Crystalfontz America, Incorporated

GRAPHICS LCD MODULE SPECIFICATIONS

CFAF240320A-032T-TS

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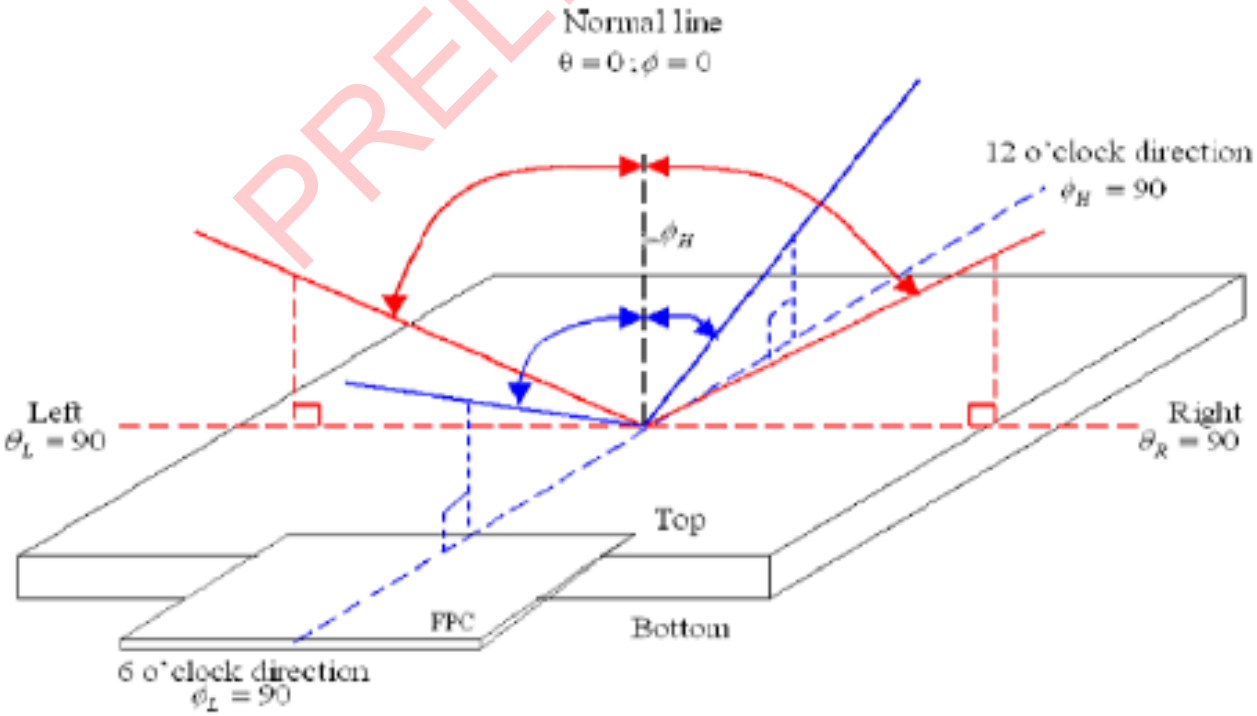
Contents

General Information Items	Main Panel	Unit	Note
Display area(AA)	48.6(H) *64.8(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	0.2052(H) *0.2052(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	-

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.
Color Filter Chromaticity	White	x	θ = ϕ = 0°	0.292	0.312	0.332
		y		0.321	0.341	0.361
	Red	x	θ = ϕ = 0°	0.621	0.641	0.661
		y		0.327	0.347	0.367
	Green	x	θ = ϕ = 0°	0.284	0.304	0.324
		y		0.553	0.573	0.593
	Blue	x	θ = ϕ = 0°	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_{CCI}+0.3	V	-
Operating temperature	T_{OP}	-30	-	+75	℃	1,2
Storage temperature	T_{ST}	-40	-	+85	℃	1,2

Note1: Background color changes slightly depending on ambient temperature. This phenomenonis reversible. Ta70℃: 75%RH max

