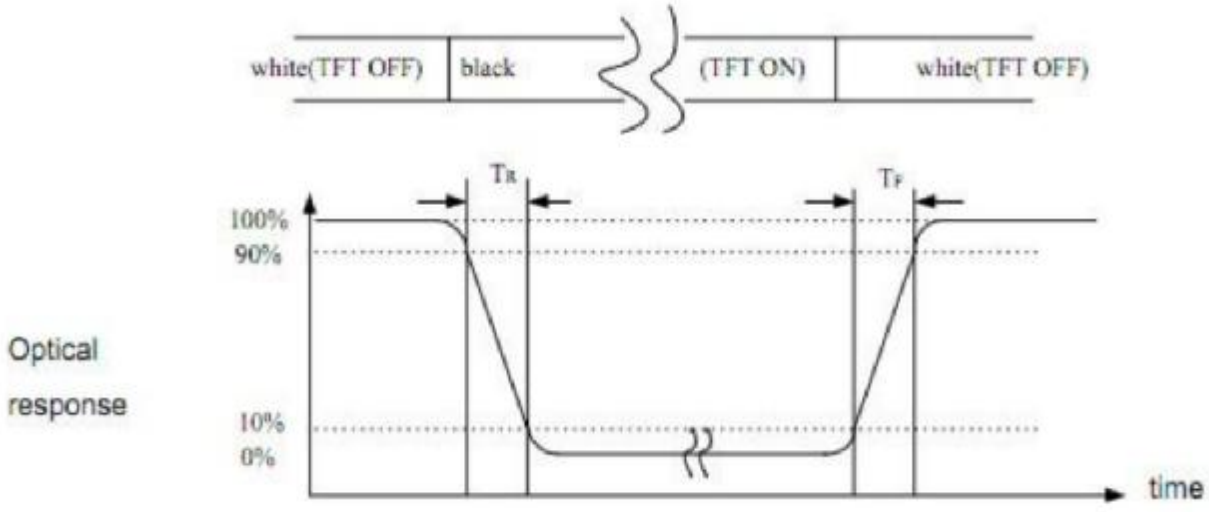

Figure 2

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Note 3: Viewing Angle

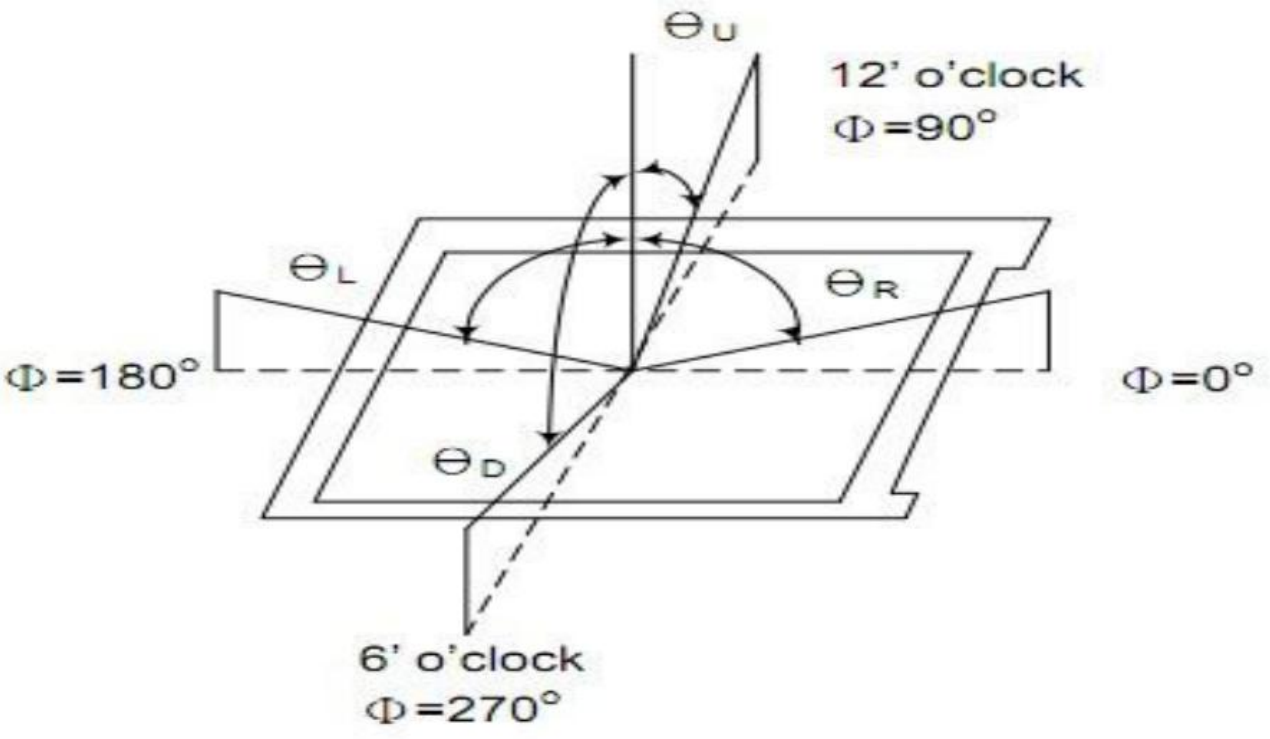

Figure 3

The above "Viewing Angle" is the measuring position with Largest Contrast Ratio; not for good image quality. View Direction for good image quality is 6 O'clock. Module maker can increase the "Viewing Angle" by applying Wide View Film.

Note 4: Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.

