



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-800480GTMQW-05H
APPROVED BY	
DATE	

- Approved For Specifications
 Approved For Specifications & Sample

AMPIRE CO., LTD.

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RECORD OF REVISION

Revision Date	Page	Contents	Editor
2008/11/25	-	New Release	Edward
2009/2/10	4	Modify the luminance of module	Edward
	6	Modify Power Supply Current of LED unit	Edward

1. FEATURES

- (1) Construction : a-Si TFT-LCD with driving system, White LED Backlight.
- (2) LCD type : Transmissive , Normally White
- (3) Number of the Colors : 262K colors (R,G,B 6 bit digital each)
- (4) RGB Interface 40 pin, support DE only mode.
- (5) LCD Power Supply Voltage : 3.3V and 5.0V single power input, built-in power supply circuit.
- (6) LED driving circuit is built-in to provide PWM dimmer function.

2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
Display size (diagonal)	7.0	inch
Resolution	800 (W) x RGB x 480 (H)	dot
Display area	152.4 (W) x 91.44 (H)	mm
Pixel pitch	0.1905 (W) x 0.1905 (H)	mm
Overall dimension	165.0(W) x 104.0(H) x 5.0(D)	mm
Color configuration	R.G.B Vertical stripe	
Surface treatment	Antiglare	
View Direction (Gray Inversion)	6 o'clock	

3. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Power Supply for logic	Vcc	-0.5	5	V	
Input Signal Voltage	VI	-0.5	VCC + 0.5	V	(1)
Operating Temperature	Top	-10	60	°C	(2)
Storage Temperature	Tstg	-20	70	°C	

Note 1: Hsync, Vsync, DEN, DCLK, R0~R5, G0~G5, B0~B5

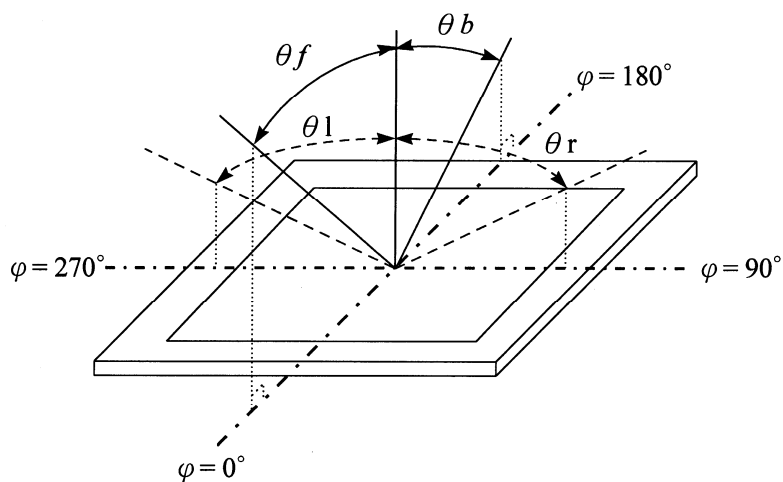
Note 2: Background color changes slightly depending on ambient temperature.
This phenomenon is reversible.

4. OPTICAL CHARACTERISTICS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing Angle	Front	θf	$CR \geq 10$	--	60	--	deg.	(1)(2)(3)
	Back	θb		--	60	--		
	Left	θl		--	70	--		
	Right	θr		--	70	--		
Contrast ratio		CR	$\Theta = \Phi = 0^\circ$	200	280	--	--	(1)(3)
Response Time		T_r	$\Theta = \Phi = 0^\circ$	--	20	30	ms	(1)(4)
		T_f					ms	(1)(4)
Color chromaticity	Red	Rx	$\Theta = \Phi = 0^\circ$	0.566	0.616	0.666	--	(1)
		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		
Luminance		L	$\Theta = \Phi = 0^\circ$	300	--	--	cd/m ²	(1)(5)
Luminance Uniformity		ΔL	$\Theta = \Phi = 0^\circ$	70	--	--	%	(1)(5)(6)

Note 1: $T_a = 25^\circ\text{C}$. To be measured on the center area of panel after 10 minutes operation.

Note 2: Definition of Viewing Angle



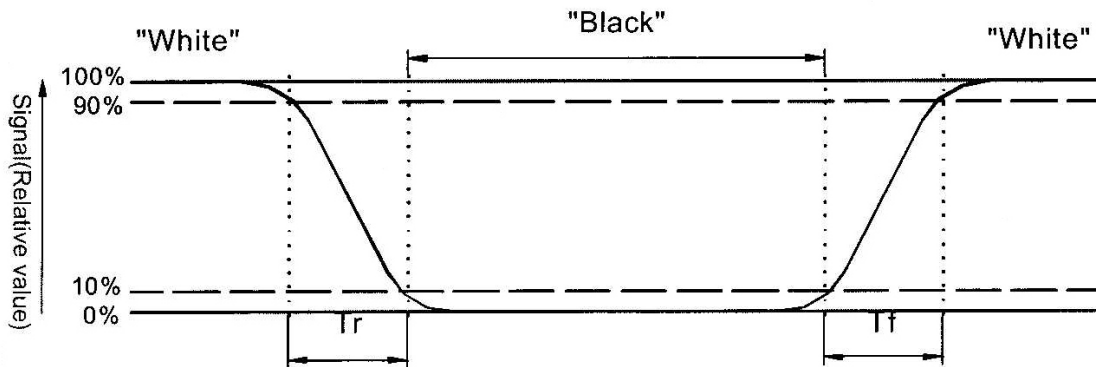
Note 3: Definition of contrast ratio:

Contrast ratio is calculated with the following formula.

