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-800600MTMQW-A2H
APPROVED BY	
DATE	

☐ **Approved For Specifications**

☐ Approved For Specifications & Sample

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APPROVED BY	CHECKED BY	ORGANIZED BY

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2012/03/26	- -		Kain

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, a driving circuit . 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 : 262K colors (R,G,B 6 bit digital each)

(4) LVDS Interface.

(5) LCD Power Supply Voltage : 3.3V single power input, built-in power supply circuit.

(6) Build-in LED Driver IC (VLED=3.3V~5V).

(7) LVDS Receiver: THC63LVDF64A-G(Thine) or SN65LVDS86AQDGGR(TI).

(8) Inductor LB1 is modified to 47uH/1.9V.

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)x9.50(D)	mm
Weight	272	g
Backlight unit	LED	
Display color	262K	colors

3. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Supply voltage range	VCC	-0.5	4	V	(1)
Voltage range at any terminal	VI	-0.5	VCC + 0.5	V	
Operating Temperature	Top	-20	70	℃	
Storage Temperature	Tstg	-30	80	℃	

(1)All voltage values are with respect to the GND terminals unless otherwise noted.

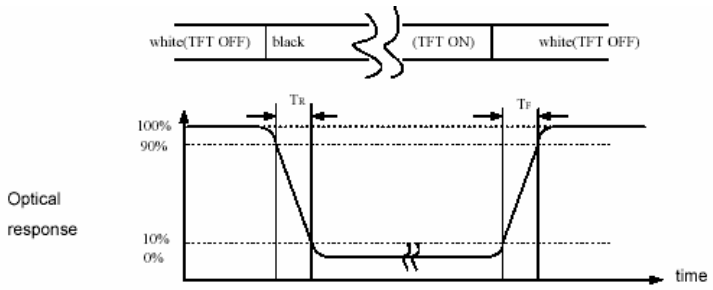
4. OPTICAL CHARACTERISTICS

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

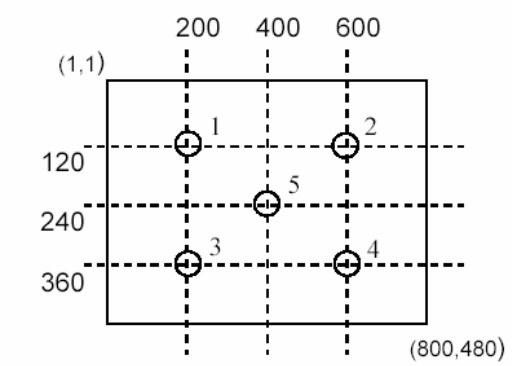


Fig.1 Measuring point

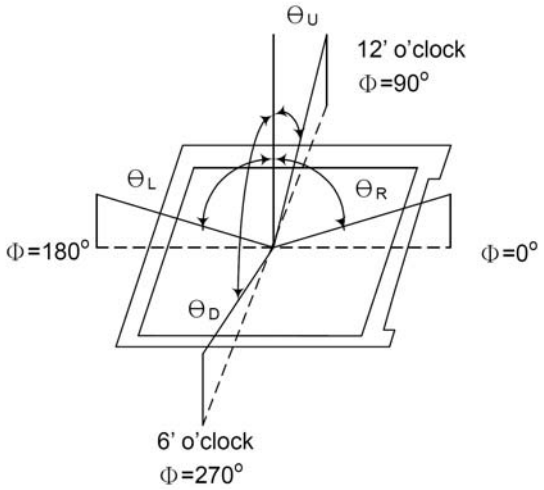
(4)Definition of Luminance Uniformity :

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

Recommended Operating Conditions

See Figure 2

		MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage	3	3.3	3.6	V
V_{IH}	High-level input voltage ($\overline{SHTDN}$)	2			V
V_{IL}	Low-level input voltage ($\overline{SHTDN}$)			0.8	V
$\lvert V_{ID}\rvert$	Magnitude differential input voltage	0.1		0.6	V
V_{IC}	Common-mode input voltage	$\frac{\lvert V_{ID}\rvert}{2}$		$2.4 - \frac{\lvert V_{ID}\rvert}{2}$	V
T_A	Operating free-air temperature	–40		125	°C

Timing Requirements

		MIN	NOM	MAX	UNIT
t_c (1)	Cycle time, input clock	14.7	t_c	32.4	ns

(1) Parameter t_c is defined as the mean duration of a minimum of 32000 clock cycles.

