A Brighter Solution

AMP DISPLAY INC.

SPECIFICATIONS

5.7-in COLOR TFT MODULE W/ TOUCH

CUSTOMER:	
CUSTOMER PART NO.	
AMP DISPLAY PART NO.	A M - 3 2 0 2 4 0 N T M Q W - T 3 0 H
APPROVED BY:	
DATE:	

☐ APPROVED FOR SPECIFICATIONS

☐ APPROVED FOR SPECIFICATION AND PROTOTYPES

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RECORD OF REVISION

Revision Date	Page	Contents	Editor
2007/2/13	-	New Release	Kokai
2007/4/30	5	Modify Electrical characteristic of LED Back-light	Edward
	13	Modify Optical characteristic of the LED Back-light	Edward
	19-21	Modify Quality and Reliability	Edward
	25-26	Modify Outline Dimension	Edward
2007/7/18	10	Modify LCD Viewing Angle	Edward

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 LED Backlight,Touch Panel 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 . DE only mode support.
(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)x12.4(D)	mm	
Weight	T.B.D	mg	
Backlight unit	LED		

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
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

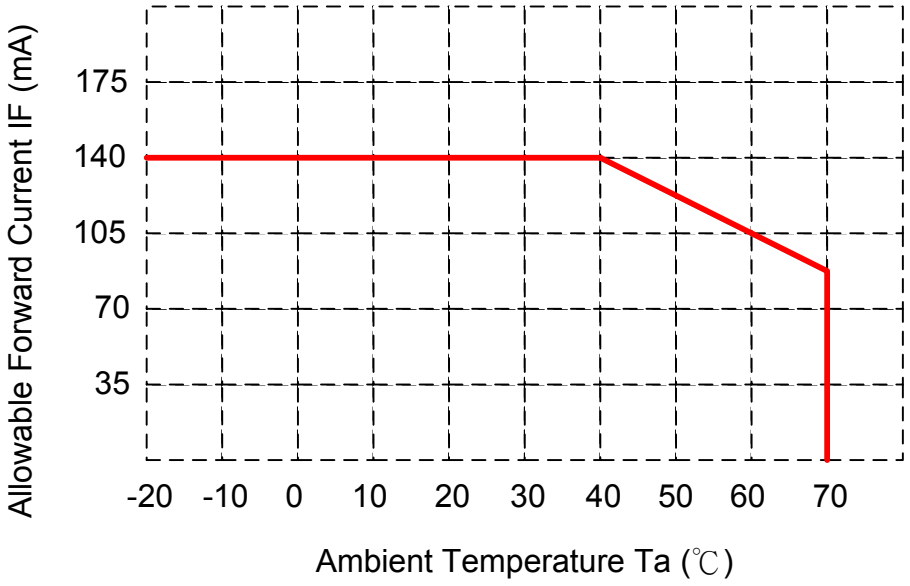
For operating condition Ta at -20℃ < 100h

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 40℃ ambient temperature, the I_{LED} of the LED back-light should be follow :



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

Note8 : When LCM be operated over than 40℃ , the life time of the LED back-light will be reduced.

3.2 Electrical characteristics

3.2.1 DC Electrical characteristic of the LCD

Typical operting conditions (VSS=0V)

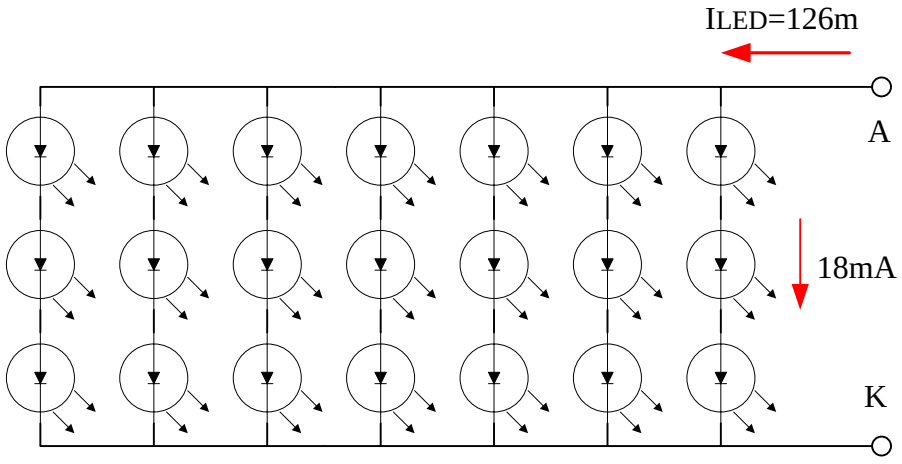
Item		Symbol	Min.	Typ.	Max.	Unit	Remark
Power supply		VDD	3.0	3.3	3.6	V	
Input Voltage for logic	H Level	V_{IH}	0.7 VDD	-	VDD	V	Note 1
	L Level	V_{IL}	0	-	0.3 VDD	V	
Power Supply current		IDD		45	55	mA	Note 2