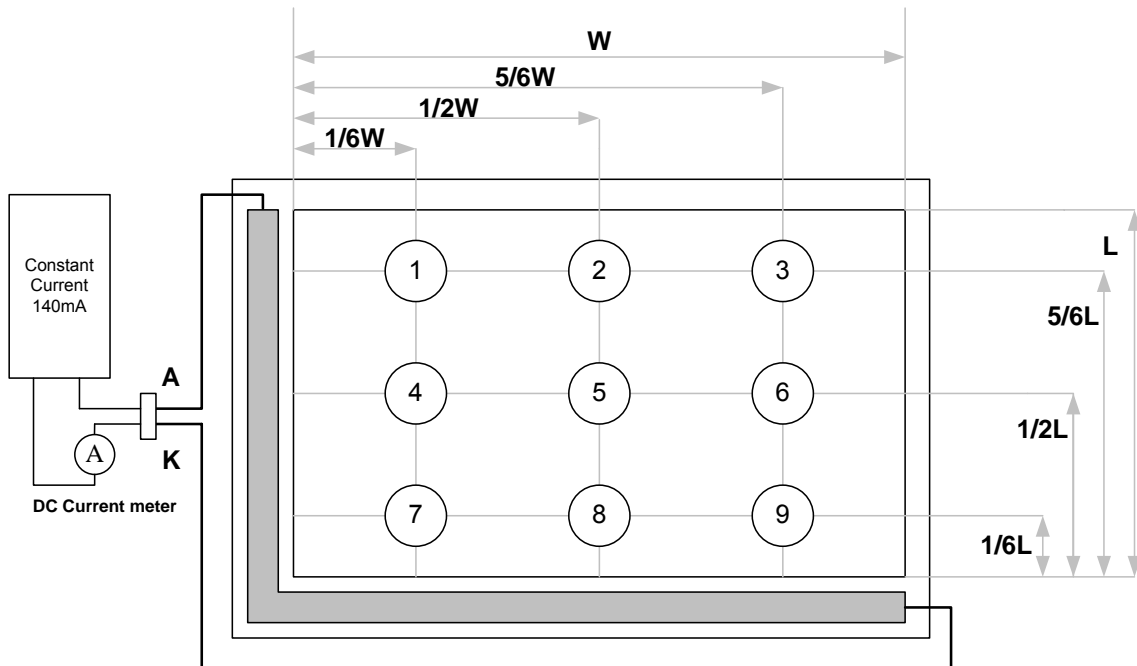
$$\text{Contrast ratio(CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector Output when LCD is at "Black" state}}$$

Note 4: 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 5 : Luminance is measured at point 5 of the display.



Note 6 : Definition of Luminance Uniformity

$$\Delta L = [L(\text{min.}) \text{ of 9 points} / L(\text{max.}) \text{ of 9 points}] \times 100\%$$

5. ELECTRICAL CHARACTERISTICS

5.1 TFT LCD Module voltage

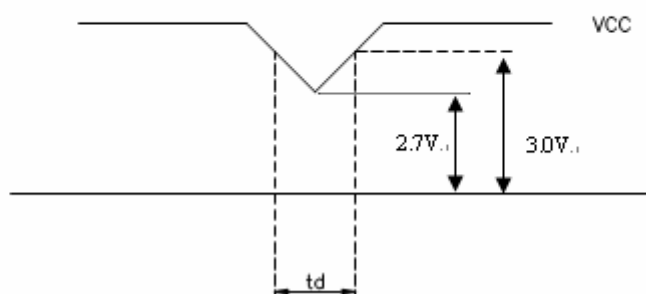
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Power supply voltage For LCD	Vcc	3.0	3.3	3.6	V	
Power Supply Voltage For LED	VDD	3	5	5.5	v	
Input voltage for logic	H Level	V_{IH}	0.7 VDD	--	VDD	(1)
	L Level	V_{IL}	0	--	0.3 VDD	
Power Supply Current For LED	IDD	--	740	--	mA	VDD=3.3; Efficiency of LED Driver IC is 75%
		--	440	--	mA	VDD=5.0; Efficiency of LED Driver IC is 75%.

