AMP DISPLAY INC.

A Brighter Solution

SPECIFICATIONS

8.4-in COLOR TFT MODULE

CUSTOMER:	
CUSTOMER PART NO.	
AMP DISPLAY PART NO.	AM- 800600MTMQW-00H
APPROVED BY:	
DATE:	

☐ APPROVED FOR SPECIFICATIONS

☐ APPROVED FOR SPECIFICATION AND PROTOTYPES

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RECORD OF REVISION

Revision Date	Page	Contents	Editor
2009/06/10	-	New Release	Emil
2009/07/09	-	Issued the official part No. AM-800600MTMQW-00H.	

1. INSTRUCTION

Ampire 8.4" Display Module is a color active matrix TFT-LCD that uses amorphous silicon TFT as a switching device . This model is composed of a TFT-LCD panel and LED Backlight . This TFT-LCD has a high resolution (800(R.G.B) X 600) and can display up to 262,144 colors.

1.1 Features

(1) Construction : a-Si TFT-LCD with driving system, White LED Backlight.

(2) LCD type : Transmissive , Normally White

(3) Number of the Colors : 16M colors (R,G,B 8 bit digital each)

(4) RGB Interface.

2. PHYSICAL SPECIFICATIONS

Item		Specifications	unit
Display resolution(dot)		800RGB (W) x 600(H)	dots
Active area		170.40 (W) x 127.80(H)	mm
Pixel pitch		213 (W) x 213 (H)	um
Color configuration		R.G.B -stripe	
Overall dimension		189.75(W)x149.40(H)x5.00(D)	mm
Weight		250(typ)	g
Backlight unit		LED	
Display color		16M	colors
Power Consumption	Logic	0.5	W
	B/L System	2.16	W

3. ABSOLUTE MAXIMUM RATINGS

3.1 TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Note
Power Voltage	VCC	-0.3	6	V	GND=0V
	AVDD	-0.3	15	V	AGND=0V
	VCOM	0	6	V	
Logic Signal Input level	VI	-0.3	VCC+0.3	V	
Temperature Range	Operation	-20	70	℃	
	Storage	-30	80	℃	

(1). All of the voltages listed above are with respective to GND =0V

(2). Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above.

3.2 Back-Light Unit

Item	Symbol	Typ.	Max.	Unit	Note
Power Voltage	IL	180	-	mA	(1)(2)(3)
	VL	10.5	-	V	(1)(2)(3)

Note

(1) Permanent damage may occur to the LCD module if beyond this specification. Functional operation should be restricted to the conditions described under normal operating conditions.

(2) Ta =25±2℃

(3) Test Condition: LED current 180 mA. The LED lifetime could be decreased if operating IL is larger than 180mA.

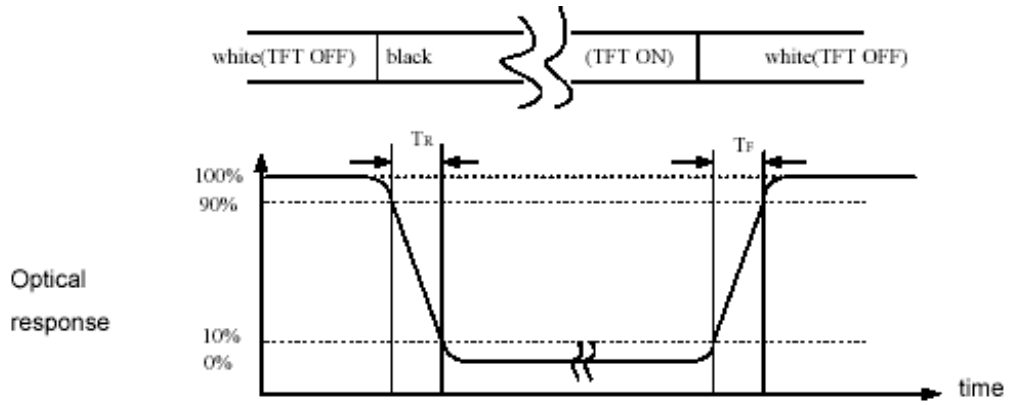
4. OPTICAL CHARACTERISTICS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Response Time		$T_r + T_f$	Θ=Φ=0°	-	8	16	ms	(1)
Contrast ratio		CR		480	600	-	-	(2)(3)
Viewing Angle	Horizontal	ΘL	CR≧10	65	75	-	Deg.	(5)
		ΘR		65	75	-		
	Vertical	ΘU		50	60	-		
		ΘD		60	70	-		
Luminance (Center)		L	Θ=Φ=0°	200	250	-	cd/m^2	(3)(4) IL=180mA
Luminance Uniformity		ΔL		-	70	-	%	(3)(4)
Color chromaticity	White	Wx		0.26	0.31	0.367		
		Wy		0.28	0.33	0.38		

NOTE :

- These items are measured by BM-5A(TOPCON) or CA-1000(MINOLTA) in the dark room (no ambient light)

(1) Definition of Response Time (White-Black)



(2) Definition of Contrast Ratio

Measure contrast ratio on the below 5 points(refer to figurel,#1~#5point) and take the average value

Contrast ratio is calculated with the following formula :

Contrast Ratio(CR)=(White)Luminance of ON ÷ (Black)Luminance of OFF

(3) Definition of Luminance :