PARAMETER MEASUREMENT INFORMATION

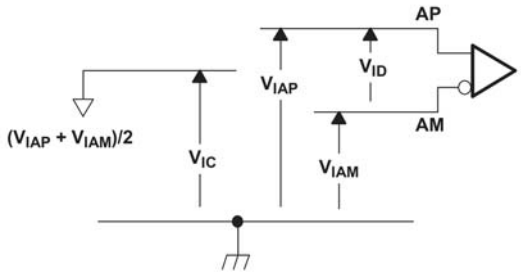
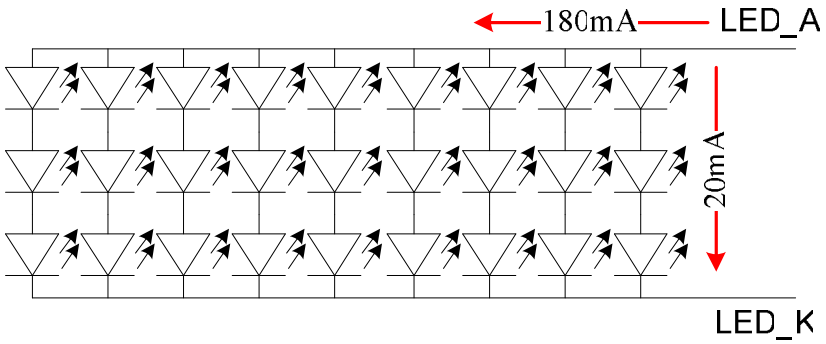


Figure 2. Voltage Definitions

6. Backlight Driving Circuit

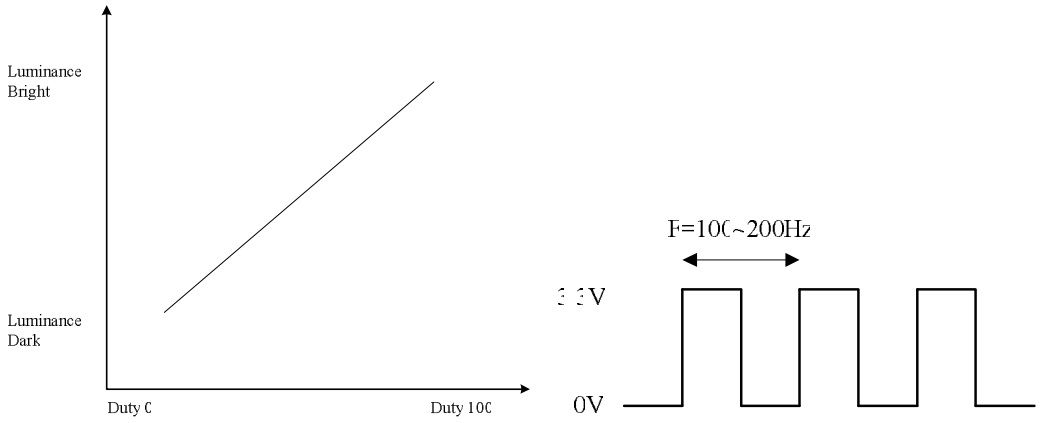
ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
LED Voltage	V_{LED}	3.3	--	5V	V	Note1
LED Current	$I_{LED(dice)}$	--	180	--	mA	
LED life time		20000	--	-	Hr	Note2
LED DRIVER Power Current	I_{LED}(VLED=5V)	-	500	--	mA	

Note 1 : There are 6 Groups LED shown as below



Note 2 : Brightness to be decreased to 50% of the initial value.