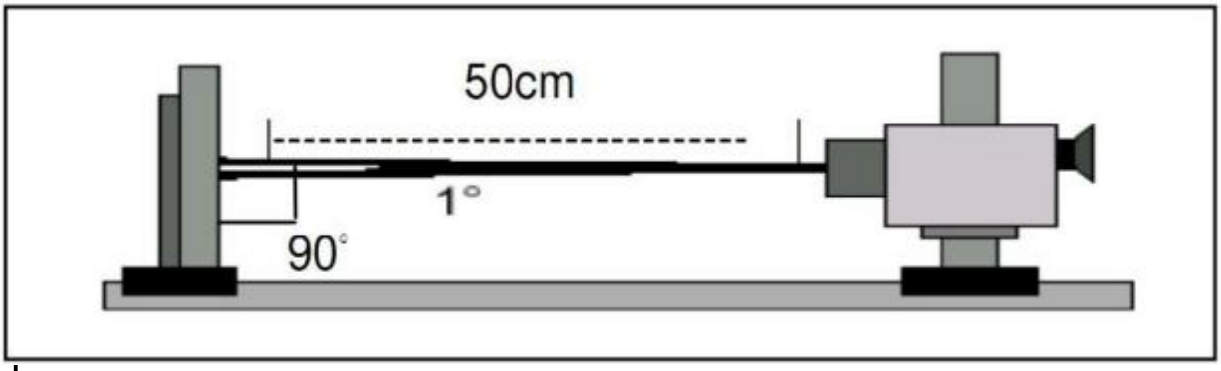

Figure 4

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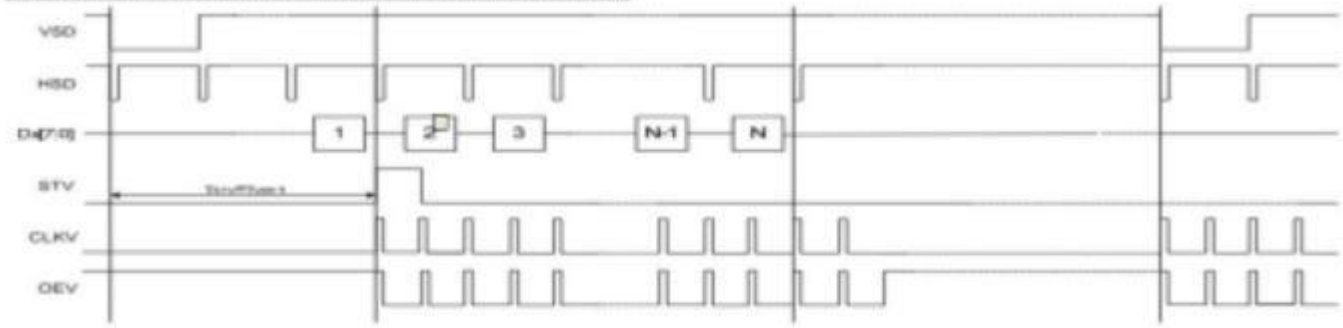
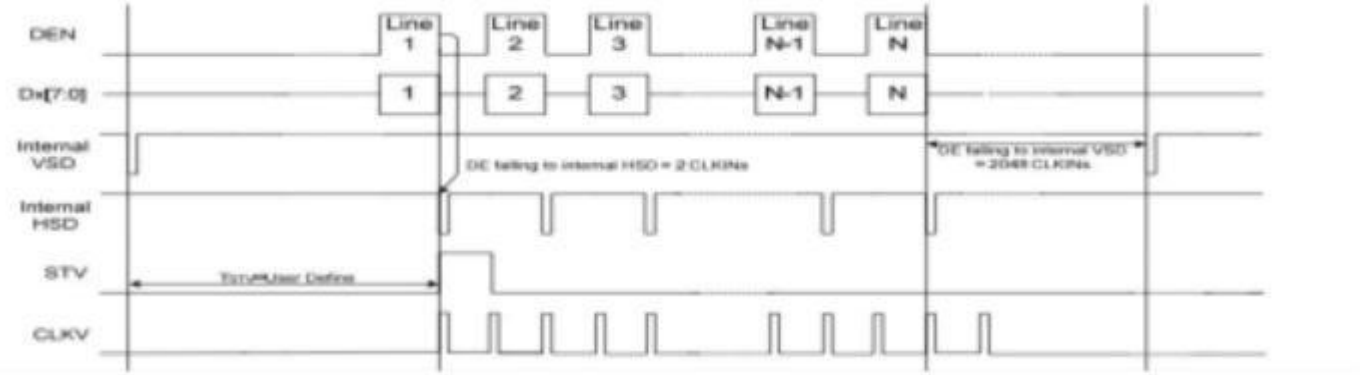
8. Data inputCharacteristics

Parallel RGB Interface

Vertical Timing Diagram of SYNC Mode (Dual Gate)



Vertical Timing Diagram of DE Mode (Dual Gate)



Parameter	Symbol	Spec			Unit	Conditions
		Min.	Typ.	Max.		
VDD Power ON slew rate	t_{POR}	--	--	20	ms	0V ~ 0.9VDD
RSTB pulse width	t_{RST}	10	--	--	us	CLKIN=50MHz
CLKIN cycle time	t_{CPH}	20	--	--	ns	
CLKIN pulse duty	t_{CWH}	40	50	60	%	
VSD setup time	t_{VST}	8	--	--	ns	
VSD hold time	t_{VHD}	8	--	--	ns	
HSD setup time	t_{HST}	8	--	--	ns	
HSD hold time	t_{HHD}	8	--	--	ns	
Data setup time	t_{DST}	8	--	--	ns	D0[7:0], D1[7:0], D2[7:0] to CLKIN
Data hold time	t_{DHD}	8	--	--	ns	D0[7:0], D1[7:0], D2[7:0] to CLKIN
DE setup time	t_{EST}	8	--	--	ns	
DE hold time	t_{EHD}	8	--	--	ns	
Output stable time	t_{SST}	--	--	6	us	10% to 90% target voltage. CL=120pF, R=10KΩ
CLKIN frequency	f_{CLK}	--	40	50	MHz	VDD=3.0 ~ 3.6V
CLKIN cycle time	t_{CLK}	20	25	--	ns	
CLKIN pulse duty	t_{CWH}	40	50	60	%	T_{CLK}
Time from HSD to Source output	t_{HSO}	--	20	--	CLKIN	
Time from HSD to LD	t_{HLD}	--	20	--	CLKIN	Note (2)
Time from HSD to STV	t_{HSTV}	--	2	--	CLKIN	
Time from HSD to CKV	t_{HCKV}	--	20	--	CLKIN	
Time from HSD to OEV	t_{HOEV}	--	4	--	CLKIN	
LD pulse width	t_{WLD}	--	10	--	CLKIN	Note (2)
CKV pulse width	t_{WCKV}	--	66	--	CLKIN	
OEV pulse width	t_{WOEV}	--	74	--	CLKIN	