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

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

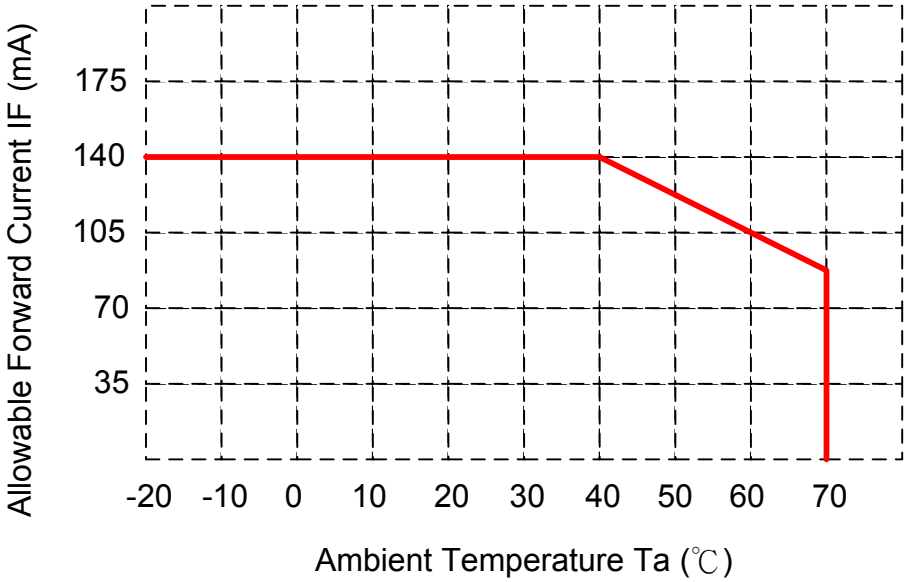
3.2.2 Electrical characteristic of LED Back-light

Paramenter	Symbol	Min.	Typ.	Max.	Unit	Condiction
LED voltage	V_{AK}	8.4	9.6	10.8	V	I_{LED} =140mA,Ta=25℃
LED forward current	I_{LED}	--	126	140	mA	Ta=25℃
	I_{LED}	--	84	105	mA	Ta=60℃
Lamp life time		30,000	-	-	Hr	I_{LED} =140mA,Ta=25℃



■ The constant current source is needed for white LED back-light driving.

When LCM is operated over 60℃ ambient temperature, the I_{LED} of the LED back-light should be adjusted to 105mA max


Allowable Forward Current IF (mA)
175
140
105
70
35
-20
-10
0
10
20
30
40
50
60
70
Ambient Temperature Ta (℃)

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**	

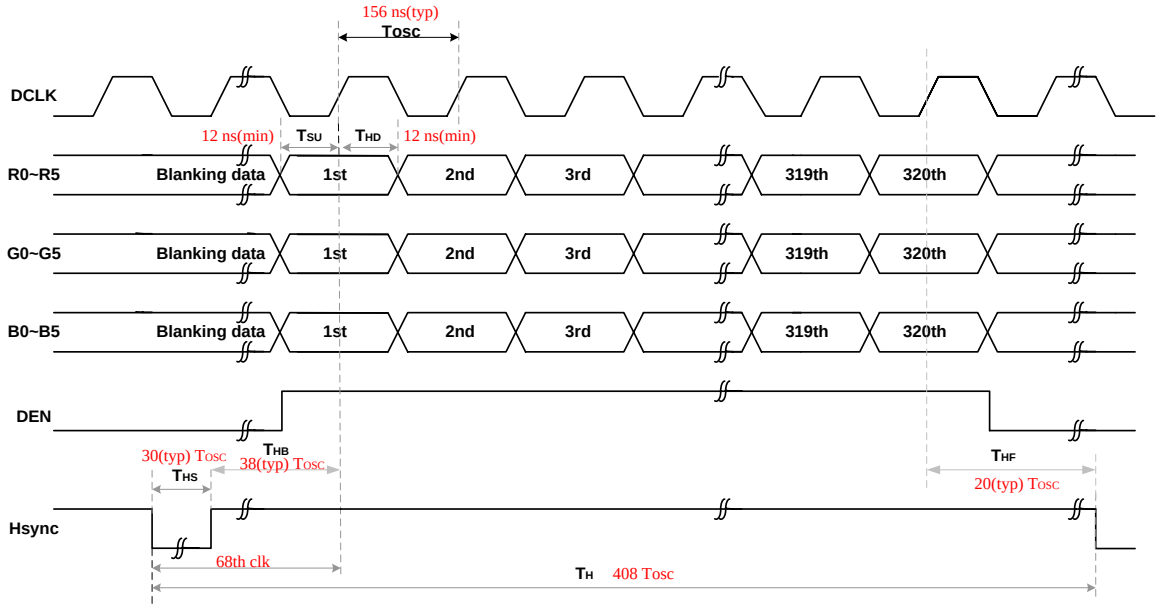
Note 1: DEN is definition of above timing for Hsync and Vsync.

Note 2: No matter when Hsync and Vsync is inputted, the LCM can be drove only DEN Signal. DEN should be set to low level when it is not input.

Note 3: The Dummy Enable is needed in the end of frame. Please set the LCD controller timing to 241 lines.

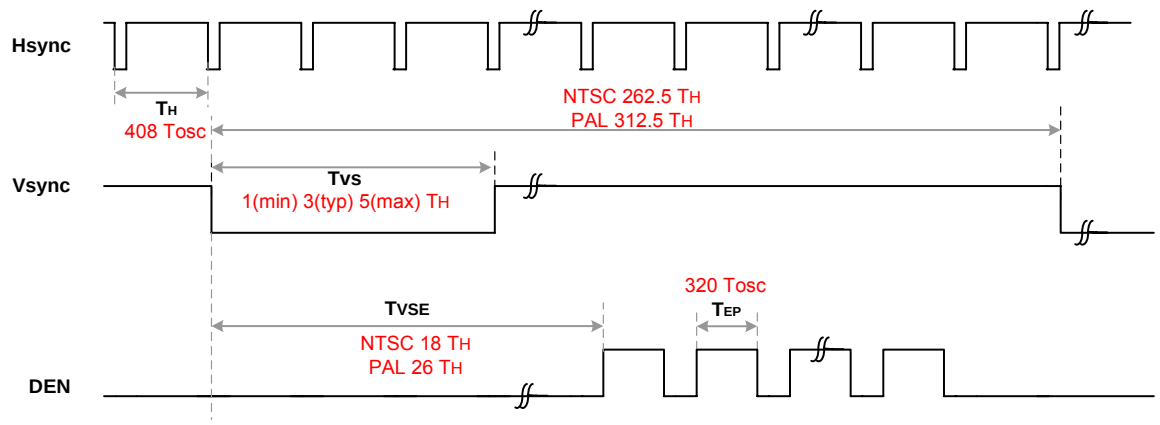
- Horizontal display timing

Note: Data is latched rising edge trigger of CLK.