6.1 PWM Dimming Control



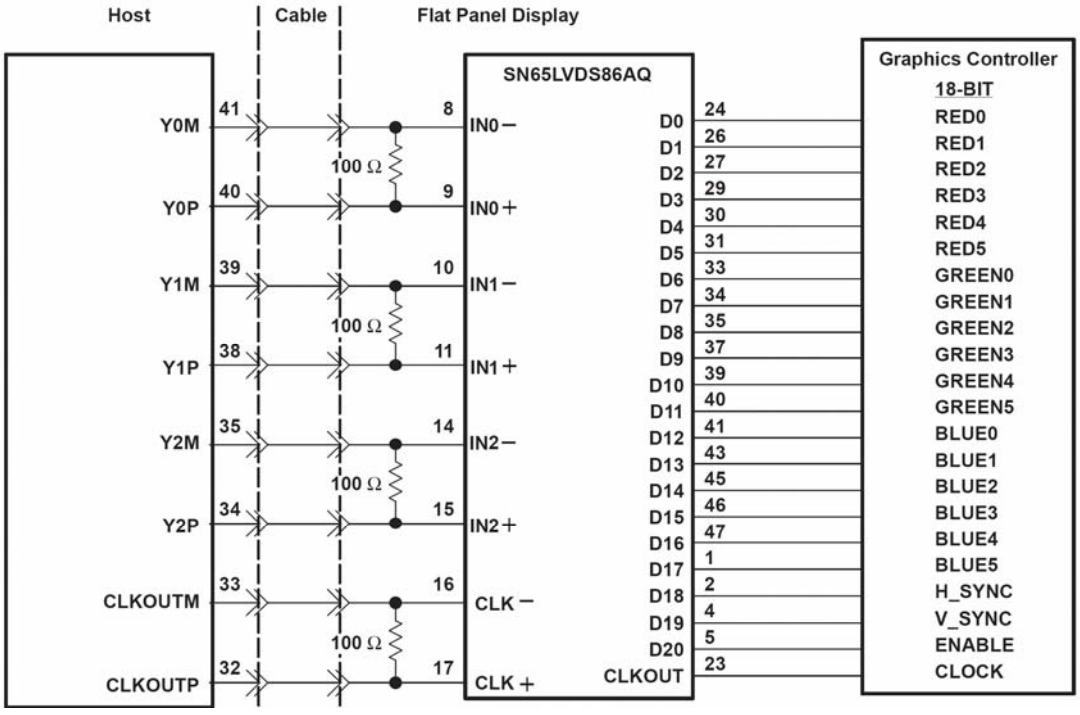
6.2Power Consumption:

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Consumption of LCD	PLCD	-	0.58	-	W	VCC=3.3V
Consumption of LED	PLED	-	3.1	-	W	VLED=3.3V
		-	2.9	-	W	VLED=5V

7. INTERFACE

LVDS CN: JAE FI-S20P-HFE

Pin no	Symbol	Function
1	ADJ	Adjust for LED Brightness by PWM.
2	Gnd	Power Ground
3	LED_EN	Backlight ON/OFF control; High level: ON, Low Level: OFF.
4	VLED	POWER SUPPLY for LED Driver IC : 3.3V-5V
5	Gnd	Power Ground
6	CLK+	Sampling Clock
7	CLK-	Sampling Clock
8	Gnd	Power Ground
9	IN2+	Transmission Data of Pixels 2
10	IN2-	Transmission Data of Pixels 2
11	Gnd	Power Ground
12	IN1+	Transmission Data of Pixels 1
13	IN1-	Transmission Data of Pixels 1
14	Gnd	Power Ground
15	IN0+	Transmission Data of Pixels
16	IN0-	Transmission Data of Pixels
17	Gnd	Power Ground
18	Gnd	Power Ground
19	VDD	POWER SUPPLY:3.3V
20	VDD	POWER SUPPLY:3.3V



8. AC Timing characteristic of the LVDS

Switching Characteristics

over recommended operating conditions (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP(1)	MAX	UNIT
t_{su}	Setup time, D0–D20 to CLKOUT↓	C_L = 8 pF, See Figure 5	5			ns
t_h	Data hold time, CLKOUT↓ to D0–D20		5			ns
$t_{(RSKM)}$	Receiver input skew margin(2) (see Figure 7)	t_c = 15.38 ns (±0.2%), |Input clock jitter| < 50 ps,(3)	550	700		ps
t_d	Delay time, CLKIN↑ to CLKOUT↓ (see Figure 7)	V_{CC} = 3.3 V, t_c = 15.38 ns (±0.2%), T_A = 25°C	3	5	7	ns
t_{en}	Enable time, $\overline{SHTDN}$ to phase lock	See Figure 7		1		ms
t_{dis}	Disable time, $\overline{SHTDN}$ to off state	See Figure 8		400		ns
t_t	Transition time, output (10% to 90% t_r or t_f) (data only)	C_L = 8 pF		3		ns
t_t	Transition time, output (10% to 90% t_r or t_f) (clock only)	C_L = 8 pF		1.5		ns
t_w	Pulse duration, output clock			0.50 t_c		ns

(1) All typical values are at V_{CC} = 3.3 V, T_A = 25°C.
(2) The parameter $t_{(RSKM)}$ is the timing margin available to allocate to the transmitter and interconnection skews and clock jitter. The value of this parameter at clock periods other than 15.38 ns can be calculated from t_{RSKM} = tc/14 – 550 ps.
(3) |Input clock jitter| is the magnitude of the change in input clock period.

