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-320240N9TMQW-00H-A(R)**
APPROVED BY	
DATE	

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

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RECORD   OF   REVISION

Revision Date	Page	Contents	Editor
2010/07/22	--	New Release	Kokai
	--	Base on AM-320240N9TMQW-00H(R) modify ZIF connector position	
	--		
2010/8/11		Rename to AM-320240N9TMQW-00H-A(R). Lower the LED driving current. Brightness : 400 cd/m2(typ)	Kokai

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 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	167.0(W)x109.0(H)x12.1(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	VCC	GND=0	-0.3	6.0	V	
Input voltege	V_{in}		-0.3	VCC+0.3	V	Note 1

Note1: DE, 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 40℃ ambient temperature, the I_{LED}
of the LED back-light should be follow :
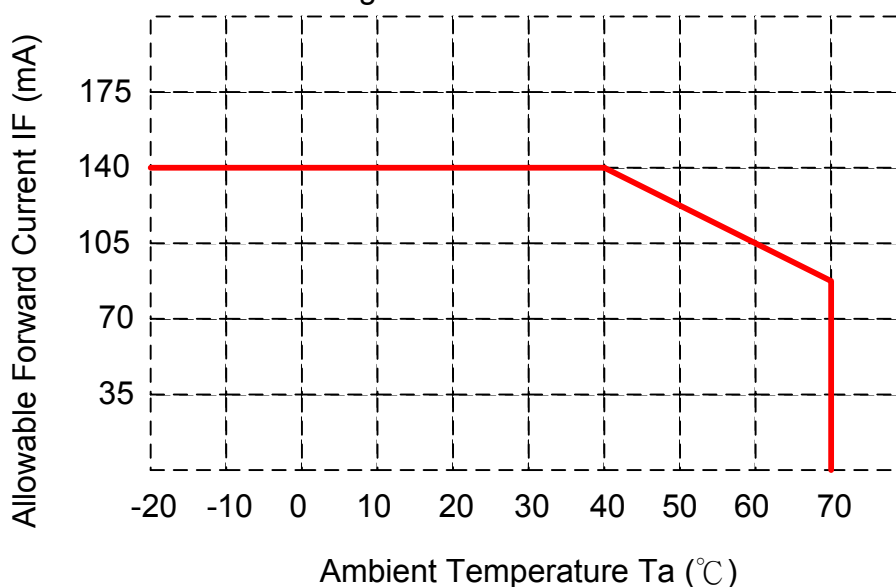
Note7 : This is panel surface temperature, not ambient temperature.

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

3.1.3 LED back-light Unit Absolute max. ratings

Item	Symbol	Ratings	Unit	Remark
Peak forward Current	IF	210	mA	
Reverse Voltage	VR	30	V	
Power Dissipation	Po	1.2	W	

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		VCC	3.0	3.3	3.6	V	
Input Voltage for logic	H Level	V_{IH}	0.7 VCC	-	VCC	V	Note 1
	L Level	V_{IL}	0	-	0.3 VCC	V	
Power Supply current		ICC		45	55	mA	Note 2