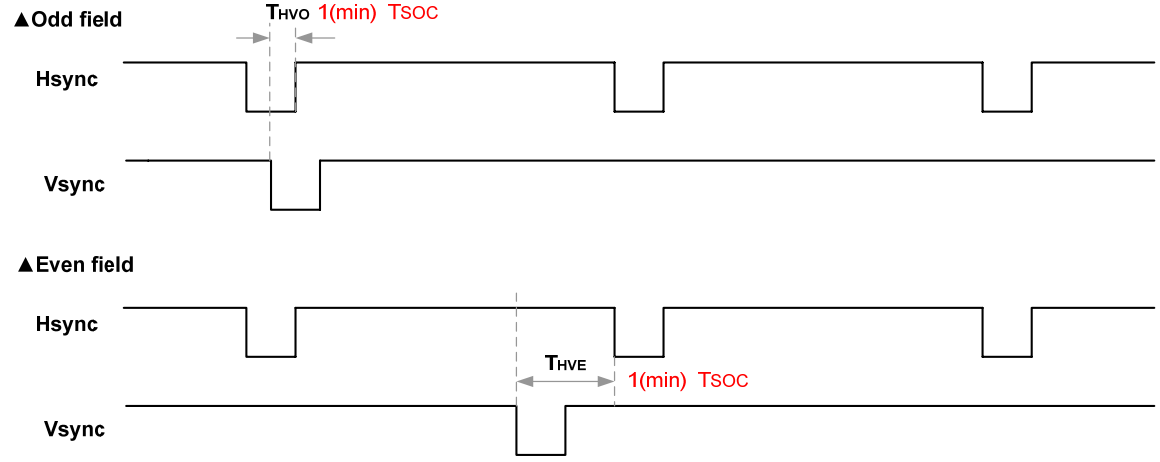


If DEN is fixed to low, the SYNC mode is used. Otherwise DE mode is used.
When SYNC mode is used, 1st data start from 68th CLK after Hsync falling

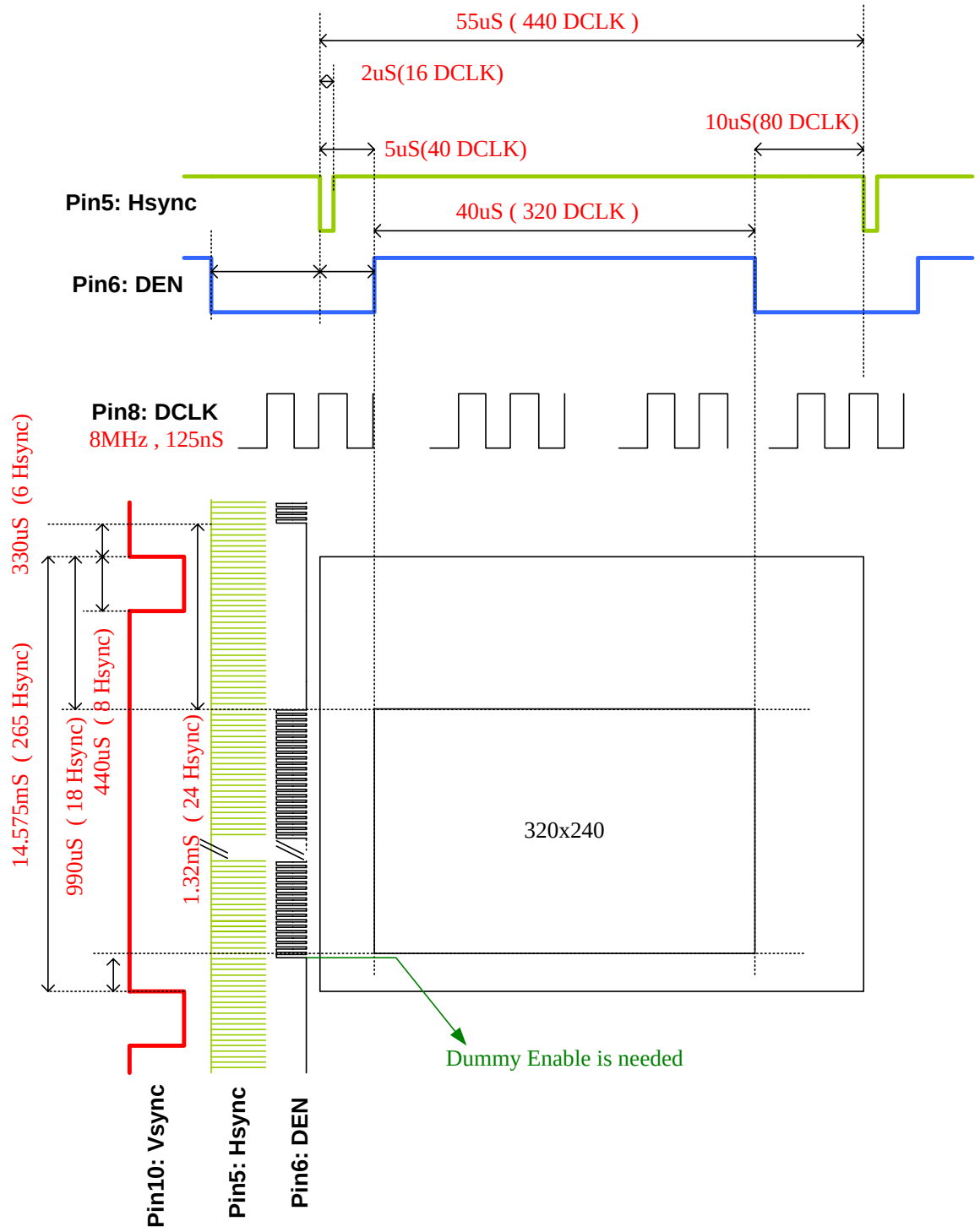
- Vertical display timing



- Hsync and Vsync timing



Recommend Driving Timing:



4 Optical specification

4.1 Optical characteristic of the LCD

Item		Symbol	Conditon	Min.	Typ.	Max.	Unit	Remark
Response Time	Rise	T_r	Θ=0°	-	15	30	ms	Note 1,2,3,5
	Fall	T_f		-	35	50	ms	
Contrast ratio		CR	At optimized viewing angle	200	350	-		Note 1,2,4,5
Viewing Angle	Top		CR≧10	55	60	-	deg.	Note1,2, 5,6
	Bottom			45	50	-		
	Left			55	60	-		
	Right			55	60	-		
Brightness		Y_L	I_{LED}=126mA, 25℃	342	360	-	cd/m²	Note 7
			I_{LED}=140mA, 25℃	380	400	-	cd/m²	
Red chromaticity		XR	Θ=0° Θ=0°	0.610	0.640	0.670		Note 7 For reference only. These data should be update according the prototype.
		YR		0.314	0.344	0.374		
Green chromaticity		XG		0.268	0.298	0.328		
		YG		0.553	0.583	0.613		
Blue chromaticity		XB		0.102	0.132	0.162		
		YB		0.107	0.137	0.167		
White chromaticity		XW		0.282	0.312	0.342		
		YW		0.299	0.329	0.359		

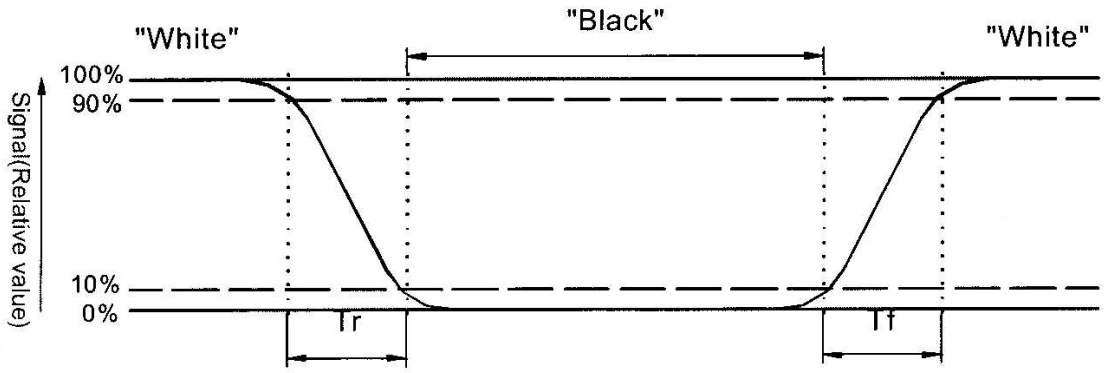
( )For reference only. These data should be update according the prototype.

Note 1:Ambient temperature=25℃,and lamp current I_{LED}=140mA.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