Measure white luminance on the same 5 points and take the average value

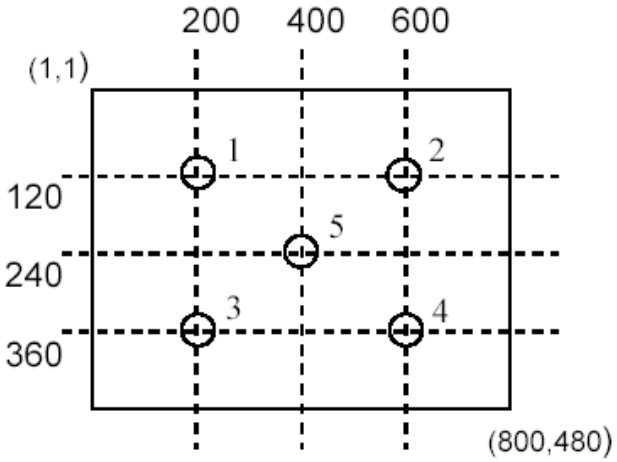


Fig.1 Measuring point

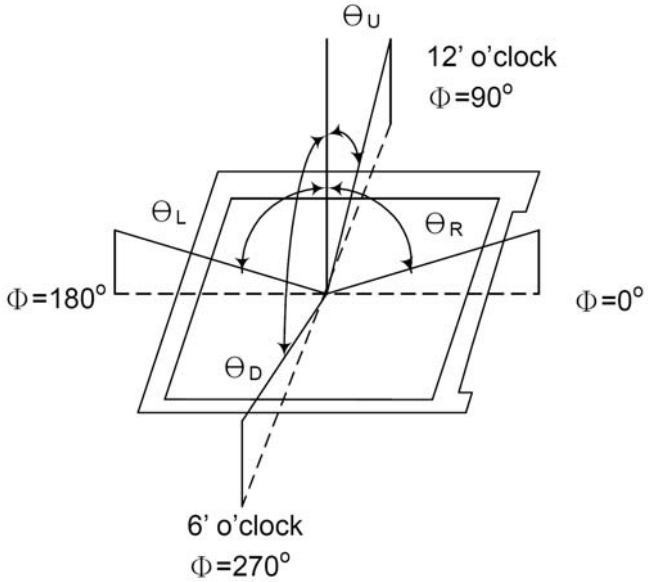
(4)Definition of Luminance Uniformity :

Measured Maximum luminance[L(MAX)] and Minimum luminance[L(MIN)] on the 5 points

Luminance Uniformity is calculated with the following formula :

ΔL =[L(MIN) / L (MAX)] X 100%

(5)Definition of Viewing Angle



5. ELECTRICAL CHARACTERISTICS

5.1 TFT LCD Module voltage

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Power voltage	VCC	3.0	3.3	3.6	V	
	VGH	14	15	16	V	
	VGL	-8.0	-7.0	-6.0	V	
	AVDD	9.85	10	10.15	V	
VCOM	VCOM	3.96	4.16	4.36	V	
Logic Input Voltage	VIH	VCC*0.7	--	VCC	V	Note(1)
	VIL	0	--	VCC*0.3	V	
Current of power supply	I_{CC}	-	7.4	-	mA	VCC=3.3V Black Pattern
	I_{ADD}	-	32.8	-	mA	AVDD=10V Black Pattern
	I_{GH}	-	0.281	-	mA	VGH=15V Black Pattern
	I_{GL}	-	0.569	-	mA	VGL=-7V Black Pattern
Input level of V1-V5	VX	AVDD/2	-	AVDD-0.1		
Input level of V6-V10	VX	0.1	-	AVDD/2		

Note

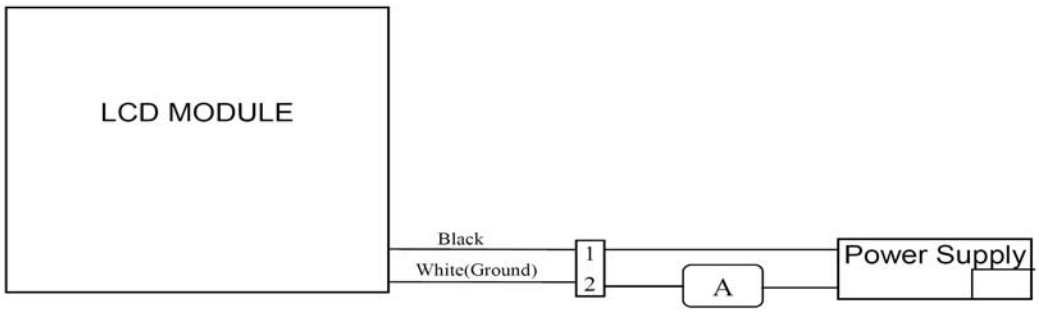
(1): HSYNC, VSYNC, DE, Digital Data.

(2): Be sure to apply the power voltage as the power sequence spec.

(3): DGND=AGND=0V.

5.2 Backlight Driving Circuit

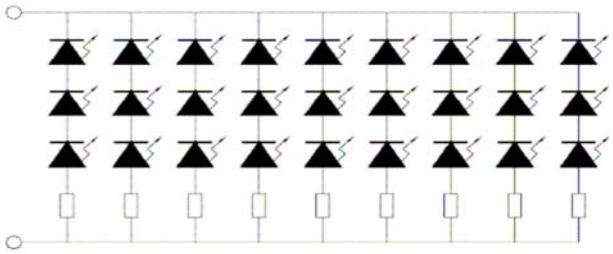
ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
LED Voltage	VL		10.5		V	(2)
LED Current	IL	--	180	--	mA	
LED life time	-	20000	--	-	Hr	(1)(2)



Note

(1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25±3℃,typical IL value indicated in the above table until the brightness becomes less than 50%.

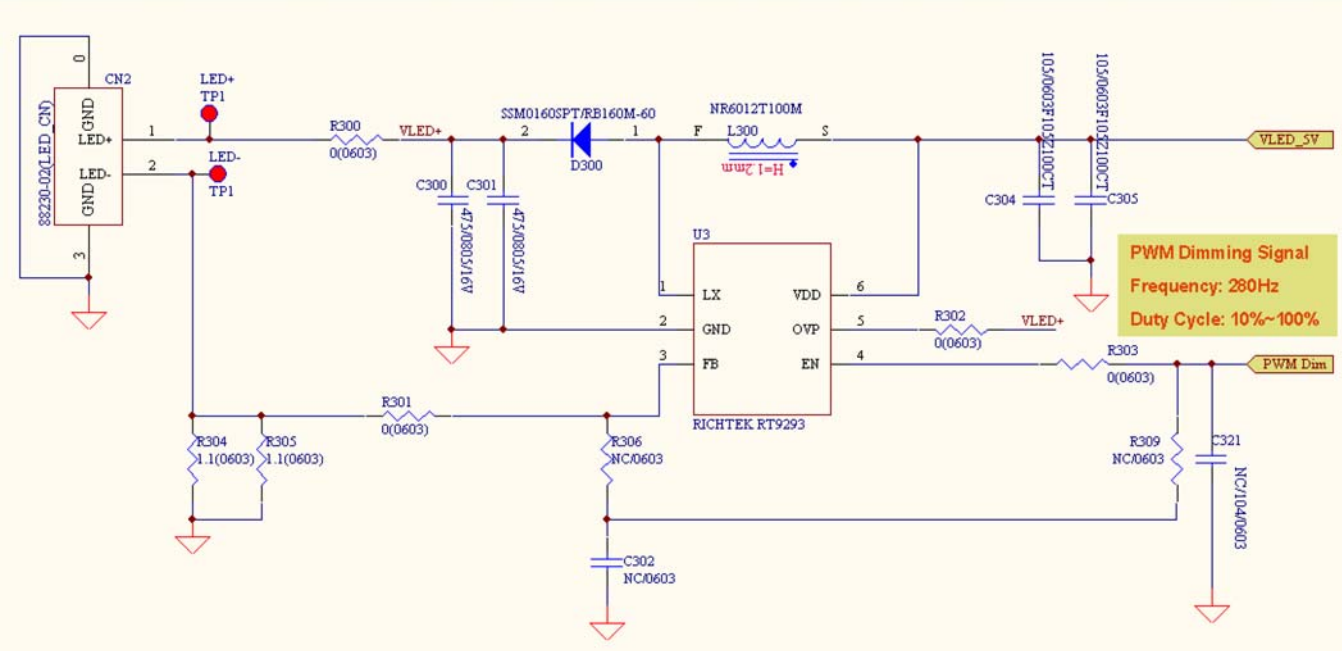
(2) The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and IL=180mA. The LED lifetime could be decreased if operating IL is larger than 180mA. The constant current driving method is suggested.