Note1: Hsync, Vsync, DE, 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}	--	10.5	12	V	I_{LED} =140mA,Ta=25℃
LED forward current	I_{LED}	--	126	140	mA	Ta=25℃
	I_{LED}	--	84	105	mA	Ta=60℃
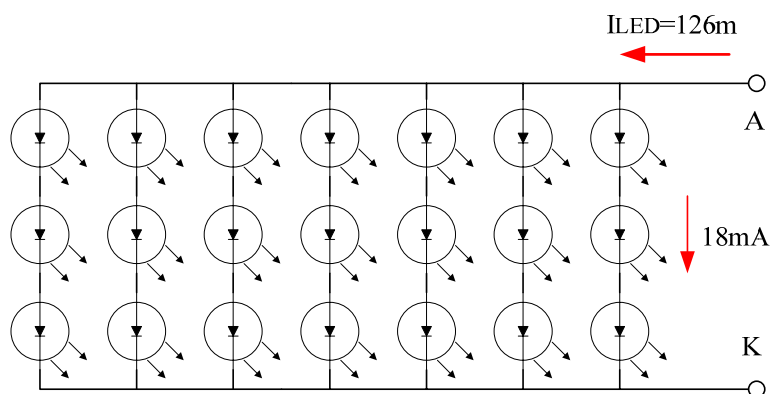
■ The constant current source is needed for white LED back-light driving.
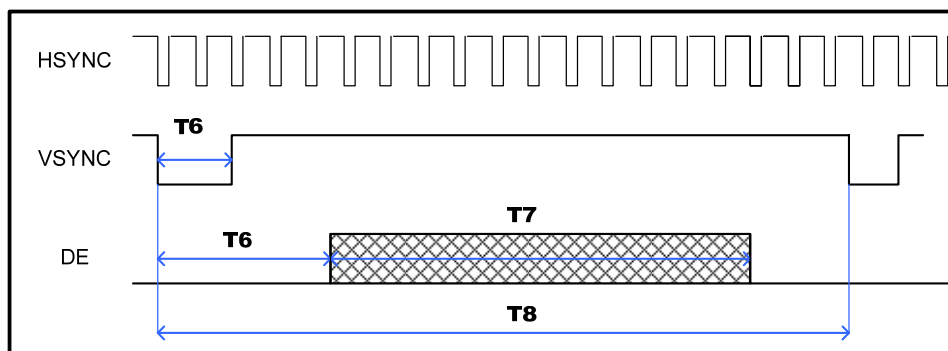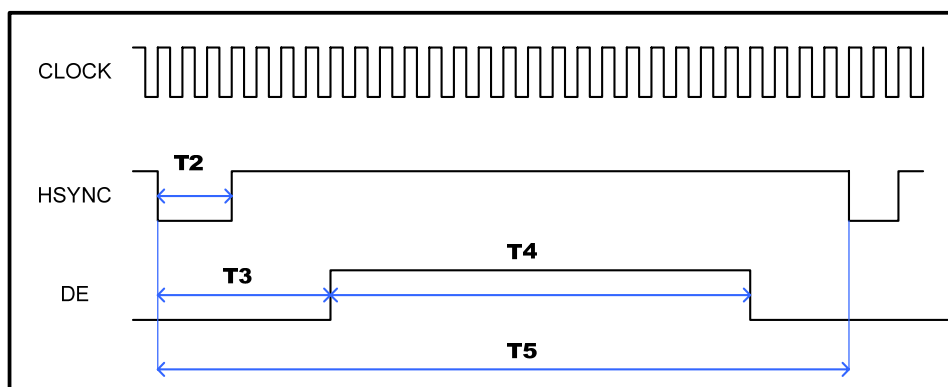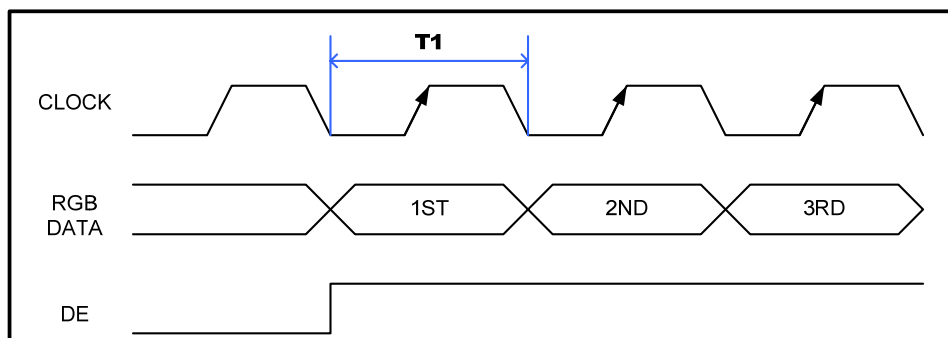
When LCM is operated over 60℃ ambient temperature, the I$_{LED}$ of the LED

back-light should be adjusted to 105mA max
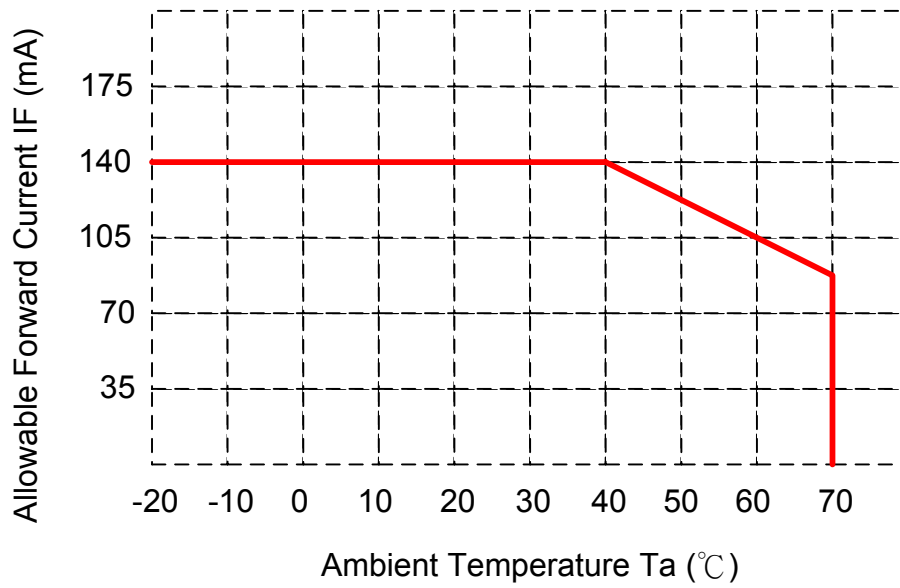
4   AC Timing characteristic of the LCD

4.1   Progressive Scan Timing condition for Generic TFT LCD controller.

ITEM	SYMBOL	MIN	TYP	MAX	UNIT
Clock Frequency	1/T1	6.4	8	12	MHz
HSYNC Plus Wide	T2	5	30	--	clocks
HSYNC to DE	T3	--	68	--	Clocks
Horizontal Display Period	T4	--	320	--	Clocks
Horizontal total Period	T5	--	408	--	Clocks
VSYNC Plus Wide	T2	1	3	5	Lines
VSYNC to DE	T6		18		Lines
Vertical Display Period	T7	--	241*	--	Lines
Vertical total Period	T8	--	262	--	Lines