Note 1: Hsync, Vsync, DEN, DCLK, R0~R5, G0~G5, B0~B5

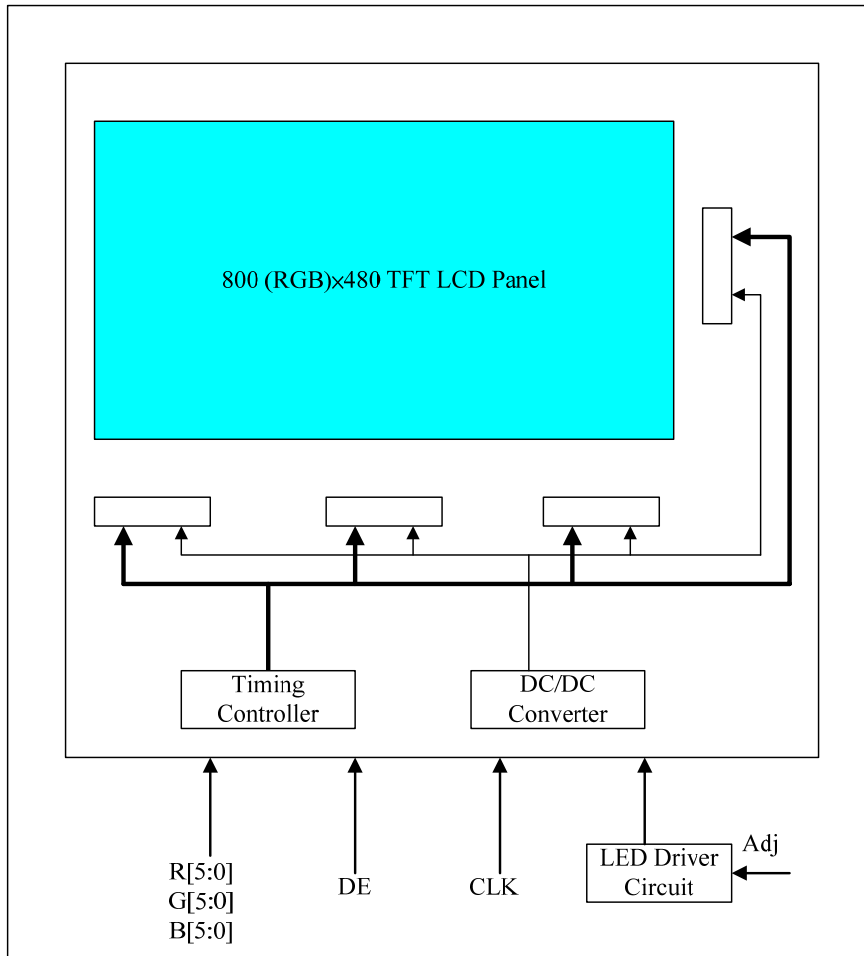
Note 2: fV =60Hz , Ta=25°C , Display pattern : All Black

VCC -dip codition:

- 1) When $2.7\text{V} \leq VCC < 3.0\text{V}$, $t_d \leq 10\text{ms}$.
- 2) $VCC > 3.0\text{V}$, VCC-dip condition should be same as VCC-turn-on condition.



6. BLOCK DIAGRAM

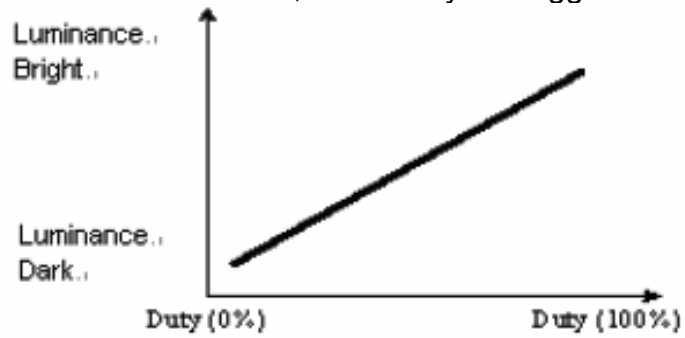


7. INTERFACE PIN ASSIGNMENT

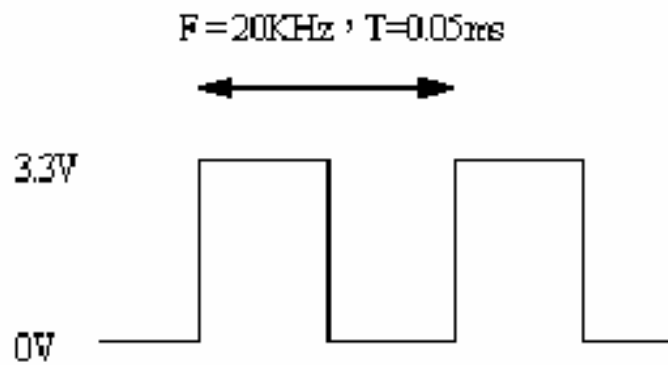
Pin No	Symbol	Function
1	GND	Ground
2	GND	Ground
3	ADJ	Brightness control for LED B/L
4	VDD	Power supply for LED Driver circuit
5		
6		
7	VCC	Power supply (3.3V)
8		
9	DE	Data Enable Timing Signal
10	GND	Ground
11	GND	Ground
12	GND	Ground
13	B5	Blue data (MSB)
14	B4	Blue data
15	B3	Blue data
16	GND	Ground
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	GND	Ground
40	GND	Ground

Remark:

