

**SPECIFICATION
FOR
LCD Module
CFAF240320P-T**

MODULE:	CFAF240320P-T
CUSTOMER:	

REV	DESCRIPTION	DATE
1	FIRST ISSUE	2008.10.06
1.1	Controller update	2010.12.13

	INITIAL	DATE
PREPARED BY		
CHECKED BY		
APPROVED BY		

CUSTOMER	INITIAL	DATE
APPROVED BY		

Revision History

Data	Rev. No.	Page	Summary
2008.10.06	1.0		FIRST ISSUE
2010.12.13	1.1		Controller change

PRELIMINARY DATASHEET

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PRELIMINARY
DATASHEET

General Description

* Description

This is a color active matrix TFT (Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching devices. This model is composed of a Transmissive type TFT-LCD Panel, driver circuit ,back-light unit. The resolution of a 3.2" TFT-LCD contains 240 x 320 pixels, and can display up to 262K colors.

* Features

- Low Input Voltage : VCC : 2.8-3.3V
- Display Colors of TFT LCD : 262K colors
- CPU Interface : 8080 parallel 18/16 bit
- Internal Power Supply Circuit.

General Information Items	Specification	Unit	Note
	Main Panel		
Display area(AA)	48.6(H) *64.80(V) (3.2 inch)	mm	-
Driver element	a-Si TFT active matrix	-	-
Display colors	262K	colors	-
Number of pixels	240(RGB) *320	dots	-
Pixel arrangement	RGB vertical stripe	-	-
Pixel pitch	0.18(H) *0.18(V)	mm	-
Viewing angle	9	o'clock	-
Drive IC	OTM3225A	-	-
Display mode	Transmissive/ Normally White	-	-
Operating temperature	-20~+70℃	-	-
Storage temperature	-30~+80℃	-	-

● Mechanical Information

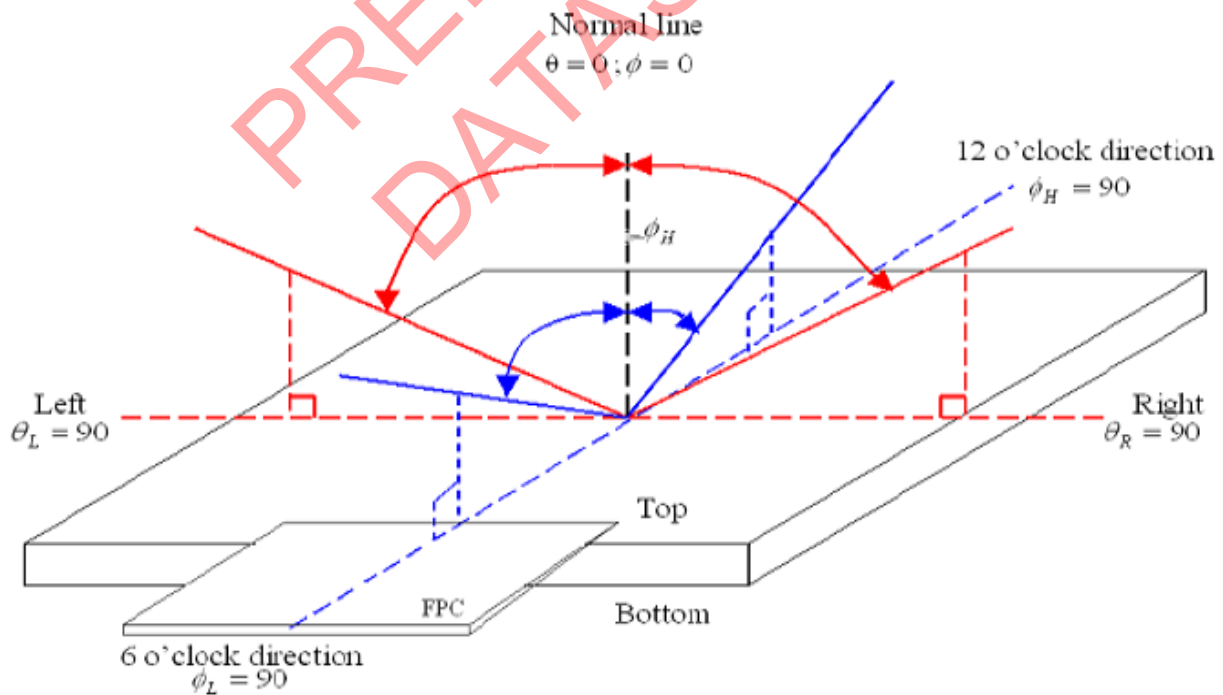
Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal(H)	-	57.04	-	mm	-
	Vertical(V)	-	78.7	-	mm	-
	Depth(D)	-	3.1	-	mm	-
Weight		-	TBD	-	g	-

1. Optical Characteristics

The following items are measured under stable conditions. The optical characteristics should be measured in a dark room or equivalent state with the methods shown in Note (1).

