



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-640480GHTNQW-00H
APPROVED BY	
DATE	

Approved For Specifications

Approved For Specifications & Sample

AMPIRE CO., LTD.

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APPROVED BY	CHECKED BY	ORGANIZED BY

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2008/12/8	--	New Release	John
2009/9/1	3&12	Correct Contrast ratio and Viewing Angle	John

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): 640(R.G.B) X 480
- (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.
Viewing Direction: 12 O'clock (The direction it's hard to be discolored)

2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
Display resolution(dot)	640RGB (W) x 480(H)	dots
Display area	115.2 (W) x 86.4 (H)	mm
Pixel pitch	0.1815 (W) x 0.1815 (H)	mm
Color configuration	R.G.B Vertical stripe	
Overall dimension	131.0(W)x102.2(H)x11.6(D)---(Typ)	mm
Surface treatment	Antiglare , Hard-Coating(3H)	
Brightness	350	cd/m ²
Contrast ratio	600 : 1	
Backlight unit	LED	

3. ABSOLUTE MAXIMUM RATINGS

3.1 Absolute max. ratings

3.1.1 Electrical Absolute max. ratings

ITEM	SYMBOL	MIN	MAX	UNIT	NOTE
Power Supply Voltage	Vcc	-0.5	5	V	
Signal Input Voltage		-0.5	Vcc + 0.5	V	Note 1

Note 1: Hsync, Vsync, DTMG, 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 : $T_a \leq 40^\circ\text{C}$: 85% RH max

$T_a > 40^\circ\text{C}$: Absolute humidity must be lower than the humidity of 85%RH at 40°C

Note2 : For storage condition T_a at $-30^\circ\text{C} < 48\text{h}$, at $80^\circ\text{C} < 100\text{h}$

For operating condition T_a at $-20^\circ\text{C} < 100\text{h}$

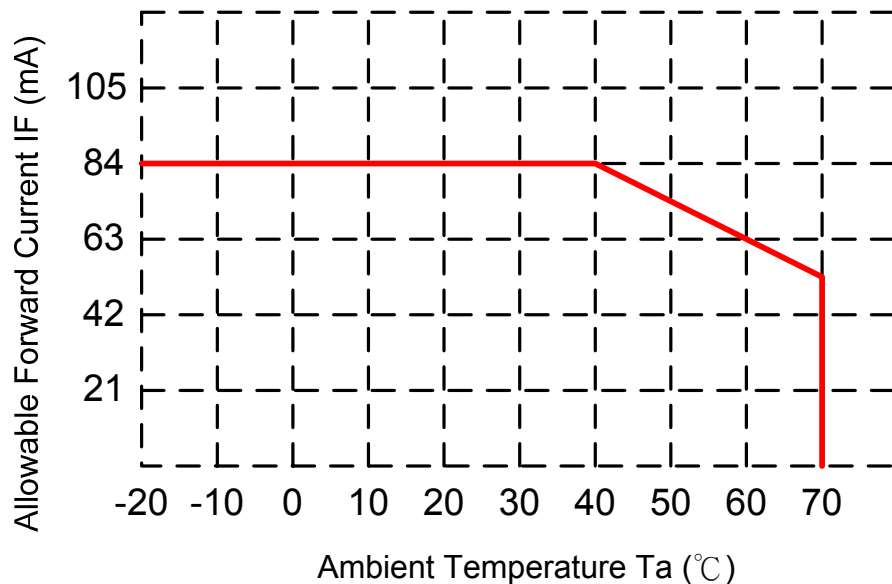
Note3 : Background color changes slightly depending on ambient temperature.

This phenomenon is reversible.

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

Note5 : Only operation is guaranteed at operating temperature. Contrast , response time, another display quality are evaluated at $+25^\circ\text{C}$

Note6 : When LCM is operated over 40°C 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°C , the life time of the LED back-light will be reduced.

4. ELECTRICAL CHARACTERISTICS

4-1 DC Electrical characteristic of the LCD

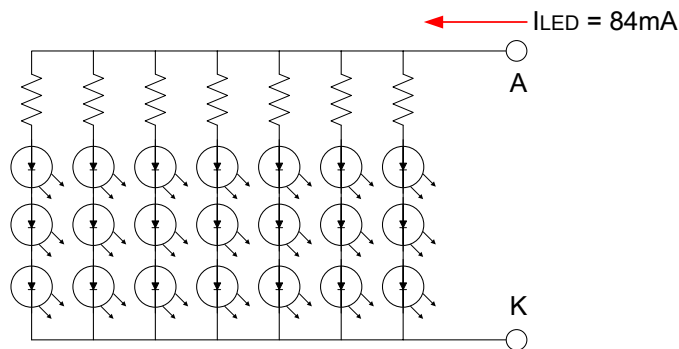
ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Power Voltage For LCD	V_{CC}	3.0	3.3	3.6	V	
Logic Input Voltage	V_{IH}	$V_{CC} * 0.7$	--	V_{CC}	V	Note1
	V_{IL}	0	--	$V_{CC} * 0.3$	V	
LCD Power Current	I_{CC}	--	82	--	mA	Note2