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

Note2: Ta at −30℃will be <48hrs, at 80℃ will be <120hrs

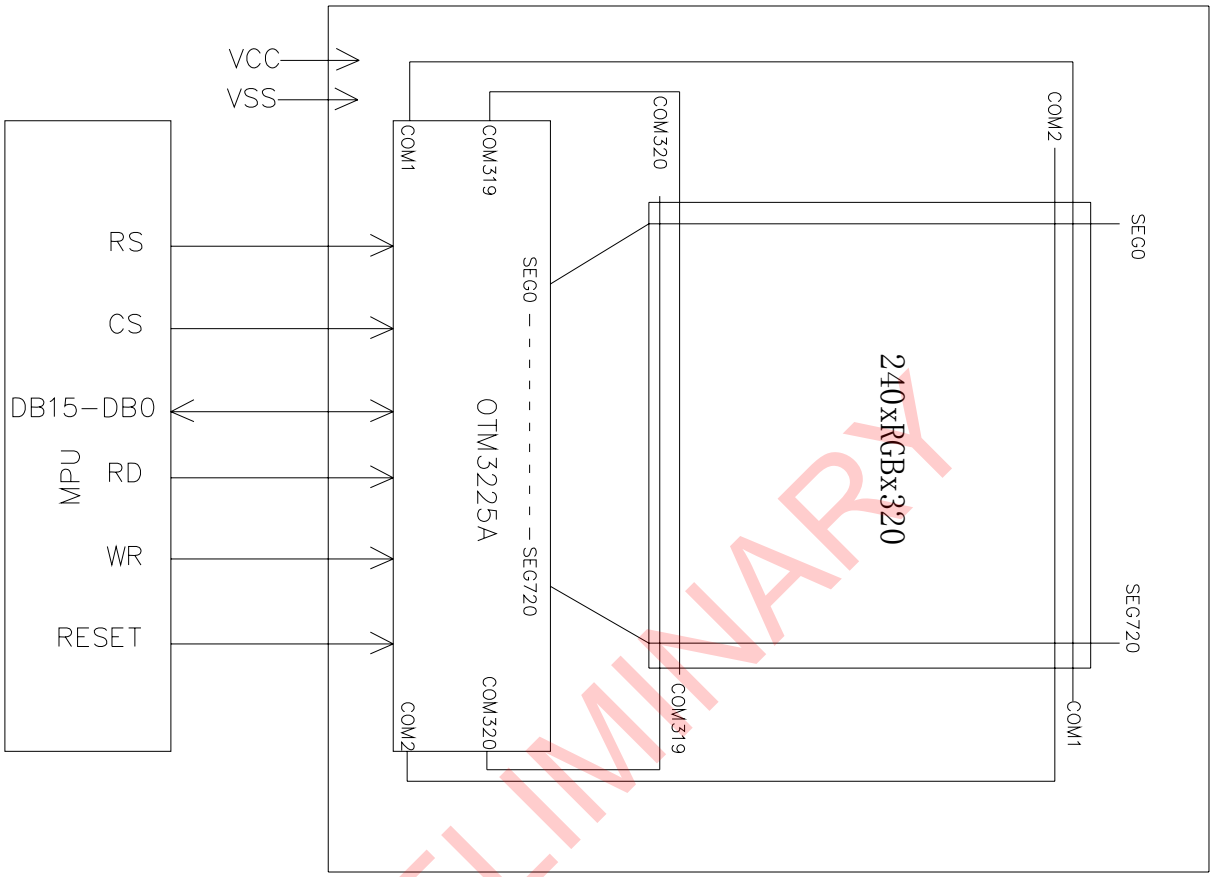
2.2 DC Electrical Characteristics

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_{CCI}	-	V_{CCI}	V	-
	V_{IL}	V_{SS}	-	0.3V_{CCI}	V	-
Level output voltage	V_{OH}	V_{SS}	-	V_{CCI}	V	-
	V_{OL}	V_{SS}	-	0.2V_{CCI}	V	-