Measuring equipment: LCD-7200, BM-5A, BM-7, PR-650, EZ-Contrast

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	
Color Filter Chromaticity	White	x	$\theta = \phi = 0^\circ$	0.292	0.312	0.332
		y		0.321	0.341	0.361
	Red	x	$\theta = \phi = 0^\circ$	0.621	0.641	0.661
		y		0.327	0.347	0.367
	Green	x	$\theta = \phi = 0^\circ$	0.284	0.304	0.324
		y		0.553	0.573	0.593
	Blue	x	$\theta = \phi = 0^\circ$	0.115	0.135	0.155
		y		0.101	0.121	0.141
	Gamut			60%		
	Measured by C light					



2. Electrical Characteristics

2.1 ABSOLUTE MAXIMUM RATING(Ta=25 VSS=0V)

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Supply voltage for Logic	V _{CC}	2.7	2.8	+3.3	V	-
Logic signal input voltage	V _{IN}	-0.3	-	V _{DDI} +0.3	V	-
Operating temperature	T _{OP}	-20	-	+70	°C	1,2
Storage temperature	T _{ST}	-30	-	+80	°C	1,2

Note1: Background color changes slightly depending on ambient temperature.
This phenomenon is reversible. Ta70°C: 75%RH max

Ta>70°C: absolute humidity must be lower than the humidity of 75%RH at 70°C

Note2: Ta at -30°C will be <48hrs, at 80°C will be <120hrs

2.2 DC Electrical Characteristics

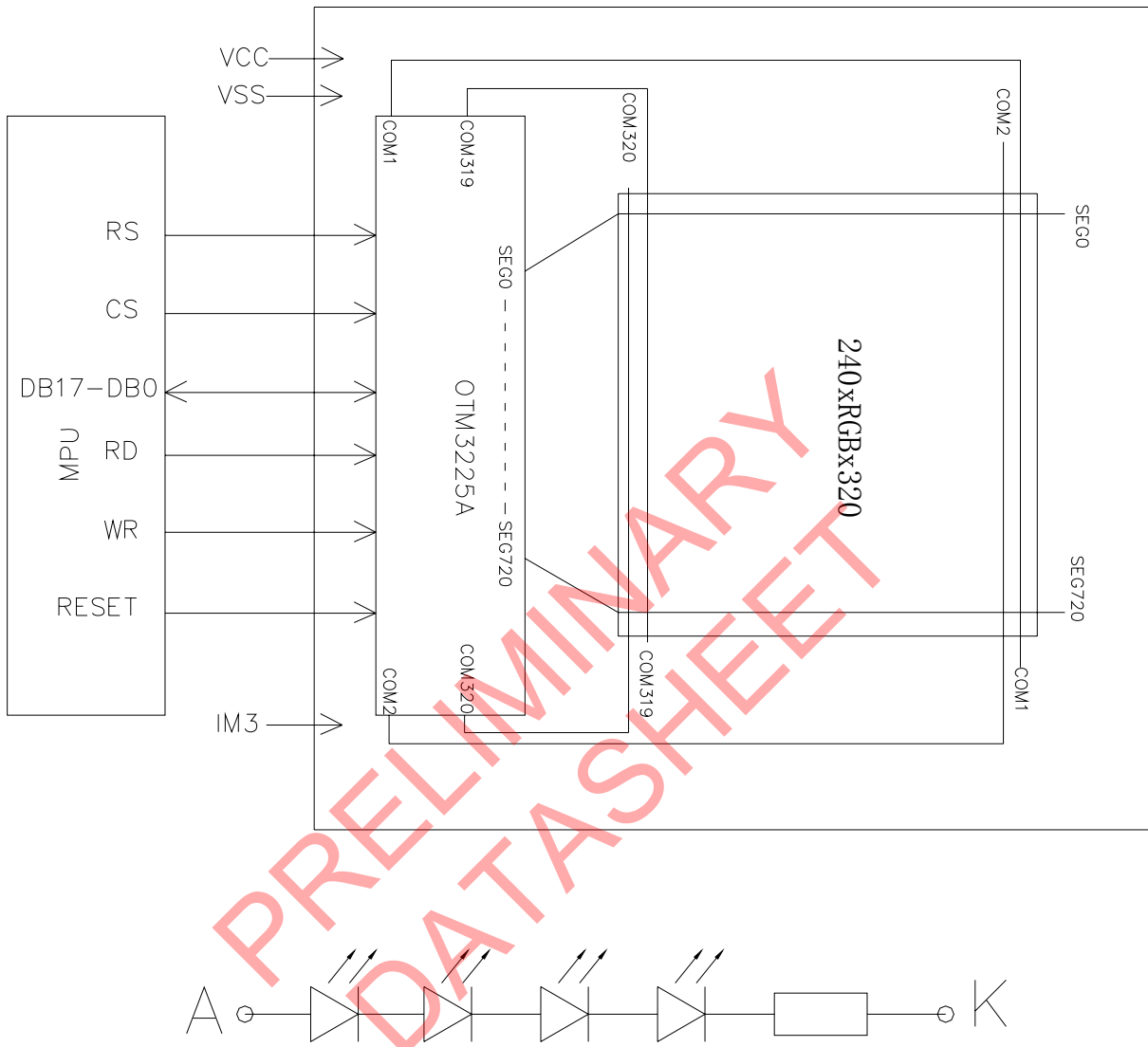
Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Supply voltage for Logic	V _{CC}	2.7	2.8	3.3	V	-
Current consumption	I _{CC} +I _{CI}	-	8	-	mA	-
Level input voltage	V _{IH}	0.7V _{DDI}	-	V _{DDI}	V	-
	V _{IL}	V _{SS}	-	0.3V _{DDI}	V	-
Level output voltage	V _{OH}	V _{SS}	-	V _{DDI}	V	-
	V _{OL}	V _{SS}	-	0.2V _{DDI}	V	-

