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-480272METMQW-D1H
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
2015/1/7	--	New Release	Kokai

1. FEATURES

(1) Construction : amorphous silicon TFT-LCD with driving system, Stainless Bezel ,PCB and White LED Backlight.

(2) LCD type : Transmissive , Normally White.

(3) Interface : 18bit RGB interface.

(4) Power Supply Voltage : 3.3V power input for TFT, built-in LED driver circuit.

(5) RoHS Compliance.

2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
Display size (diagonal)	4.3	inch
Resolution	480 RGB(H) x 272(V)	Dot
Display area	95.04 (H) x 53.856 (V)	mm
Pixel pitch	0.198 (H) x 0.198 (V)	mm
Overall dimension	105.5 x 67.2 x 5.71(Typ.)	mm
Color configuration	R.G.B Vertical stripe	
Surface treatment	Antiglare, Hard-Coating (3H)	
(Gray Inversion)	6 o'clock	
View Direction	12 o'clock	
Brightness	400 (min)	cd/m^2
Backlight unit	LED	

3. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply Voltage	VDD	-0.3	--	4	V	GND=0
Logic Signal Input Level	V_I	-0.3	--	4	V	
Operating Temperature	Tops	-20	--	70	℃	
Storage Temperature	Tstg	-30	--	80	℃	

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 40 mA. The LED lifetime could be decreased if operating IL is larger than 40mA.

4. OPTICAL CHARACTERISTICS

4.1 Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing Angle	Left	Θ_L	CR≧10	60	70	--	deg.	(1)(4)
	Right	Θ_R		60	70	--		
	Up	Θ_U		40	50	--		
	Down	Θ_D		60	70	--		
Contrast ratio		CR	Θ=0 Normal viewing angle	400	500	--	--	(1)(2)
Response Time	Rising	T_R		--	8	10	msec	(1)(3)
	Falling	T_F		--	17	20	msec	
Color chromaticity (CIE1931)	White	Wx		0.26	0.31	0.36	--	(1)(4)
		Wy		0.28	0.33	0.38		
White Luminance (Center)		Y_L		400	500	--	cd/m^2	(1)(4)(7) (IL=40mA)
Brightness Uniformity		B_{UNI}		70	--	--	%	(5)(7)
Optima View Direction		6 o'clock						(6)

4.2 Measuring Condition

(1) Measuring surrounding : dark room

(2) LED current I_L : 40mA

(3) Ambient temperature : 25±2℃

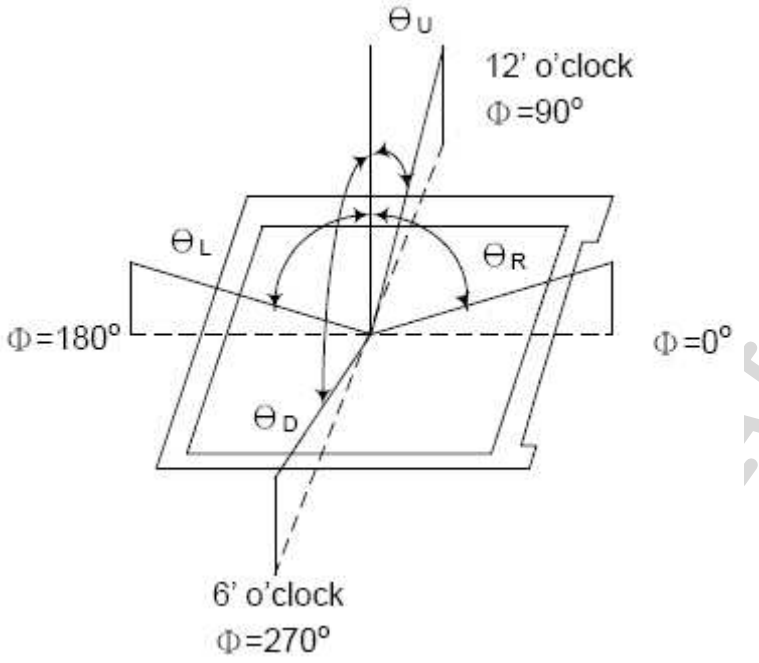
(4) 15min. warm-up time.

