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晶采光電科技股份有限公司
AMPIRE CO., LTD.

SPECIFICATIONS FOR LCD MODULE

CUSTOMER	
CUSTOMER PART NO.	
AMPIRE PART NO.	**AM-320240NTMCW-00H**
APPROVED BY	
DATE	

☑ **Approved For Specifications**
☐ **Approved For Specifications & Sample**

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RECORD OF REVISION

Revision Date	Page	Contents	Editor
2006/1/3	-	New Release	Kokai

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1 Features

5.7 inch Amorphous-TFT-LCD (Thin Film Transistor Liquid Crystal Display) module. This module is composed of a 5.7" TFT-LCD panel, a driver circuit and backlight unit.

(1) Construction: 5.7" a-Si color TFT-LCD, White CCFL Backlight and PCB.
(2) Resolution (pixel): 320(R.G.B) X240
(3) Number of the Colors : 262K colors (R , G , B 6 bit digital each)
(4) LCD type : Transmissive Color TFT LCD (normally White)
(5) Interface: 40 pin
(6) Power Supply Voltage: 3.3V single power input. Built-in power supply circuit.
(7) Viewing Direction: 6 O'clock (The direction it's hard to be discolored)

2 Physical specifications

Item	Specifications	Unit	
Display resolution(dot)	960 (W) x 240(H)	mm	
Active area	115.2 (W) x 86.4 (H)	mm	
Screen size	5.7(Diagonal)	mm	
Pixel size	120 (W) x 360 (H)	um	
Color configuration	R.G.B stripe		
Overall dimension	131.0(W)x102.2(H)x10.9(D)	mm	
Weight	T.B.D	mg	
Backlight unit	CCFL		

3 Electrical specification

3.1 Absolute max. ratings

3.1.1 Electrical Absolute max. ratings

Item	Symbol	Condition	Min.	Max.	Unit	Remark
Power voltage	VDD	VSS=0	-0.3	6.0	V	
Input voltege	V_{in}		-0.3	VDD+0.3	V	Note 1

Note1:Hsync, Vsync, DEN, DCLK, R0~R5, G0~G5, B0~B5

3.1.2 Environmental Absolute max. ratings

Item	OPERATING		STORAGE		Remark
	MIN	MAX	MIN	MAX	
Temperature	-20	70	-30	80	Note2,3,4,5,6,7,8
Humidity	Note1		Note1		
Corrosive Gas	Not Acceptable		Not Acceptable		

Note1 : Ta <= 40℃ : 85% RH max

Ta > 40℃ : Absolute humidity must be lower than the humidity of 85%RH at 40℃

Note2 : For storage condition Ta at -30℃ < 48h , at 80℃ < 100h

For operating condition Ta at -20℃ < 100h

Note3 : Background color changes slightly depending on ambient temperature. This phenomenon is reversible.

Note4 : The response time will be slower at low temperature.

Note5 : Only operation is guarantied at operating temperature. Contrast , response time, another display quality are evaluated at +25℃

Note6 : When LCM is operated over 60℃ ambient temperature, the I_L of the CCFL back-light should be adjusted to 3mA max

Note7 : This is panel surface temperature, not ambient temperature.

Note8 : When LCM be operated less than 0℃ , the life time of the CCFL back-light will be reduced. The rise time of the CCFL ON will be longer when the ambient temperature below 0℃ and confirm the characteristics of inverter is nessary.

3.1.3 CCFL back-light Unit Absolute max. ratings

Item	Symbol	Min	Max	Unit	Remark
Lamp Current	IL	-	7.0	mArms	Note 1
Lamp Voltage	VL	-	3000	Vrms	Note 2

Note1 : Please put your meter at GND cable to measurement.

Note2 : Apply to the connector of the back-light unit.

3.2 Electrical characteristics

3.2.1 DC Electrical characteristic of the LCD

Typical operting conditions (VSS=0V)

Item		Symbol	Min.	Typ.	Max.	Unit	Remark
Power supply		VDD	3.0	3.3	3.6	V	
Input Voltage for logic	H Level	V_{IH}	0.7 VDD	-	VDD	V	Note 1
	L Level	V_{IL}	0	-	0.3 VDD	V	
Power Supply current		IDD		T.B.D			Note 2

Note1: Hsync, Vsync, DEN, DCLK, R0~R5, G0~G5, B0~B5

Note2: fv =60Hz , Ta=25℃ , Display pattern : All Black

3.2.2 Electrical characteristic of Back-light

Paramenter	Symbol	Min.	Typ.	Max.	Unit	Remark
Lamp voltage	V_L	-	(T.B.D)	-	Vrms	
Lamp current	I_L	(2.5)	(6.0)	(6.5)	mArms	Note7,8
Frequency	F_L		(55)		KHz	Note 4
Lamp starting voltage	Vs	-	-	1000	Vrms	Note1,5
		-	-	-	Vrms	Note2,5
		-	-	1,300	Vrms	Note3,5
Lamp life time		-	30,000	-	Hr	Note 6

( )For reference only. These data should be update according the prototype.

Note 1:Ta=25℃

Note 2:Ta=0℃

Note 3:Ta=-20℃

Note 4:The lamp frequency should be selected as different as possible from display horizontal synchronous signal to avoid interference.

Note 5: For starting the backlight unit, the output voltage of DC/AC's transformer Should be larger than the maximum lamp starting voltage.

Note 6:The " Lamp life time" is defined as the module brightness decrease to 50% Original brightness at Ta=25℃, I_L=6mA.

Note 7: Measurement of IL is provided for GND side of the CFL.

Note 8: When I_L is over 6.0mA,it may cause uneven contrast near CFL location, due to heat dispersion from CFL.