1. ADJ adjust brightness to control Pin , Pulse duty the bigger the brighter.



2. ADJ signal = 0 ~ 3.3V , operation frequency : $20 \pm 10\text{KHz}$



3. VSS Pin must ground contact, can not be floating.

8. INPUT SIGNAL (DE ONLY MODE)

Timing Characteristics

DE mode Input signal characteristics, 800 x 480

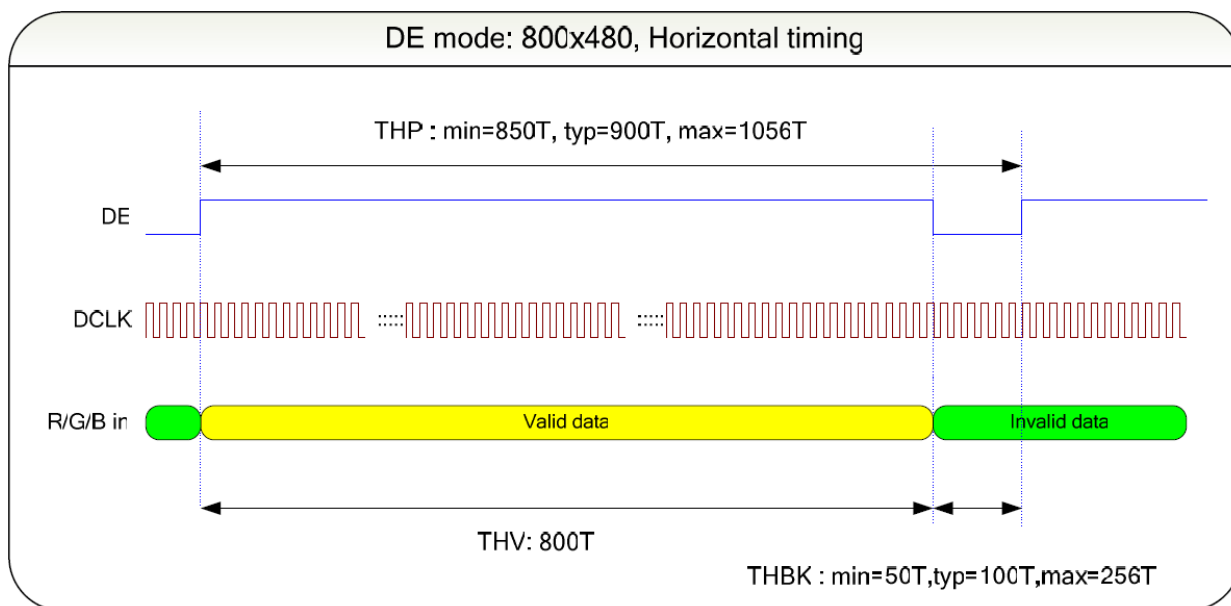
PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	REMARK
DCLK	PERIOD	TCLK	25	34	-	NS
	FREQUENCY	FCLK	-	29.5	40	MHZ
	LOW LEVEL WIDTH	TWCL	6	-	-	NS
	HIGH LEVEL WIDTH	TWCH	6	-	-	NS
	RISE, FALL TIME	TCLKR, TCLKF	-	-	3	NS
	DUTY	-	0.45	0.50	0.55	-
DE	SETUP TIME	TDES	5	-	-	NS
	HOLD TIME	TDEH	5	-	-	NS
	RISE, FALL TIME	TDER, TDEF	-	-	5	NS
	HORIZONTAL PERIOD	THP	810	928	1600	TCLK
	HORIZONTAL VALID	THV	800			TCLK
	HORIZONTAL BLANK	THBK	THP - THV			TCLK
	VERTICAL PERIOD	TVP	485	525	960	THP
	VERTICAL VALID	TW	480			THP
VERTICAL BLANK	TVBK	TVP - TW			THP	
DATA	SETUP TIME	TDS	5	-	-	NS
	HOLD TIME	TDH	5	-	-	NS
	RISE, FALL TIME	TDR, TDF	-	-	3	NS