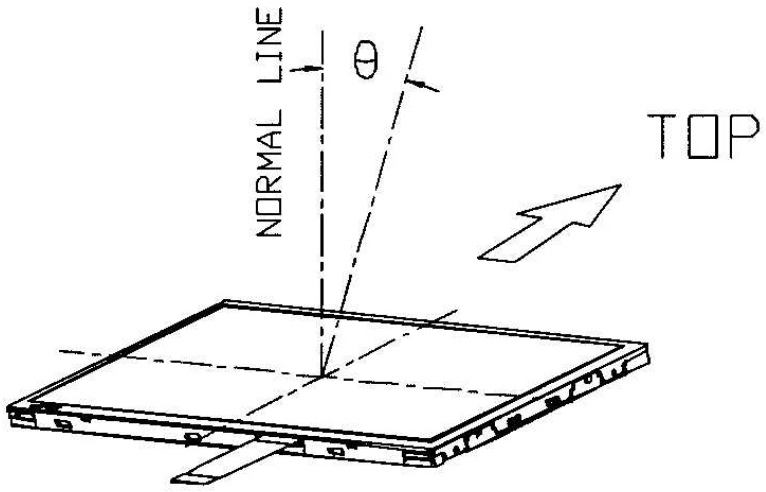
Black $V_i=V_{i50}$ +2.0V

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

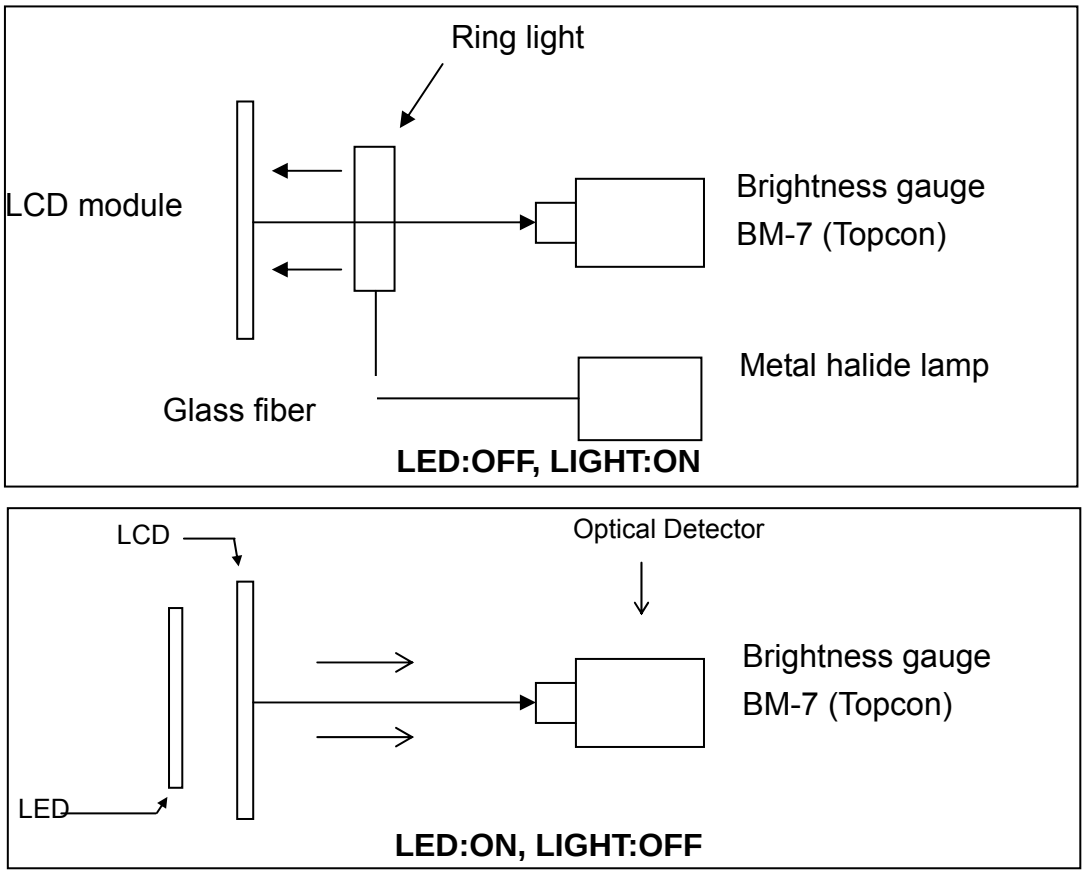
" $\frac{-}{+}$ " means that the analog input signal swings out of phase with V_{COM} signal.

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.



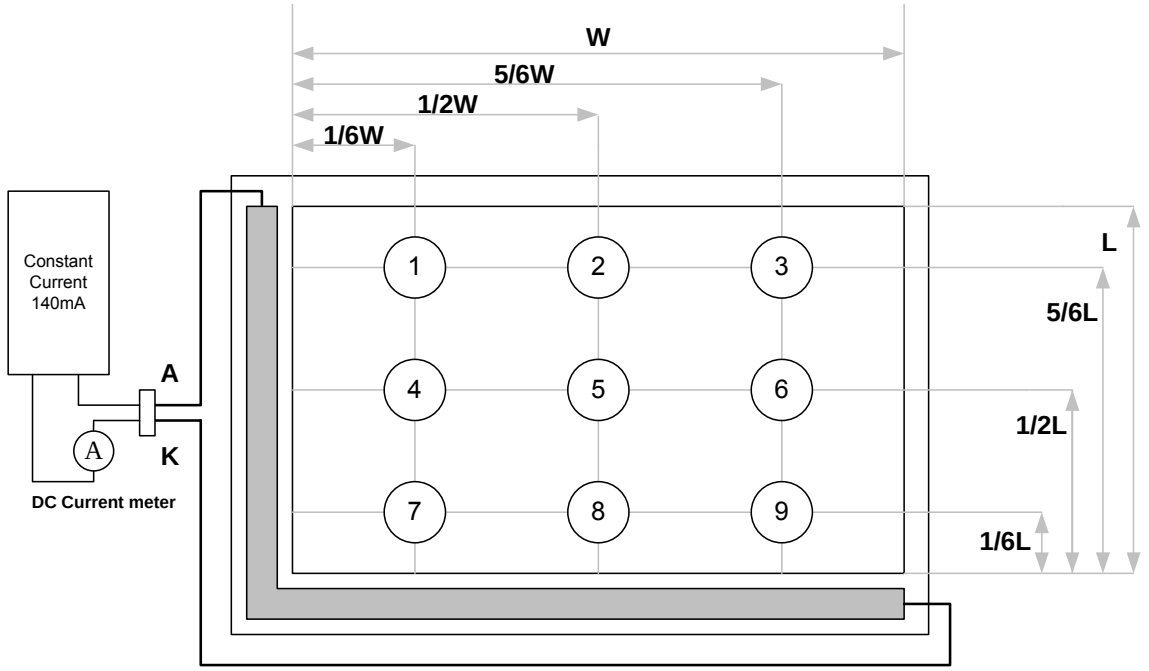
4.2 Optical characteristic of the LED Back-light

ITEM	MIN	TYP	MAX	UNIT	Condition
Bare Brightness	3500	--	--	Cd/m2	I_{LED} =140mA,Ta=25℃
AVG. X of 1931 C.I.E.	0.28	0.31	0.34	--	I_{LED} =140mA,Ta=25℃
AVG. Y of 1931 C.I.E.	0.28	0.31	0.34	--	I_{LED} =140mA,Ta=25℃
Brightness Uniformity	80	--	--	%	I_{LED} =140mA,Ta=25℃

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

Note1 : Measurement after 10 minutes from LED operating.

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



Note3: The Uniformity definition

(Min Brightness / Max Brightness) x 100%

4.3 Touch Panel Electrical Specification

Parameter	Condition	Standard Value
Terminal Resistance	X Axis	400 ~ 900 Ω
	Y Axis	200 ~ 500 Ω
Insulating Resistance	DC 25 V	More than 10MΩ
Linearity	--	±1.5 %
Notes life by Pen	Note a	100,000 times(min)
Input life by finger	Note b	1,000,000 times (min)

Note A .

Notes area for pen notes life test is 10 x 9 mm.