3.3 AC Timing characteristic of the LCD

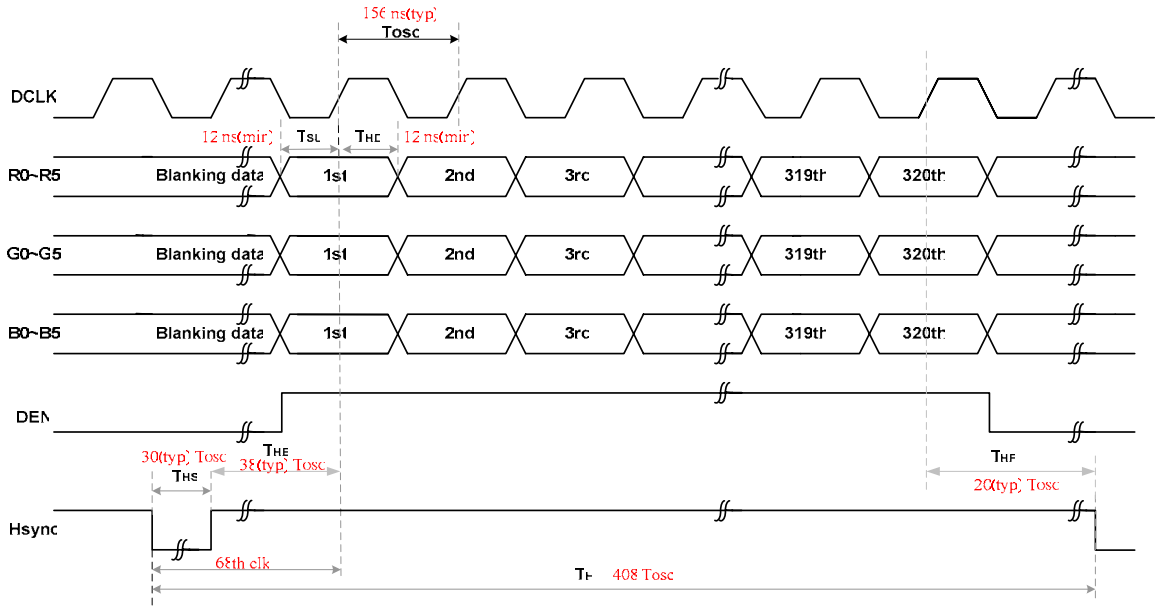
a. Timing condition

Signal	Parameter		Symbol	Min.	Typ.	Max.	Unit.	Remark
DCLK	DCLK period		TOSC	-	156	-	ns	
	Frequency		FOSC	-	6.4	-	MHz	
	DCLK High plus width		TCH	-	78	-	ns	
	DCLK Low plus width		TCL	-	78	-	ns	
RGB DATA	Data setup time		TSU	12	-	-	ns	
	Data hold time		THD	12	-	-	ns	
Hsync	Hsync period		TH	-	408	-	TOSC	
	Hsync pulse width		THS	5	30	-	TOSC	
	Back-Parch		THB		38		TOSC	
	Front-Parch		THF		20		TOSC	
	Hsync rising time		TCr	-	-	700	ns	
	Hsync falling time		TCf	-	-	300	ns	
Vsync	Vsync period	NTSC		-	262.5	-	TH	
		PAL		-	312.5	-	TH	
	Vsync pulse width		TVS	1	3	5	TH	
	Back-Porch	NTSC	TVB		15		TH	
		PAL			23		TH	
	Display Period		TVD		240		TH	
	Front Porch	NTSC	TVF		4.5		TH	
		PAL			46.5		TH	
	Vsync rising time		TVr	-	-	700	ns	
	Vsync falling time		TVf	-	-	1.5	μs	
	Vsync falling to Hsync rising time for odd field		THVO	1	-	-	TOSC	
	Vsync falling to Hsync falling time for even field		THVE	1	-	-	TOSC	
DEN	Vsync-DEN time	NTSC	TVSE	-	18	-	TH	
		PAL	TVSE	-	26	-	TH	
	Hsync-DEN time		THE	36	68	88	TOSC	
	DEN plus width		TEP	-	320	-	TOSC	

Note : If DEN is fixed to low, the SYNC mode is used. Otherwise DE mode is used. When SYNC mode is used, 1st data start from 68th CLK after Hsync falling

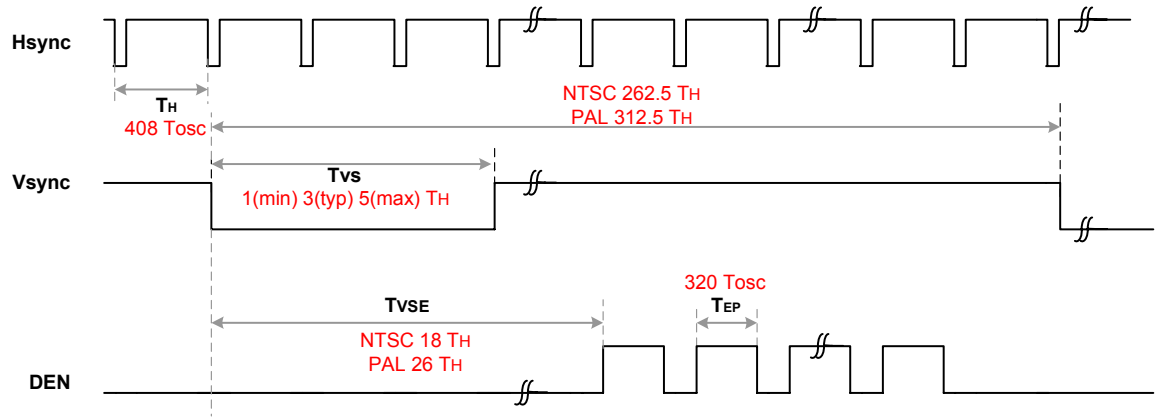
- Horizontal display timing

Note Data is latched rising edge trigger of CLK

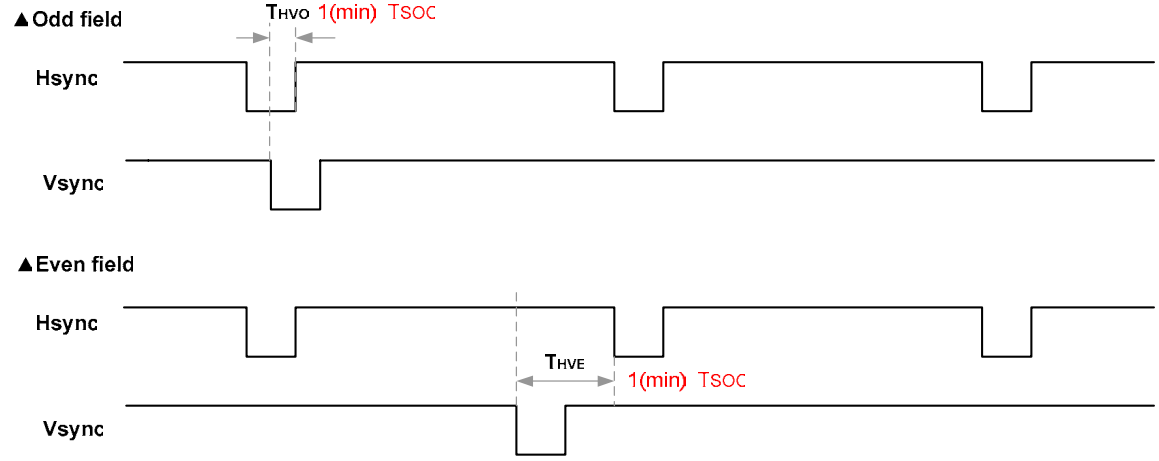


If DEN is fixed to low the SYNC mode is usec Otherwise DE mode is usec
When SYNC mode is usec st data start from 656th CLK after Hsync falling