2.3 LED Backlight Characteristics

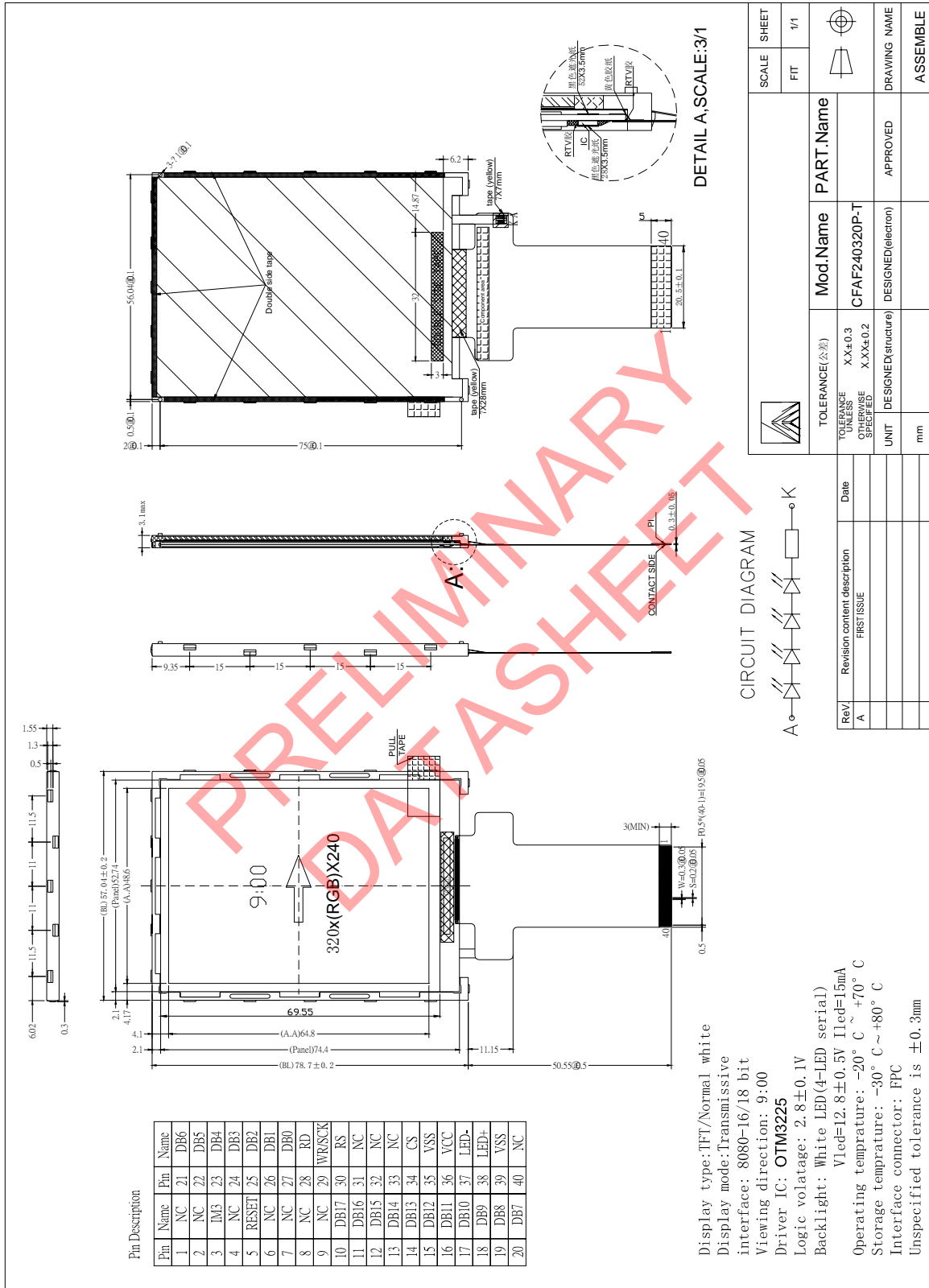
The back-light system is edge-lighting type with 4chips White LED in series