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

Note2: $f_V = 60\text{Hz}$, $T_a = 25^\circ\text{C}$, Display pattern : All Black

4-2 Electrical characteristic of LED Back-light

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
LED voltage	V_{AK}	--	9.12	--	V	$I_{LED} = 84\text{mA}$, $T_a = 25^\circ\text{C}$
LED forward current	I_{LED}	--	84	91	mA	$T_a = 25^\circ\text{C}$

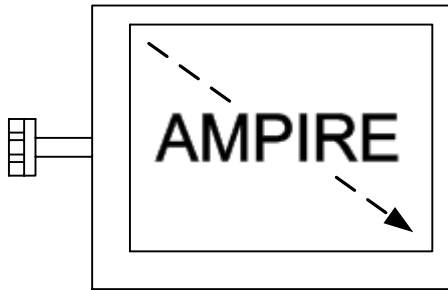


5. INTERFACE

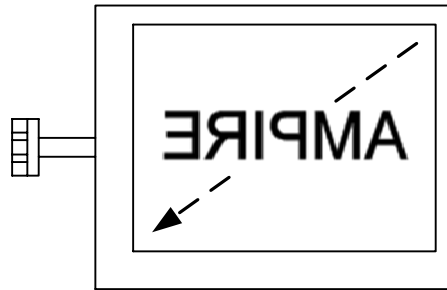
Pin No	Symbol	Function
1	VDD	Power Supply for Logic
2	VDD	
3	U/D	Vertical Display mode Control (Note 1)
4	L/R	Horizontal Display mode Control (Note 1)
5	VSYNC	Vertical Sync Pulse (Note 2)
6	DEN	Timing Signal for Data (Note 2)
7	VSS	GND
8	DCLK	Dot Clock
9	VSS	GND
10	HSYNC	Horizontal Sync Pulse (Note 2)
11	VSS	GND
12	B5	Blue Data
13	B4	
14	B3	
15	VSS	GND
16	B2	Blue Data
17	B1	
18	B0	
19	VSS	GND
20	G5	Green Data
21	G4	
22	G3	
23	VSS	GND
24	G2	Green Data
25	G1	
26	G0	
27	VSS	GND
28	R5	Red Data
29	R4	
30	R3	
31	VSS	GND
32	R2	Red Data
33	R1	
34	R0	
35	NC	No Connection
36	VSS	GND
37	NC	No Connection
38	NC	
39	NC	
40	NC	

Note 1: Vertical Display mode and Horizontal Display mode control.

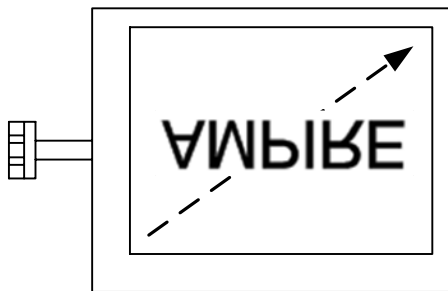
L/R : H, U/D : H



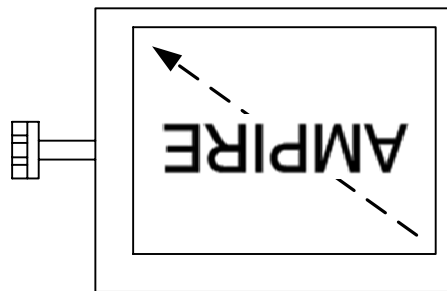
L/R : L, U/D : H



L/R : H, U/D : L



L/R : L, U/D : L



Note 2: It will auto detect which mode is used. If DEN signal is fixed low, SYNC mode is used. Otherwise, DE mode is used.

- (1) Use DE mode : DEN only, VSYNC and HSYNC short to GND
- (2) Use SYNC mode : VSYNC and HSYNC only, DEN short to GND.

6. INPUT SIGNAL :

6-1 Timing Specification.

6.1.1 AC Electrical Characteristics

PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max	
HS setup time	T_{HST}	10			ns
HS hold time	T_{HHD}	10			ns
VS setup time	T_{VST}	10			ns
VS hold time	T_{VHD}	10			ns
Data setup time	T_{DSU}	10			ns
Date hold time	T_{DHD}	10			ns
DEN setup time	T_{ESU}	10			ns