- Vertical display timing



- Hsync and Vsync timing



4 Optical specification

4.1 Optical characteristic of the LCD

Item		Symbol	Conditon	Min.	Typ.	Max.	Unit	Remark
Response Time	Rise Fall	T_r T_f	Θ=0°	- -	15 35	30 50	ms ms	Note 1,2,3,5
Contrast ratio		CR	At optimized viewing angle	(150)	(250)	-		Note 1,2,4,5
Viewing Angle	Top Bottom Left Right		CR≧10	- - - -	(35) (15) (45) (45)	- - - -	deg.	Note1,2, 5,6
Brightness		Y_L	I_L=5mA,25℃	(350)	(420)	-	cd/m^2	Note 7
			I_L=6mA,25℃	-	(500)	-	cd/m^2	
Red chromaticity		X_R	Θ=0° Θ=0°	0.610	0.640	0.670		Note 7 For reference only. These data should be update according the prototype.
		Y_R		0.314	0.344	0.374		
Green chromaticity		X_G		0.268	0.298	0.328		
		Y_G		0.553	0.583	0.613		
Blue chromaticity		X_B		0.102	0.132	0.162		
		Y_B		0.107	0.137	0.167		
White chromaticity		X_W		0.282	0.312	0.342		
		Y_W		0.299	0.329	0.359		

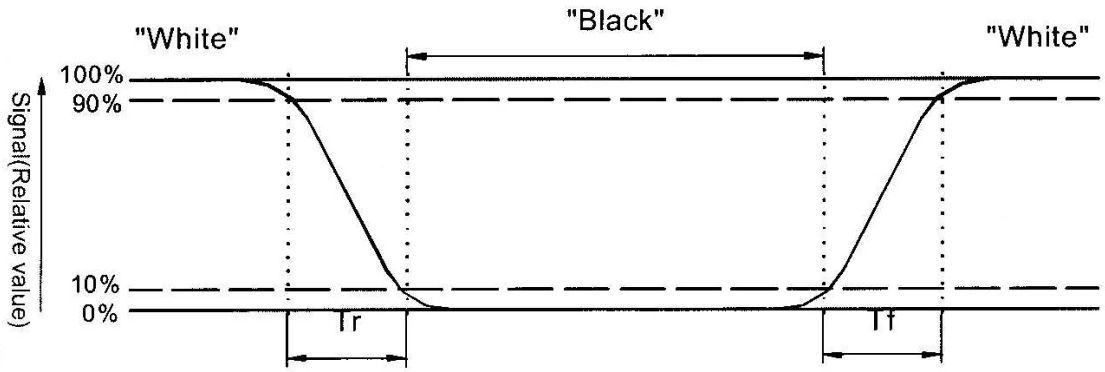
( )For reference only. These data should be update according the prototype.

Note 1:Ambient temperature=25℃,and lamp current I_L=6 mArms.To be measured in the dark room.

Note 2:To be measured on the center area of panel with a viewing cone of 1°by Topcon luminance meter BM-7,after 10 minutes operation.

Note 3.Definition of response time:

The output signals of photo detector are measured when the input signals are changed from “black“ to “white”(falling time) and from”white” to “black” (rising time),respectively.The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below.



Note 4.Definition of contrast ratio:

Contrast ratio is calculated with the following formula.

$$\text{Contrast ratio(CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector Output when LCD is at "Black" state}}$$

Note 5:White $V_i=V_{i50}$ +1.5V

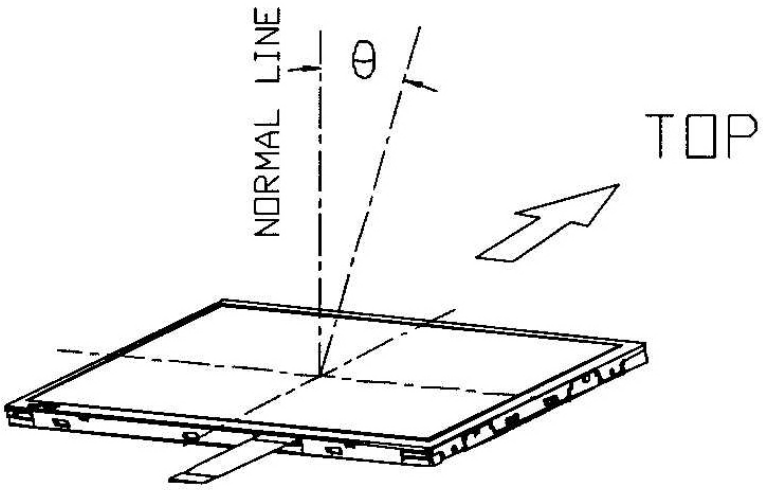
Black $V_i=V_{i50}$ +2.0V

"±"means that the analog input signal swings in phase with V_{COM} signal.

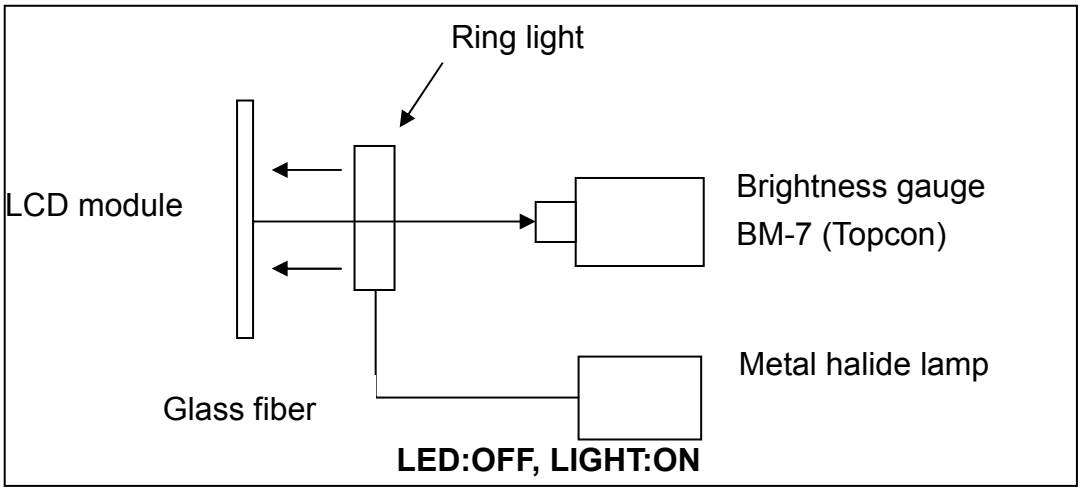
"$\frac{-}{+}$ " means that the analog input signal swings out of phase with V_{COM} signal.