Note: The module need dummy DE. Please set the "Vertical Display Period" set to 241.
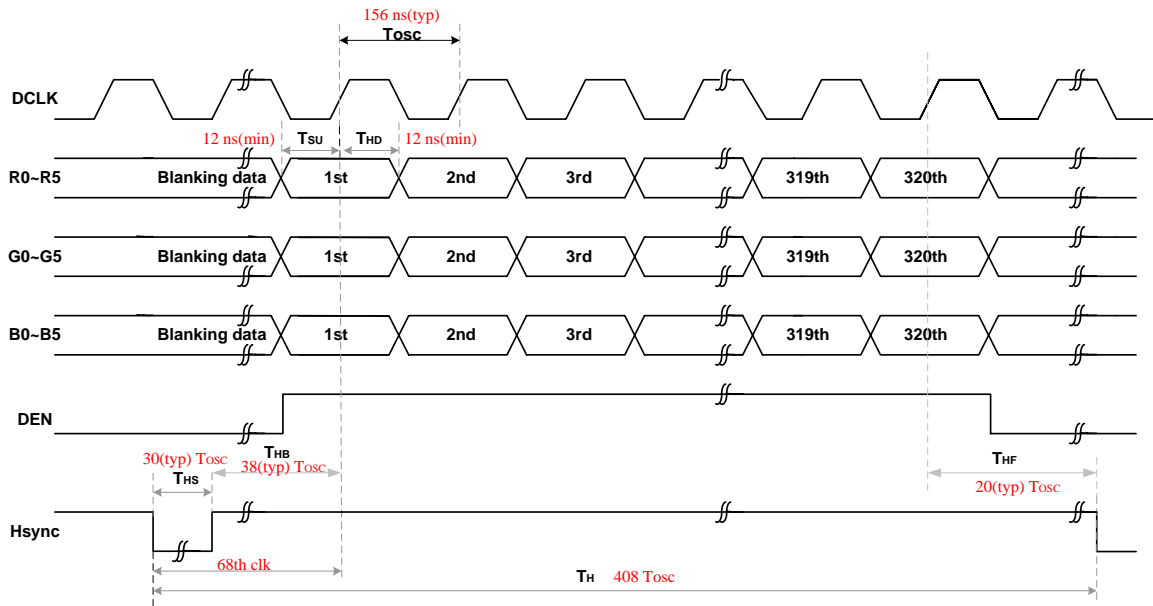
4.2 Interlace Scan Timing condition for Video decoder application

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

156 ns(typ)
Tosc

DCLK

12 ns(min) | **Tsu** | **Thd** | 12 ns(min)

R0~R5 | Blanking data | 1st | 2nd | 3rd | 319th | 320th

G0~G5 | Blanking data | 1st | 2nd | 3rd | 319th | 320th

B0~B5 | Blanking data | 1st | 2nd | 3rd | 319th | 320th

DEN

30(typ) Tosc **THB** 38(typ) Tosc **THF**
THS **THF** 20(typ) Tosc

Hsync

68th clk **TH** 408 Tosc

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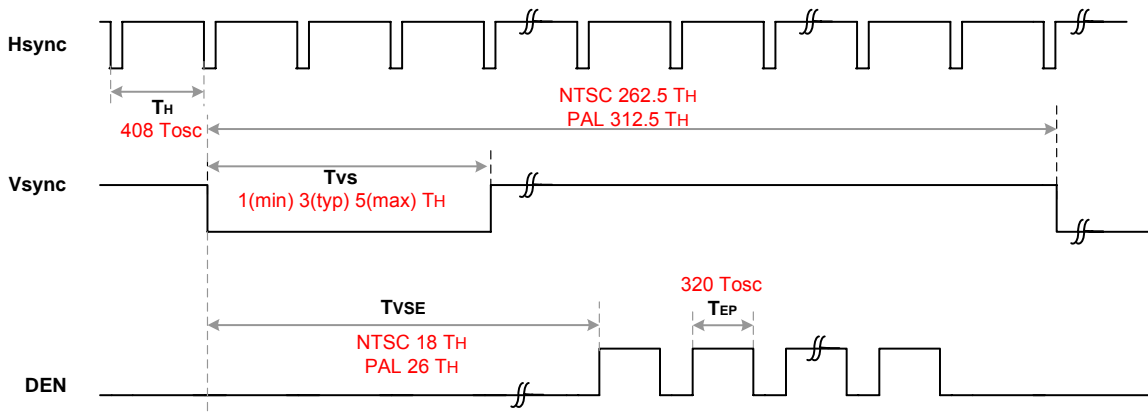When SYNC mode is used, 1st data start from 68th CLK after Hsync falling