Size of word is 7.5 x 6.72

Shape of pen end : R0.8

Load : 250 g

Note B

By Silicon rubber tapping at same point

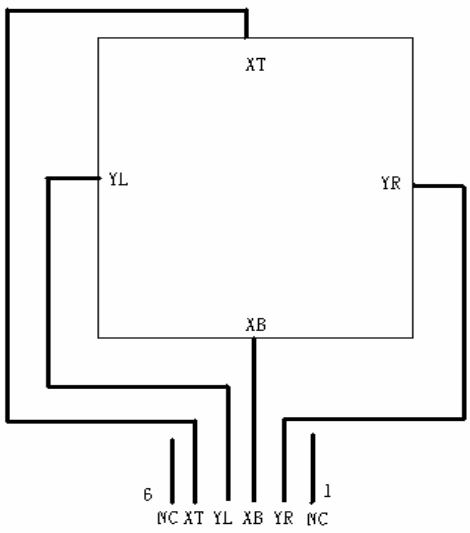
Shape of rubber end : R8

Load : 200g

Frequency : 5 Hz

Interface

No.	Symbol	Function
1	NC	No connection
2	YR	Touch Panel Right Signal
3	XB	Touch Panel Bottom Signal
4	YL	Touch Panel Left Signal
5	XT	Touch Panel Top Signal
6	NC	No connection



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)

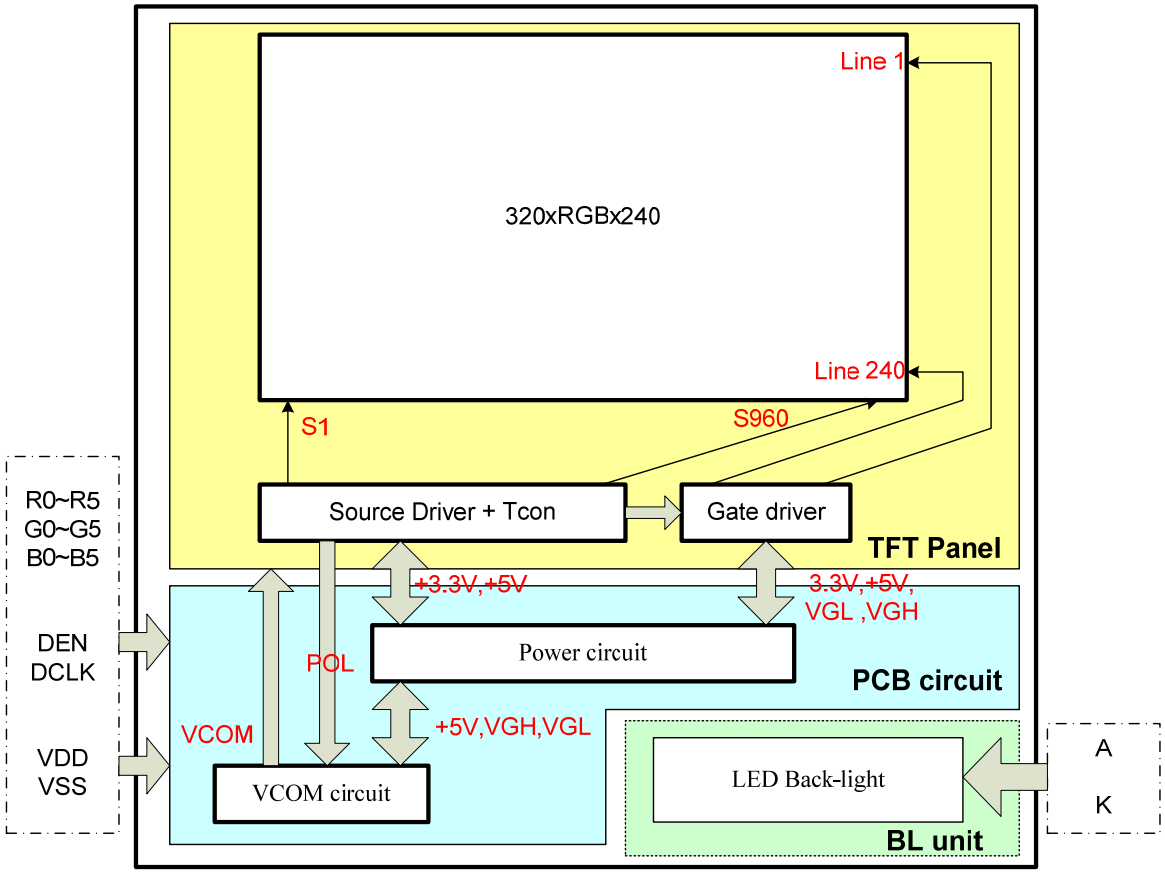
Pin no	Symbol	I/O	Description	Remark
1~4	VDD		Power supply for the logic (3.3V)	
5	NC	I	No connection Can be OPEN fixed to VDD or GND.	
6	DEN	I	Input data enable control	
7	VSS		GND	
8	DCLK	I	Clock signal. Latching data at the rising edge.	
9	VSS		GND	
10	NC	I	No connection Can be OPEN fixed to VDD or GND.	
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	Green 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	XT		Touch Panel Top Signal	
38	YL		Touch Panel Left Signal	
39	XB		Touch Panel Bottom Signal	
40	YR		Touch Panel Right Signal	

5.2 Driving signals for the LED back-light

JST Housing: BHR-03VS-1

Pin no	Symbol	Level	Description	Remark
1	A	-	LED Anode	
2	NC	-	No connection	
3	K	-	LED Cathode	

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	Black	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