Note: (1) VDD=3.0 ~ 3.6V, VDDA=6.5~13.5V, DGND=AGND=0V, Ta=-20~+85℃

(2) The contents of the data register are transferred to the latch circuit at the rising edge of LD. Then the gray scale voltage is output from the device at the falling edge of LD.

(3) Output loading condition :

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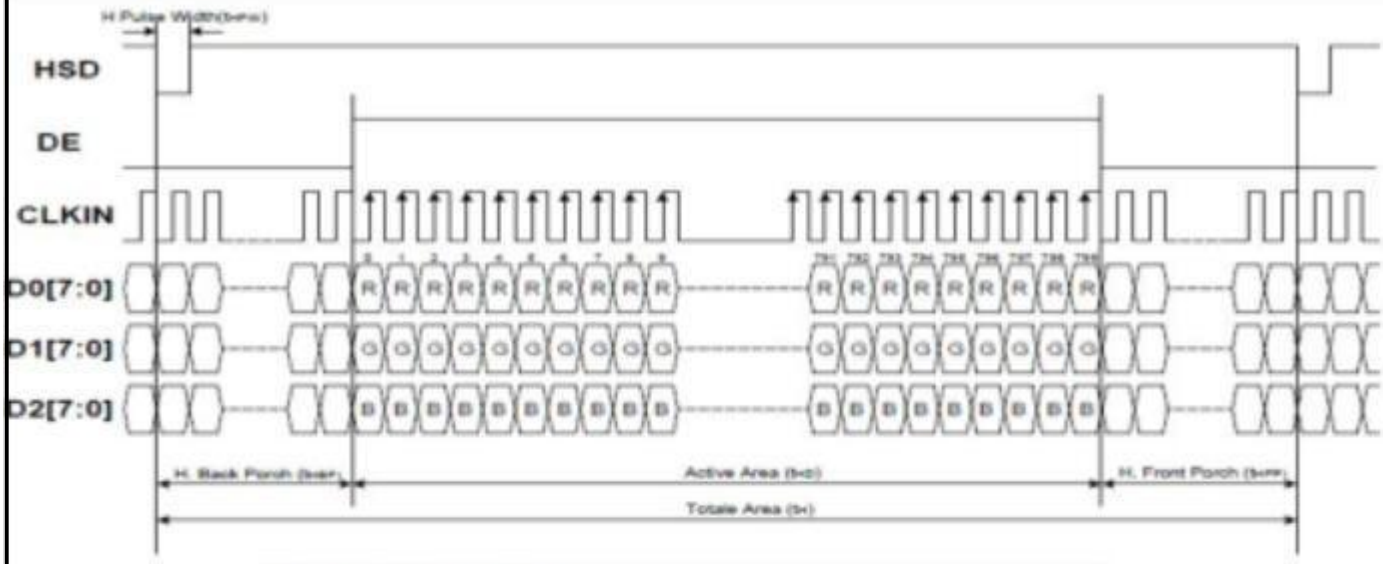
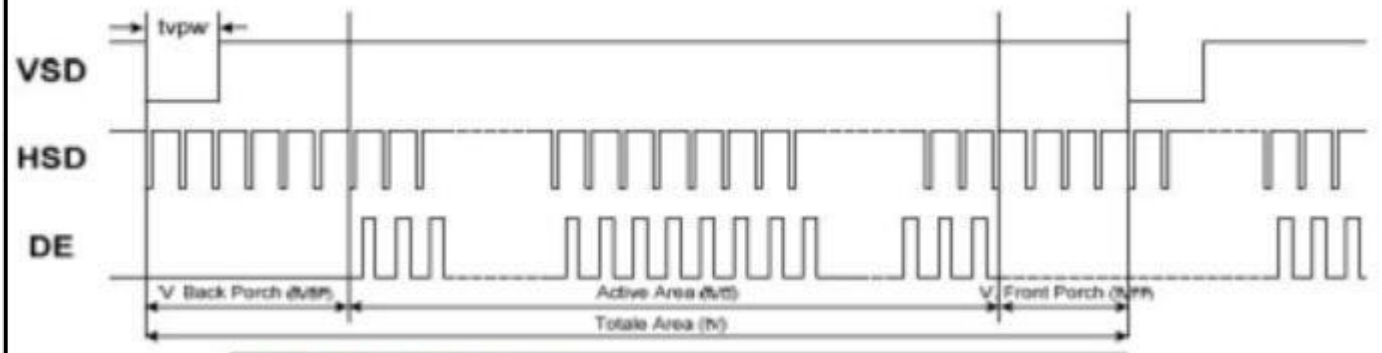
8.1 Display Timing characteristics