- This module is operated by DE only mode

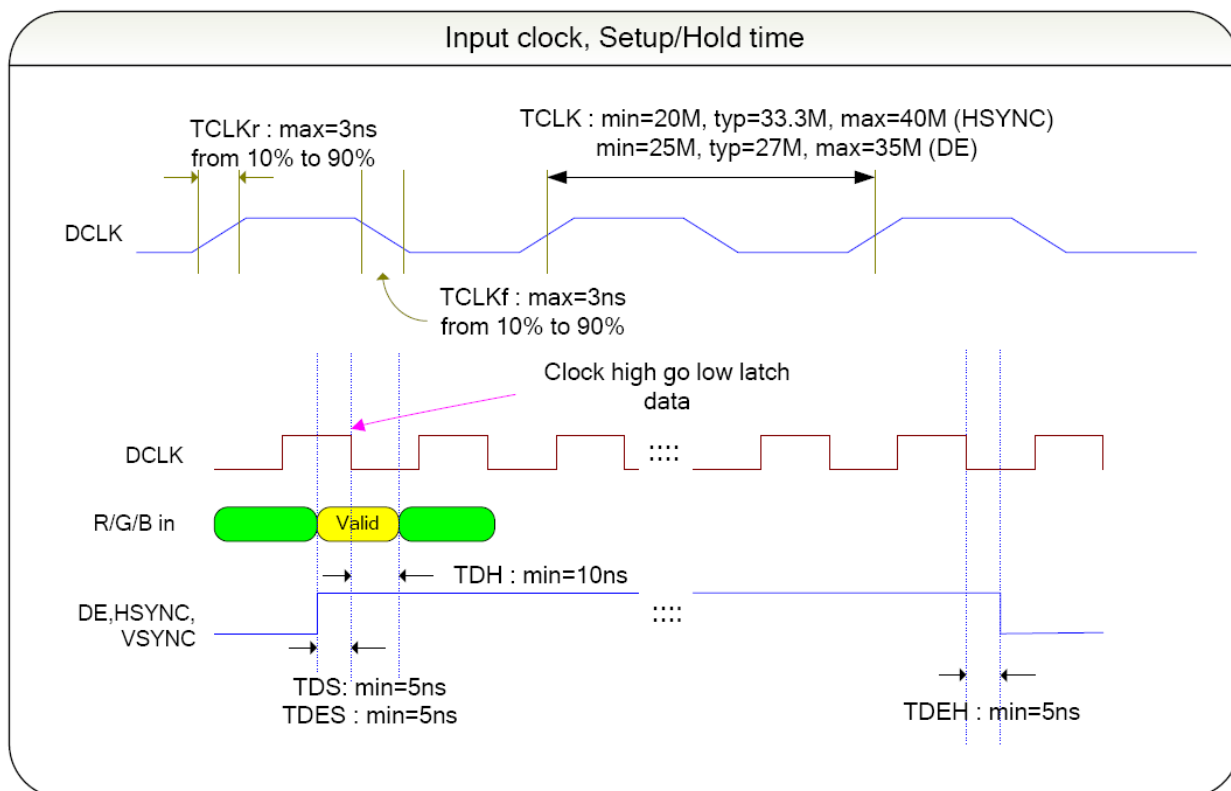
Output Signal Characteristics, 800 x 480

PARAMETER	SYMBOL	VALUE	UNIT
HCLK FREQUENCY	NORMAL	FHCLK	1
HCLK FREQUENCY	DUAL	1/2FHCLK	0.5
HCLK PERIOD	NORMAL	THCLK	1
HCLK PERIOD	DUAL	2THCLK	2
DATA, REV DIO VALID TO HCLK RISING	TSU	0.5	THCLK
HCLK RISING TO DATA, REV, DIO VALID	THD	0.5	THCLK
POL PULSE WIDTH	TPOL	1	THP
POL VALID TO LD RISING	TPSU	0.5 THP + 12	THCLK
LD RISING TO POL VALID	TPHD	THP - TPSU	THCLK
STV PULSE WIDTH	TSTV	1	THP
STV VALID TO CKV RISING	TVSU	0.5	THP
CKV RISING TO STV VALID	TVHD	0.5	THP
DIO PULSE WIDTH	TDIOW	1	THCLK
LD PULSE WIDTH	TLDW	4	THCLK
OEV PULSE WIDTH	TOEV	66	THCLK
CKV PULSE WIDTH	TCKV	0.5	THP
TIME FROM LD TO CKV	TGS	1	THCLK
TIME FROM LD TO DIO	TLDO	THBK - 6	THCLK
TIME FROM THE LAST DATA TO LD	TED	5.5	THCLK
AP PULSE WIDTH	TAPW	THP - 62	THCLK
TIME FROM LD TO AP	TLDAP	44	THCLK

◆ Waveform : DE mode, 800x600, Horizontal timing



◆ Waveform : input clock, setup/hold time



9. 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	
Red	Black	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	
	Red(61)	0	0	0	0	1	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	
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	Red(1)	1	1	1	1	1	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	
Green	Black	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	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	
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	Green(31)	0	0	0	0	0	0	0	1	1	1	1	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	
	Green(0)	0	0	0	0	0	0	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	
	Blue(62)	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	1	0	
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	Blue(31)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	
	Blue(0)	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1		

10. QUALITY AND RELIABILITY

10.1. Test Conditions

Tests should be conducted under the following conditions :

Ambient temperature : $25 \pm 5^{\circ}\text{C}$

Humidity : $60 \pm 25\% \text{ RH}$.

10.2. Sampling Plan

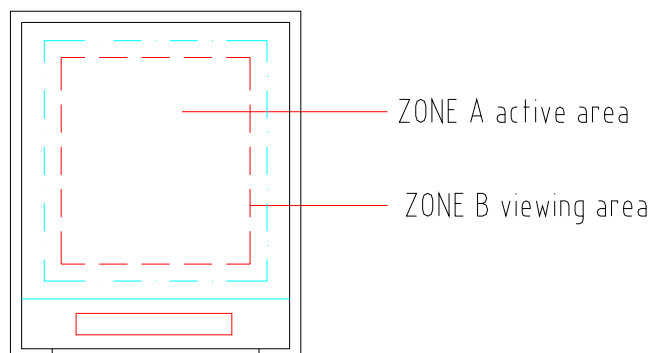
Sampling method shall be in accordance with MIL-STD-105E , level II, normal single sampling plan .