LED Light Bar Circuit

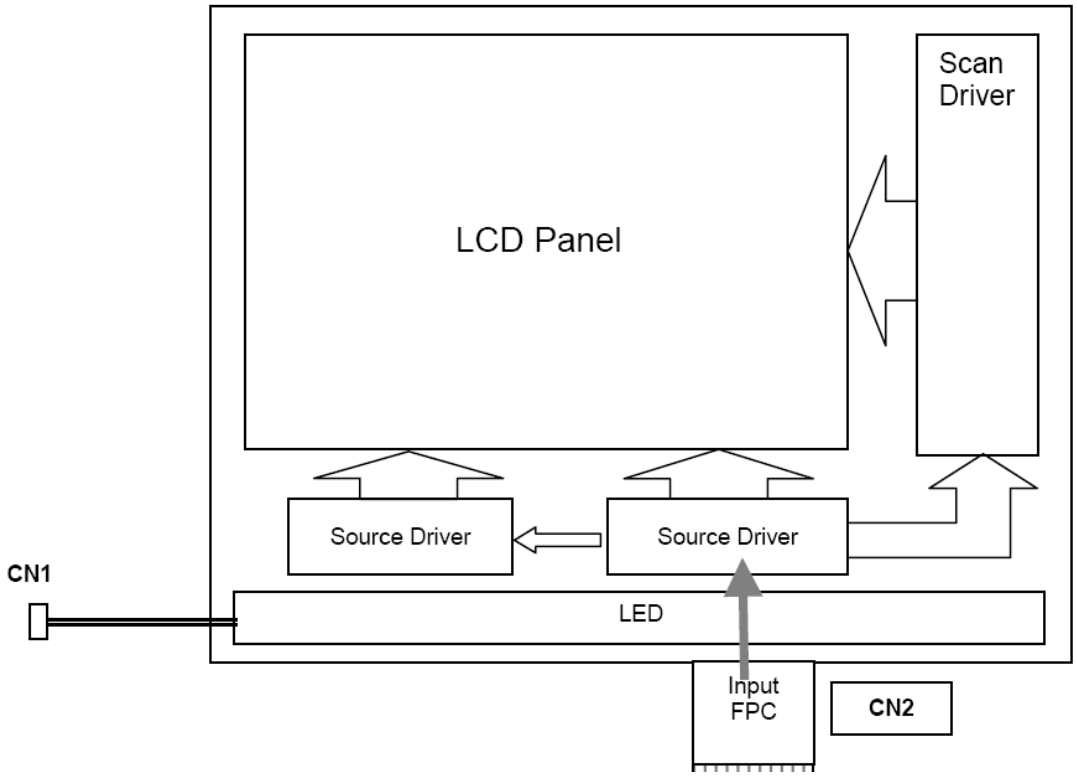
(3) Suggested Schematic of LED Back-Light Driver