4.3 Measuring Equipment

(1) FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.

(2) Measuring spot size : 20 ~ 21 m

Note (1) Definition of Viewing Angle :

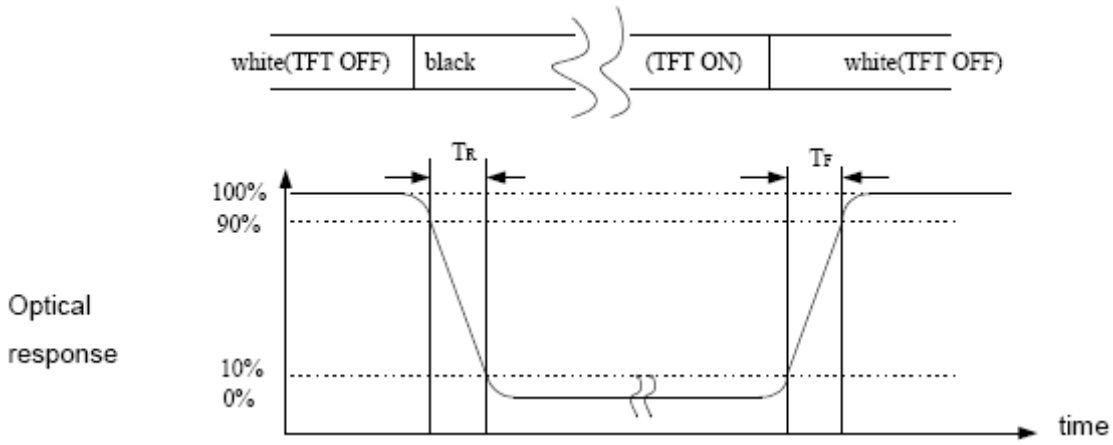


Note (2) Definition of Contrast Ratio (CR) :

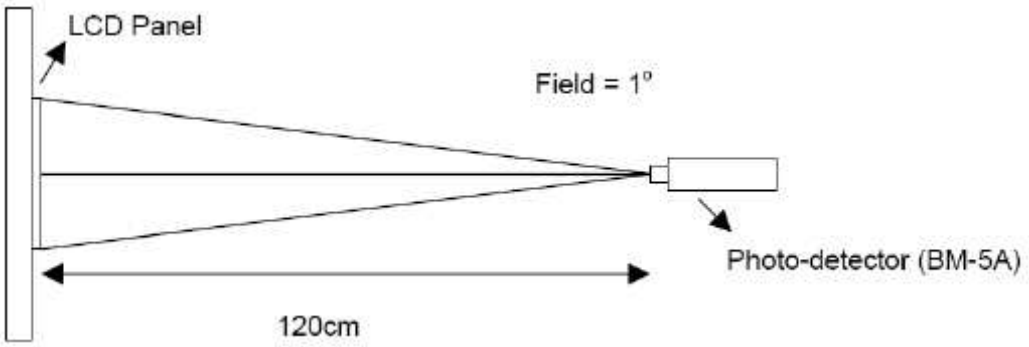
measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