10.3. 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.

10.4. Appearance

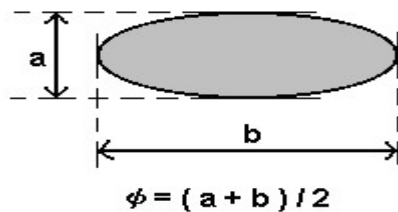
An appearance test should be conducted by human sight at approximately 30 cm distance from the LCD module under florescent light. The inspection area of LCD panel shall be within the range of following limits.



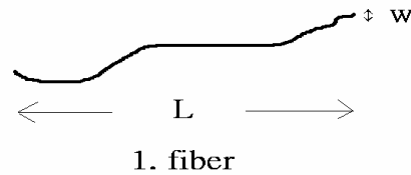
10.5. Incoming Inspection Standard

Defect Type			Limit			Note			
Visual Defect	Internal	Spot	$\phi < 0.15\text{mm}$		Ignore	(1)			
			$0.15\text{mm} \leq \phi \leq 0.5\text{mm}$		$N \leq 4$				
			$0.5\text{mm} < \phi$		$N=0$				
		Fiber	$0.03\text{mm} < W \leq 0.1\text{mm}, L \leq 5\text{mm}$		$N \leq 3$	(1)			
			$1.0\text{mm} < W, 1.5\text{mm} < L$		$N=0$				
		Polarizer Bubble	$\phi < 0.15\text{mm}$		Ignore		(1)		
	$0.15\text{mm} \leq \phi \leq 0.5\text{mm}$		$N \leq 2$						
$0.5\text{mm} < \phi$			$N=0$						
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	(3)
	Dark Dot		$N \leq 0$	$N \leq 2$	$N \leq 2$	$N \leq 2$	$N \leq 3$	$N \leq 5$	(2)
	Total Dot		$N \leq 4$			$N \leq 5$	$N \leq 6$	$N \leq 8$	(2)
	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	(4)
	Three or More Adjacent Dot		Not Allowed						
	Line Defect		Not Allowed						

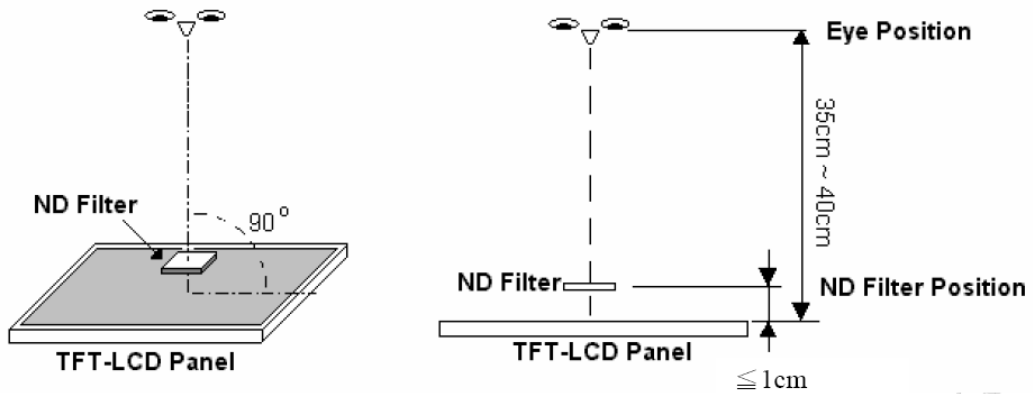
[Note1] W : Width[mm], L : Length[mm], N : Number, ϕ : Average Diameter



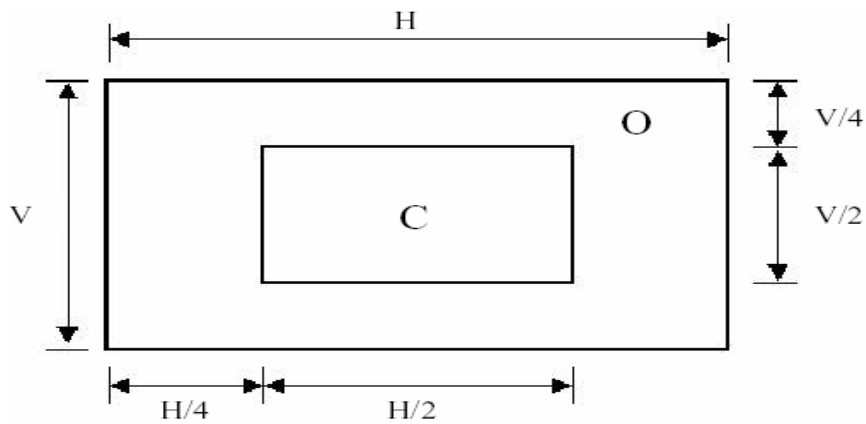
1. (White, black) Spot
2. Polarizer Bubble



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



[Note3]