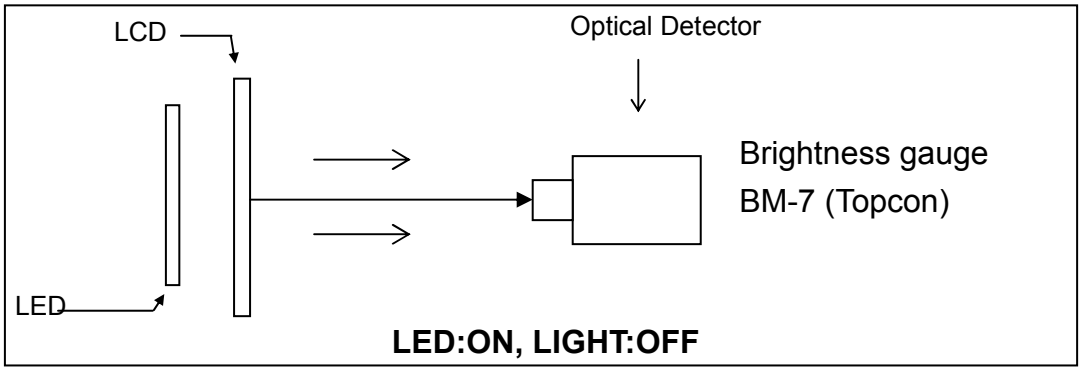
V_{i50} : The analog input voltage when transmission is 50%.The 100% Transmission is defined as the transmission of LCD panel when all the Input terminals of module are electrically opened.

Note 6.Definition of viewing angle,Refer to figure as below.



Note 7.Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.





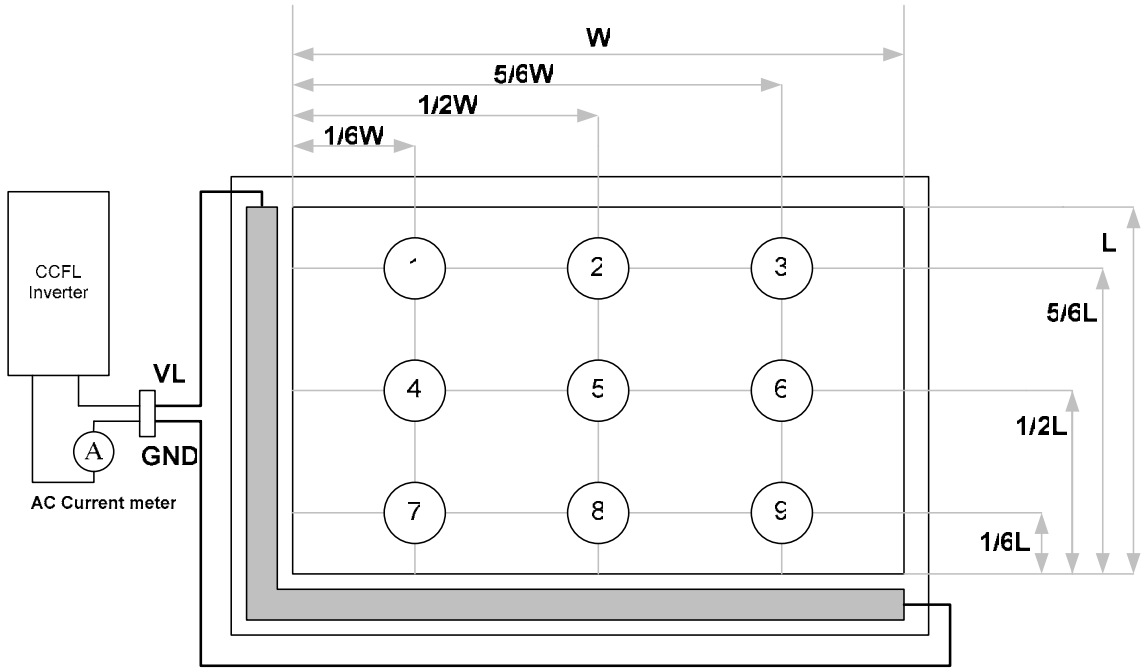
4.2 Optical characteristic of the Back-light

ITEM	MIN	TYP	MAX	UNIT	NOTE
Bare Brightness	(4000)	(4500)		Cd/m2	IL=6.0 mA (Note 1)
Rise Time	-	3	-	Minute	IL=6.0 mA Brightness 80%
Brightness Uniformity	80	-	-	%	(Note 1,2,3)

( )For reference only. These data should be update according the prototype.

Note1 : Measurement after 10 minutes from CFL operating.

Note2 : Measurement of the following 9 places on the display.



Note3: The Uniformity definition

(Min Brightness / Max Brightness) x 100%

5 Interface specifications

5.1 Driving signals for the TFT panel

JAE:FA5B040HF1R3000 (Suitable FPC :t=0.3+/-0.03mm , 0.5+/-0.03mm pitch)