2.3 LED Backlight Characteristics

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

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Forward Current	I_F	–	20	–	mA	
Forward Voltage	V_F	12.3	12.8	13.3	V	–
LCM Luminance	L_V		TBD	–	cd/m2	
Uniformity	AVg	80	–	–	%	–



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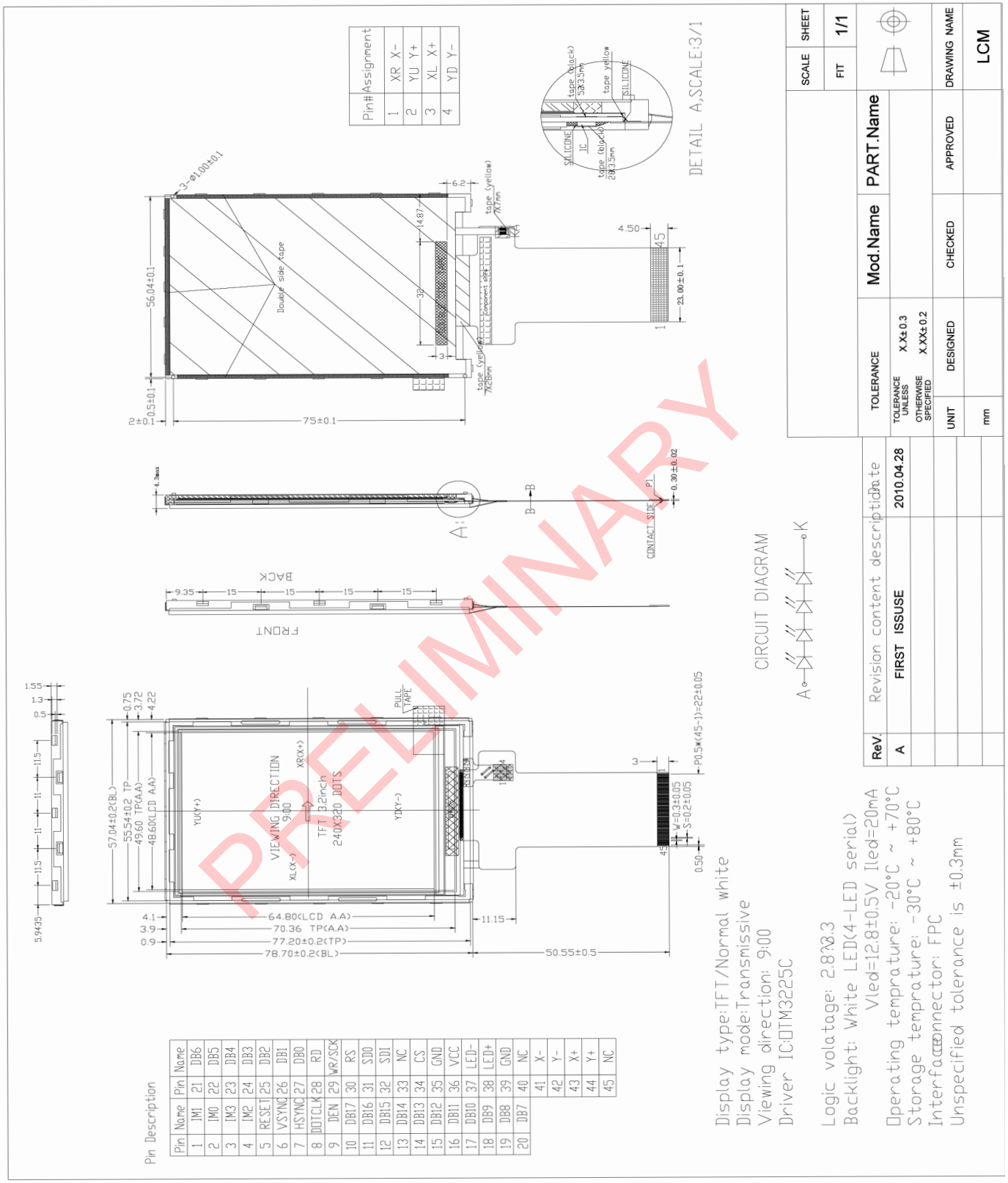
4. Outline dimension