● Vertical display timing

Hsync

TH NTSC 262.5 TH
408 Tosc PAL 312.5 TH

Vsync

Tvs
1(min) 3(typ) 5(max) TH

TVSE 320 Tosc
TEP

NTSC 18 TH
PAL 26 TH

DEN

● Hsync and Vsync timing

▲ Odd field

THVO 1(min) TSOC

Hsync

Vsync

▲ Even field

Hsync

THVE
1(min) TSOC

Vsync
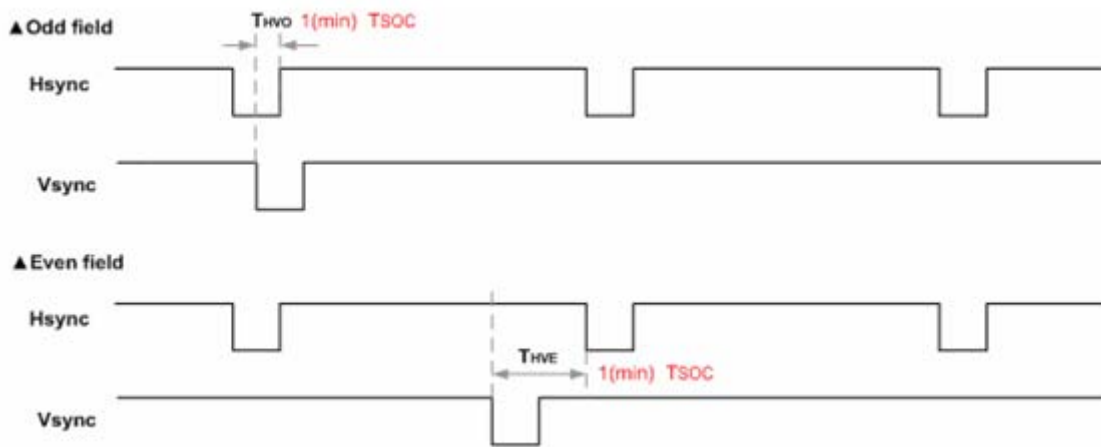
5 Optical specification

5.1 Optical characteristic of the LCD

| Item		Symbol	Conditon	Min.	Typ.	Max.	Unit	Remark
Response Time	Rise	T_r	$\Theta=0°$	-	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		$CR\geqq10$	55	60	-	deg.	Note1,2, 5,6
	Bottom			45	50	-		
	Left			55	60	-		
	Right			55	60	-		
Brightness		Y_L	I_{LED}=83.3mA, RLED1=2.4Ω 25℃	**320**	**400**	-	cd/m^2	Note 7
Red chromaticity		XR	$\Theta=0°$ $\Theta=0°$	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: 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.
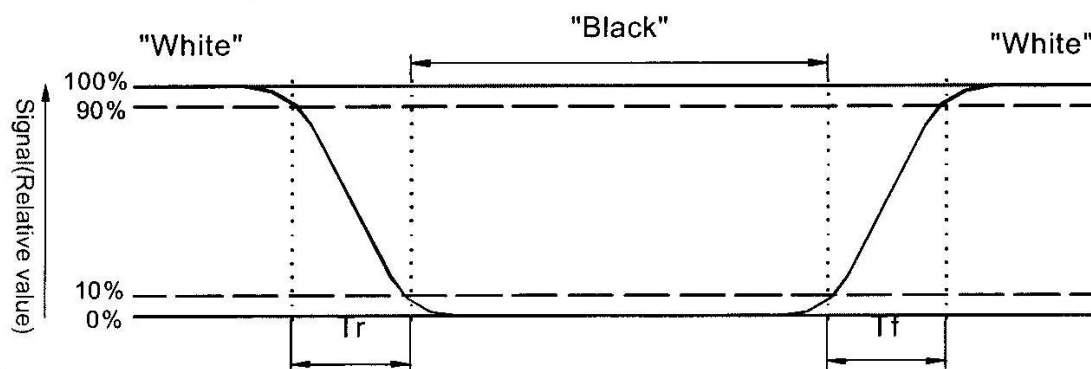
Note 4.Definition of contrast ratio:

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.

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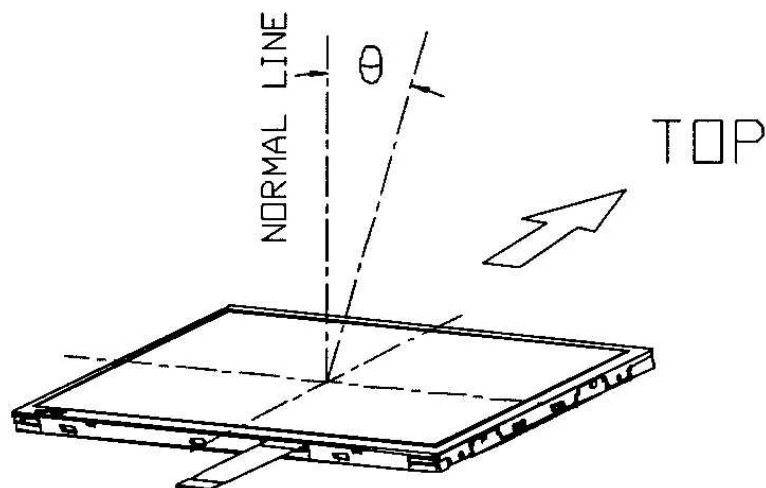
Note 7.Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

Ring light

LCD module

Brightness gauge
BM-7 (Topcon)

Metal halide lamp

Glass fiber

LED:OFF, LIGHT:ON

LCD

Optical Detector

Brightness gauge
BM-7 (Topcon)