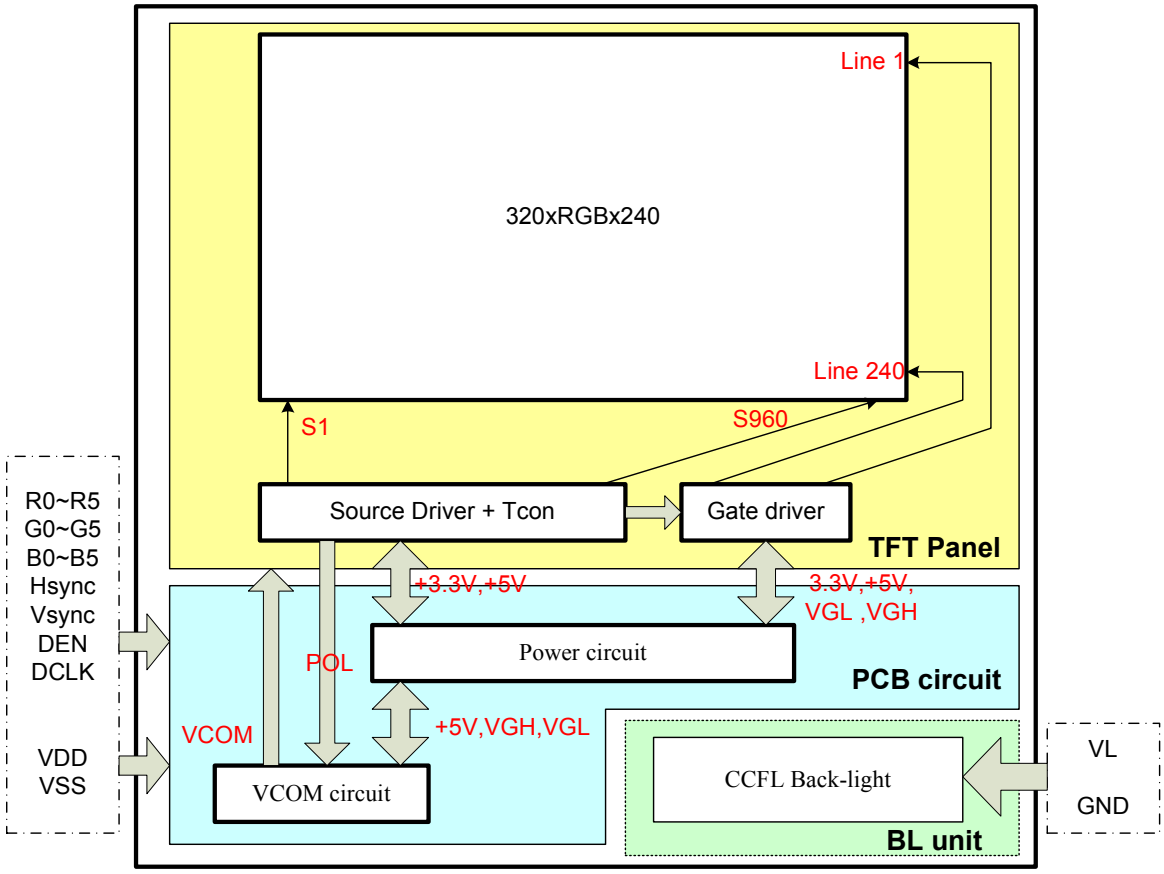
Pin no	Symbol	I/O	Description	Remark
1~4	VDD		Power supply for the logic (3.3V)	
5	Hsync	I	Horizontal sync input in digital RGB mode	
6	DEN	I	Input data enable control	
7	VSS		GND	
8	DCLK	I	Clock signal. Latching data at the rising edge.	
9	VSS		GND	
10	Vsync	I	Vertical sync input in digital RGB mode.	
11	VSS		GND	
12	B5	I	Blue data	
13	B4	I		
14	B3	I		
15	VSS		GND	
16	B2	I	Blue data	
17	B1	I		
18	B0	I		
19	VSS		GND	
20	G5	I	Green data	
21	G4	I		
22	G3	I		
23	VSS		GND	
24	G2	I	Blue data	
25	G1	I		
26	G0	I		
27	VSS		GND	
28	R5	I	Red data	
29	R4	I		
30	R3	I		
31	VSS		GND	
32	R2	I	Red data	
33	R1	I		
34	R0	I		
35	NC		No connection	
36	VSS		GND	
37	NC		No connection	
38	NC		No connection	
39	NC		No connection	
40	NC		No connection	

5.2 Driving signals for the CCFL back-light

JST Housing: BHR-03VS-1

Pin no	Symbol	Level	Description	Remark
1	VL	-	Power supply for CFL	
2	NC	-	No connection	
3	GND	-	GND for CFL (OV)	

6 BLOCK DIAGRAM



7 DISPLAYED COLOR AND INPUT DATA

	Color & Gray Scale	DATA SIGNAL																	
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Color		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(0)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green(0)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue(0)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(62)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(61)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(31)	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(1)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(0)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green(61)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(31)	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(1)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green(0)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(61)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(31)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue(0)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

8 QUALITY AND RELIABILITY

8.1 TEST CONDITIONS

Tests should be conducted under the following conditions :
Ambient temperature : 25 ± 5°C
Humidity : 60 ± 25% RH.

8.2 SAMPLING PLAN

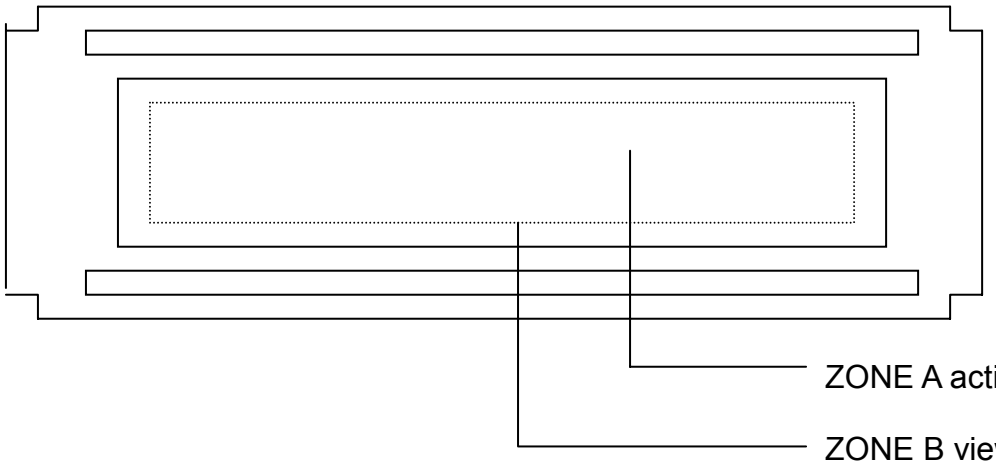
Sampling method shall be in accordance with MIL-STD-105E , level II, normal single sampling plan .

8.3 ACCEPTABLE QUALITY LEVEL

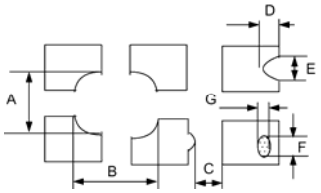
A major defect is defined as one that could cause failure to or materially reduce the usability of the unit for its intended purpose. A minor defect is one that does not materially reduce the usability of the unit for its intended purpose or is an infringement from established standards and has no significant bearing on its effective use or operation.

8.4 APPEARANCE

An appearance test should be conducted by human sight at approximately 30 cm distance from the LCD module under flourescent light. The inspection area of LCD panel shall be within the range of following limits.