Pin Description

Pin	Name	Pin	Name
1	IM1	21	DB6
2	IM0	22	DB5
3	IM3	23	DB4
4	IM2	24	DB3
5	RESET	25	DB2
6	VSYNC	26	DB1
7	HSYNC	27	DB0
8	DOTCLK	28	RD
9	DEN	29	WR/SCK
10	DB17	30	RS
11	DB16	31	SDO
12	DB15	32	SDI
13	DB14	33	NC
14	DB13	34	CS
15	DB12	35	GND
16	DB11	36	VCC
17	DB10	37	LED-
18	DB9	38	LED+
19	DB8	39	GND
20	DB7	40	NC
		41	X-
		42	Y-
		43	X+
		44	Y+
		45	NC

5. Input terminal Pin Assignment

Pin NO.	Symbol	Level	Function
1	IM1	H/L	Interface selected pin 1
2	IM0	H/L	Interface selected pin 0
3	IM3	H/L	Interface selected pin 3
4	IM2	H/L	Interface selected pin 2
5	RESET	L	Hardware reset pin
6	VSYNC	H/L	Vertical sync. Signal in RGB I/F mode.
7	HSYNC	H/L	Horizontal sync. signal in RGB I/F mode
8	DOTCLK	H/L	Pisel clock signal in RGB I/F Mode
9	DEN	H/L	Data enable signal in RGB I/F mode.
10-27	DB17-DB0	H/L	DATA BUS
28	RD	H/L	Read enable clock pin
29	WR	H/L	Write enable clock input pin
30	RS	H/L	A register select signal
31	SDO	H/L	Serial DATA Output
32	SDI	H/L	Serial DATA Input
33	NC	-	NC
34	CS	H/L	Chip select input pin
35	GND	L	Ground
36	VCC	H	Power supply
37	K	H/L	Power supply LED Backlight1-
38	A	H/L	Power supply LED Backlight+
39	GND	L	Ground
40	NC	-	NC
41	X-(XR)	H/L	Touch panel XR
42	Y-(YD)	H/L	Touch panel YD
43	X+(XL)	H/L	Touch panel XL
44	Y+(YU)	H/L	Touch panel YU
45	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)