PARAMETER MEASUREMENT INFORMATION (continued)

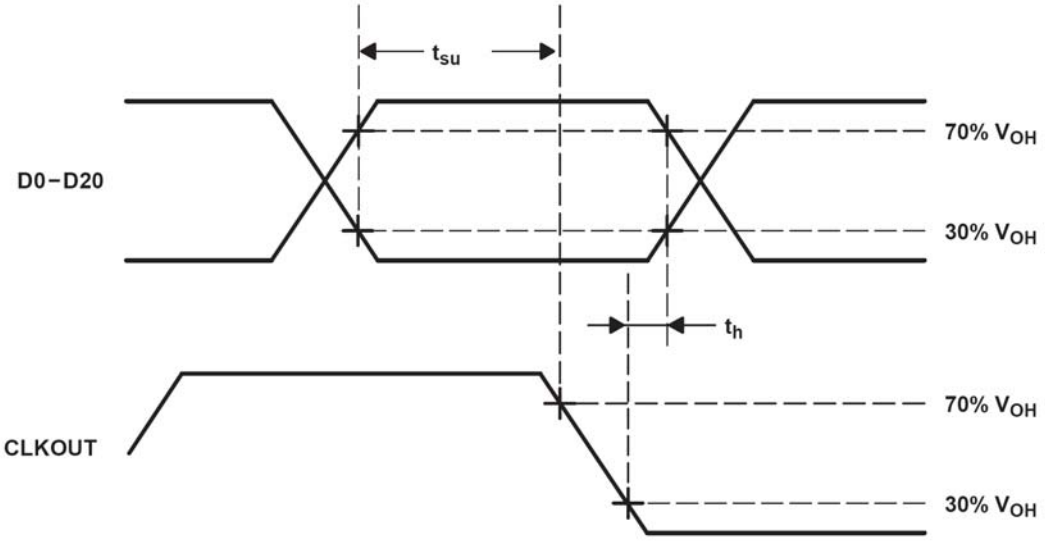


Figure 5. Setup and Hold Time Waveforms

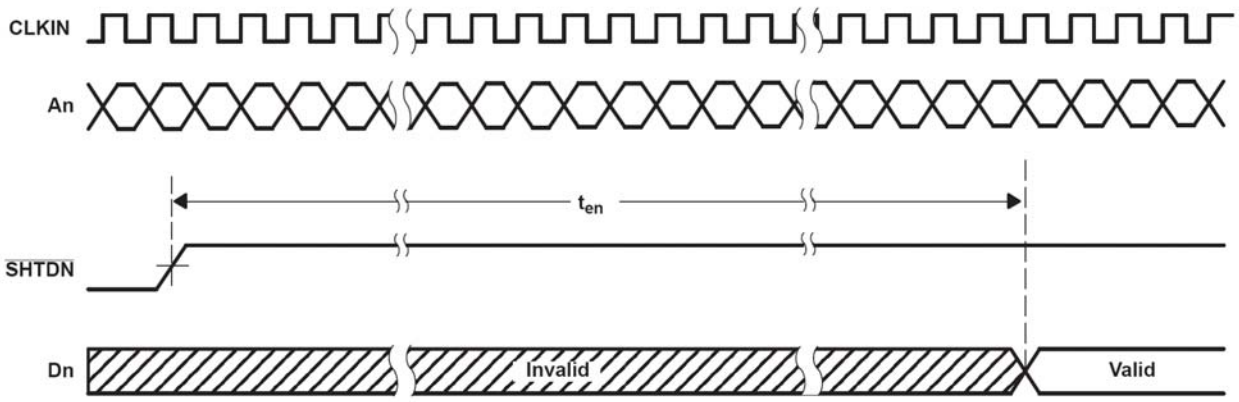


Figure 7. Enable Time Waveforms

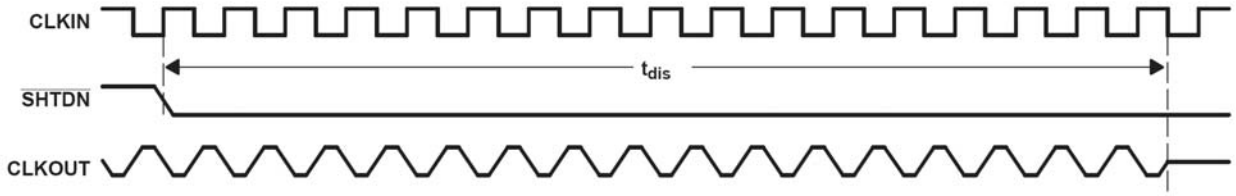
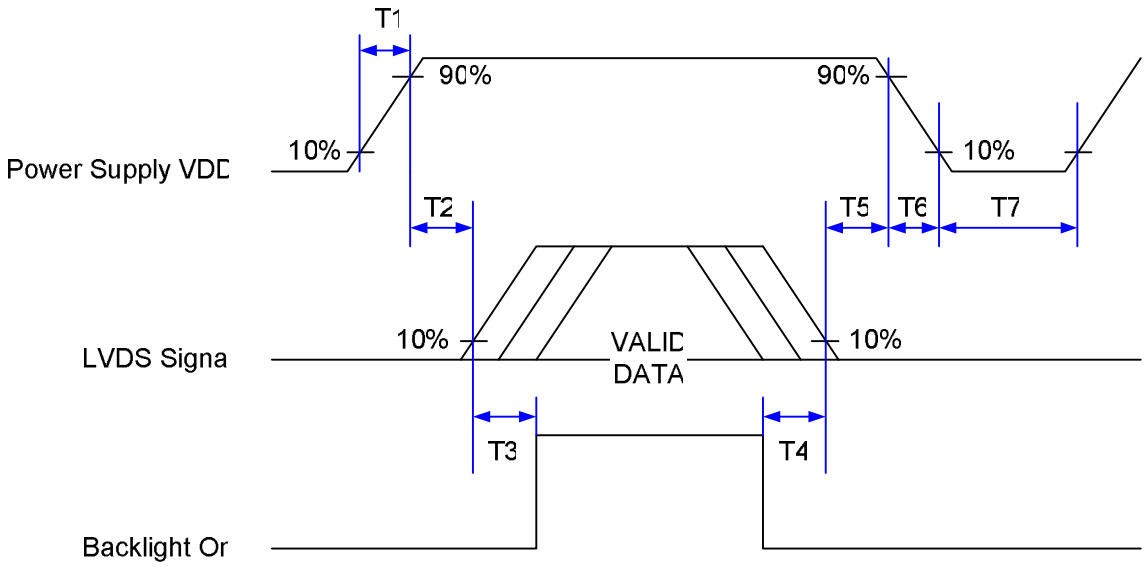


Figure 8. Disable Time Waveforms

Power ON/OFF Sequence



Power ON/OFF sequence timing

Symbol	Value			Unit
	Min.	Typ.	Max.	
T1	0.5	--	20	ms
T2	0	40	50	ms
T3	200	--	--	ms
T4	200	--	--	ms
T5	0	40	50	ms
T6	0	--	20	ms
T7	1000	--	--	ms

9 . Inspection Specifications

1. Scope

Specifications contain

1.1 Display Quality Evaluation

1.2 Mechanics Specification

2. Sampling Plan

Unless there is other agreement, the sampling plan for incoming inspection shall follow MIL-STD-105E LEVEL II.

2.1 Lot size: Quantity per shipment as one lot (different model as different lot).

2.2 Sampling type: Normal inspection, single sampling.

2.3 Sampling level: Level II.