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Forward Current	I _F	-	15	-	mA	-
Forward Voltage	V _F	-	12.8	-	V	-
Luminance	L _V	--	3000	-	cd/m ²	I _B =15mA
Uniformity	A _{Vg}	80	-	-	%	-

3. Block Diagram



4. Outline dimension



5. Input terminal Pin Assignment

Pin NO.	Symbol	Function
1-2	NC	NC
3	IM3	Select the mpu system interface mode IM3=0 i80-system 16-bit interface IM3=1 i80-system 18-bit interface
4	NC	NC
5	RESET	This signal will reset the device and it must be applied to properly
6-9	NC	NC
10-27	DB17-D B0	MCU parallel interface data bus.
28	RD	Read enable in 8080 MCU parallel interface.
29	WR/SCK	Write enable in 8080 MCU parallel interface.
30	RS	Display data/command selection pin in MCU interface. RS='1': display data or parameter. RS='0': command data.
31-33	NC	NC
34	CS	Chip selection pin ("Low" is enable) signal
35	VSS	Power Ground
36	VCC	Power supply
37	LED-	Backlight Ground
38	LED+	Backlight Power supply
39	VSS	Power Ground
40	NC	NC

6. Operating Principle & Methods

Please refer to OTM3225A datasheet for more details.

80-System Bus operation Interface Timing Characteristics .

Normal write operation (VCC=2.5V~3.30V)