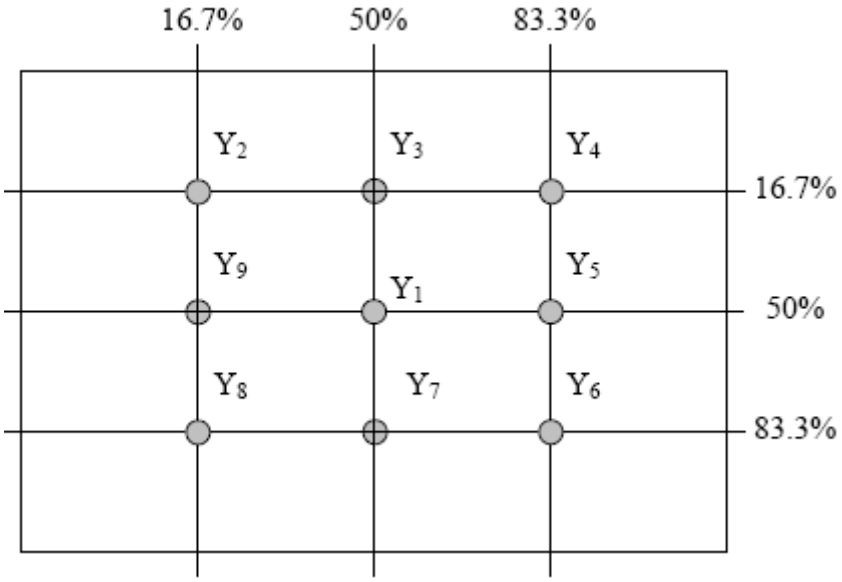
Note (3) Definition of Response Time : Sun of T_R and T_F



Note (4) Definition of optical measurement setup



Note (5) Definition of brightness uniformity



$$\text{Luminance uniformity} = \frac{\text{(Min Luminance of 9 points)}}{\text{(Max Luminance of 9 points)}} \times 100\%$$

Note (6) Rubbing Direction (The different Rubbing Direction will cause the different optima view direction.)

Note (7) Measured at the brightness of the panel when all terminals of LCD panel ate electrically open.

5. ELECTRICAL CHARACTERISTICS

5.1 TFT LCD Module

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	V_{DD}	3.0	3.3	3.6	V	
Input signal voltage	V_{IH}	$0.7V_{DD}$	--	V_{DD}	V	Note(1)
	V_{IL}	0	--	$0.3V_{DD}$	V	
Current of power supply	I_{CC}	--	--	24.12	mA	V_{DD}=3.3V

Note (1) : HSYNC , VSYNC , DE , R/G/B Date

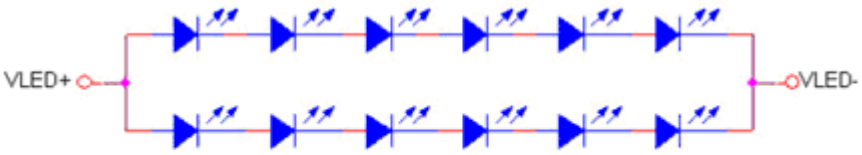
Note (2) : GND = 0V

5.2 Back-Light Unit

The back-light system is an edge-lighting type with 12 LED.

The characteristics of the LED are shown in the following tables.

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED current	IL	--	40	--	mA	(2)
LED voltage	VL	--	19.8	--	V	
Operating LED life time	Hr	20K	25K	--	Hours	(1)(2)

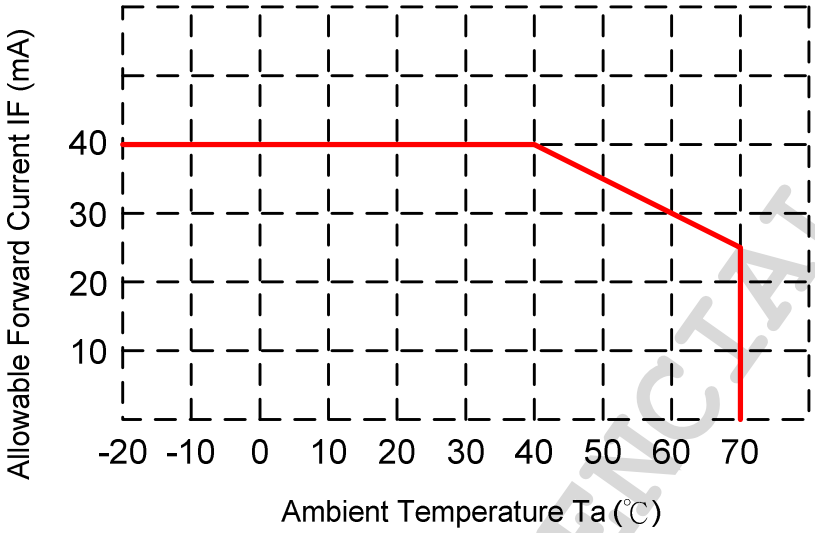


LED Light Bar Circuit

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%.