((FB = 0.3V) /R)=I
R =R304 // R305

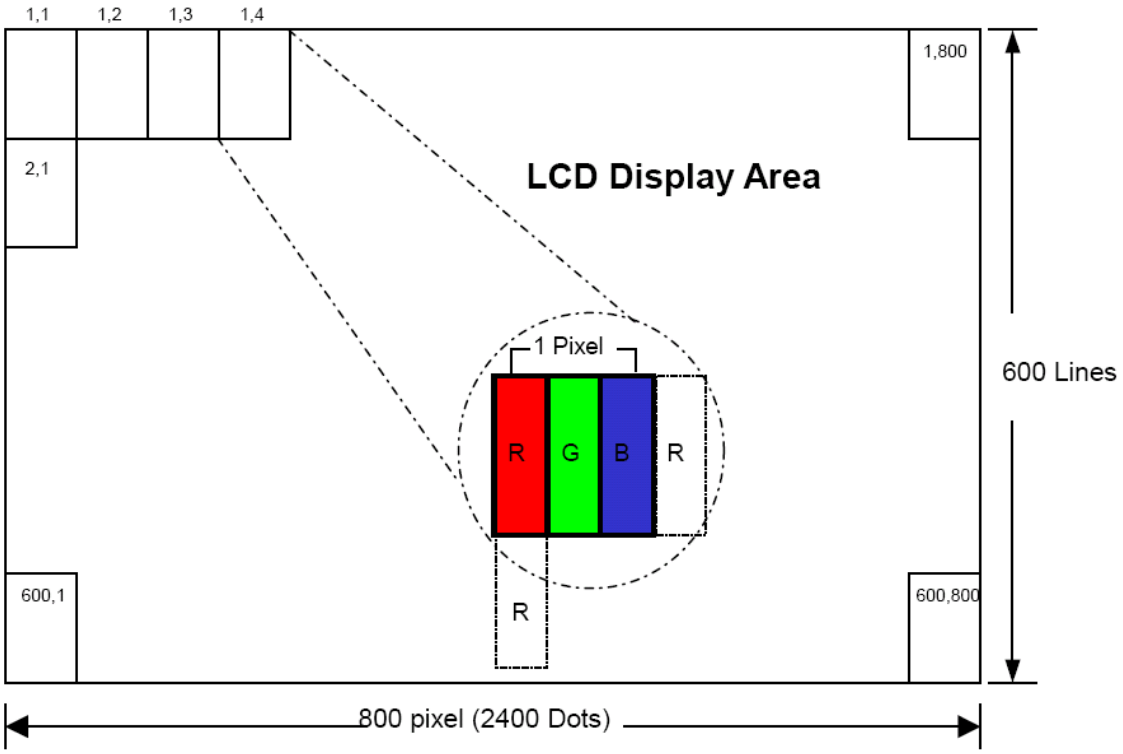


6. Block diagram and Interface

6.1 TFT LCD Module



6.2 Pixel format



6.3 Interface

CN:2

Pin No	Symbol	I/O	Function
1	AGND	P	Analog Ground
2	AVDD	P	Analog Power
3	VCC	P	Digital Ground
4	R0	I	Data Input(LSB)
5	R1	I	Data Input
6	R2	I	Data Input
7	R3	I	Data Input
8	R4	I	Data Input
9	R5	I	Data Input
10	R6	I	Data Input
11	R7	I	Data Input(MSB)
12	G0	I	Data Input(LSB)
13	G1	I	Data Input
14	G2	I	Data Input
15	G3	I	Data Input
16	G4	I	Data Input
17	G5	I	Data Input
18	G6	I	Data Input
19	G7	I	Data Input(MSB)
20	B0	I	Data Input(LSB)
21	B1	I	Data Input
22	B2	I	Data Input
23	B3	I	Data Input
24	B4	I	Data Input
25	B5	I	Data Input
26	B6	I	Data Input
27	B7	I	Data Input(MSB)
28	DCLK	I	Clock Input
29	DE	I	Data Enable signal
30	HSD	I	Horizontal sync input. Negative polarity
31	VSD	I	Vertical sync input. Negative polarity
32	MODE3	I	DE/SYNC mode select .normally pull high H:DE mode .L:HSD/VSD mode
33	RSTB	I	Global reset pin. Active low to enter reset state. suggest to connecting with an RC reset circuit for stability .normally pull high.
34	STBYB	I	Standby mode, normally pull high STBYB="1",normal operation STBYB="0",timming control , source driver will turn off, all Input are high-Z
35	SHLR	I	Source right or left sequence control .SHLR="L", shift left: last data=S1<-S2…S1200=first data ; SHLR="H", shift right :first data=S1->S2…S1200=last data

36	VCC	P	Digital Ground
37	UPDN	I	gate up or down scan control. UPDN="L" , DOWN shift : G1->G2…->G600 ; UPDN="H", up shift: G1<-G2…<-G600
38	GND	P	Digital Ground
39	AGND	P	Analog Ground
40	AVDD	P	Analog Power
41	VCOM	P	For external VCOM DC input(Optional)
42	DITH	I	Dithering setting DITH="H" 6bit resolution (last 2 bits of input data truncated) (default setting) DITH="L" 8bit resolution
43	NC	-	Not connect
44	NC	-	Not connect
45	V10	P	Gamma correction voltage reference
46	V9	P	Gamma correction voltage reference
47	V8	P	Gamma correction voltage reference
48	V7	P	Gamma correction voltage reference
49	V6	P	Gamma correction voltage reference
50	V5	P	Gamma correction voltage reference
51	V4	P	Gamma correction voltage reference
52	V3	P	Gamma correction voltage reference
53	V2	P	Gamma correction voltage reference
54	V1	P	Gamma correction voltage reference
55	NC	-	Not connect
56	VGH	P	Positive Power for TFT
57	VCC	P	Digital Power
58	VGL	P	Negative Power for TFT
59	GND	P	Digital Ground
60	NC	-	Not connect

CN1: LED Power Source (BHSR-02VS-1) or equivalent

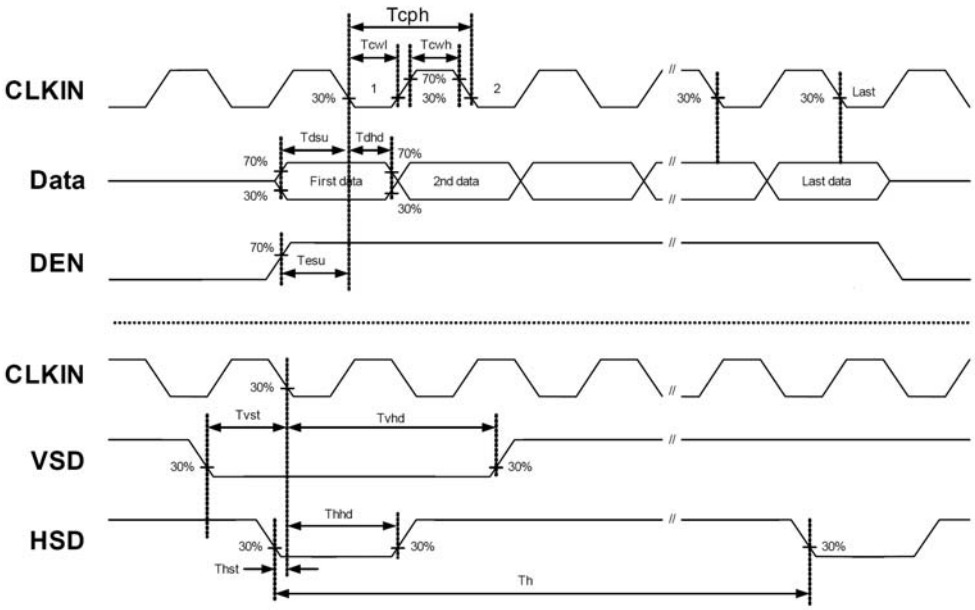
Mating Connector: (SBHT-002T-P0.5) or equivalent

Terminal no.	Symbol	Function
1	VL	LED power supply (high voltage)
2	GL	LED power supply (Low voltage)