2.4 AQL: Acceptable Quality Level

Major defect: AQL=0.65

Minor defect: AQL=1.0

3. Panel Inspection Condition

3.1 Environment:

Room Temperature: 25±5°C.

Humidity: 65±5% RH.

Illumination: 300 ~ 700 Lux.

3.2 Inspection Distance:

35-40 cm

3.3 Inspection Angle:

The vision of inspector should be perpendicular to the surface of the Module.

3.4 Inspection time :

Perceptibility Test Time: 20 seconds max.

4. Display Quality

4.1 Function Related:

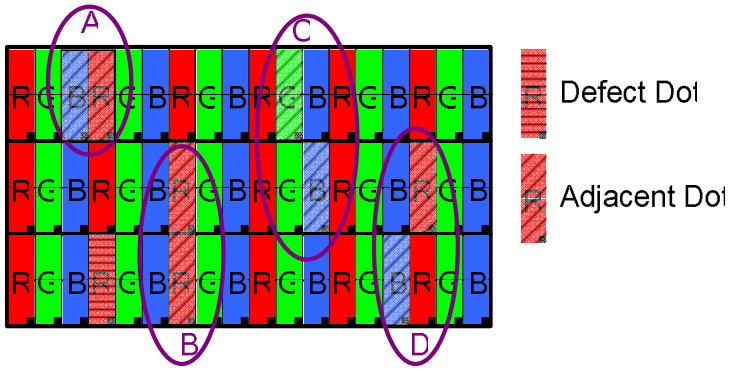
The function defects of line defect, abnormal display, and no display are considered Major defects.

4.2 Bright/Dark Dots:

Defect Type / Specification	G0 Grade	A Grade
Bright Dots	0	N≤ 3
Dark Dots	0	N≤ 4
Total Bright and Dark Dots	0	N≤ 6

[Note 1]

Judge defect dot and adjacent dot as following.



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

(2) The definition of dot: The size of a defective dot over 1/2 of whole dot is regarded as one defective dot.