6.1.2 Digital Parallel RGB interface

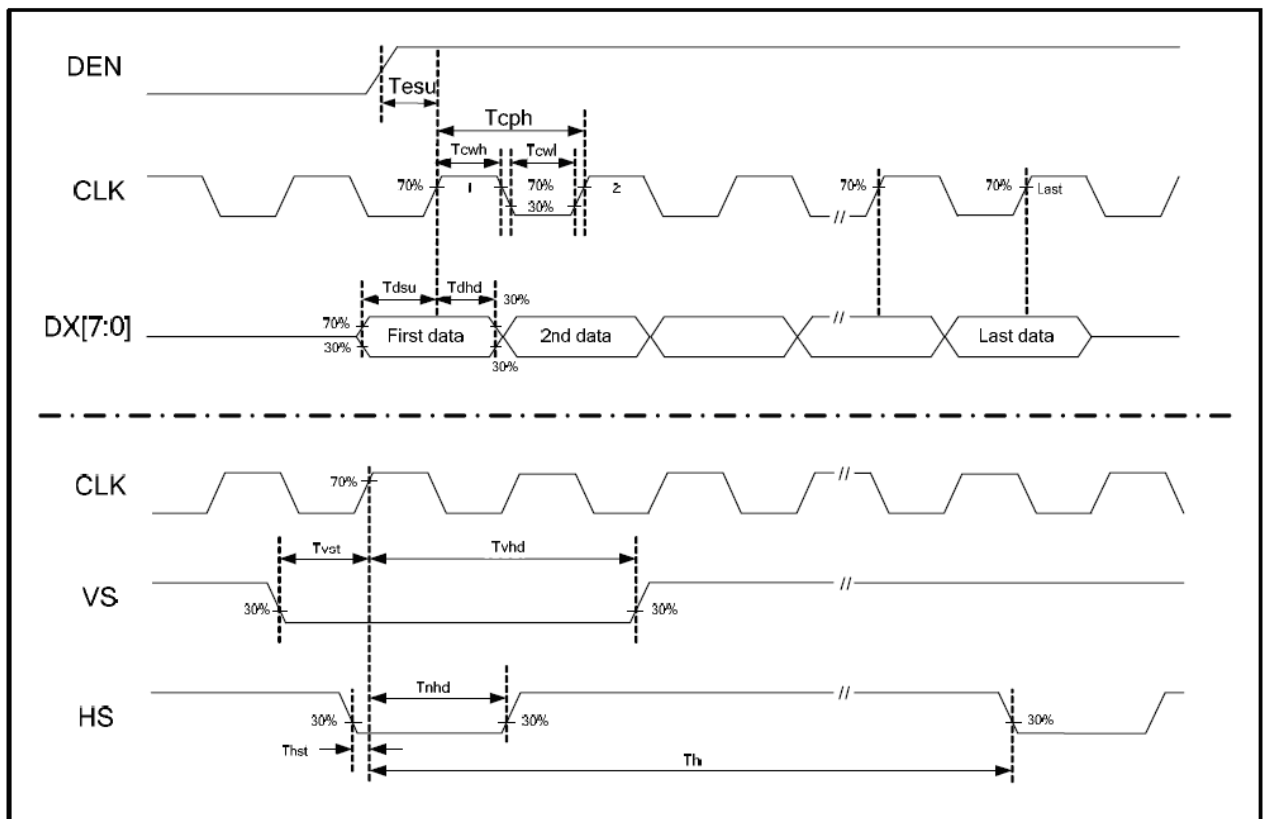
PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max	
CLK frequency	F_{CPH}		25.175		MHz
CLK period	T_{CPH}	-	39.7	-	ns
CLK pulse duty	T_{CWH}	40	50	60	%
HS period	T_H	-	800	-	T_{CPH}
HS pulse width	T_{WH}	5	30	-	T_{CPH}
HS-first horizontal data time	T_{HS}	112	144	175	T_{CPH}
DEN pulse width	T_{EP}	-	640	-	T_{CPH}
VS pulse width	T_{WV}	1	3	5	T_H
VS-DEN time	T_{STV}	-	35	-	T_H
VS period	T_V	-	525	-	T_H

Note: When SYNC mode is used, 1st data start from 144th CLK after HS falling (when $STHD[5:0]=00000$)