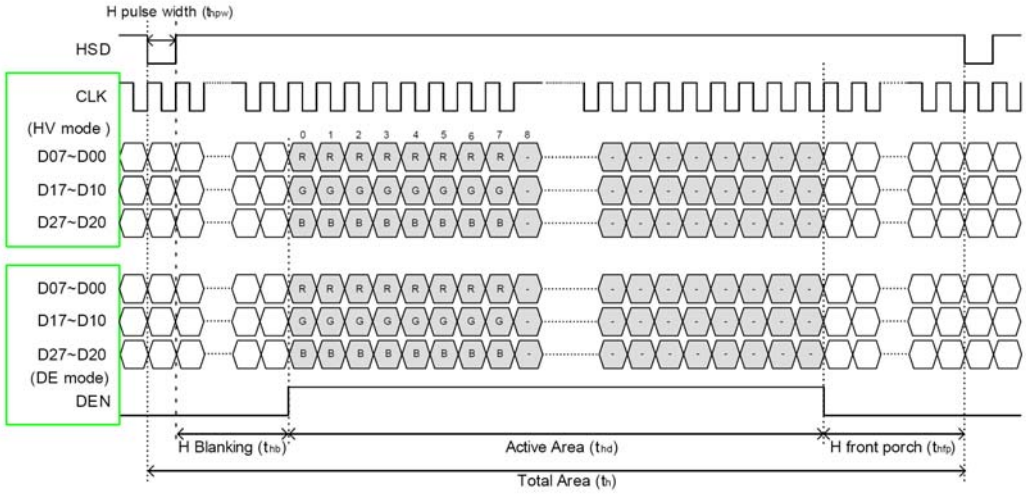
7. AC Timing characteristic

7-1 Timing Specification.

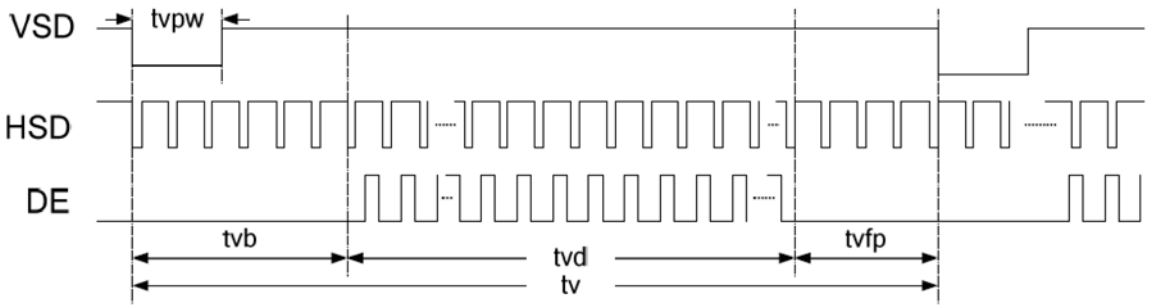
Item	Symbol	Min.	Typ.	Max.	Unit	Note
DCLK cycle time	Tcph	20			ns	
DCLK frequency	fclk		40	50	MHz	
DCLK pulse duty	Tcwh	40	50	60	%	
VSD setup time	Tvst	8			ns	
VSD hold time	Tvhd	8			ns	
HSD setup time	Thst	8			ns	
HSD hold time	Thhd	8			ns	
Data setup time	Tdsu	8			ns	
Data hold time	Tdhd	8			ns	
DE setup time	Tesu	8			ns	
DE hold time	Tehd	8			ns	
Horizontal display area	thd		800		Tcph	
HSD period time	th		1000		Tcph	
HSD pulse width	thpw	1	48		Tcph	
HSD back porch	thb		40		Tcph	
HSD front porch	thfp		112		Tcph	
Vertical display area	tvd		600		th	
VSD period time	tv		660		th	
VSD pulse width	tvpw		3		th	
VSD back porch	tvb		39		th	
VSD front porch	tvfp		18		th	

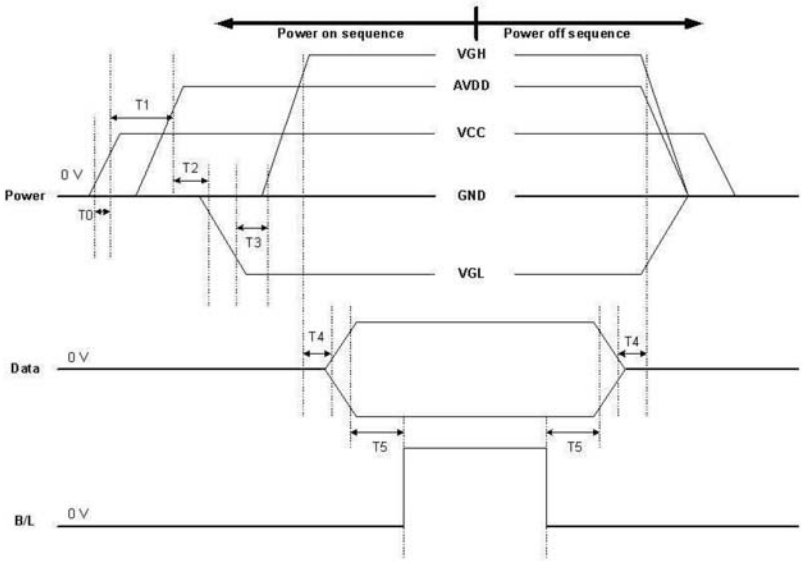


Sampling clock timing

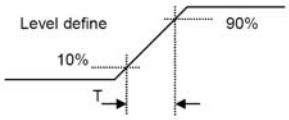


Horizontal display timing range





Item	Min.	Typ.	Max.	Unit
T0	0.5	--	20	msec
T1	16			msec
T2	0			msec
T3	20			µsec
T4	10		50	msec
T5	50			msec