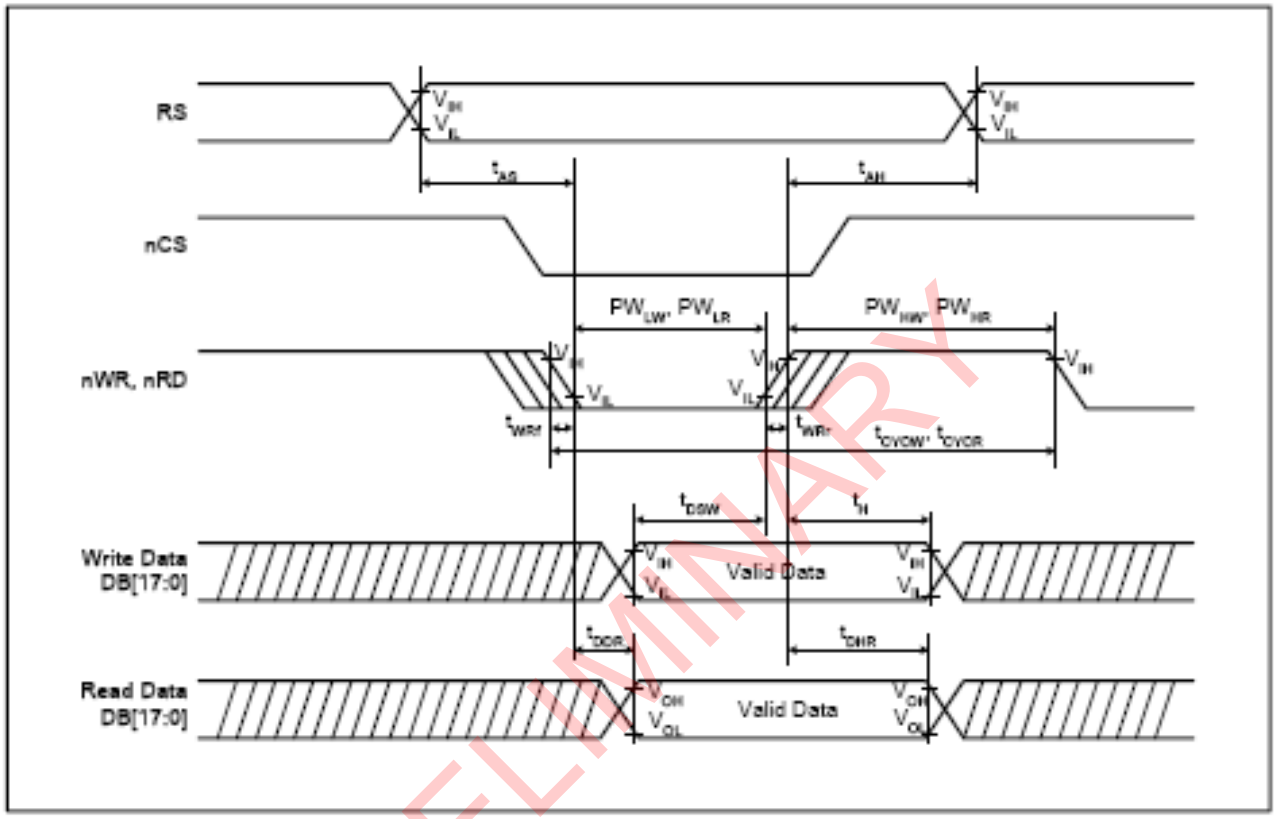
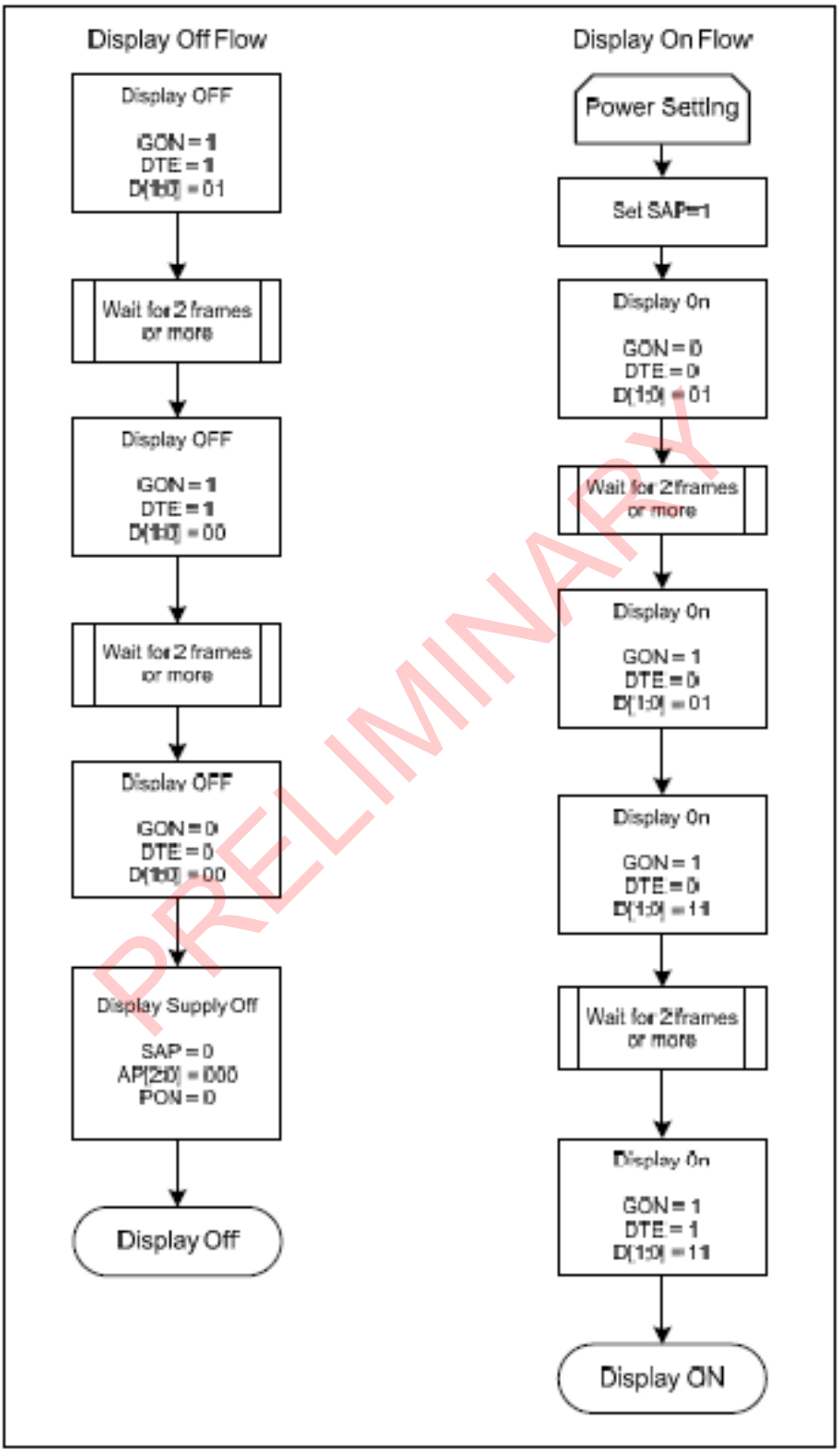