Horizontal Input Timing

Parameter		Symbol	Value Min.	Value Typ.	Value Max.	Unit
Horizontal display area		t_{HD}	--	800	--	CLKIN
CLKIN frequency		f_{CLK}	--	33.3	50	MHz
1 Horizontal line period		t_H	862	1056	1200	CLKIN
HSD pulse width	Min.	t_{HPW}	--	1	--	CLKIN
	Typ.		--	--	--	CLKIN
	Max.		--	40	--	CLKIN
HSD back porch	SYNC	t_{HBP}	46	46	46	CLKIN
HSD front porch	SYNC	t_{HFP}	16	210	354	CLKIN



Vertical Input Timing

Parameter	Symbol	Value Min.	Value Typ.	Value Max.	Unit
Vertical display area	t_{VD}	--	480	--	HSD
VSD period time	t_V	510	525	650	HSD
VSD pulse width	t_{VPW}	1	--	20	HSD
VSD back porch	t_{VBP}	23	23	23	HSD
VSD front porch	t_{VFP}	7	22	147	HSD

9. Environmental / ReliabilityTest

Table 8

Test Item	Sample Type	Test Condition	Test result determinant gist
High temperature storage	Normal temperature	60±3℃;96H	the inspection of appearance and function character.
	Wide temperature	70±3℃;96H	
Low temperature storage	Normal temperature	-10±3℃;96H	
	Wide temperature	-20±3℃;96H	
Hightemperature /humiditystorage	Normal temperature	50℃±3℃,85%±3%RH;96H	
	Wide temperature	60℃±3℃,85%±3%RH;96H	
High temperature operation	Normal temperature	60±3℃;96H	No objection of the function character; no fatal objection of the appearance.
	Wide temperature	70±3℃;96H	
Low temperature operation	Normal temperature	-10±3℃;96H	
	Wide temperature	-20±3℃;96H	
High temperature /humidity operation	Normal temperature	40℃±3℃,85%±3%RH;96H	
	Wide temperature	50℃±3℃,85%±3%RH;96H	
Temperature Shock	Normal temperature	-10±3℃,30min→60±3℃,30 min;10cycle	inspect the objections appearance、function & the whole structure
	Wide temperature	-20±3℃,30min 70±3,30min;10cycle	The inspection of appearance、function & the whole structure

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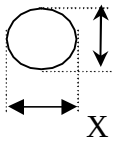
10. InspectionCriteria