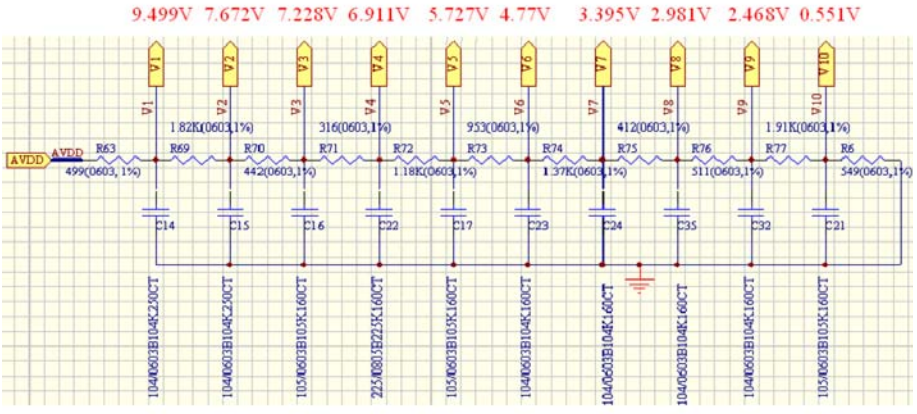


Power On Sequence: VCC-> AVDD -> VGL -> VGH -> Data -> B/L

Power Off Sequence: B/L-> Data -> VGH -> VGL -> AVDD -> VCC

Notes: Data include R0~R7, G0~G7 , B0~B7 , HSD , VSD, DCLK , SHLR , UPDN , DE MODE , RSTB , STBYB , SHLR ,UPDN , DITH

7.2 Gamma Circuit



*Suggested Gamma Circuit.

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

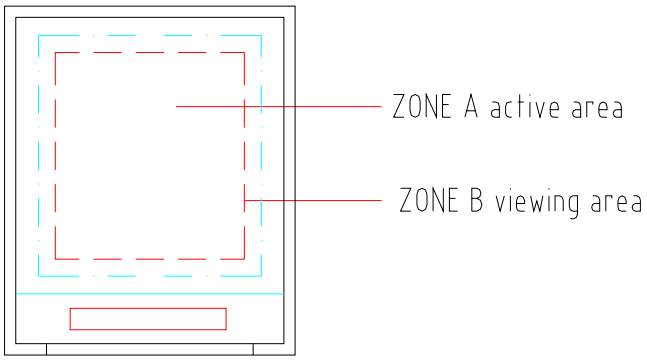
Sampling method shall be in accordance with MIL-STD-105E , level II, normal single sampling plan .

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 florescent light. The inspection area of LCD panel shall be within the range of following limits.



8.5 INCOMING INSPECTION STANDARD FOR TFT-LCD PANEL

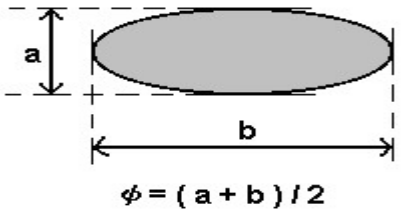
DEFECT TYPE			LIMIT		Note
VISUAL DEFECT	INTERNAL	SPOT	φ < 0.15mm	Ignore	Note1
			0.15mm ≦ φ ≦ 0.5mm	N≦4	
			0.5mm < φ	N=0	
		FIBER	0.03mm<W≦0.1mm, L≦ 5mm	N≦3	Note1
			1.0mm < W, 1.5mm < L	N=0	
		POLARIZER BUBBLE	φ < 0.15mm	Ignore	Note1
			0.15mm ≦ φ ≦ 0.5mm	N≦2	
			0.5mm < φ	N=0	
		Mura	It' OK if mura is slight visible through 6%ND filter		

ELECTRICAL DEFECT		A Grade			B Grade			
	BRIGHT DOT	C Area	O Area	Total	C Area	O Area	Total	Note3
		N≦0	N≦2	N≦2	N≦2	N≦3	N≦5	Note2
	DARK DOT	N≦2	N≦3	N≦3	N≦3	N≦5	N≦8	
	TOTAL DOT	N≦4			N≦5	N≦6	N≦8	Note2
	TWO ADJACENT DOT	N≦0	N≦1 pair	N≦1 pair	N≦1 pair	N≦1 pair	N≦1 pair	Note4
	THREE OR MORE ADJACENT DOT	NOT ALLOWED						
	LINE DEFECT	NOT ALLOWED						

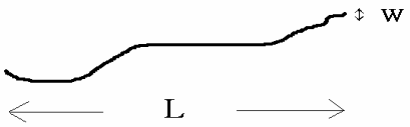
(1) One pixel consists of 3 sub-pixels, including R,G, and B dot.(Sub-pixel = Dot)

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

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

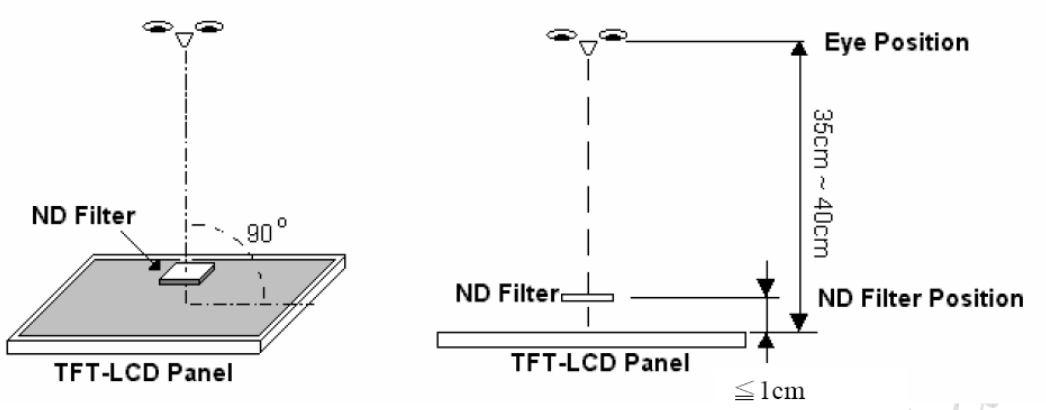


1. (White, black) Spot
2. Polarizer Bubble

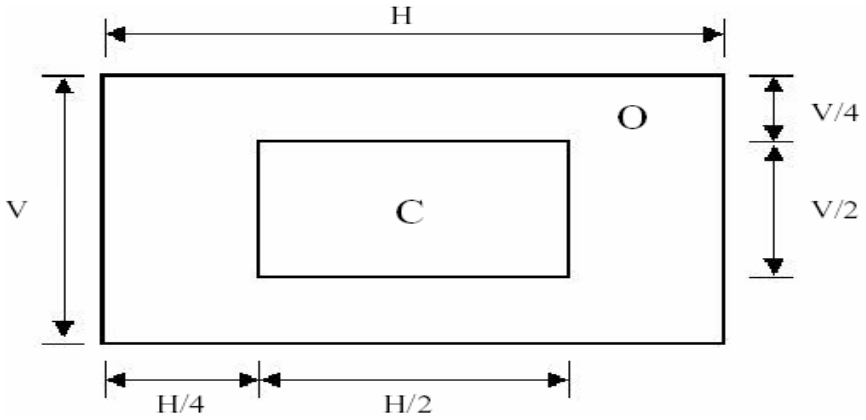


1. fiber

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



[Note3]