(3) Allow above (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.

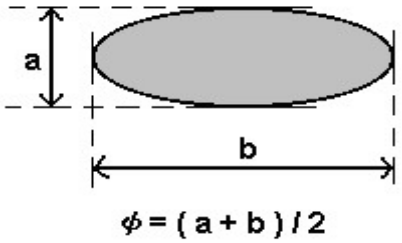
(4) Defects on the Black Matrix, out of Display area, are not considered as a defect or counted.

(5) There should be no distinct non-uniformity visible through 3% ND Filter within 2 sec inspection times.

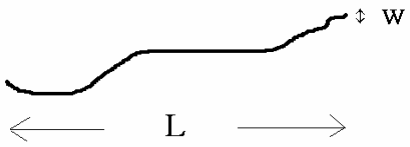
4.3 Visual Inspection specifications:

Defect Type	Specification	Count(N)
Dot Shape (Particle、Scratch and Bubbles in display area)	D≤0.25mm	Ignored
	0.25mm < D≤ 0.5mm	N≤ 3
	D > 0.5mm	N=0
Line Shape (Particles、Scratch、Lint and Bubbles in display area)	W≤ 0.07mm	Ignored
	0.07mm<W≤ 0.1mm，L≤ 5mm	N≤ 3
	W > 0.1mm， L > 5mm	N=0

[Note 2] W : Width[mm], L : Length[mm], N : Number, φ : Average Diameter

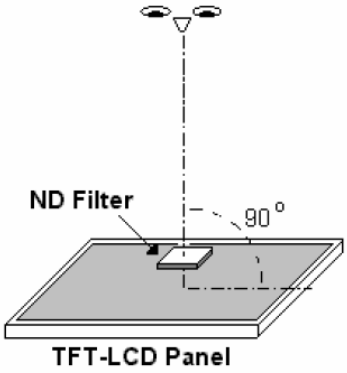


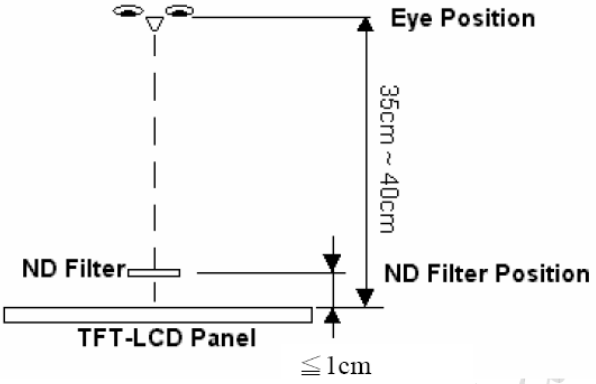
1. (White, black) Spot
2. Polarizer Bubble



1. fiber

[Note 3] Bright dot is defined through 3% transmission ND Filter as following.





4.4Reliability 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.

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.