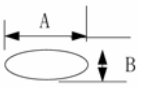


8.5 INSPECTION QUALITY CRITERIA

<table>
<tr><th>No.</th><th>Item</th><th>Criterion for defects</th><th>Defect type</th></tr>
<tr><td>1</td><td>Non display</td><td>No non display is allowed</td><td>Major</td></tr>
<tr><td>2</td><td>Irregular operation</td><td>No irregular operation is allowed</td><td>Major</td></tr>
<tr><td>3</td><td>Short</td><td>No short are allowed</td><td>Major</td></tr>
<tr><td>4</td><td>Open</td><td>Any segments or common patterns that don’t activate are rejectable.</td><td>Major</td></tr>
<tr><td>5</td><td>Black/White spot (I)</td><td><table><tr><th>Size D (mm)</th><th>Acceptable number</th></tr><tr><td>D ≤ 0.15</td><td>Ignore</td></tr><tr><td>0.15 < D ≤ 0.20</td><td>3</td></tr><tr><td>0.20 < D ≤ 0.30</td><td>2</td></tr><tr><td>0.30 < D</td><td>0</td></tr></table></td><td>Minor</td></tr>
<tr><td>6</td><td>Black/White line (I)</td><td><table><tr><th>Length(mm)</th><th></th><th>Acceptable number</th></tr><tr><td>10 < L</td><td>0.03 < W ≤ 0.04</td><td>5</td></tr><tr><td>5.0 < L ≤10</td><td>0.04 < W ≤ 0.06</td><td>3</td></tr><tr><td>1.0 < L ≤ 5.0</td><td>0.06 < W ≤ 0.07</td><td>2</td></tr><tr><td>L ≤ 1.0</td><td>0.07 < W ≤ 0.09</td><td>1</td></tr></table></td><td>Minor</td></tr>
<tr><td>7</td><td>Black/White sport (II)</td><td><table><tr><th>Size D (mm)</th><th>Acceptable number</th></tr><tr><td>D ≤ 0.30</td><td>Ignore</td></tr><tr><td>0.30 < D ≤ 0.50</td><td>5</td></tr><tr><td>0.50 < D ≤ 1.20</td><td>3</td></tr><tr><td>1.20 < D</td><td>0</td></tr></table></td><td>Minor</td></tr>
<tr><td>8</td><td>Black/White line (II)</td><td><table><tr><th>Length (mm)</th><th>Width (mm)</th><th>Acceptable number</th></tr><tr><td>20 < L</td><td>0.05 < W ≤ 0.07</td><td>5</td></tr><tr><td>10 < L ≤ 20</td><td>0.07 < W ≤ 0.09</td><td>3</td></tr><tr><td>5.0 < L ≤ 10</td><td>0.09 < W ≤ 0.10</td><td>2</td></tr><tr><td>L ≤ 5.0</td><td>0.10 < W ≤ 0.15</td><td>1</td></tr></table></td><td>Minor</td></tr>
<tr><td>9</td><td>Back Light</td><td>1. No Lighting is rejectable
2. Flickering and abnormal lighting are rejectable</td><td>Major</td></tr>
<tr><td>10</td><td>Display pattern</td><td> 

Unit:mm
<table><tr><td>$\frac{A+B}{2} \le 0.30$</td><td>0 < C</td><td>$\frac{D+E}{2} \le 0.25$</td><td>$\frac{F+G}{2} \le 0.25$</td></tr></table>
Note: 1. Acceptable up to 3 damages
2. NG if there’re to two or more pinholes per dot</td><td>Minor</td></tr>
</table>

<table>
<tr><td>11</td><td>Blemish & Foreign matters

Size:
$D = \frac{A+B}{2}$</td><td><table><tr><th>Size D (mm)</th><th>Acceptable number</th></tr><tr><td>D ≤ 0.15</td><td>Ignore</td></tr><tr><td>0.15 < D ≤ 0.20</td><td>3</td></tr><tr><td>0.20 < D ≤ 0.30</td><td>2</td></tr><tr><td>0.30 < D</td><td>0</td></tr></table></td><td>Minor</td></tr>
<tr><td>12</td><td>Scratch on Polarizer
  </td><td><table><tr><th>Width (mm)</th><th>Length (mm)</th><th>Acceptable number</th></tr><tr><td>W≤0.03</td><td>Ignore</td><td>Ignore</td></tr><tr><td>0.03<W≤0.05</td><td>L ≤ 2.0</td><td>Ignore</td></tr><tr><td></td><td>L > 2.0</td><td>1</td></tr><tr><td>0.05<W≤0.08</td><td>L > 1.0</td><td>1</td></tr><tr><td></td><td>L ≤ 1.0</td><td>Ignore</td></tr><tr><td>0.08<W</td><td>Note (1)</td><td>Note(1)</td></tr></table>Note(1) Regard as a blemish</td><td>Minor</td></tr>
<tr><td>13</td><td>Bubble in polarizer</td><td><table><tr><th>Size D (mm)</th><th>Acceptable number</th></tr><tr><td>D ≤ 0.20</td><td>Ignore</td></tr><tr><td>0.20 < D ≤ 0.50</td><td>3</td></tr><tr><td>0.50 < D ≤ 0.80</td><td>2</td></tr><tr><td>0.80 < D</td><td>0</td></tr></table></td><td>Minor</td></tr>
<tr><td>14</td><td>Stains on LCD panel surface</td><td>Stains that cannot be removed even when wiped lightly with a soft cloth or similar cleaning too are rejectable.</td><td>Minor</td></tr>
<tr><td>15</td><td>Rust in Bezel</td><td>Rust which is visible in the bezel is rejectable.</td><td>Minor</td></tr>
<tr><td>16</td><td>Defect of land surface contact (poor soldering)</td><td>Evident crevices which is visible are rejectable.</td><td>Minor</td></tr>
<tr><td>17</td><td>Parts mounting</td><td>1. Failure to mount parts
2. Parts not in the specifications are mounted
3. Polarity, for example, is reversed</td><td>Major
Major
Major</td></tr>
<tr><td>18</td><td>Parts alignment</td><td>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 pad outline.</td><td>Minor

Minor</td></tr>
<tr><td>19</td><td>Conductive foreign matter (Solder ball, Solder chips)</td><td>1. 0.45< φ ,N≧1
2. 0.30< φ ≤0.45 ,N≧1
φ :Average diameter of solder ball (unit: mm)
3. 0.50<L ,N≧1
L: Average length of solder chip (unit: mm)</td><td>Major
Minor

Minor</td></tr>
<tr><td>20</td><td>Faulty PCB correction</td><td>1. Due to PCB copper foil pattern burnout, the pattern is connected, using a jumper wire for repair; 2 or more places are corrected per PCB.
2. Short circuited part is cut, and no resist coating has been performed.</td><td>Minor

Minor</td></tr>
</table>

9 Reliability test items (Note2):

No.	Test items	Conditions	Remark
1	High temperature storage	Ta=80℃ 240Hrs	
2	Low temperature storage	Ta=-30℃ 240Hrs	
3	High temperature operation	Ta=70℃ 240Hrs	
4	Low temperature operation	Ta=-20℃ 240Hrs	
5	High temperature and high humidity	Ta=40℃,85% RH 240Hrs	Operation
6	Heat shock	-30℃~80℃/200 cycles 1Hrs/cycle	Non-operation
7	Electrostatic discharge	±200V,200Pf(0Ω),once for each terminal	Non-operation
8	Vibration	Frequency range :8~33.3Hz Stoke :1.3mm Sweep :2.9G,33.3~400Hz Cycle :15 minutes 2 hours for each direction of X,Z 4 hours for Y direction	JIS C7021, A-10 Condition A
9	Mechanical shock	100G, 6ms,±X, ±Y,±Z 3 times for each direction	JIS C7021, A-7 Condition C
10	Vibration (With carton)	Random vibration: $0.015G^2$/Hz from 5~200Hz -6dB/octave from 200~500Hz	IEC 68~34
11	Drop (with carton)	Height:60cm 1 corner,3 edges,6 surfaces	JIS Z0202

8 USE PRECAUTIONS

8.1 Handling precautions

1) The polarizing plate may break easily so be careful when handling it. Do not touch, press or rub it with a hard-material tool like tweezers.
2) Do not touch the polarizing plate surface with bare hands so as not to make it dirty. If the surface or other related part of the polarizing plate is dirty, soak a soft cotton cloth or chamois leather in benzine and wipe off with it. Do not use chemical liquids such as acetone, toluene and isopropyl alcohol. Failure to do so may bring chemical reaction phenomena and deteriorations.
3) Remove any spit or water immediately. If it is left for hours, the suffered part may deform or decolorize.
4) If the LCD element breaks and any LC stuff leaks, do not suck or lick it. Also if LC stuff is stuck on your skin or clothing, wash thoroughly with soap and water immediately.