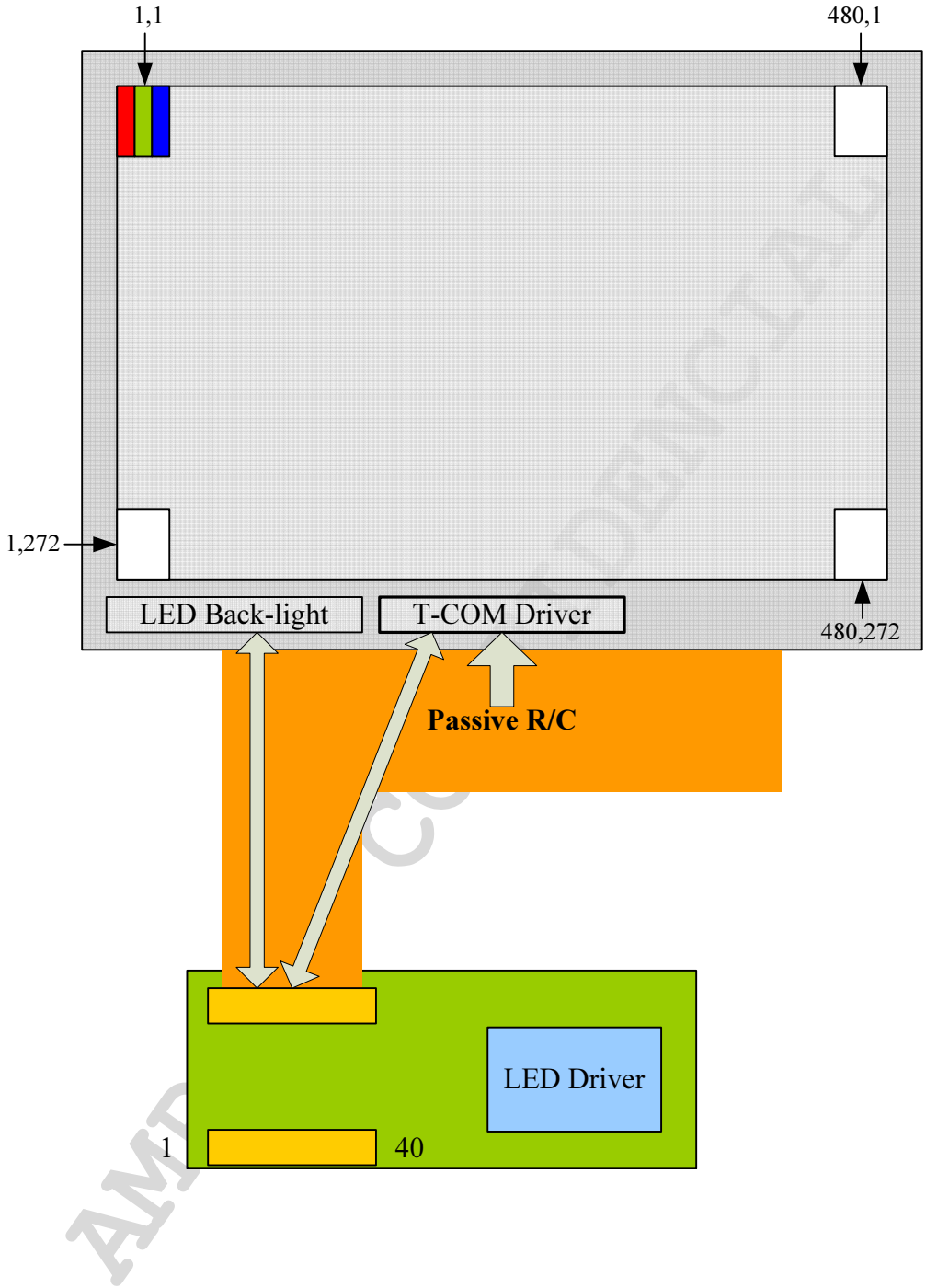
Note (2) The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and IL=40mA. The LED lifetime could be decreased if operating IL is larger than 40mA. The constant current driving method is suggested.