LED

LED:ON, LIGHT:OFF
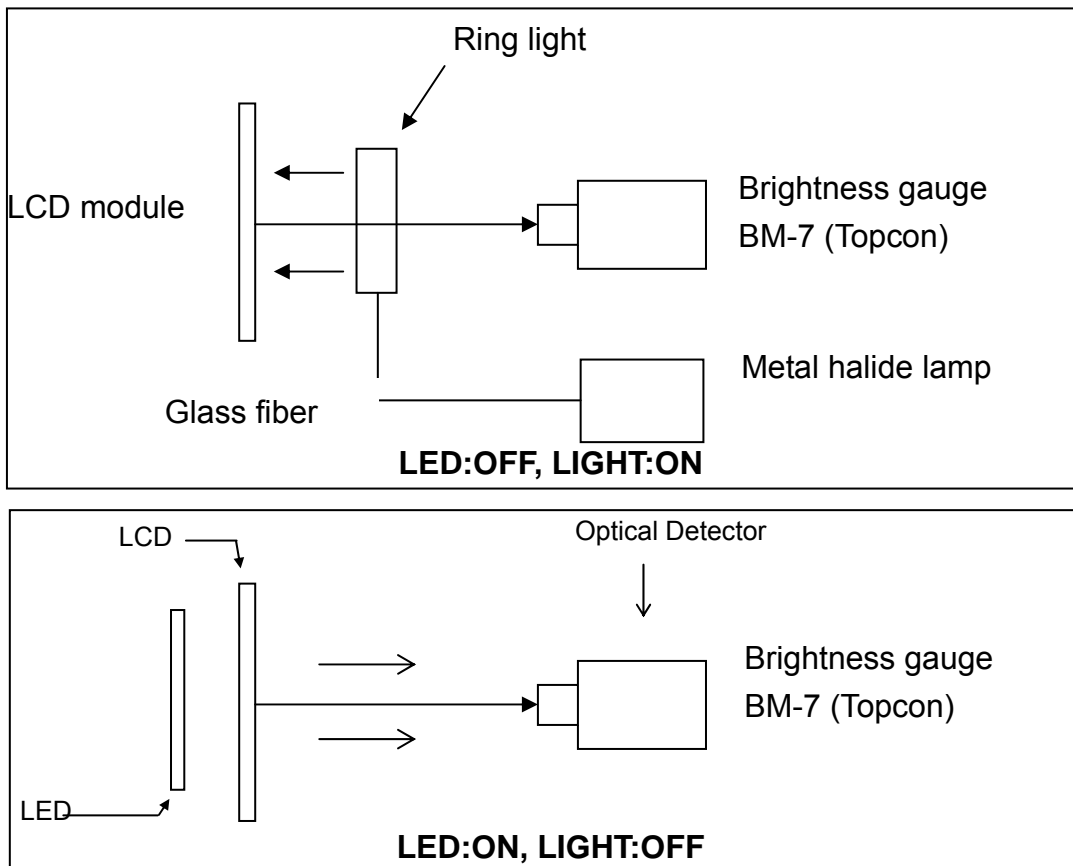
5.2 Optical characteristic of the Back-light

ITEM	MIN	TYP	MAX	UNIT	Condition
Bare Brightness	3600	--	--	Cd/m2	I_{LED} =140mA,Ta=25℃
AVG. X of 1931 C.I.E.	0.26	0.28	0.31	--	I_{LED} =140mA,Ta=25℃
AVG. Y of 1931 C.I.E.	0.27	0.29	0.32	--	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.
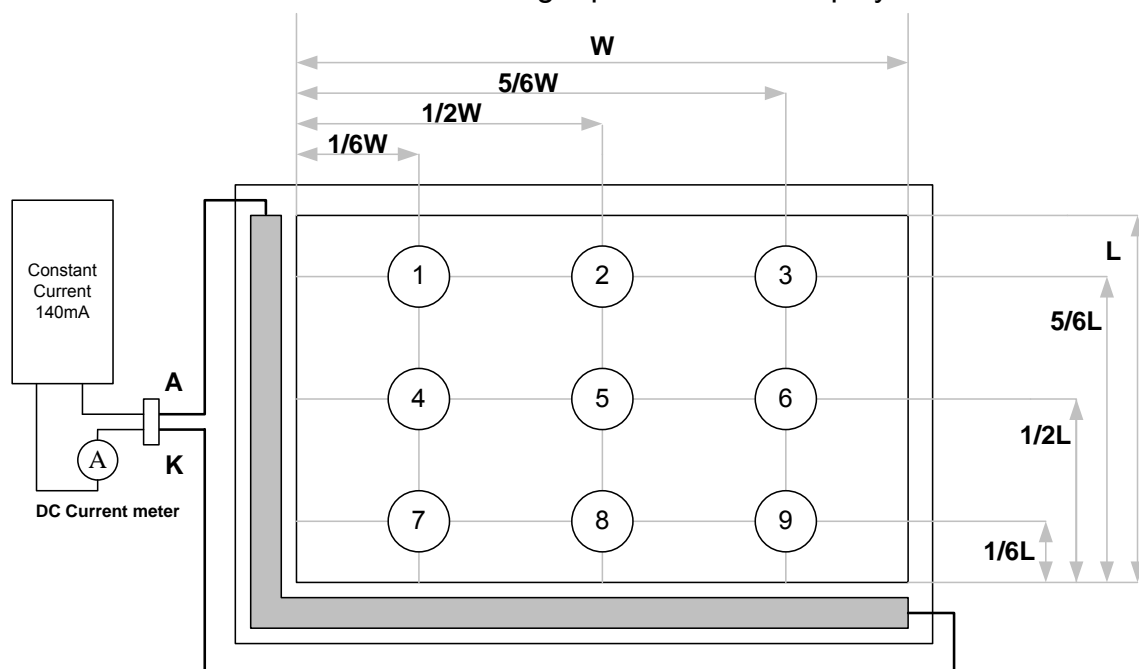
Note3: The Uniformity definition