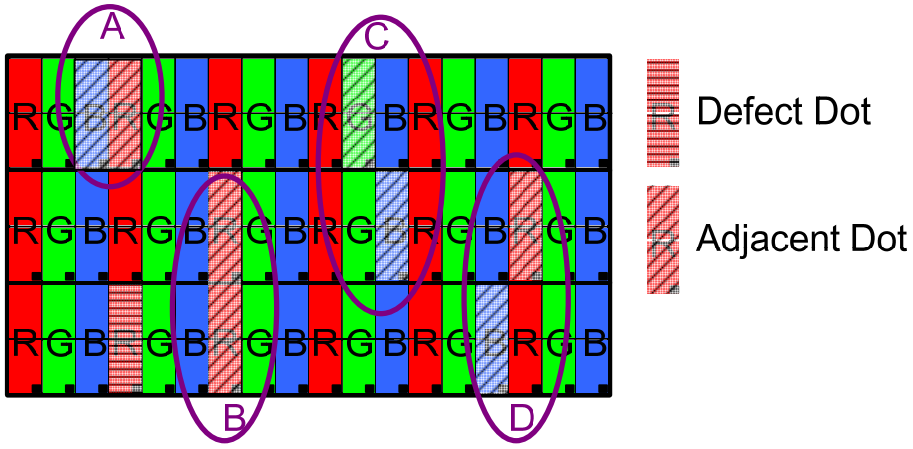


C Area: Center of display area

C 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 dart 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.

8.6 Reliability Test

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	60 °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.