The constant current source is needed for white LED back-light driving. When LCM is operated over 60℃ ambient temperature, the I_L of the LED back-light should be adjusted to 30mA max.

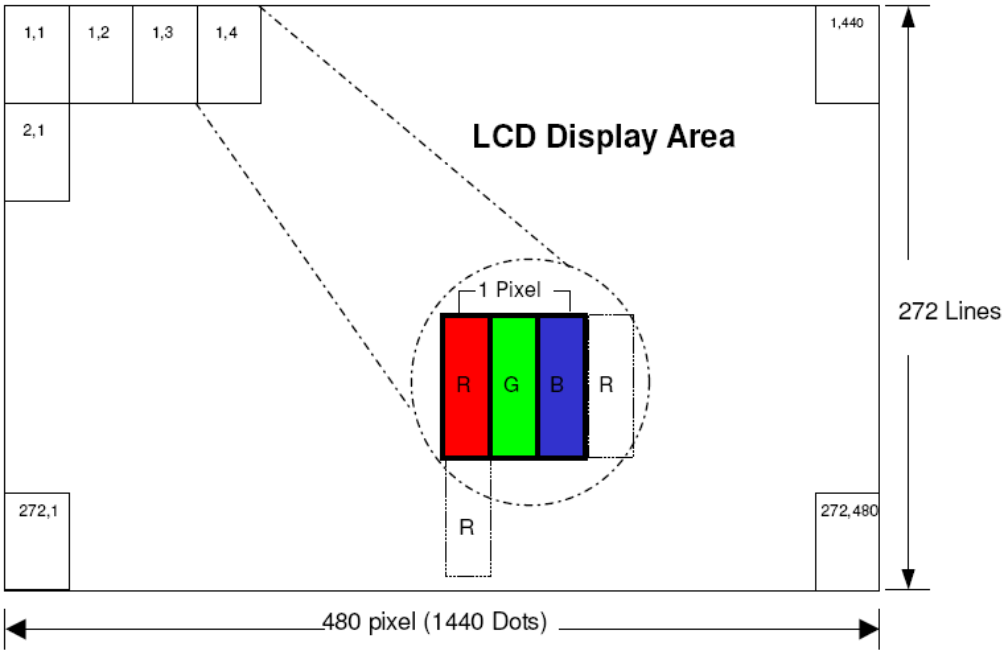


6. BLOCK DIAGRAM

6.1 TFT LCD Module



6.2 Pixel Format

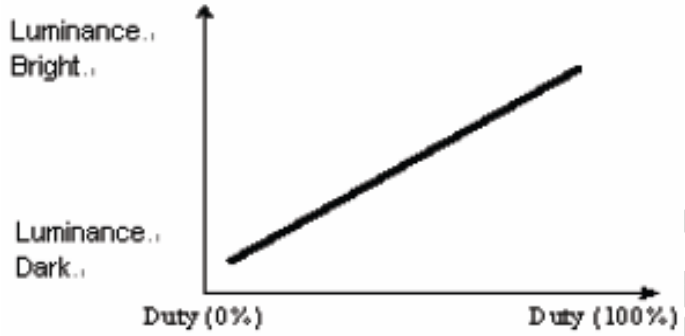


7. INTERFACE PIN ASSIGNMENT

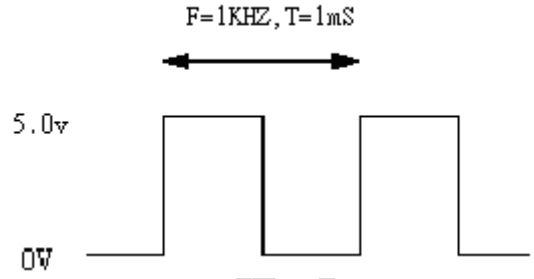
Pin No	Symbol	Function
1	U/D	No connection
2	(NC)	No connection
3	Hsync(NC)	Honizontal SYNC. (Sync mode used)
4	VLED	Power Supply for LED
5	VLED	Power Supply for LED
6	VLED	Power Supply for LED
7	Vcc	Power Supply for LCD
8	Vsync(NC)	Vertical SYNC. (Sync mode used)
9	DE	Data Enable
10	Vss	Power Ground
11	Vss	Power Ground
12	ADJ	Adjust for LED Brightness
13	B5	Blue Data 5 (MSB)