Figure 52 i80-System Bus Timing

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_{WRf}	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_{DDR}	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℃, 96HR	3ea	pass	-
Thermal Humidity Operating Life test	40℃, 90%RH, 96HR	3ea	pass	-
Temperature Cycle ON/OFF test	-20℃ ↔ 70℃, ON/OFF, 20CYC	3ea	pass	(1)
High Temperature Storage test	80℃, 96HR	3ea	pass	-
Low Temperature Storage test	−30℃, 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, 66㎝(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 ℃ 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, Scratchs(Glass & Polarizer), Color Variation, Solder Ball, Misalignment	1.0	

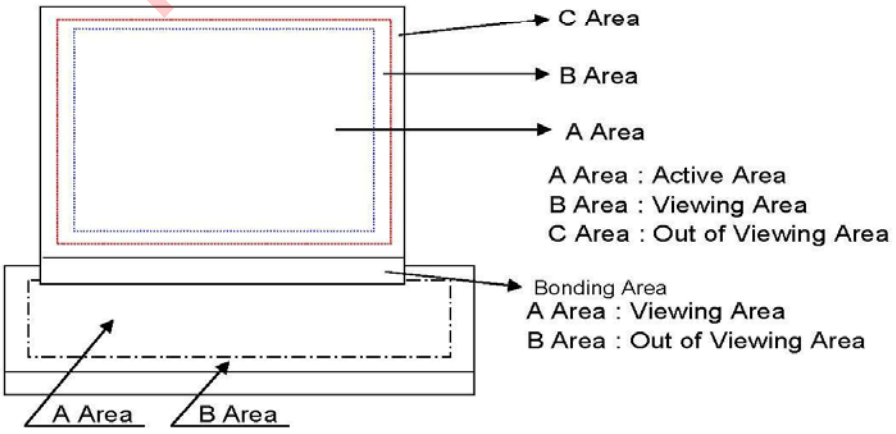
Note) AQL- Acceptable Quality Level

(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.