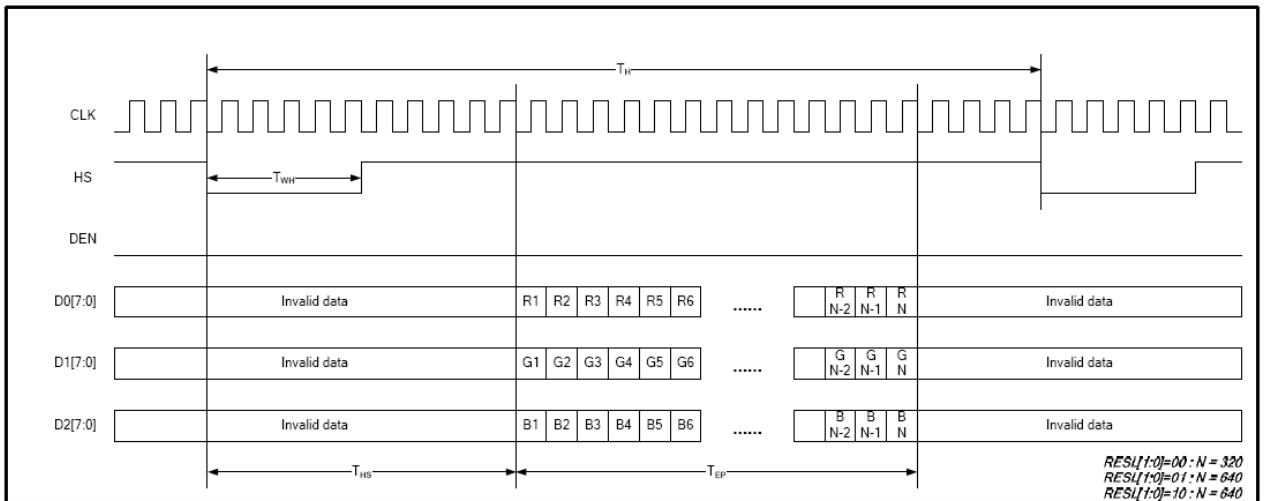
PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max	
OEV pulse width	T_{OEV}		100	-	T_{CPH}
CKV pulse width	T_{CKV}	-	96	-	T_{CPH}
HS-CKV time	T_1	-	52	-	T_{CPH}
HS-OEV time	T_2	-	8	-	T_{CPH}
HS-POL time	T_3	-	72	-	T_{CPH}
STV setup time	T_{SUV}	-	46	-	T_{CPH}
STV pulse width	T_{WSTV}	-	1	-	T_H

6-2 Timing chart

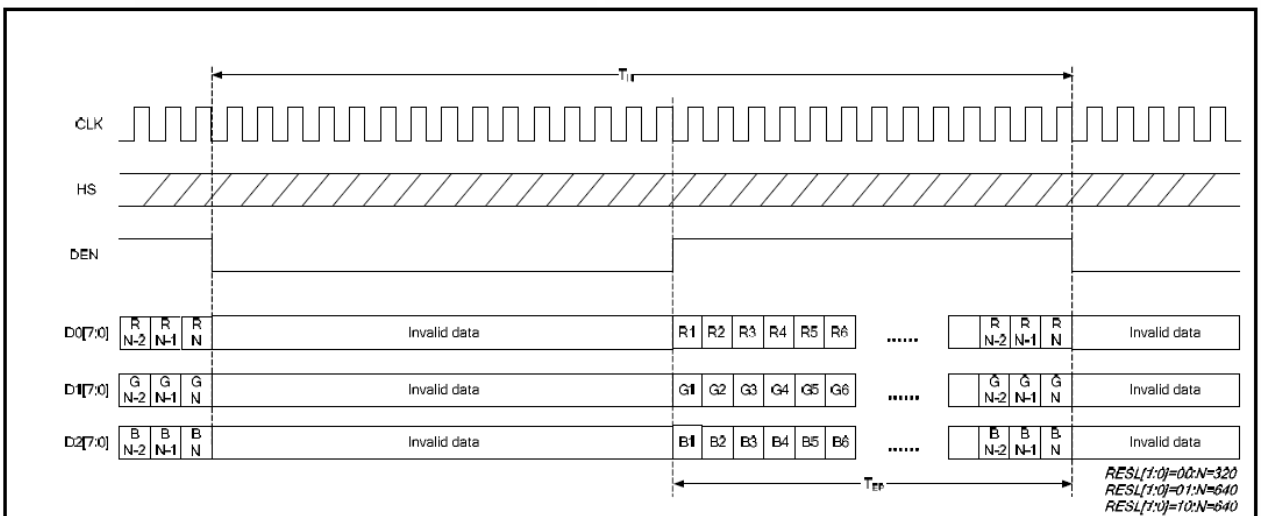
Clock and Data input waveforms



Parallel RGB SYNC Mode Horizontal Data Format



Parallel RGB DE Mode Horizontal Data Format



6-3 Color Data Assignment

COLOR	Input Data	R DATA						G DATA						B DATA					
		R5 MSB	R4	R3	R2	R1	R0 LSB	G5 MSB	G4	G3	G2	G1	G0 LSB	B5 MSB	B4	B3	B2	B1	B0 LSB
BASIC COLOR	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	BLUE(63)	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	RED(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	RED(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
GREEN	GREEN (0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN (1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	GREEN (2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	GREEN (62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
BLUE	BLUE (0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BLUE (1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	BLUE (2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	BLUE (62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	BLUE (63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

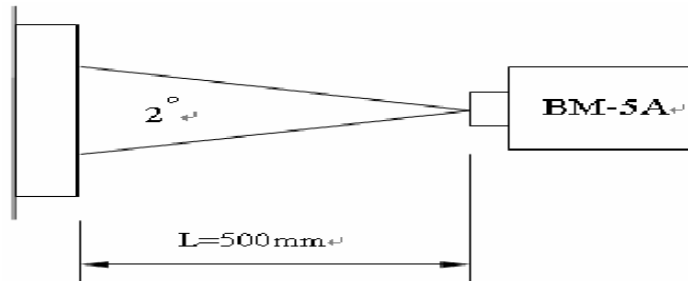
NOTE : (1) Definition of Gray Scale , Color(n) : n is series of Gray Scale
The more n value is the bright Gray Scale
(2) Data : 1-High , 0-Low