14	B4	Blue Data 4
15	B3	Blue Data 3
16	Vss	Power Ground
17	B2	Blue Data 2
18	B1	Blue Data 1
19	B0	Blue Data 0 (LSB)
20	Vss	Power Ground
21	G5	Green Data 5 (MSB)
22	G4	Green Data 4
23	G3	Green Data 3
24	Vss	Power Ground
25	G2	Green Data 2
26	G1	Green Data 1
27	G0	Green Data 0 (LSB)
28	Vss	Power Ground
29	R5	Red Data 5 (MSB)
30	R4	Red Data 4
31	R3	Red Data 3
32	Vss	Power Ground
33	R2	Red Data 2
34	R1	Red Data 1
35	R0	Red Data 0 (LSB)
36	Vss	Power Ground
37	Vss	Power Ground
38	DCLK	Clock Signals
39	Vss	Power Ground
40	L/R	No connection

NOTE :

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



2. ADJ signal = 0 ~ 5.0V , operation frequency : 300Hz~1KHz



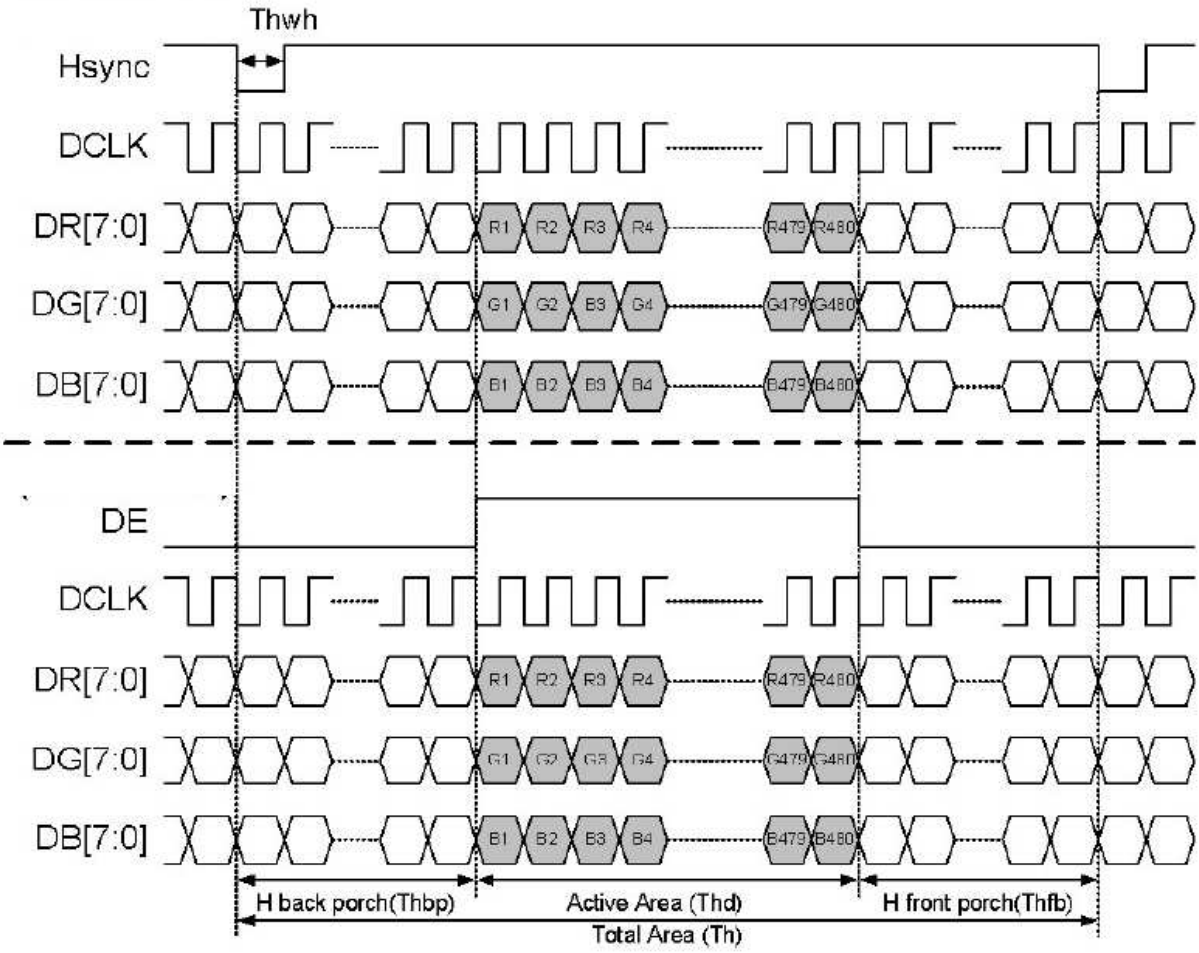
3. VSS Pin must ground contact , can not be floating.