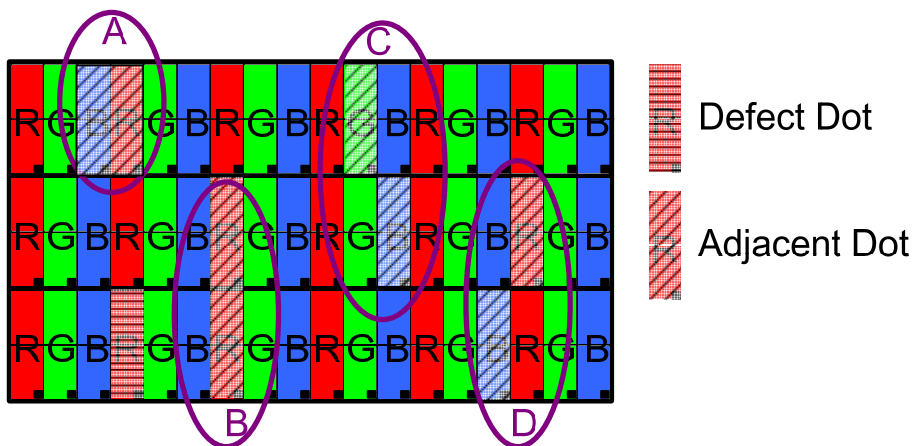


C Area: Center of display area

O Area: Outer of display area

[Note4]

Judge defect dot and adjacent dot as following. Allow below (as A, B, C and D status) adjacent defect dots, including bright and dark adjacent dot. And they will be counted 2 defect dots in total quantity.



(1) The defects that are not defined above and considered to be problem shall be reviewed and discussed by both parties.

(2) Defects on the Black Matrix, out of Display area, are not considered as a defect or counted.

10.6. Reliability Test

Test Item	Test Conditions	Note
High Temperature Operation	60±3°C , t=96 hrs	
Low Temperature Operation	-10±3°C , t=96 hrs	
High Temperature Storage	70±3°C , t=96 hrs	1,2
Low Temperature Storage	-20±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.

11. USE PRECAUTIONS

11.1. 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.

11.2. 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. $1M\Omega$ 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.

11.3. 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.