7. OPTICAL CHARACTERISTICS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast ratio		CR	Point - 5 $\Theta = \Phi = 0^\circ$	400	600	--	--	(1)(2)(3)
Luminance		Lw		200	350	-	cd/m ²	(1)(3)
Luminance Uniformity		ΔL		70	75	-	%	(1)(3)
Response Time (White – Black)		$T_r + T_f$		--	50	--	ms	(1)(3)(5)
Viewing Angle	Vertical	Θ	CR \geq 10 Point – 5	100	130	-	Deg.	(1)(2)(4)
	Horizontal	Φ		120	150	-		
Color chromaticity	Red	Rx	Point - 5 $\Theta = \Phi = 0^\circ$	0.566	0.616	0.666	--	(1)(3)
		Ry		0.302	0.352	0.402		
	Green	Gx		0.308	0.358	0.408		
		Gy		0.518	0.568	0.618		
	Blue	Bx		0.096	0.146	0.196		
		By		0.086	0.136	0.186		
	White	Wx		0.296	0.346	0.396		
		Wy		0.328	0.378	0.428		

NOTE :

- (1) Measure conditions : 25°C±2°C , 60±10%RH under 10Lux , in the dark room by BM-7TOPCON) ,viewing 2° , VCC=3.3V , VDD=3.3V



- (2) Definition of Contrast Ratio :

$$\text{Contrast Ratio (CR)} = (\text{White}) \text{ Luminance of ON} \div (\text{Black}) \text{ Luminance of OFF}$$

- (3) Definition of Luminance :

Measure white luminance on the point 5 as figure9-1

Definition of Luminance Uniformity

Measure white luminance on the point 1 ~ 9 as figure9-1

$$\Delta L = [L(\text{MIN}) / L(\text{MAX})] \times 100\%$$

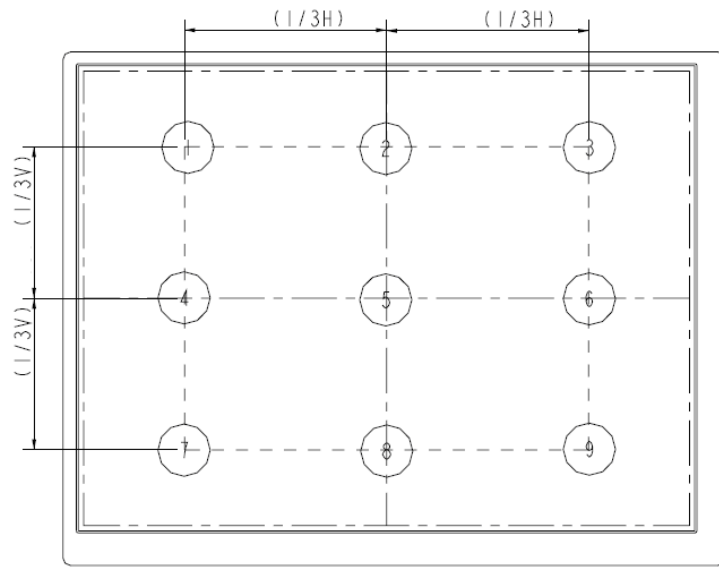


Fig9-1 Measuring point

(4) Definition of Viewing Angle(Θ, Φ), refer to Fig9-2 as below :

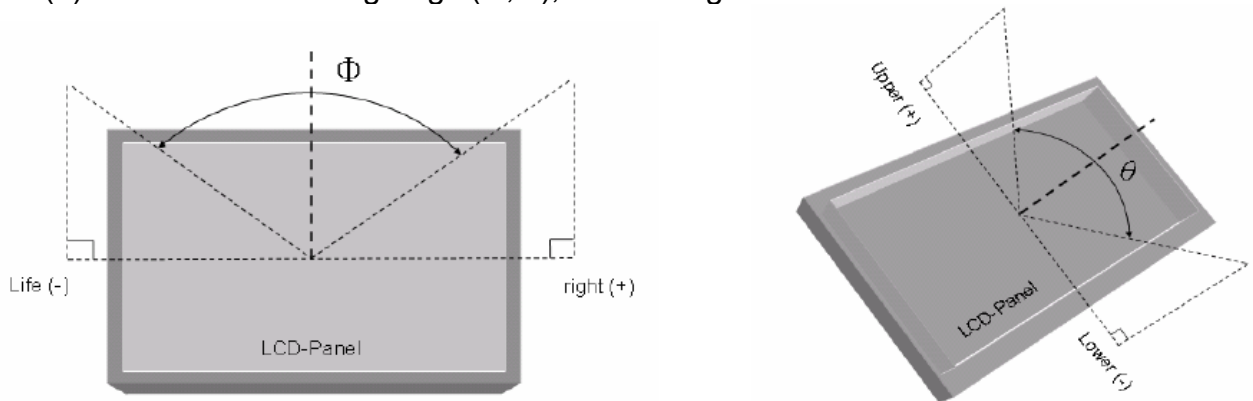


Fig9-2 Definition of Viewing Angle

(5) Definition of Response Time.(White – Black)