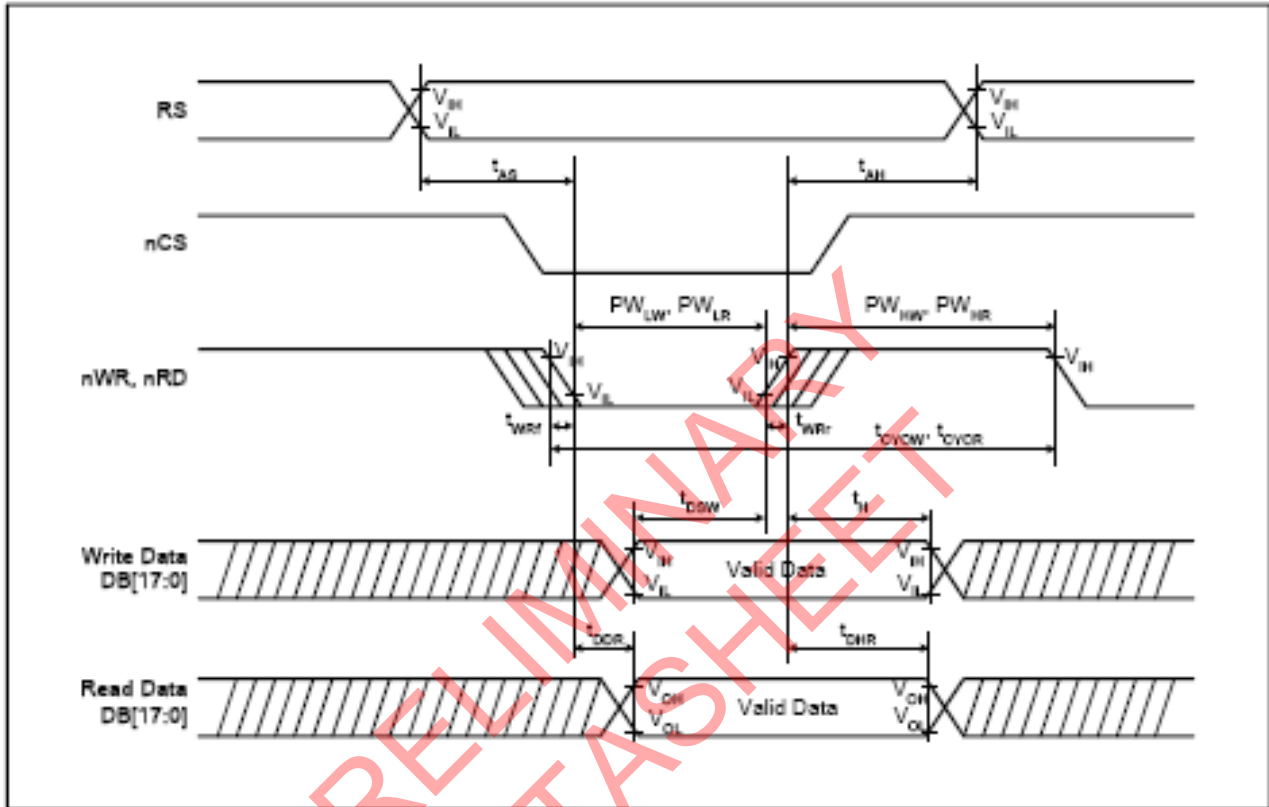
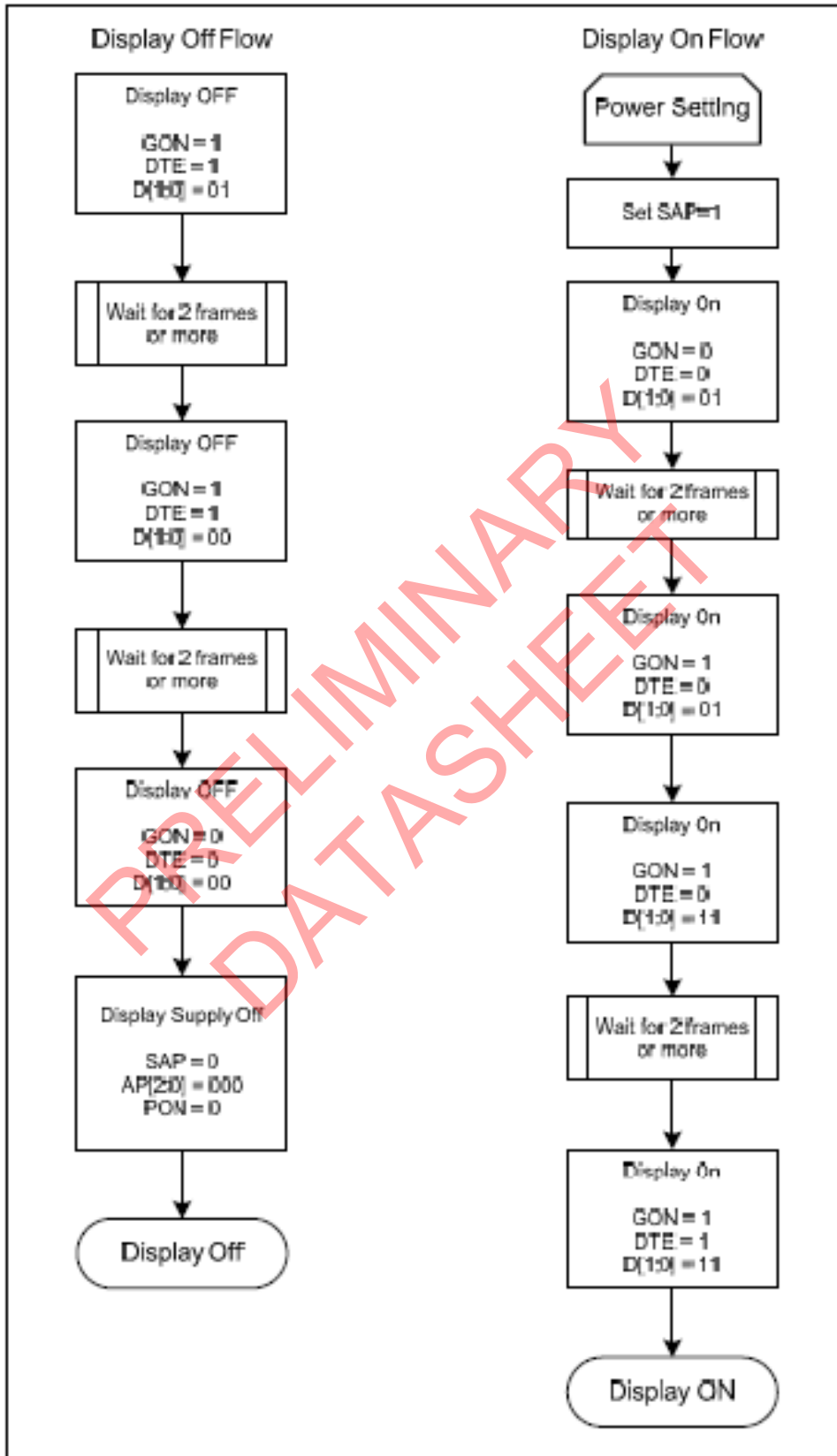


Figure 52 i80-System Bus Timing

Normal Write Mode (IOVCC = 1.65~3.3V)