(Min Brightness / Max Brightness) x 100%

6 Interface specifications

6.1 Driving signals for the TFT panel

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

| Pin no	Symbol	Function
1	LGND	LED Driver Ground
2	LGND	LED Driver Ground
3	ADJ	Adjust for LED Brightness
4	VLED	Power supply for LED (5V)
5	VLED	Power supply for LED (5V)
6	VLED	Power supply for LED (5V)
7	VCC	Power supply for LCD (3.3V)
8	VCC	Power supply for LCD (3.3V)
9	DE	Data Enable Timing Signal
10	GND	Ground
11	GND	Ground
12	GND	Ground
13	B5	Blue data (MSB)
14	B4	Blue data
15	B3	Blue data
16	GND	Ground
17	B2	Blue data
18	B1	Blue data
19	B0	Blue data (LSB)
20	GND	Ground
21	G5	Green data (MSB)
22	G4	Green data
23	G3	Green data
24	GND	Ground
25	G2	Green data
26	G1	Green data
27	G0	Green data (LSB)
28	GND	Ground
29	R5	Red data (MSB)
30	R4	Red data
31	R3	Red data
32	GND	Ground
33	R2	Red data
34	R1	Red data
35	R0	Red data (LSB)
36	GND	Ground
37	GND	Ground
38	DCLK	Data Clock
39	NC	No Connection (need to be floating)
40	NC	No Connection (need to be floating)

(Note1) The DCLK is with ELM74S86.
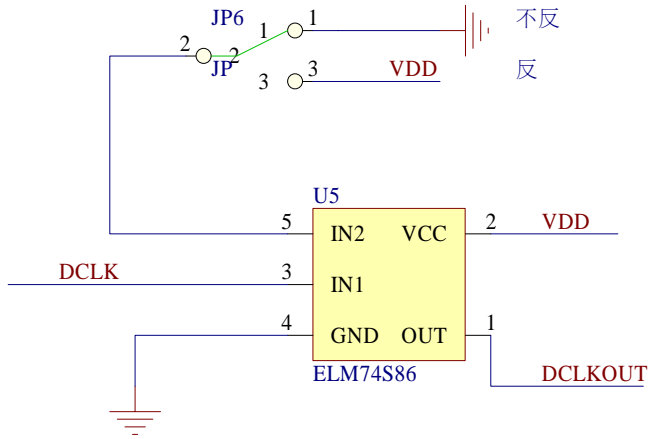
6.2　Driving signals for the LED back-light

JST Housing: BHR-03VS-1

Pin no	Symbol	Level	Description	Remark
1	A	-	LED Back-light Anode	
2	K	-	LED Back-light Cathode	

7　BLOCK DIAGRAM

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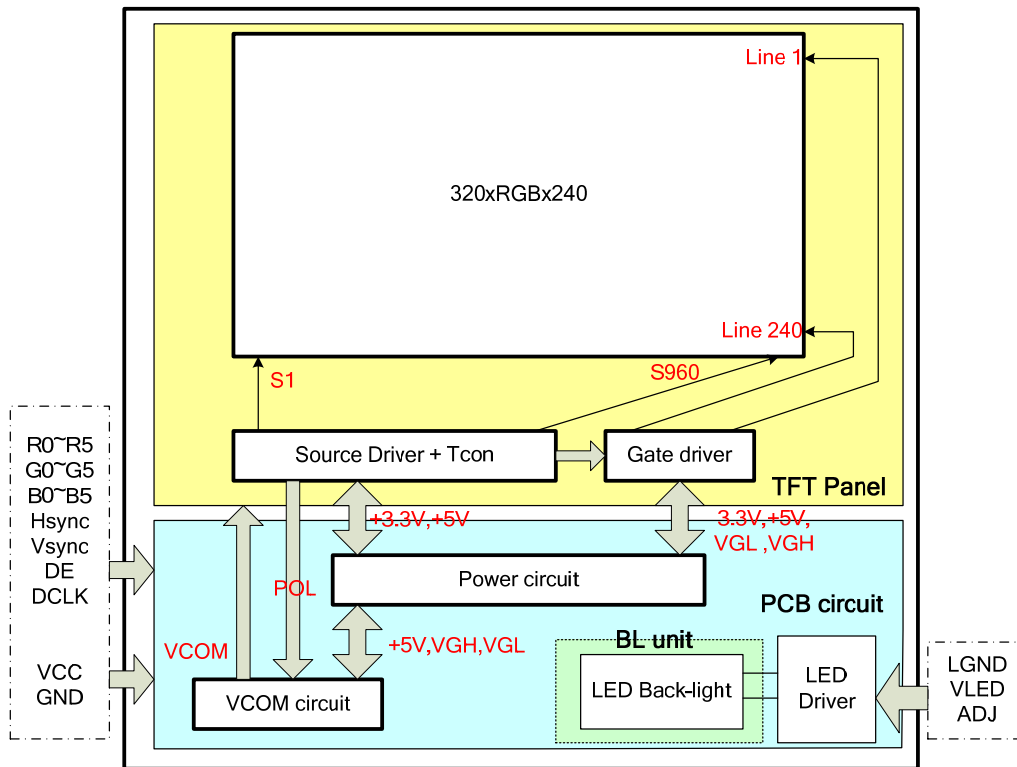
8 DISPLAYED COLOR AND INPUT DATA