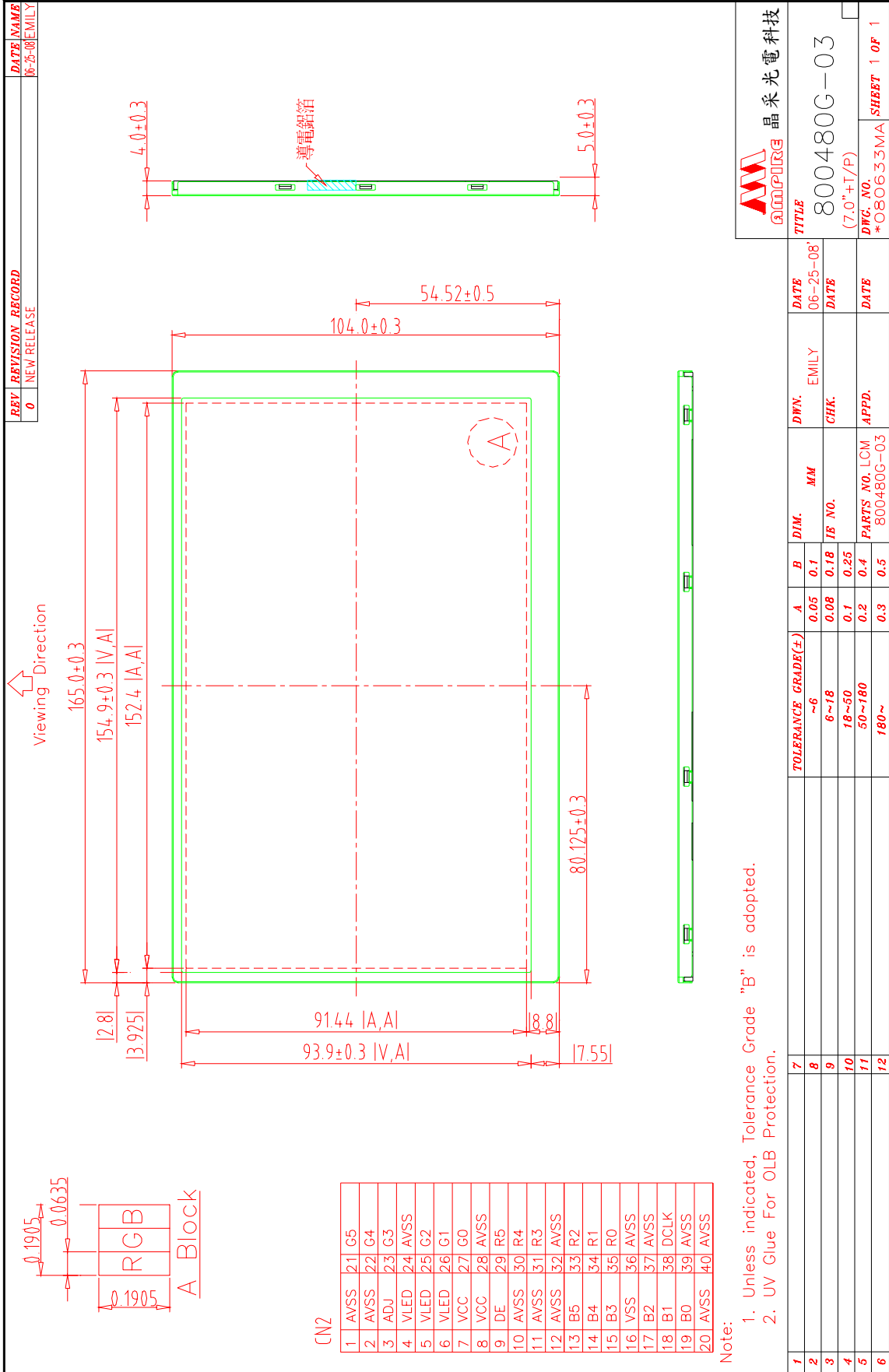
11.4. Operating precautions

- 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 drive 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: 0.2V_{dd} or less and H level: 0.8V_{dd} 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.

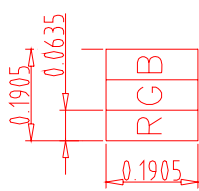
11.5. Other

- 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



REV	REVISION RECORD	DATE NAME
0	NEW RELEASE	06-25-08 EMILY

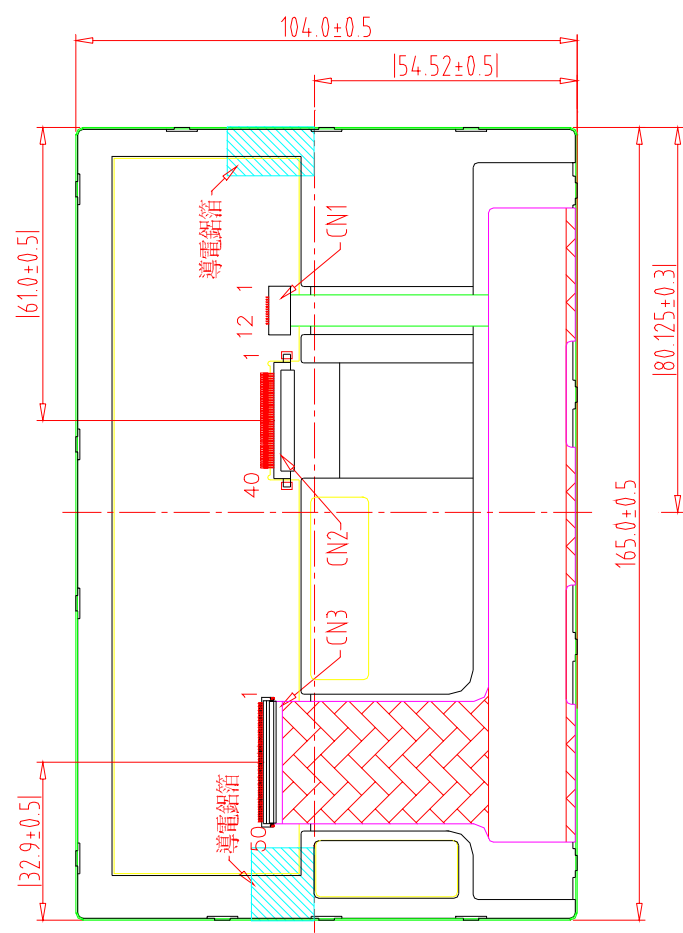


A Block

CN2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
	AVSS	AVSS	ADJ	VLED	VLED	VCC	DE	AVSS	AVSS	AVSS	AVSS	AVSS	B5	B4	B3	VSS	B2	B1	B0	AVSS	G5	G4	G3	AVSS	G2	G1	G0	AVSS	R5	R4	R3	AVSS	R2	R1	R0	AVSS	DCLK	AVSS	AVSS	

Note:

1. Unless indicated, Tolerance "±0.3"
2. UV Glue For OLB Protection.
3. CN1:106A12-000000-G2-R
4. CN2:089N40-000R00-G2-R
5. CN3:FH19SC-50S-0.5SH
6. LCD 800X3(R.G.B)x480=> 7.0" Digital TFT LCD



Back View

適用機種:

- AM-800480G-03
- AM-800480G-04

晶采光電科技		TITLE		DATE		DWN.		MM		DIM.		TOLERANCE GRADE(±)		A		B		DWN.		DATE		DWN.		DATE	
AMPIRE		800480G-03		06-25-08		EMILY		MM		0.05 0.1		~6		0.05 0.1		0.1 0.1		CHK.		06-25-08		EMILY		06-25-08	
		(7.0"+T/P)				CHK.		IE NO.		6~18		6~18		0.08 0.18		0.18 0.25		APPD.				EMILY			
		*O80634MA				APPD.		PARTS NO.LCM-1		18~50		50~180		0.1 0.2		0.2 0.4		800480G-03				APPD.			
		SHEET 1 OF 1				APPD.		800480G-03		180~		180~		0.3 0.5		0.3 0.5		800480G-03				APPD.			