Item	Symbol	Unit	Min.	Typ.	Max.	Test Condition
Bus cycle time	Write	t_{CYCW}	ns	100	-	-
	Read	t_{CYCR}	ns	300	-	-
Write low-level pulse width	PW_{LW}	ns	50	-	-	-
Write high-level pulse width	PW_{HW}	ns	50	-	-	-
Read low-level pulse width	PW_{LR}	ns	150	-	-	-
Read high-level pulse width	PW_{HR}	ns	150	-	-	-
Write / Read rise / fall time	t_{WR}/t_{WR}	ns	-	-	25	-
Setup time	Write (RS to nCS, E/nWR)	t_{AS}	ns	10	-	-
	Read (RS to nCS, RW/nRD)			5	-	-
Address hold time	t_{AH}	ns	5	-	-	-
Write data set up time	t_{DSW}	ns	10	-	-	-
Write data hold time	t_H	ns	15	-	-	-
Read data delay time	t_{DQR}	ns	-	-	100	-
Read data hold time	t_{DHR}	ns	5	-	-	-

7. Display ON/OFF Sequence



8. Reliability Test Result

8.1 Condition

Item	Condition	Sample Size	Test Result	Note
Low Temperature Operating Life test	-20 °C, 96HR	3ea	pass	-
Thermal Humidity Operating Life test	40 °C, 90%RH, 96HR	3ea	pass	-
Temperature Cycle ON/OFF test	-20 °C ↔ 70 °C, ON/OFF, 20CYC	3ea	pass	(1)
High Temperature Storage test	80 °C, 96HR	3ea	pass	-
Low Temperature Storage test	- 30 °C, 96HR	3ea	pass	-
Thermal Shock Resistance	The sample should be allowed to stand the following 5 cycles of operation: TSTL for 30 minutes -> normal temperature for 5 minutes -> TSTH for 30 minutes -> normal temperature for 5 minutes, as one cycle, then taking it out and drying it at normal temperature, and allowing it stand for 24 hours	3ea	pass	
Box Drop Test	1 Corner 3 Edges 6 faces, 66cm(MEDIUM BOX)	1box	pass	-

Note (1) ON Time over 10 seconds, OFF Time under 10 seconds

9. Packing

TBD

10. Cautions and Handling Precautions

10.1 Handling and Operating the Module

(1) When the module is assembled, it should be attached to the system firmly.

Do not warp or twist the module during assembly work.

(2) Protect the module from physical shock or any force. In addition to damage, this may cause improper operation or damage to the module and back-light unit.

(3) Note that polarizer is very fragile and could be easily damaged. Do not press or scratch the surface.

(4) Do not allow drops of water or chemicals to remain on the display surface.

If you have the droplets for a long time, staining and discoloration may occur.

(5) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.

(6) The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane.

Do not use ketene type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.

(7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs, or clothes, it must be washed away thoroughly with soap.

(8) Protect the module from static; it may cause damage to the CMOS ICs.

(9) Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.

(10) Do not disassemble the module.

(11) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.

(12) Pins of I/F connector shall not be touched directly with bare hands.

(13) Do not connect, disconnect the module in the "Power ON" condition.

(14) Power supply should always be turned on/off by the item 6.1 Power On Sequence & 6.2 Power Off Sequence

10.2 Storage and Transportation.

(1) Do not leave the panel in high temperature, and high humidity for a long time.

It is highly recommended to store the module with temperature from 0 to 35 °C and relative humidity of less than 70%

(2) Do not store the TFT-LCD module in direct sunlight.

(3) The module shall be stored in a dark place. When storing the modules for a long time, be sure to adopt effective measures for protecting the modules from strong ultraviolet radiation, sunlight, or fluorescent light.

(4) It is recommended that the modules should be stored under a condition where no condensation is allowed. Formation of dewdrops may cause an abnormal operation or a failure of the module.

In particular, the greatest possible care should be taken to prevent any module from being operated

where condensation has occurred inside.

(5) This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.

11. LCD Module Out-Going Quality Level

11. LCD Module Out-Going Quality Level

(1.0) Purpose

The LCD specification provides outgoing provision and its expected quality level based on our outgoing inspection of LCD.

(2.0) Applicable Scope

The LCD specification is applicable to the arrangement in regard to outgoing inspection and quality assurance after it.

(3.0) Quality Specification

(3.1) Quality Level

The quality level of BHL&BMDT are based on GB/T2828.1, Apply Level II, normal inspection by single sampling.