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

<table>
<tr><th>No</th><th>Item</th><th>Criterion for defects</th><th>Defect type</th></tr>
<tr><td>1</td><td>Black/white s defect（in displaying</td><td>black/whitespotdefinition
$\Phi=\frac{(x+y)}{2}$
 
y
X
1. black/white spot defect(I)
<table>
<tr><th rowspan="2">area
size（mm）</th><th colspan="3">Acceptable number</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.1</td><td colspan="2">ignore</td><td rowspan="4">ignore</td></tr>
<tr><td>0.10＜Φ≤0.15</td><td colspan="2">3</td></tr>
<tr><td>0.15＜Φ≤0.25</td><td colspan="2">2</td></tr>
<tr><td>Φ＞0.25</td><td colspan="2">0</td></tr>
</table>
2. black/white spot defect(II)
<table>
<tr><th rowspan="2">area
size（mm）</th><th colspan="3">Acceptable number</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.3</td><td colspan="2">ignore</td><td rowspan="4">ignore</td></tr>
<tr><td>0.30＜Φ≤0.50</td><td colspan="2">5 (spac ebetween is 20mm)</td></tr>
<tr><td>0.50＜Φ≤1.00</td><td colspan="2">3(spac ebetween is 50mm)</td></tr>
<tr><td>1.00＜Φ</td><td colspan="2">0</td></tr>
</table></td><td>Minor</td></tr>
<tr><td>2</td><td>Black/white defect （ in displaying</td><td>1. black/white line defect (I)
<table>
<tr><th colspan="2">size（mm）</th><th colspan="3">Acceptable number</th></tr>
<tr><th rowspan="2">L(length)</th><th rowspan="2">W(width)</th><th colspan="3">area</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>10＜L</td><td>0.03＜
W≤0.04</td><td colspan="2">5</td><td rowspan="3">ignore</td></tr>
<tr><td>5.0＜
L≤10</td><td>0.04＜
W≤0.06</td><td colspan="2">3</td></tr>
<tr><td>1.0＜
L≤5.0</td><td>0.06＜
W≤0.07</td><td colspan="2">2</td></tr>
</table></td><td>Minor</td></tr>
</table>

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		L≤1.0	0.07＜ W≤0.09	1		

2. black/white line defect(II)

size(mm)		Acceptable number		
L(length)	W(width)	area		
		A	B	C
20＜L	0.05＜ W≤0.07	5		ignore
10＜L≤20	0.07＜ W≤0.09	3		
5.0＜L≤10	0.09＜ W≤0.10	2		
L≤5.0	0.10＜ W≤0.15	1		

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<table>
<tr>
<td>3</td>
<td>Blemish & foreign matters</td>
<td>
1. dot(LCD)
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<tr><td rowspan="3">size(mm)</td><td colspan="3">Acceptable number</td></tr>
<tr><td colspan="3">area</td></tr>
<tr><td>A</td><td>B</td><td>C</td></tr>
<tr><td>Φ≤0.1</td><td colspan="2">ignore</td><td rowspan="4">ignore</td></tr>
<tr><td>0.10＜Φ≤0.15</td><td colspan="2">2</td></tr>
<tr><td>0.15＜Φ≤0.25</td><td colspan="2">1</td></tr>
<tr><td>0.25＜Φ</td><td colspan="2">0</td></tr>
</table>
2. blemish（on touch panle or between touch panel ane LCD）
<table>
<tr><td rowspan="3">size(mm)</td><td colspan="3">Acceptable number</td></tr>
<tr><td colspan="3">AREA</td></tr>
<tr><td>A</td><td>B</td><td>C</td></tr>
<tr><td>Φ≤0.1</td><td colspan="2">ignore</td><td rowspan="3">ignore</td></tr>
<tr><td>0.10＜Φ≤0.15</td><td colspan="2">1</td></tr>
<tr><td>0.15＜Φ</td><td colspan="2">0</td></tr>
</table>
3.line（LCD/touchpanle）
<table>
<tr><td colspan="2">size(mm)</td><td colspan="3">Acceptable number</td></tr>
<tr><td rowspan="2">L(length)</td><td rowspan="2">W(width)</td><td colspan="3">area</td></tr>
<tr><td>A</td><td>B</td><td>C</td></tr>
<tr><td>Ignore</td><td>W≤0.02</td><td colspan="2">5</td><td rowspan="4">ignore</td></tr>
<tr><td>L≤3.0</td><td>0.02＜W≤0.03</td><td colspan="2">3</td></tr>
<tr><td>L≤2.0</td><td>0.03＜W≤0.05</td><td colspan="2">2</td></tr>
<tr><td>---</td><td>W＞0.05</td><td colspan="2">Treat with dot</td></tr>
</table>
</td>
<td>Minor</td>
</tr>
<tr>
<td>4</td>
<td>Stain on LCD panel surface</td>
<td colspan="2">Stain which cannot be removed even when wiped lightly with a soft cloth or similar cleaning too are rejectable</td>
<td>Minor</td>
</tr>
</table>