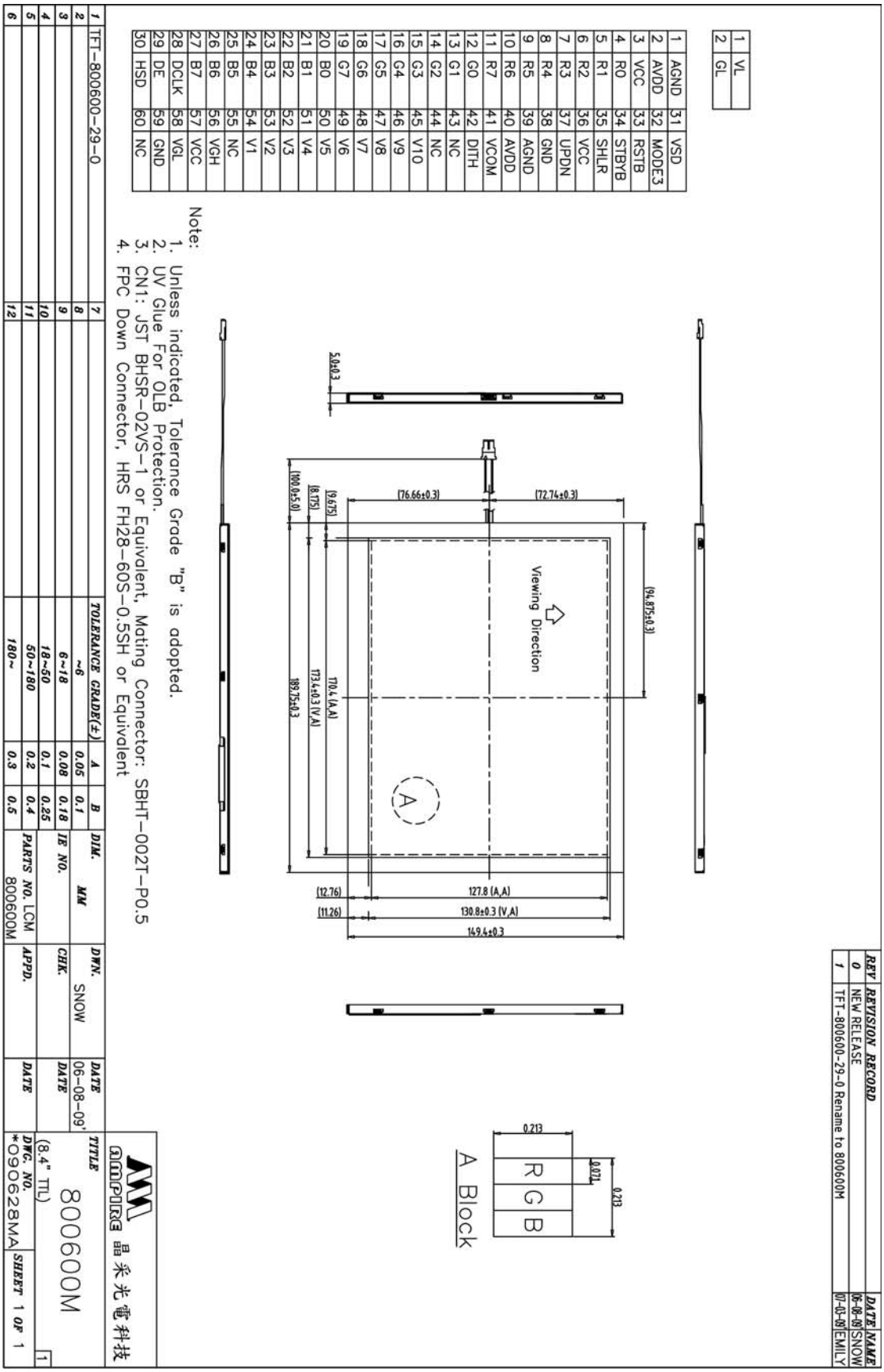
9.4 Operating precautions

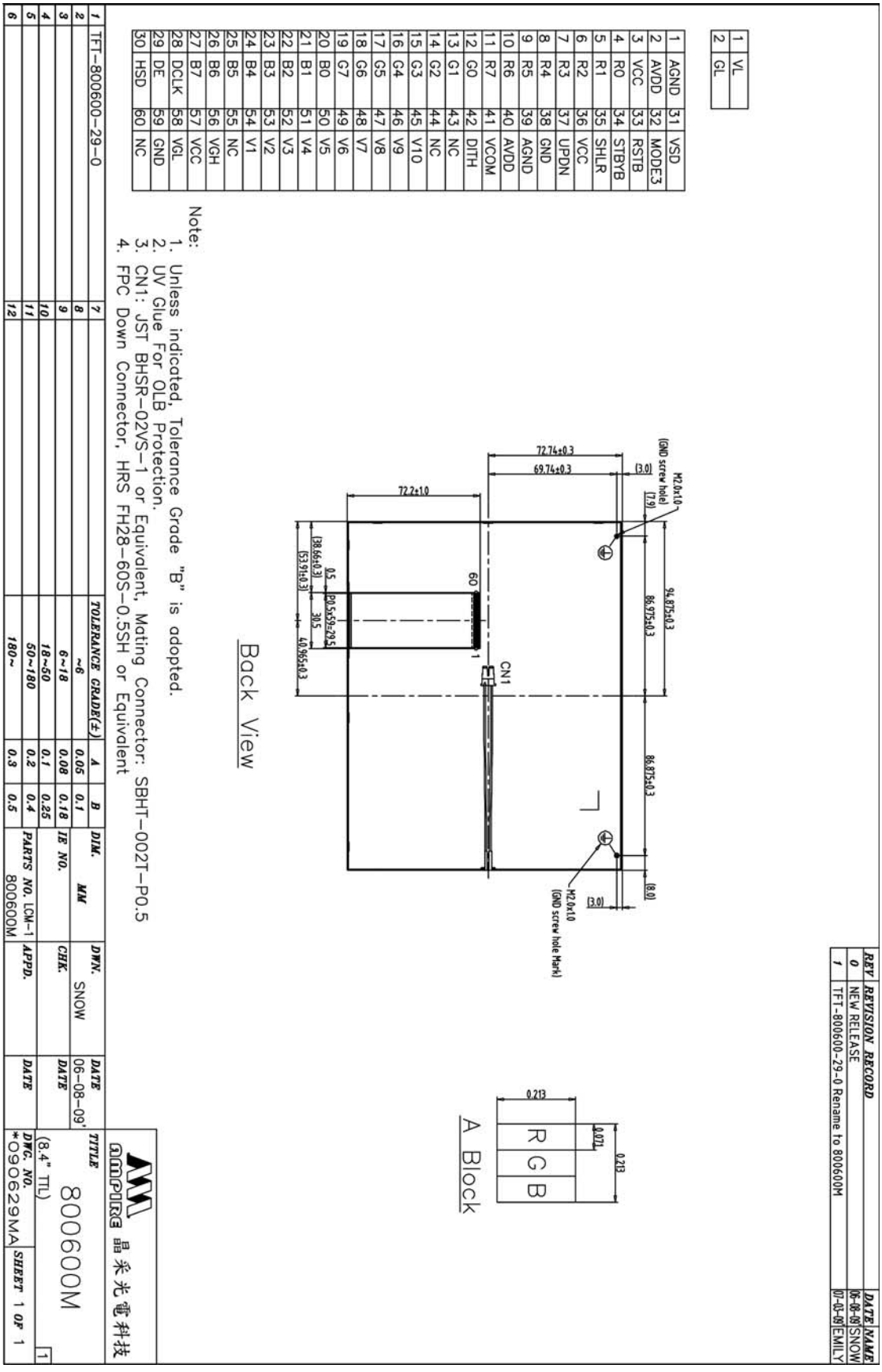
1) Do not boost the applied drive voltage abnormally. Failure to do so may break ICs. When applying power voltage, check the electrical features beforehand and be careful. Always turn off the power to the LC module controller before removing or inserting the LC module input connector. If the input connector 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.
3) AMIPRE will provide one year warranty for all products and three months warrantee for all repairing products.

10. OUTLINE DIMENSION




REV REVISION RECORD DATE NAME
0 NEW RELEASE 06-08-09 SNOW
1 TFT-800600-29-0 Rename to 800600M 07-05-09 EMILY
1 VL
2 GL
1 AGND 31 VSD
2 AVDD 32 MODE3
3 VCC 33 RSTB
4 R0 34 STBYB
5 R1 35 SHLR
6 R2 36 VCC
7 R3 37 UPDN
8 R4 38 GND
9 R5 39 AGND
10 R6 40 AVDD
11 R7 41 VCOM
12 G0 42 DITH
13 G1 43 NC
14 G2 44 NC
15 G3 45 V10
16 G4 46 V9
17 G5 47 V8
18 G6 48 V7
19 G7 49 V6
20 B0 50 V5
21 B1 51 V4
22 B2 52 V3
23 B3 53 V2
24 B4 54 V1
25 B5 55 NC
26 B6 56 VGH
27 B7 57 VCC
28 DCLK 58 VGL
29 DE 59 GND
30 HSD 60 NC
Note:
1. Unless indicated, Tolerance Grade "B" is adopted.
2. UV Glue For OLB Protection.
3. CN1: JST BHSR-02VS-1 or Equivalent, Mating Connector: SBHT-002T-P0.5
4. FPC Down Connector, HRS FH28-60S-0.5SH or Equivalent
Back View
72.74±0.3
69.74±0.3
72.2±1.0
M2.0x1.0
(GND screw hole)
[7.9]
[3.0]
94.875±0.3
86.975±0.3
86.875±0.3
[8.0]
[3.0]
M2.0x1.0
(GND screw hole Mark)
[38.66±0.3]
[53.91±0.3]
0.5
20.5±0.2
30.5
40.965±0.3
60
1
CN1
A Block
0.213
0.071
0.213
R G B
TFT-800600-29-0
TOLERANCE GRADE(±)
~6 6~18 18~50 50~180 180~
A 0.05 0.08 0.1 0.2 0.3
B 0.1 0.18 0.25 0.4 0.5
DIM. MM
TE NO.
PARTS NO. LCM-1 800600M
DWN. SNOW DATE 06-08-09
CHK. DATE
APPD. DATE
AMPIRE 晶采光電科技
TITLE 800600M (8.4" TTL)
DWG. NO. *090629MA
SHEET 1 OF 1