Rank	Item	AQL	Note
Major(MA)	Segment Short	0.65	
	Segment Missing		
	Solder Bridging		
	Outside Dimension		
	Cold Solder		
Minor (MI)	Black Spots, Foreign Substance, White Spots, Pinhole, Segment Deformation, Air Bubbles between Glass & Polarizer, Scratches(Glass & Polarizer), Color Variation, Solder Ball, Misalignment	1.0	

Note) AQL- Acceptable Quality Level

(3.2) Appearance Standards

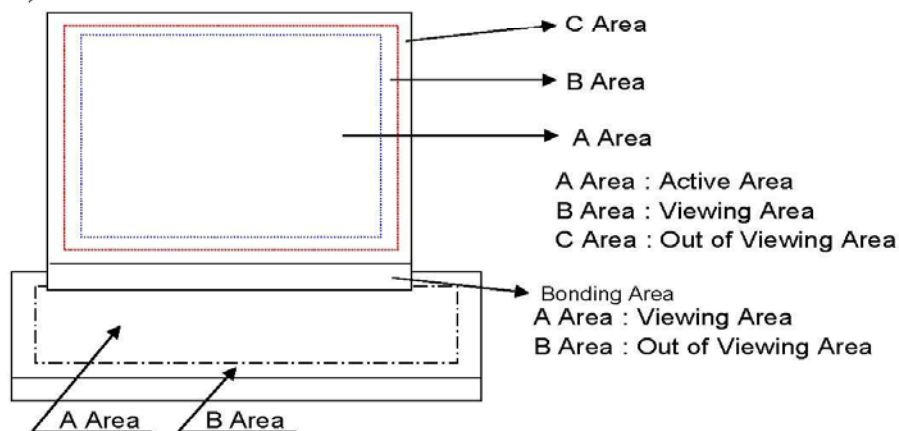
1) Inspection Conditions

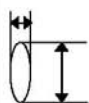
The LCD shall be inspected under 20W white fluorescent lamp light.

The distance between the eyes and the sample shall be 30cm.

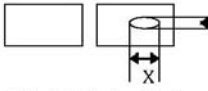
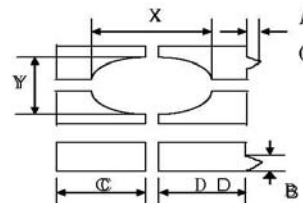
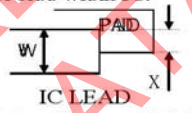

All directions for inspecting the sample should be within 30° to perpendicular line.

2) Definition of the Area



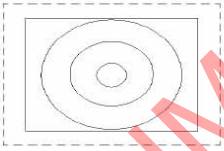

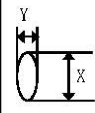
(3.3) Apperance Spec				Y																																												
No	Item	Criteria	Rank	Remark																																												
1	Segment Short Segment Missing	Not allowed	MA	X																																												
2	Solder Bridging	Any bridging between components, except common circuit, is not allowed.	MA																																													
3	Outside Dimension	Drawing & specification must be within permitable tolerance. A Area B Area	MA																																													
4	Cold Solder	Cold solder is not allowed.	MA																																													
5	Black(White) Spots, Foreign Substances	1) Round Type <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Area Dimension**</th> <th>Acceptable Q'ty</th> <th>Remark</th> </tr> </thead> <tbody> <tr> <td>≤ 0.1</td> <td colspan="2">Ignore</td> </tr> <tr> <td>≤ 0.2</td> <td>2</td> <td>Ignore</td> </tr> <tr> <td>≤ 0.3</td> <td>1</td> <td>Ignore</td> </tr> <tr> <td>0.3 <</td> <td>0</td> <td>Ignore</td> </tr> </tbody> </table> 2) Liner Type <table border="1" style="margin-left: 20px;"> <thead> <tr> <th colspan="2">Dimension</th> <th colspan="2">Acceptable Q'ty</th> <th rowspan="2">Remark</th> </tr> <tr> <th>Length</th> <th>Width</th> <th>A Area</th> <th>B Area</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>≤ 0.025</td> <td colspan="2">Ignore</td> <td></td> </tr> <tr> <td>≤ 2.5</td> <td>≤ 0.05</td> <td>3</td> <td>Ignore</td> <td></td> </tr> <tr> <td>≤ 1.5</td> <td>≤ 0.075</td> <td>2</td> <td>Ignore</td> <td></td> </tr> <tr> <td></td> <td>0.075 <</td> <td colspan="2">Follow round type</td> <td></td> </tr> </tbody> </table> At (1) & (2) total defect q'ty is must not exceed 5 pieces.	Area Dimension**	Acceptable Q'ty	Remark	≤ 0.1	Ignore		≤ 0.2	2	Ignore	≤ 0.3	1	Ignore	0.3 <	0	Ignore	Dimension		Acceptable Q'ty		Remark	Length	Width	A Area	B Area	-	≤ 0.025	Ignore			≤ 2.5	≤ 0.05	3	Ignore		≤ 1.5	≤ 0.075	2	Ignore			0.075 <	Follow round type			MI	 ** : Mean Diameter (X + Y)/2
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(3.3) Appearance Spec