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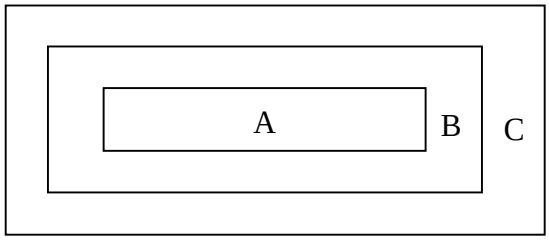
5	Rust in bezel	Rust which is visible in the bezel is rejectable	Minor
6	Defect of landsurface contact	Evident crevices which is visble are rejectable	Minor
7	Parts mounting	(1) failure to mountparts (2) parts not in the specification aremounted (3) polarith, for example,isreversed	Major Major Major
8	Parts alignment	(1) LSI,IC lead width is more than 50% beyond pad outline (2) Chip component is off center and more than 50% of the leads is off the padoutline	Minor Minor
9	Conductive foreign matter	(1) on open space(gnd,manual solder)solder ball is allowed uptoΦ0.1mm(1EA). (2) In case of shield space is allowedup toΦ0.2mm(1EA)	Major
10	Faculty PWB correction	(1) due to PWB copper foil pattern burnout,the patter is connected,using a jumper wire for repair;2 or more places corrected per PWB (2) short circuited part is cut,and no resist coating has beenperformed.	Minor Minor

area definition



LCD inspectionarea

A：active area B：
visible area

C：outside of visible area（Invisible area after assembling）

Visible Defect in areac，butit cannot affect product’s quality ， it is allowed.

11. Suggestions for using LCDmodules

Handling of LCM

1. The LCD screen is made of glass. Don't give excessive external shock, or drop from a highplace.
2. If the LCD screen is damaged and the liquid crystal leaks out, do not lick and swallow. When the liquid is attach to your hand, skin, cloth etc, wash it off by using soap and water thoroughly and immediately.
3. Don't apply excessive force on the surface of theLCM.
4. If the surface is contaminated ,clean it with soft cloth. If the LCM is severely contaminated , useIsopropyl alcohol/Ethyl alcohol to clean. Other solvents may damage the polarizer . The following solvents is especially prohibited: water , ketone Aromatic solventsetc.
5. Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidityenvironment.
6. Install the LCD Module by using the mounting holes. When mounting the LCD module make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlightcable.
7. Don’t disassemble theLCM.
8. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
   - Be sure to ground the body when handling the LCDmodules.
   - Tools required for assembling, such as soldering irons, must be properlygrounded.
   - To reduce the amount of static electricity generated, do not conduct assembling and other work under dryconditions.
   - The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may begenerated.
9. Do not alter, modify or change the the shape of the tab on the metalframe.
10. Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to beattached.
11. Do not damage or modify the pattern writing on the printed circuitboard.
12. Absolutely do not modify the zebra rubber strip (conductive rubber) or heat sealconnector
13. Except for soldering the interface, do not make any alterations or modifications with a soldering iron.
14. Do not drop, bend or twistLCM.

Storage

1. Storeinanambienttemperatureof5to45。C, andinarelativehumidityof 40% to 60%. Don't expose to sunlight or fluorescentlight.
2. Storage in a clean environment, free from dust, active gas, andsolvent.
3. Store in antistaticcontainer.