		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	0	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

9   QUALITY AND RELIABILITY

9.1   TEST CONDITIONS

Tests should be conducted under the following conditions :
Ambient temperature   : $25 \pm 5°C$
Humidity   : $60 \pm 25\%$ RH.
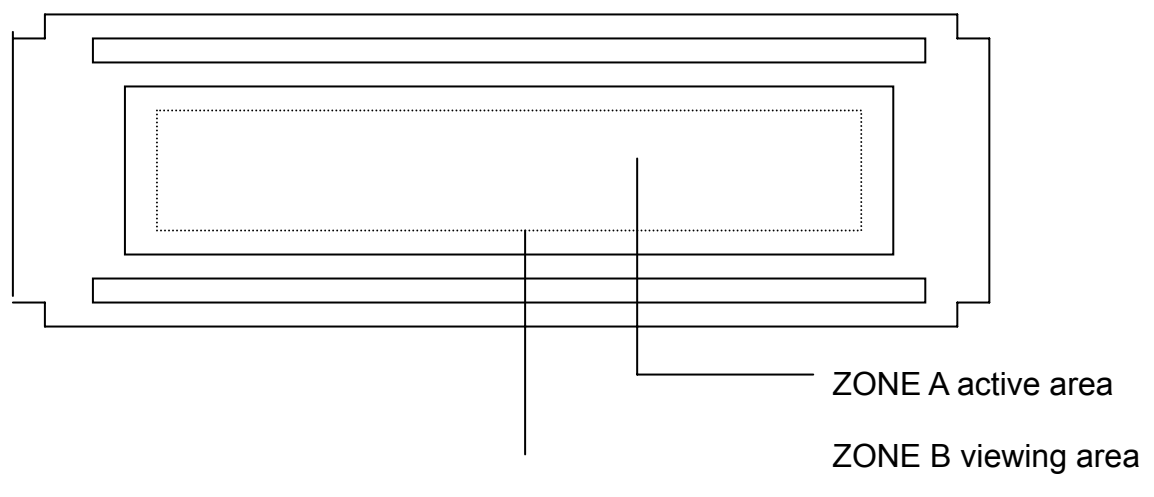
9.2   SAMPLING PLAN

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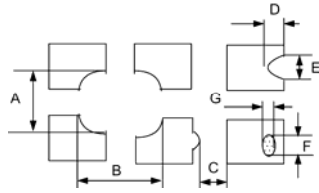
9.3   ACCEPTABLE QUALITY LEVEL

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.
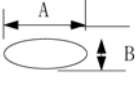
9.4   APPEARANCE

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.

ZONE A active area

ZONE B viewing area

9.5 INSPECTION QUALITY CRITERIA

No.	Item	Criterion for defects	Defect type
1	Non display	No non display is allowed	Major
2	Irregular operation	No irregular operation is allowed	Major
3	Short	No short are allowed	Major
4	Open	Any segments or common patterns that don't activate are rejectable.	Major
5	Black/White spot (I)	<table><tr><td colspan="2">Size D (mm)</td><td>Acceptable number</td></tr><tr><td colspan="2">D ≤ 0.15</td><td>Ignore</td></tr><tr><td colspan="2">0.15 < D ≤ 0.20</td><td>3</td></tr><tr><td colspan="2">0.20 < D ≤ 0.30</td><td>2</td></tr><tr><td colspan="2">0.30 < D ≦ 0.5</td><td>1</td></tr></table>	Minor
6	Black/White line (I)	<table><tr><td>Length(mm)</td><td></td><td>Acceptable number</td></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>	Minor
7	Black/White sport (II)	<table><tr><td colspan="2">Size D (mm)</td><td>Acceptable number</td></tr><tr><td colspan="2">D ≤ 0.30</td><td>Ignore</td></tr><tr><td colspan="2">0.30 < D ≤ 0.50</td><td>5</td></tr><tr><td colspan="2">0.50 < D ≤ 1.20</td><td>3</td></tr><tr><td colspan="2">1.20 < D</td><td>0</td></tr></table>	Minor
8	Black/White line (II)	<table><tr><td>Length (mm)</td><td>Width (mm)</td><td>Acceptable number</td></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>	Minor
9	Back Light	1. No Lighting is rejectable 2. Flickering and abnormal lighting are rejectable	Major
10	Display pattern	Unit:mm $\frac{A+B}{2} \le 0.30$ $0 < C$ $\frac{D+E}{2} \le 0.25$ $\frac{F+G}{2} \le 0.25$ Note: 1. Acceptable up to 3 damages 2. NG if there're to two or more pinholes per dot	Minor