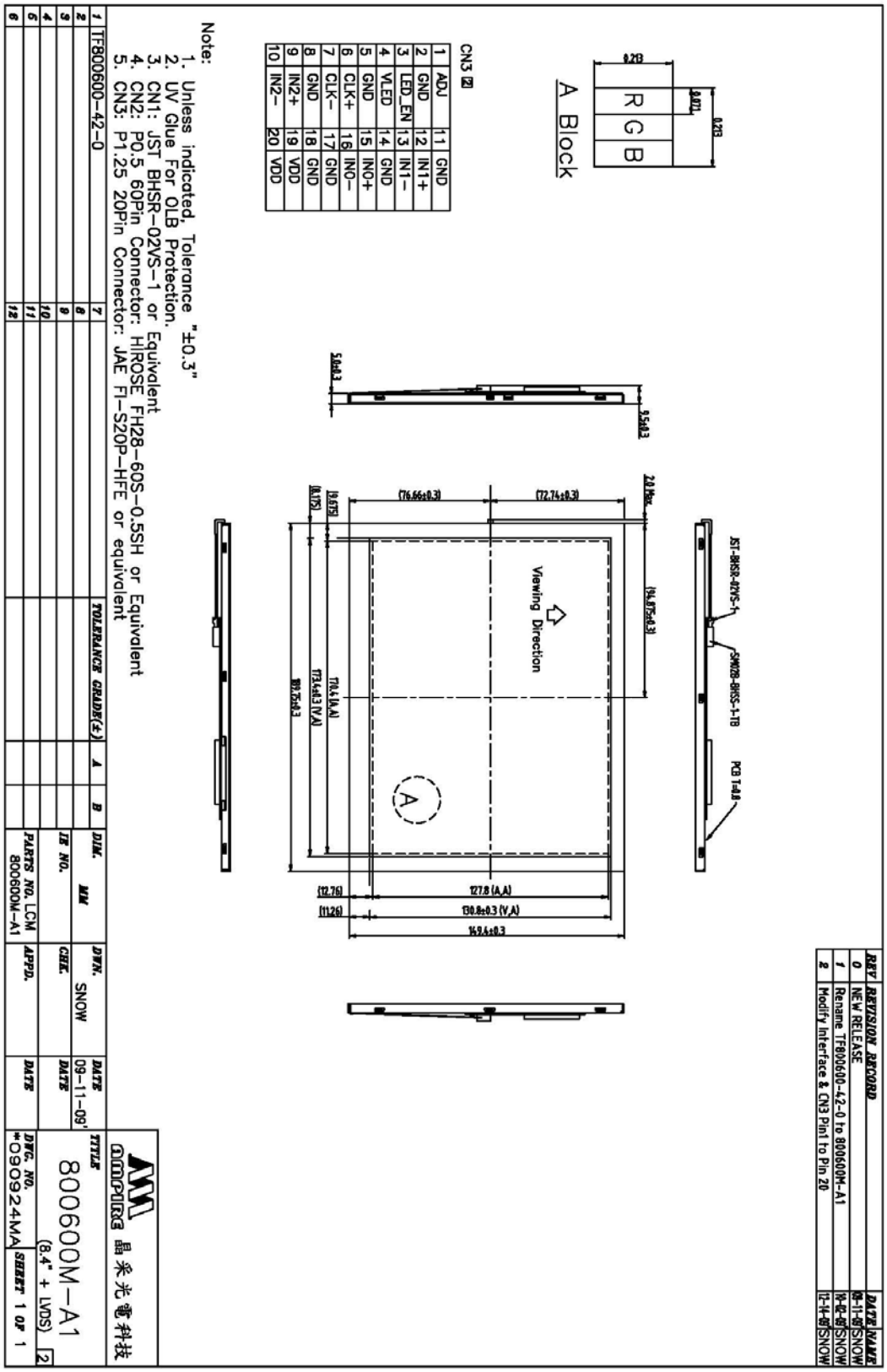
10.4 Operating precautions

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.

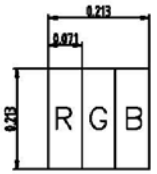
10.5 Other

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 warranty for all products and three months warrantee for all repairing products.

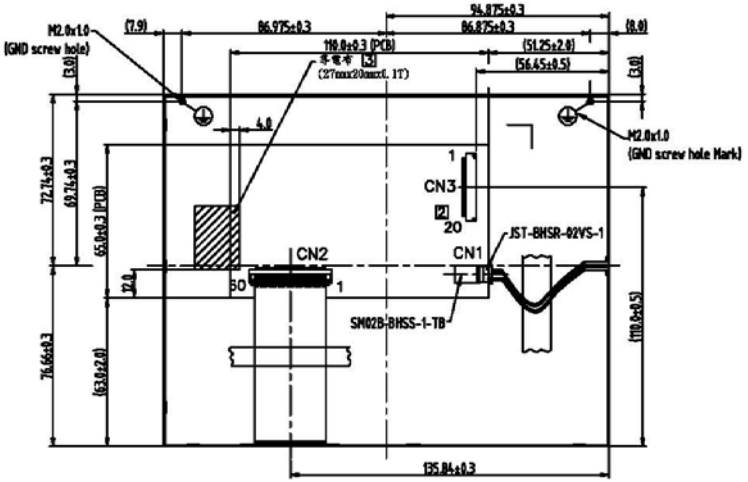
11. OUTLINE DIMENSION



REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	09-11-09'	SNOW
1	Rename TF800600-42-0 to 800600M-A1	10-02-09'	SNOW
2	Modify Interface & CN3 Pin1 to Pin 20	12-14-09'	SNOW
3	Added 導電布 (27mmx20mmx0.1T)	03-09-10'	SNOW



A Block



Back View

CN3 [2]

1	ADJ	11	GND
2	GND	12	IN1+
3	LED_EN	13	IN1−
4	VLED	14	GND
5	GND	15	IN0+
6	CLK+	16	IN0−
7	CLK−	17	GND
8	GND	18	GND
9	IN2+	19	VDD
10	IN2−	20	VDD