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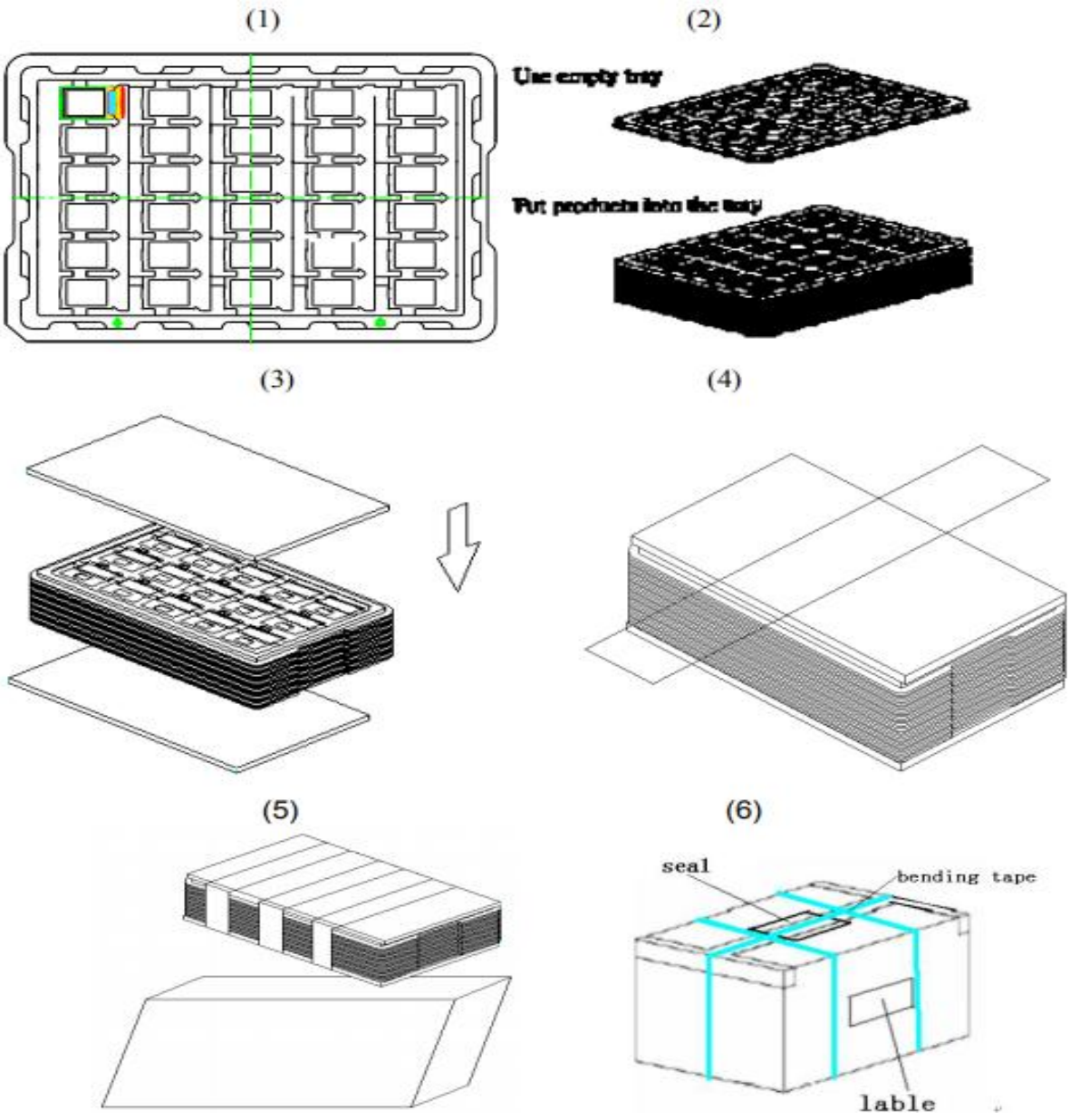
12. Packing (Referenceonly)

12.1 Packing Method



1. Put module into traycavity:
2. Traystacking
3. Put 1 cardboard under the tray stack and 1 cardboardabove:
4. Fix the cardboard to the tray stack with adhesivetape:
5. Put the tray stack intocarton.
6. Carton sealing with adhesivetape.