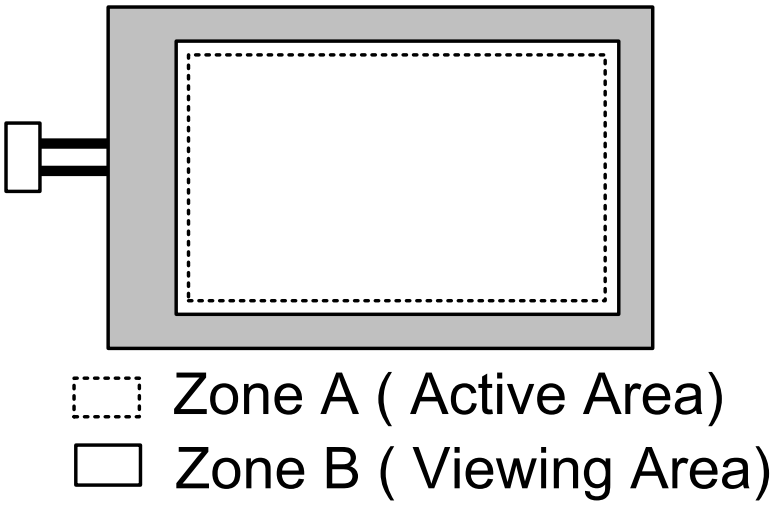
Sampling method shall be in accordance with MIL-STD-105E , level II, normal single sampling plan .

8.3 ACCEPTABLE QUALITY LEVEL

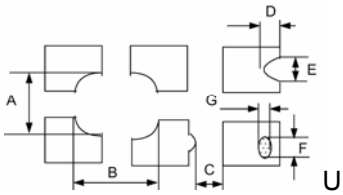
A major defect is defined as one that could cause failure to or materially reduce the usability of the unit for its intended purpose. A minor defect is one that does not materially reduce the usability of the unit for its intended purpose or is an infringement from established standards and has no significant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



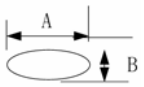
8.5 INSPECTION QUALITY CRITERIA

<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 ≦ 0.5</td><td>1</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 ≦ 0.5</td><td>1</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>

<table>
<tr><td>21</td><td>Defect Dot</td><td>The TFT panel may have bright dot or Dark dot.
The acceptable number defection:<table><tr><th>Bright dot</th><th>Dark dot</th><th>Total dot</th><th>Distance between Dark-- dark</th></tr><tr><td>2</td><td>4</td><td>6</td><td>L≧5 mm</td></tr></table></td><td>Minor</td></tr>
</table>

8.6 RELIABILITY

Test Item	Test Conditions	Note
High Temperature Operation	70±3°C , t=96 hrs	
Low Temperature Operation	-20±3°C , t=96 hrs	
High Temperature Storage	80±3°C , t=96 hrs	1,2
Low Temperature Storage	-30±3°C , t=96 hrs	1,2
Thermal Shock Test	-20°C ~ 25°C ~ 70°C 30 m in. 5 min. 30 min. (1 cycle) Total 5 cycle	1,2
Humidity Test	40 °C, Humidity 90%, 96 hrs	1,2
Vibration Test (Packing)	Sweep frequency : 10 ~ 55 ~ 10 Hz/1min Amplitude : 0.75mm Test direction : X.Y.Z/3 axis Duration : 30min/each axis	2

Note 1 : Condensation of water is not permitted on the module.

Note 2 : The module should be inspected after 1 hour storage in normal conditions (15-35°C , 45-65%RH).

Definitions of life end point :

- Current drain should be smaller than the specific value.
- Function of the module should be maintained.
- Appearance and display quality should not have degraded noticeably.
- Contrast ratio should be greater than 50% of the initial value.

9 USE PRECAUTIONS

9.1 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.

9.2 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.

9.3 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.