No	Item	Criteria	Rank	Remark								
8	Pin hole (On Segment)	 <p>$(X+Y)/2 \leq 0.2\text{mm}$ Within 1 per one segment (Less than 0.1mm is not counted) Total defects q'ty is must not exceed 5 pieces.</p>	MI									
9	Segment Deformation	 <p>$(X+Y)/2 \leq 0.2\text{mm}$ $A \leq 0.2\text{mm}$ $B \leq 0.2\text{mm}$ $(C-D) \leq 0.2\text{mm}$</p> <table border="1" data-bbox="558 784 1093 884"> <thead> <tr> <th></th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <tr> <td>Dot, Segment</td> <td>1</td> </tr> <tr> <td>LCD</td> <td>5</td> </tr> <tr> <td>≤ 0.1</td> <td>Ignore all defect</td> </tr> </tbody> </table> <p>Each visible dot must be more than half effective dot area</p>		Acceptable Q'ty	Dot, Segment	1	LCD	5	≤ 0.1	Ignore all defect	MI	$(X + Y)/2 \leq 0.2\text{mm}$
	Acceptable Q'ty											
Dot, Segment	1											
LCD	5											
≤ 0.1	Ignore all defect											
10	Color Variation	Within the three colors, except LCD Standard color is acceptable.	MI									
11	Glass & Polarizer Scratch	Follow NO.5(2) condition	MI									
12	Solder Ball	1)Acceptable if the size of void is less than 0.18mm 2)Acceptable if a solder ball is not movable 3)Rejectable if the solder ball exceed 5EA in $2.54 \times 2.54\text{mm}$ area.	MI									
13	Miss Alignment	1)Acceptable if it dose not exceed 50% of the lead width IC.  <p>$X \leq W/2$: Accept $X > W/2$: Reject</p> 2)Rejectable, provided that it does exceed 50% of the component termination width.  <p>$W1 > W2$: Reject</p>										

Note : A limitation sample is given top priority

(3.3) Appearance Spec

No	Item	Criteria	Rank	Remark																																																
14	Touch Panel	<p>1) Round Type、 Foreign Substances</p> <table border="1"> <thead> <tr> <th rowspan="2">Area Dimension**</th> <th colspan="2">Acceptable Q'ty</th> <th rowspan="2">Remark</th> </tr> <tr> <th>A Area</th> <th>B Area</th> </tr> </thead> <tbody> <tr> <td>≤ 0.1</td> <td colspan="2">Ignore</td> <td rowspan="4"></td> </tr> <tr> <td>≤ 0.2</td> <td>2</td> <td>Ignore</td> </tr> <tr> <td>≤ 0.3</td> <td>1</td> <td>Ignore</td> </tr> <tr> <td>0.3 <</td> <td>0</td> <td>Ignore</td> </tr> </tbody> </table> <p>2) Liner Type & Scratch</p> <table border="1"> <thead> <tr> <th colspan="2">Dimension</th> <th colspan="2">Acceptable Q'ty</th> <th rowspan="2">Remark</th> </tr> <tr> <th>Length</th> <th>Width</th> <th>A Area</th> <th>B Area</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>W ≤ 0.025</td> <td colspan="2">Ignore</td> <td rowspan="5">Ignore</td> </tr> <tr> <td>L ≤ 3.0</td> <td rowspan="2">W ≤ 0.05</td> <td colspan="2">Ignore</td> </tr> <tr> <td>3.0 < L ≤ 5.0</td> <td colspan="2">2</td> </tr> <tr> <td>≤ 7</td> <td>W ≤ 0.1</td> <td colspan="2">1</td> </tr> <tr> <td>-</td> <td>W > 0.1</td> <td colspan="2">Follow round type</td> </tr> </tbody> </table> <p>4) Newton Ring</p> <p>a) Regular</p>  <p>The area of the Newton ring is more than 1/3 area of the touch panel It's NG. The area of the Newton ring is less than 1/3 area of the touch panel It's OK.</p> <p>b) None-regularity</p>  <p>The area of the Newton ring is more than 1/2 area of the touch panel It's NG. The area of the Newton ring is less than 1/2 area of the touch panel It's OK.</p>	Area Dimension**	Acceptable Q'ty		Remark	A Area	B Area	≤ 0.1	Ignore			≤ 0.2	2	Ignore	≤ 0.3	1	Ignore	0.3 <	0	Ignore	Dimension		Acceptable Q'ty		Remark	Length	Width	A Area	B Area	-	W ≤ 0.025	Ignore		Ignore	L ≤ 3.0	W ≤ 0.05	Ignore		3.0 < L ≤ 5.0	2		≤ 7	W ≤ 0.1	1		-	W > 0.1	Follow round type		MI	 <p>** : Mean Diameter (X + Y)/2</p>
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