8. INTERFACE TIMING

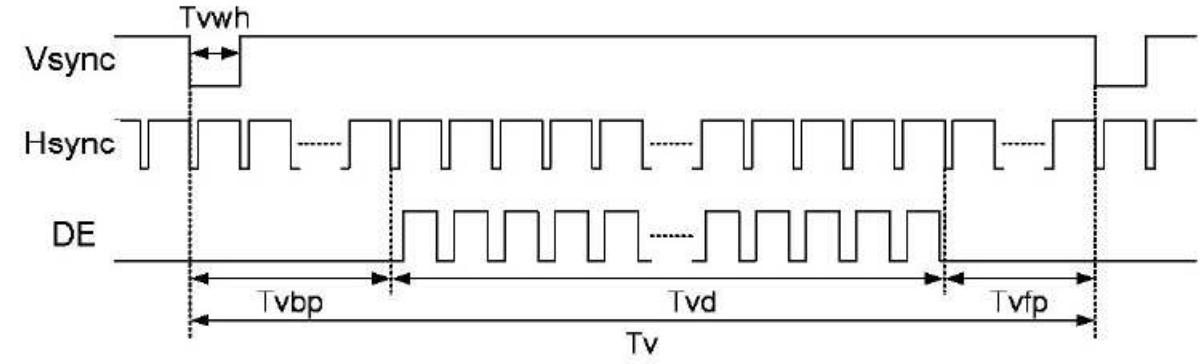
8.1 Parallel 18*bit RGB Input Timing Table

Item	Symbol	Min.	Typ.	Max.	Unit	Note
DCLK frequency	Fclk	--	9	15	MHz	
VSYNC period time	Tv	285	286	399	Th	
VSYNC display area	Tvd		272		Th	
VSYNC back porch	Tvbp	1	2	11	Th	
VSYNC front porch	Tvfp	1	2	227	Th	
VSYNC pulse width	Tvwh	1	10	11	Th	
HSYNC period time	Th	525	525	605	DCLK	
HSYNC display area	Thd		480		DCLK	
HSYNC back porch	Thbp	36	40	255	DCLK	
HSYNC front porch	Thfp	2	2	82	DCLK	
HSYNC pulse width	Thwh	2	2	41	DCLK	