8.2 Installing precautions

1) The PCB has many ICs that may be damaged easily by static electricity. To prevent breaking by static electricity from the human body and clothing, earth the human body properly using the high resistance and discharge static electricity during the operation. In this case, however, the resistance value should be approx. 1MΩ and the resistance should be placed near the human body rather than the ground surface. When the indoor space is dry, static electricity may occur easily so be careful. We recommend the indoor space should be kept with humidity of 60% or more. When a soldering iron or other similar tool is used for assembly, be sure to earth it.
2) When installing the module and ICs, do not bend or twist them. Failure to do so may crack LC element and cause circuit failure.
3) To protect LC element, especially polarizing plate, use a transparent protective plate (e.g., acrylic plate, glass etc) for the product case.
4) Do not use an adhesive like a both-side adhesive tape to make LCD surface (polarizing plate) and product case stick together. Failure to do so may cause the polarizing plate to peel off.

8.3 Storage precautions

1) Avoid a high temperature and humidity area. Keep the temperature between 0°C and 35°C and also the humidity under 60%.
2) Choose the dark spaces where the product is not exposed to direct sunlight or

fluorescent light.

3) Store the products as they are put in the boxes provided from us or in the same conditions as we recommend.

8.4 Operating precautions

1) Do not boost the applied drive voltage abnormally. Failure to do so may break ICs. When applying power voltage, check the electrical features beforehand and be careful. Always turn off the power to the LC module controller before removing or inserting the LC module input connector. If the input connector is removed or inserted while the power is turned on, the LC module internal circuit may break.
2) The display response may be late if the operating temperature is under the normal standard, and the display may be out of order if it is above the normal standard. But this is not a failure; this will be restored if it is within the normal standard.
3) The LCD contrast varies depending on the visual angle, ambient temperature, power voltage etc. Obtain the optimum contrast by adjusting the LC dive voltage.
4) When carrying out the test, do not take the module out of the low-temperature space suddenly. Failure to do so will cause the module condensing, leading to malfunctions.
5) Make certain that each signal noise level is within the standard (L level: 0.2Vdd or less and H level: 0.8Vdd or more) even if the module has functioned properly. If it is beyond the standard, the module may often malfunction. In addition, always connect the module when making noise level measurements.
6) The CMOS ICs are incorporated in the module and the pull-up and pull-down function is not adopted for the input so avoid putting the input signal open while the power is ON.
7) The characteristic of the semiconductor element changes when it is exposed to light emissions, therefore ICs on the LCD may malfunction if they receive light emissions. To prevent these malfunctions, design and assemble ICs so that they are shielded from light emissions.
8) Crosstalk occurs because of characteristics of the LCD. In general, crosstalk occurs when the regularized display is maintained. Also, crosstalk is affected by the LC drive voltage. Design the contents of the display, considering crosstalk.

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8.5 Other

1) Do not disassemble or take the LC module into pieces. The LC modules once disassembled or taken into pieces are not the guarantee articles.
2) The residual image may exist if the same display pattern is shown for hours. This residual image, however, disappears when another display pattern is shown or the drive is interrupted and left for a while. But this is not a problem on reliability.