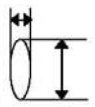
2) Definition of the Area



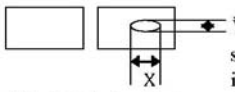
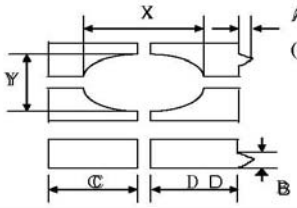
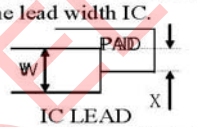
(3.3) Apperance Spec

Y

X

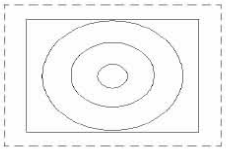
No	Item	Criteria	Rank	Remark
1	Segment Short Segment Missing	Not allowed	MA	
2	Solder Bridging	Any bridging between components, except common circuit, is not allowed.	MA	
3	Outside Dimension	Drawing & specification must be within permitable tolerance.	MA	
4	Cold Solder	Cold solder is not allowed.	MA	
5	Black(White) Spots, Foreign Substances	1) Round Type A Area B Area Area Dimension** / Acceptable Q'ty / Remark ≤ 0.1: Ignore ≤ 0.2: 2 / Ignore ≤ 0.3: 1 / Ignore 0.3 <: 0 / Ignore 2) Liner Type A Area B Area Dimension (Length / Width) / Acceptable Q'ty / Remark - / ≤ 0.025: Ignore ≤ 2.5 / ≤ 0.05: 3 / Ignore ≤ 1.5 / ≤0.075: 2 / Ignore 0.075 <: Follow round type At (1) & (2) total defect q'ty is must not exceed 5 pieces.	MI	 ** : Mean Diameter (X + Y)/2
6	OC Spot	A Area B Area Area Dimension** / Acceptable Q'ty / Remark ≤ 0.2: Ignore ≤ 0.8: 3 / Ignore ≤ 1.0: 1 / Ignore	MI	
7	Air Bubles Between Glass & Polarizer (Polarizer Defects)	Area Dimension** / Acceptable Q'ty / Remark ≤ 0.15: Ignore ≤ 0.3: 3 / Ignore ≤ 0.5: 2 / Ignore ≤ 0.7: 1 / Ignore Total: 5 / Ignore	MI	

(3.3) Appearance Spec

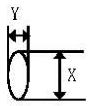
No	Item	Criteria	Rank	Remark
8	Pin hole (On Segment)	 (X+Y)/2 ≤ 0.2㎜ Within 1 per one segment (Less than 0.1㎜ is not counted) Total defects q'ty is must not exceed 5 pieces.	MI	
9	Segment Deformation	 (X+Y)/2 ≤ 0.2㎜ A ≤ 0.2㎜ B ≤ 0.2㎜ (C-D) ≤ 0.2㎜ Each visible dot must be more than half effective dot area	MI	(X + Y)/2 ≤ 0.2㎜
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 0.18㎜ 2)Acceptable if a solder ball is not movable 3)Rejectable if the solder ball exceed 5EA in 2.54 × 2.54㎜ area.	MI	
13	Miss Alignment	1)Acceptable if it dose not exceed 50% of the lead width IC.  X ≤ W/2 : Accept X > W/2 : Reject 2)Rejectable, provided that it does exceed 50% of the component termination width. 		

Note : A limitation sample is given top priority

(3.3) Appearance Spec

<table>
<tr><th>No</th><th>Item</th><th>Criteria</th><th>Rank</th><th>Remark</th></tr>
<tr><td>14</td><td>Touch Panel</td><td>
1) Round Type、Foreign Substances
<table>
<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>
<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>
</table>
2) Liner Type & Scratch
<table>
<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>
<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>
</table>
4) Newton Ring
a)Regular

The area of the Newton ring is more than 1/3area 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.

b)None-regularity

The area of the Newton ring is more than 1/2area 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.
</td><td>MI</td><td>


** : Mean Diameter (X + Y)/2
</td></tr>
</table>