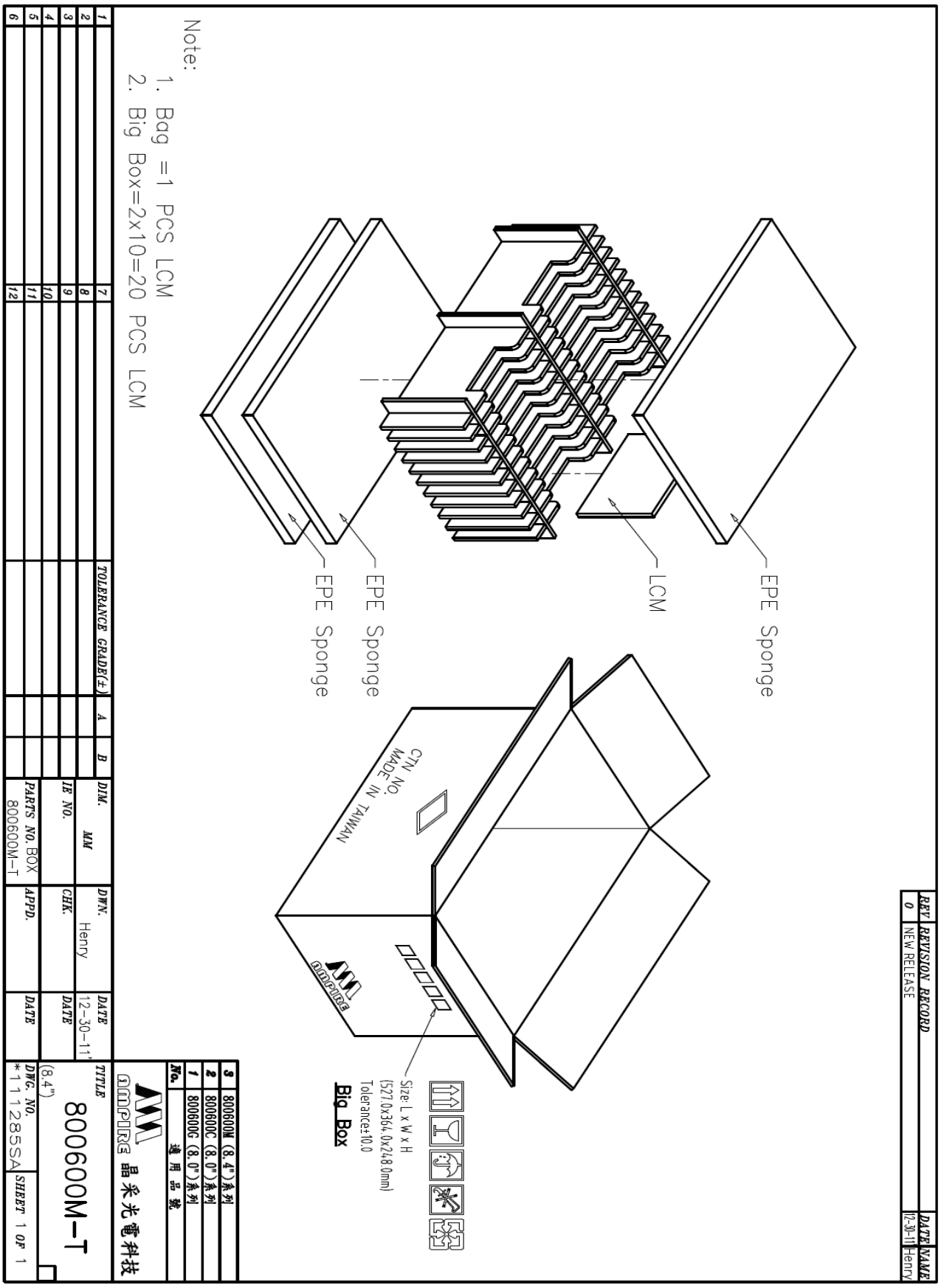
Note:
1. Unless indicated, Tolerance "±0.3"
2. UV Glue For OLB Protection.
3. CN1: JST BHSR-02VS-1 or Equivalent
4. CN2: P0.5 60Pin Connector: HIROSE FH28-60S-0.5SH or Equivalent
5. CN3: P1.25 20Pin Connector: JAE FI-S20P-HFE or equivalent

1	TF800600-42-0	7		TOLERANCE GRADE(±)	A	B	DIM. MM	DWN. SNOW	DATE 09-11-09'	TITLE 800600M-A1 (8.4" + LVDS) 3
2		8					IE NO.	CHK.	DATE	
3		9								
4		10								
5		11					PARTS NO. LCM-1 800600M-A1	APPD.	DATE	DWG. NO. *090925MB SHEET 1 OF 1
6		12								

AMPIRE 晶采光電科技

12 Packing Condition and Date Code

12-1 Packing Condition



12-2 Date Code