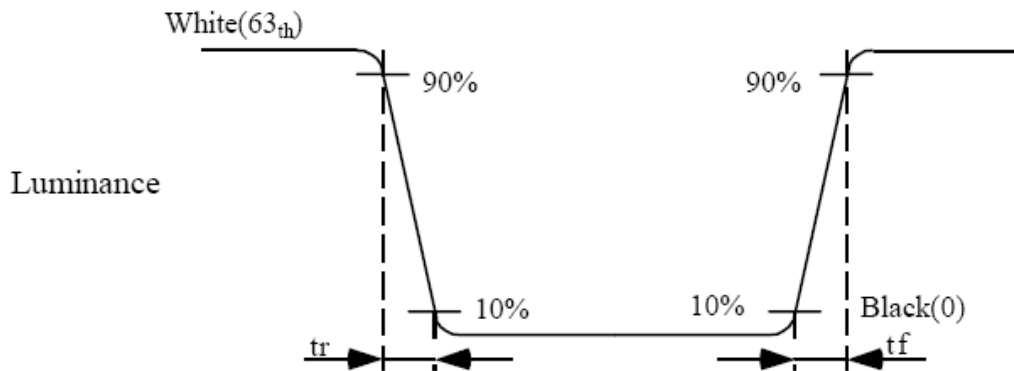


Fig9-3 Definition of Response Time(White-Black)

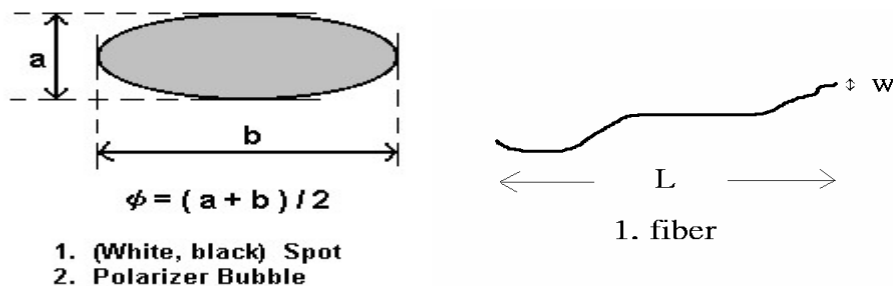
8. INCOMING INSPECTION STANDARD FOR TFT-LCD PANEL

DEFECT TYPE			LIMIT			Note		
VISUAL DEFECT	INTERNAL	SPOT	$\phi < 0.15\text{mm}$	Ignore		Note1		
			$0.15\text{mm} \leq \phi \leq 0.5\text{mm}$	$N \leq 4$				
			$0.5\text{mm} < \phi$	$N = 0$				
		FIBER	$0.03\text{mm} < W \leq 0.1\text{mm},$ $L \leq 5\text{mm}$	$N \leq 3$		Note1		
			$1.0\text{mm} < W, 1.5\text{mm} < L$	$N = 0$				
		POLARIZER BUBBLE	$\phi < 0.15\text{mm}$	Ignore		Note1		
			$0.15\text{mm} \leq \phi \leq 0.5\text{mm}$	$N \leq 2$				
			$0.5\text{mm} < \phi$	$N = 0$				
		Mura	It' OK if mura is slight visible through 6%ND filter					
ELECTRICAL DEFECT	BRIGHT DOT	A Grade			B Grade			
		C Area	O Area	Total	C Area	O Area	Total	Note3
		$N \leq 0$	$N \leq 2$	$N \leq 2$	$N \leq 2$	$N \leq 3$	$N \leq 5$	Note2
	DARK DOT	$N \leq 2$	$N \leq 3$	$N \leq 3$	$N \leq 3$	$N \leq 5$	$N \leq 8$	
	TOTAL DOT	$N \leq 4$			$N \leq 5$	$N \leq 6$	$N \leq 8$	Note2
	TWO ADJACENT DOT	$N \leq 0$	$N \leq 1$ pair	$N \leq 1$ pair	$N \leq 1$ pair	$N \leq 1$ pair	$N \leq 1$ pair	Note4
	THREE OR MORE ADJACENT DOT	NOT ALLOWED						
LINE DEFECT	NOT ALLOWED							

(1) One pixel consists of 3 sub-pixels, including R,G, and B dot.(Sub-pixel = Dot)

(2) LITTLE BRIGHT DOT ACCEPTITABLE UNDER 6 % ND-Filter

[Note1] W : Width[mm], L : Length[mm], N : Number, ϕ : Average Diameter



[Note2] Bright dot is defined through 6% transmission ND Filter as following.