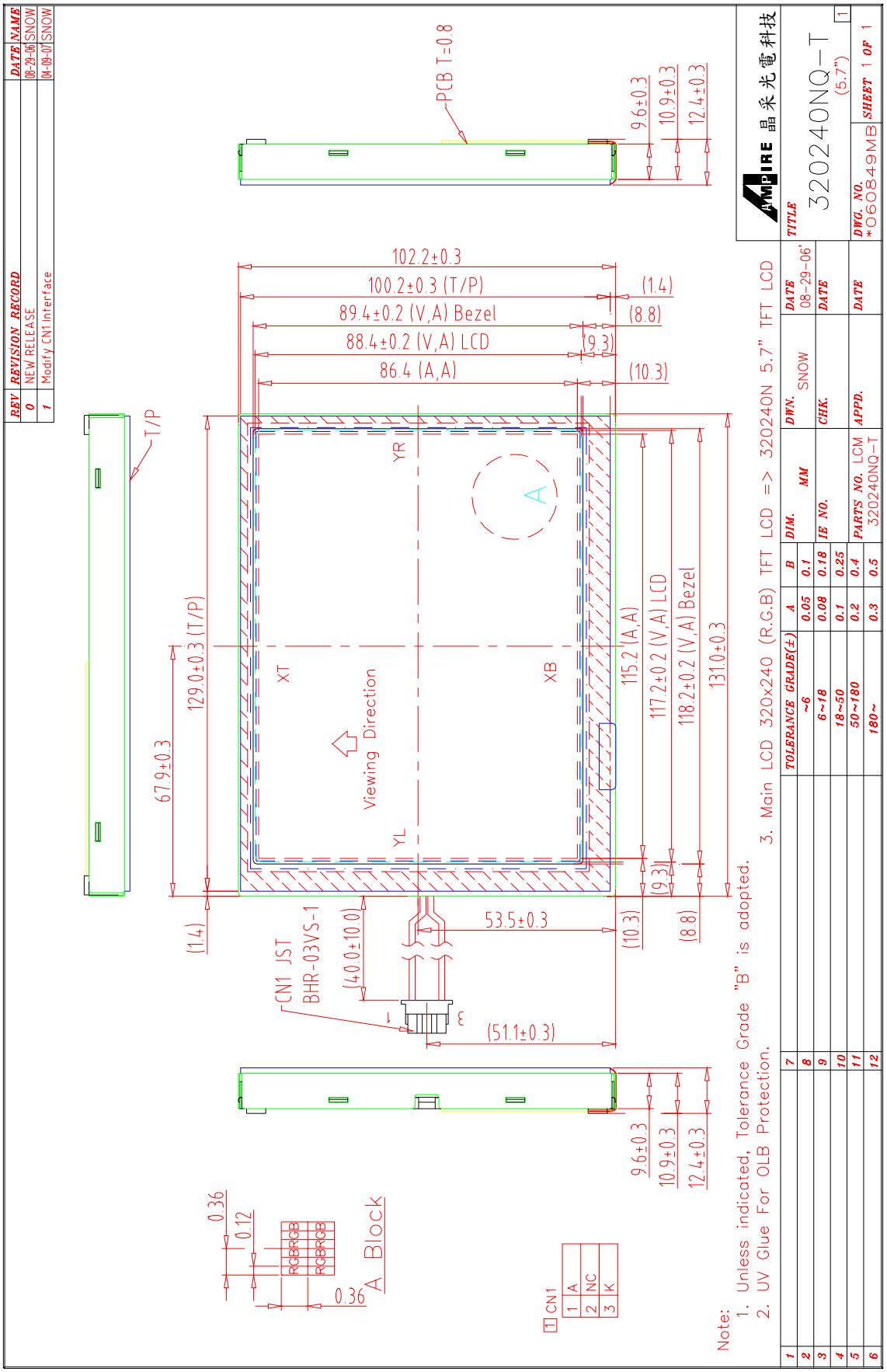
9.4 Operating precautions

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.

9.5 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.

10 OUTLINE DIMENSION



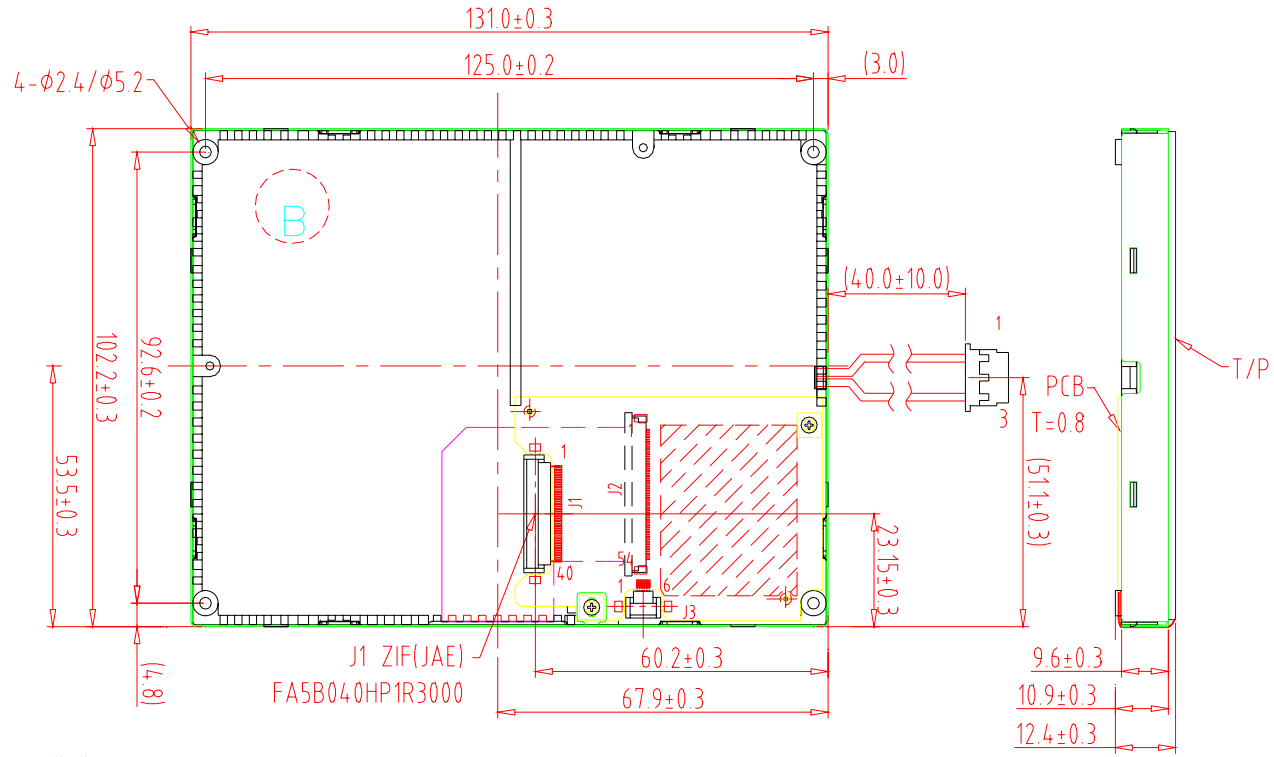
REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	08-29-06	SNOW
1	Added B Block	03-26-07	SNOW

材質:鋁鎂合金

1 B Block

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



Back view

Note:
1. Unless indicated, Tolerance Grade "B" is adopted.
2. UV Glue For OLB Protection.
3. Main LCD 320x240 (R.G.B) TFT LCD => 320240N 5.7" TFT LCD

				TOLERANCE GRADE(±)	A	B
1		7				
2		8		~6	0.05	0.1
3		9		6~18	0.08	0.18
4		10		18~50	0.1	0.25
5		11		50~180	0.2	0.4
6		12		180~	0.3	0.5

DIM. MM	DWN. SNOW	DATE 08-29-06'
IE NO.	CHK.	DATE
PARTS NO. LCM-1 320240NQ-T	APPD.	DATE

AMPIRE 晶采光電科技

TITLE 320240NQ-T (5.7") 1

DWG. NO. *060850MB SHEET 1 OF 1