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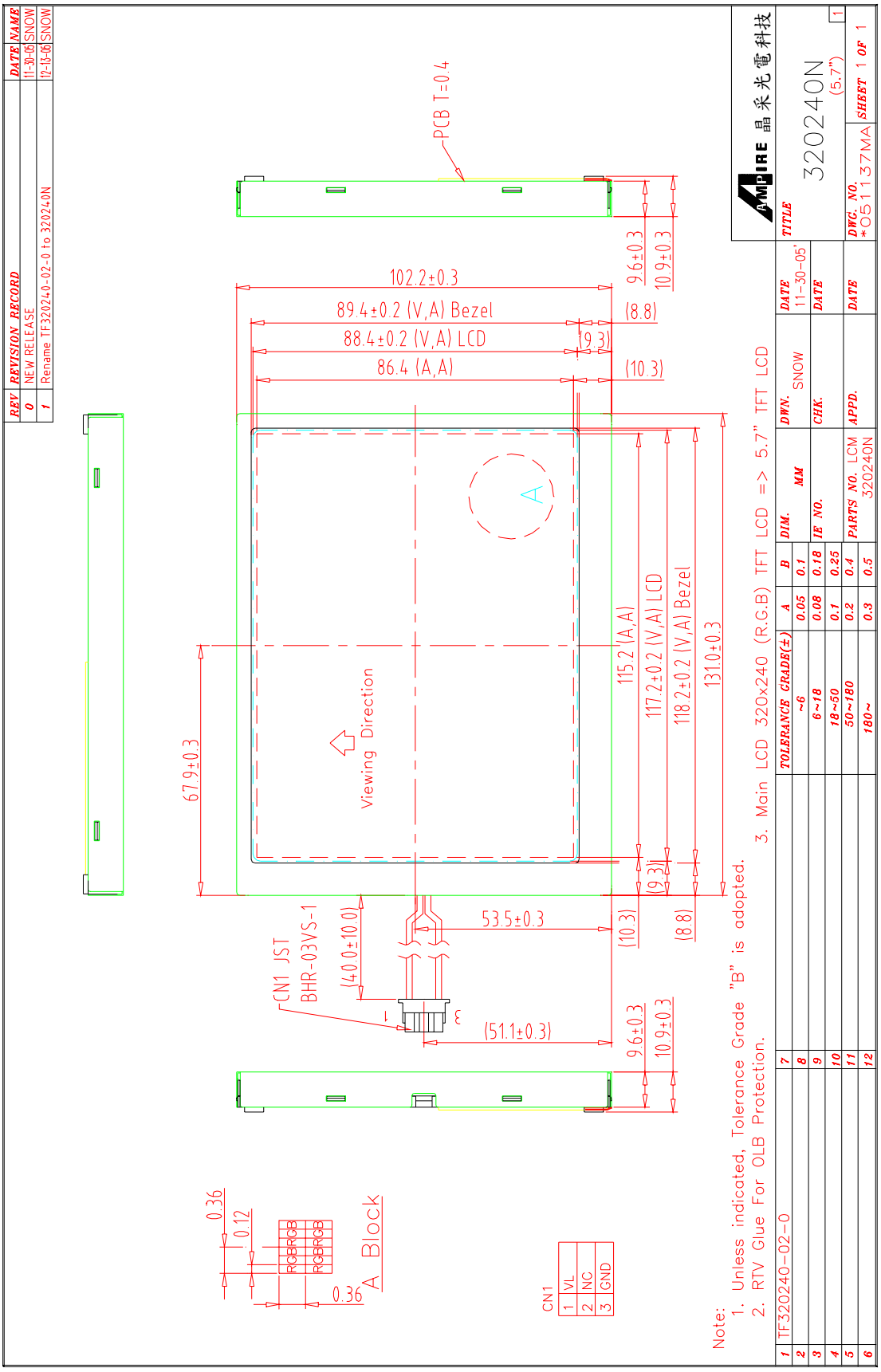
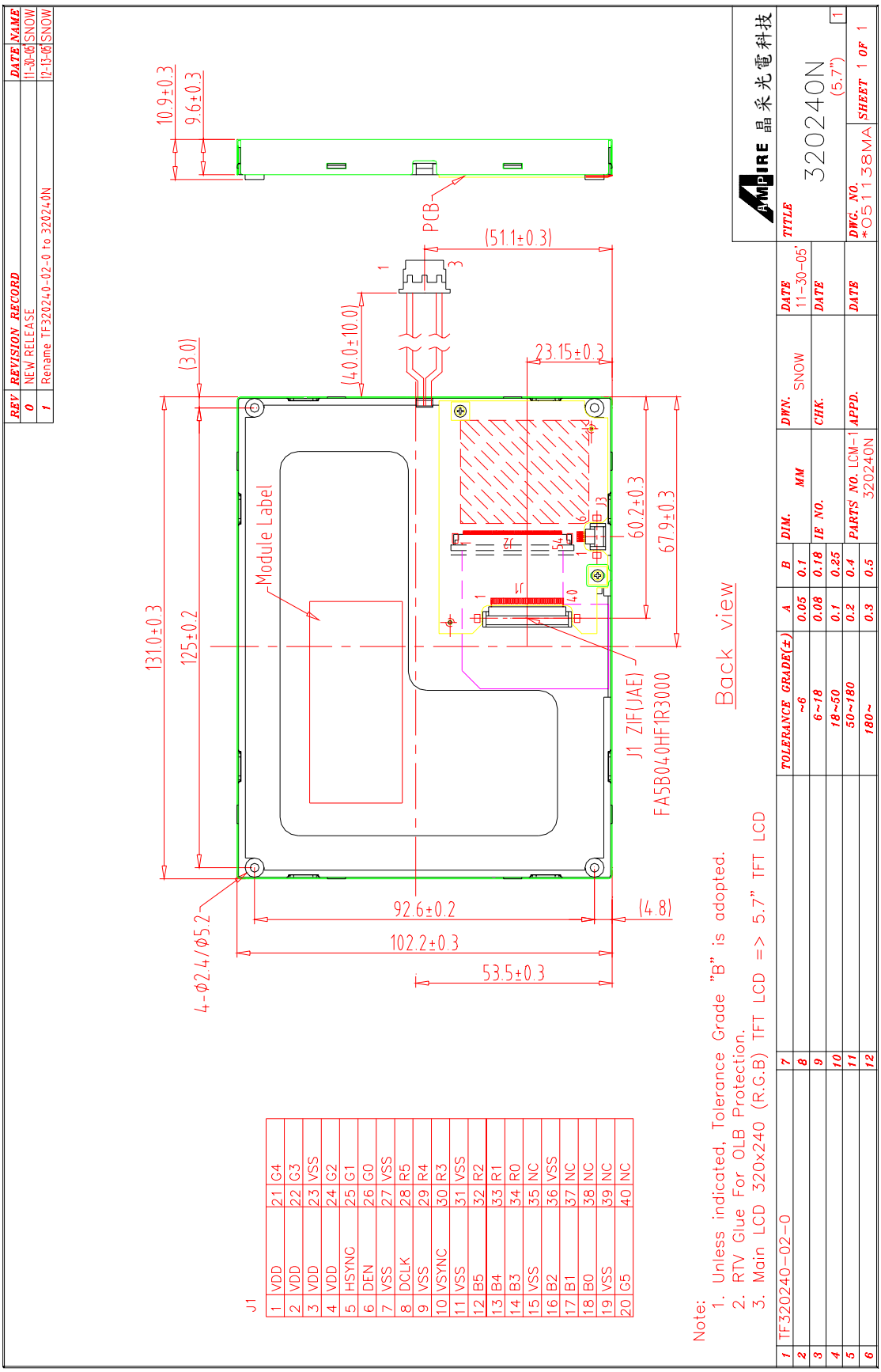
9 OUTLINE DIMENSION




REV REVISION RECORD DATE NAME
0 NEW RELEASE 11-30-05 SNOW
1 Rename TF320240-02-0 to 320240N 12-13-05 SNOW
10.9±0.3
9.6±0.3
PCB
(51.1±0.3)
(40.0±10.0)
23.15±0.3
(3.0)
Module Label
131.0±0.3
125±0.2
60.2±0.3
67.9±0.3
J1 ZIF(JAE)
FA5B040HF1R3000
Back view
92.6±0.2
(4.8)
102.2±0.3
53.5±0.3
4-Φ2.4/Φ5.2
J1
1 VDD 21 G4
2 VDD 22 G3
3 VDD 23 VSS
4 VDD 24 G2
5 HSYNC 25 G1
6 DEN 26 G0
7 VSS 27 VSS
8 DCLK 28 R5
9 VSS 29 R4
10 VSYNC 30 R3
11 VSS 31 VSS
12 B5 32 R2
13 B4 33 R1
14 B3 34 R0
15 VSS 35 NC
16 B2 36 VSS
17 B1 37 NC
18 B0 38 NC
19 VSS 39 NC
20 G5 40 NC
Note:
1. Unless indicated, Tolerance Grade "B" is adopted.
2. RTV Glue For OLB Protection.
3. Main LCD 320x240 (R.G.B) TFT LCD => 5.7" TFT LCD
AMPIRE 晶采光電科技
TITLE 320240N (5.7")
DWG. NO. *05113 8MA
SHEET 1 OF 1
DWN. SNOW DATE 11-30-05
CHK. DATE
APPD. DATE
DIM. MM
IE NO.
PARTS NO. LCM-1 320240N
TOLERANCE GRADE(±) A B
~6 0.05 0.1
6~18 0.08 0.18
18~50 0.1 0.25
50~180 0.2 0.4
180~ 0.3 0.5
TF320240-02-0