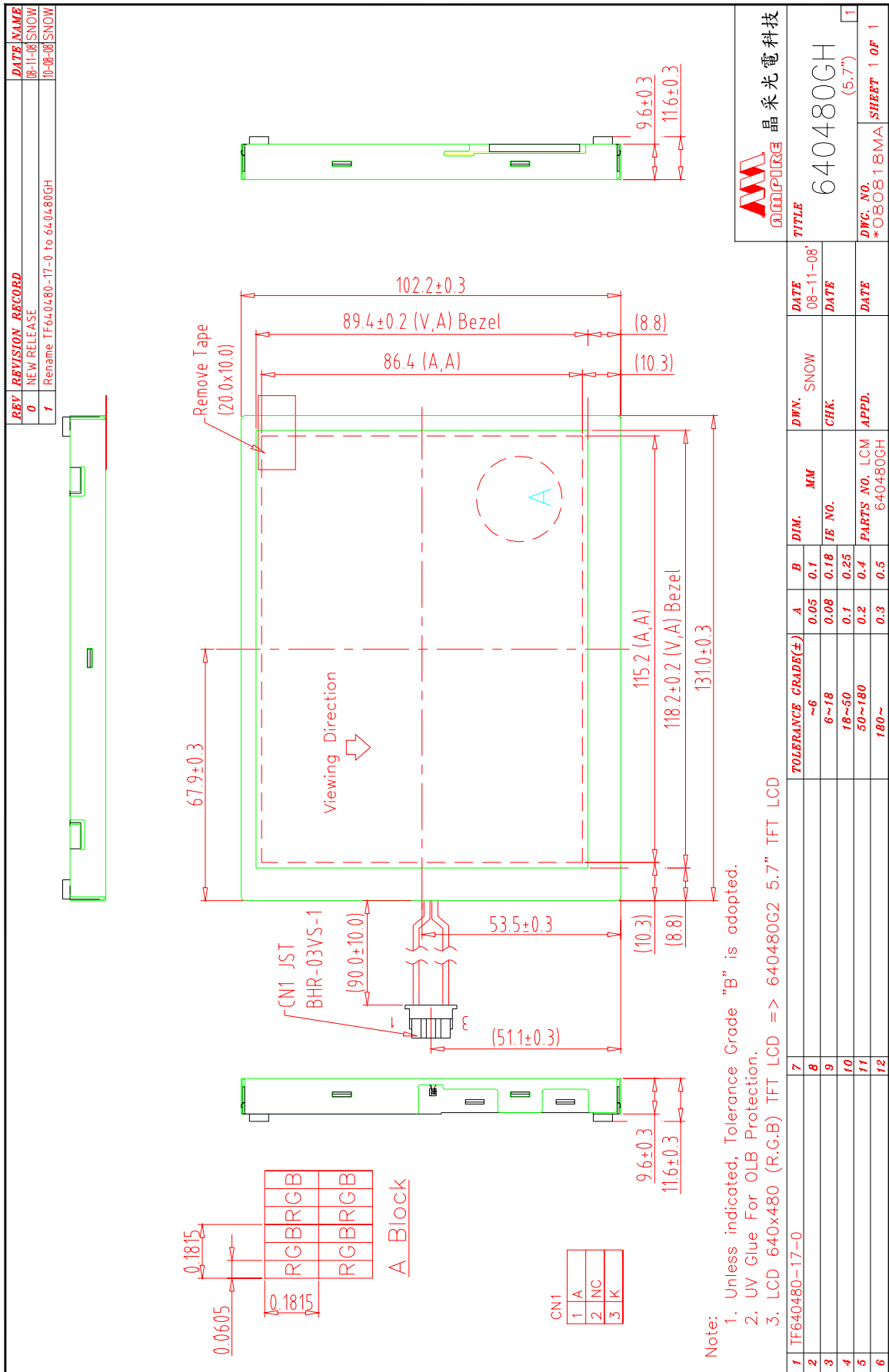
9. RELIABILITY TEST CONDITIONS

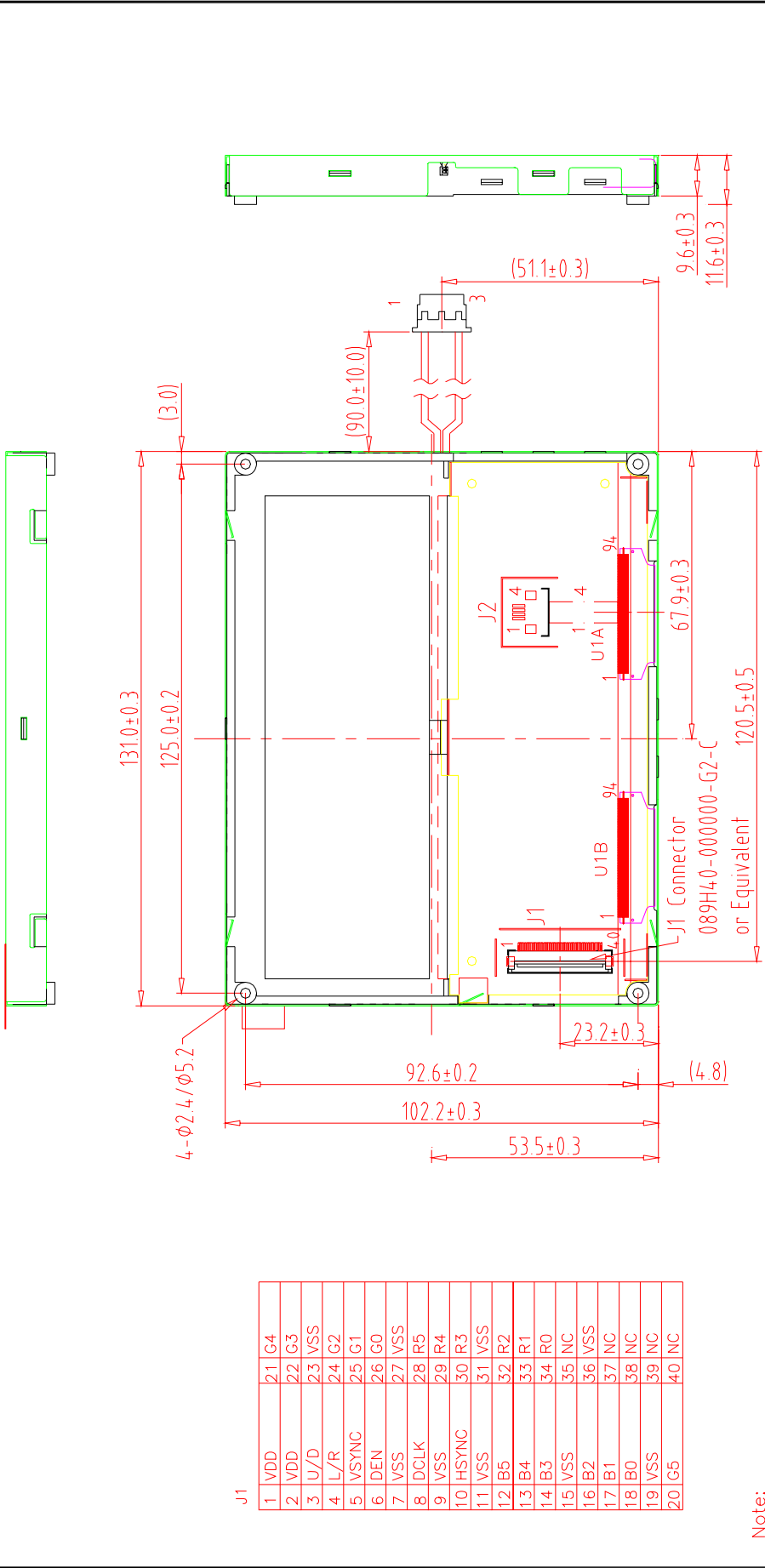
ITEM	CONDITIONS
HIGH TEMPERATURE OPERATION	70°C , 240Hrs
HIGH TEMPERATURE AND HIGH HUMIDITY OPERATION	60°C , 90%RH , 240Hrs
HIGH TEMPERATURE STORAGE	80°C , 240Hrs
LOW TEMPERATURE OPERATION	-20°C , 240Hrs
LOW TEMPERATURE STORAGE	-30°C , 240Hrs
THERMAL SHOCK	-30°C (0.5Hr) ~80°C (0.5Hr) 200Cycle

9.1 OTHERS

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

10. OUTLINE DIMENSION





J1		J2	
1	VDD	21	G4
2	VDD	22	G3
3	U/D	23	VSS
4	L/R	24	G2
5	VSYNC	25	G1
6	DEN	26	G0
7	VSS	27	VSS
8	DCLK	28	R5
9	VSS	29	R4
10	HSYNC	30	R3
11	VSS	31	VSS
12	B5	32	R2
13	B4	33	R1
14	B3	34	R0
15	VSS	35	INC
16	B2	36	VSS
17	B1	37	INC
18	B0	38	INC
19	VSS	39	INC
20	G5	40	INC

Note:

1. Unless indicated, Tolerance Grade "B" is adopted.
2. UV Glue For OLB Protection.
3. LCD 640x480 (R.G.B) TFT LCD => 640480G2 5.7" TFT LCD

Back view

NO.	REVISION	DATE	BY	CHK.	APPD.	PARTS NO.	LCM-1	MM	DIM.	A	B	TOLERANCE GRADE(±)	7	8	9	10	11	12
1	0	08-11-08	SNOW	SNOW		640480GH			0.05	0.1	~6							
2									0.08	0.18	6~18							
3									0.1	0.25	18~50							
4									0.2	0.4	50~180							
5									0.3	0.5	180~							
6																		

AMPIRE 晶采光電科技

TITLE 640480GH (5.7")

DWG. NO. *080819MA SHEET 1 OF 1