11	Blemish & Foreign matters Size: $D = \dfrac{A+B}{2}$	<table><tr><td>Size D (mm)</td><td>Acceptable number</td></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>		Minor
12	Scratch on Polarizer	<table><tr><td>Width (mm)</td><td>Length (mm)</td><td>Acceptable number</td></tr><tr><td>W≤0.03</td><td>Ignore</td><td>Ignore</td></tr><tr><td rowspan="2">0.03<W≤0.05</td><td>L ≤ 2.0</td><td>Ignore</td></tr><tr><td>L > 2.0</td><td>1</td></tr><tr><td rowspan="2">0.05<W≤0.08</td><td>L > 1.0</td><td>1</td></tr><tr><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		Minor
13	Bubble in polarizer	<table><tr><td>Size D (mm)</td><td>Acceptable number</td></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>		Minor
14	Stains on LCD panel surface	Stains that cannot be removed even when wiped lightly with a soft cloth or similar cleaning too are rejectable.		Minor
15	Rust in Bezel	Rust which is visible in the bezel is rejectable.		Minor
16	Defect of land surface contact (poor soldering)	Evident crevices which is visible are rejectable.		Minor
17	Parts mounting	1. Failure to mount parts 2. Parts not in the specifications are mounted 3. Polarity, for example, is reversed		Major Major Major
18	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 pad outline.		Minor Minor
19	Conductive foreign matter (Solder ball, Solder chips)	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)		Major Minor Minor
20	Faulty PCB correction	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.		Minor Minor

21	Defect Dot	The TFT panel may have bright dot or Dark dot. The acceptable number defection:				Minor
		Bright dot	**Dark dot**	**Total dot**	**Distance between Dark-- dark**	
		2	4	6	L≧5 mm	

9.6 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.

10 USE PRECAUTIONS

10.1 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.

10.2 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.

10.3 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.

10.4   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.

10.5 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.

3) AMIPRE will provide one year warrantee for all products and three months warrantee for all repairing products.

11 OUTLINE DIMENSION

J1 (A Block pin assignment)

No.	Signal	No.	Signal
1	LGND	21	G5
2	LGND	22	G4
3	ADJ	23	G3
4	VLED	24	GND
5	VLED	25	G2
6	VCC	26	G1
7	VCC	27	G0
8	VCC	28	GND
9	DE	29	R5
10	GND	30	R4
11	GND	31	R3
12	GND	32	GND
13	GND	33	R2
14	B4	34	R1
15	B3	35	R0
16	GND	36	GND
17	B2	37	GND
18	B1	38	DCLK
19	B0	39	GND
20	GND	40	GND

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

TOLERANCE GRADE (±)

DIM. MM	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

IE NO.

PARTS NO. LCM 32024ON9-A

DWN. EMILY DATE 07-21-10'

CHK. DATE

APPD. DATE

TITLE 32024ON9-A (5.7")

DWG. NO. *100751MA

SHEET 1 OF 1

AMPIRE 晶采光電科技

		1	TFT-32024O-86-0 Rename to 32024ON9-A	07-26-10 EMILY
REV	REVISION RECORD	0	NEW RELEASE	07-21-10 EMILY
				DATE NAME

Dimensions shown:
- 0.36, 0.12, 0.36
- 8.9±0.3
- 54.49±0.3
- 4-Φ3.5
- (7.4), (4.0)
- 85.99±0.3
- 145.35±0.5
- 152.0±0.3
- (28.39)
- (27.1826)
- (26.6826)
- 115.2 (A,A)
- 117.4074±0.2 (V,A) LCD
- 118.4074±0.2 (V,A) Bezel
- 167.0±0.5
- 6.9
- 12.1±0.3
- Remove tape (20.0x10.0)
- (11.29), 86.4 (A,A)
- (10.29), 88.4±0.2 (V,A) LCD
- (9.79), 89.4±0.2 (V,A) Bezel
- (2-7.0), 95.0±0.5
- (4.0), 101.0±0.3
- 109.0±0.5
- (2.22)
- Viewing Direction

1 TFT-32024O-86-0

J1

1	LGND	21	G5
2	LGND	22	G4
3	ADJ	23	G3
4	VLED	24	GND
5	VLED	25	G2
6	VCC	26	G1
7	VCC	27	G0
8	VCC	28	GND
9	DE	29	R5
10	GND	30	R4
11	GND	31	R3
12	GND	32	GND
13	B5	33	R2
14	B4	34	R1
15	B3	35	R0
16	GND	36	GND
17	B2	37	GND
18	B1	38	DCLK
19	B0	39	GND
20	GND	40	GND

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

Back view

White
Pink

K
CN2
A

CN1
1
54

4
0

J1
1

Connector
089H40-000000-G2-C
or Equivalent

(69.05±0.3)
54.49±0.3
10.0±0.3
4-Φ3.5
6.9
12.1±0.3
14.535±0.5
152.0±0.3
167.0±0.5
152.3±0.3 (PCB)
85.99±0.3
55.0±0.3
(7.4)
(4.0)
29.63±0.3
0.4
2.4
51.6±0.3 (PCB)
(2-7.4)
94.2±0.5
(4.0)
101.0±0.3
109.0±0.5
8.9±0.3

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

DIM.	IB NO.
MM	PARTS NO. LCM-1 320240N9-A

DWN. EMILY
CHK.
APPD.
DATE 07-21-10'
DATE
DATE

Back view

1	TFT-320240-86-0	7			
2		8			
3		9			
4		10			
5		11			
6		12			

AMPIRE 晶采光電科技

TITLE 32024ON9-A (5.7")
DWG. NO. *10O752MA
SHEET 1 OF 1