Parallel 24-bit RGB Mode Data Format (DE Mode)



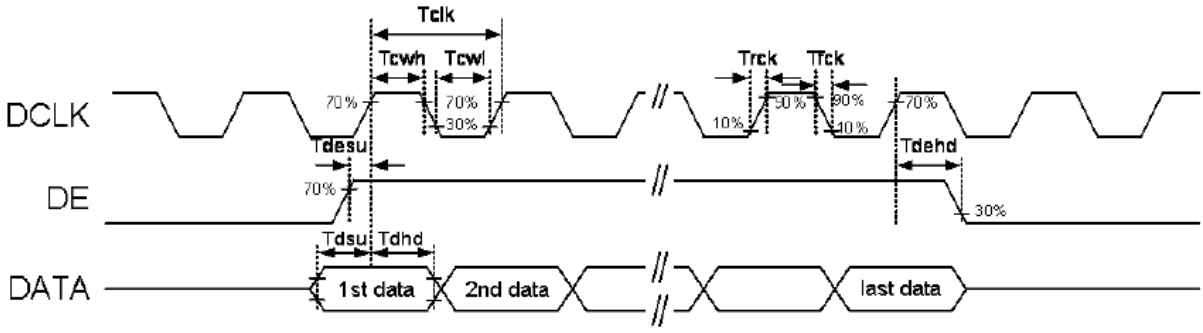
Vertical Input Timing

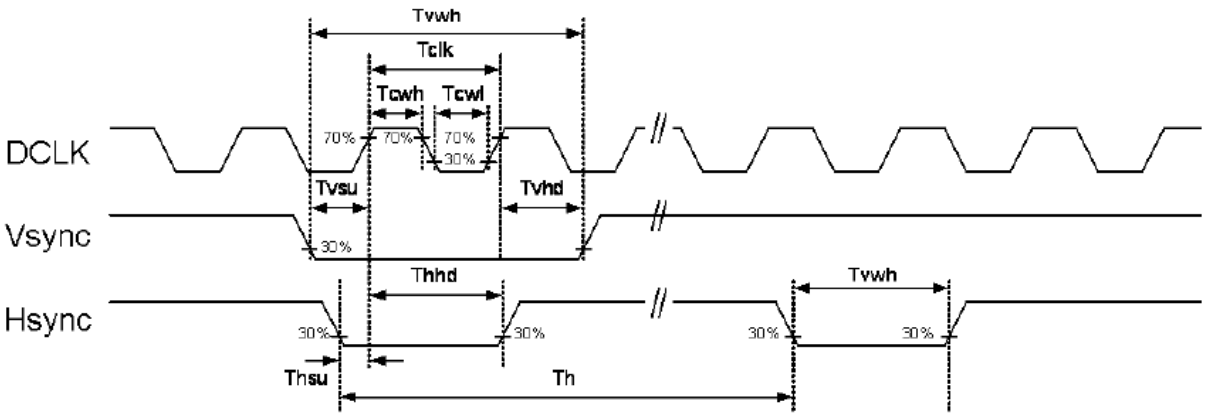


8.2 AC Electrical Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Note
DCLK period time	Tclk	66.7	--	--	ns	
DCLK rising time	Trck	--	--	6.65	ns	
DCLK falling time	Tfck	--	--	6.65	ns	
DCLK pulse duty	Tcwh	40	50	60	%	
DE setup time	Tdesu	10	--	--	ns	
DE hold time	Tdehd	10	--	--	ns	
HSYNC pulse width	Thwh	2	--	--	DCLK	
HSYNC setup time	Thsu	10	--	--	ns	
HSYNC hold time	Thhd	10	--	--	ns	
VSYNC pulse width	Tvwh	1	--	--	Th	
VSYNC setup time	Tvsu	10	--	--	ns	
VSYNC hold time	Tvhd	10	--	--	ns	
Data setup time	Tdsu	10	--	--	ns	
Data hold time	Tdhd	10	--	--	ns	

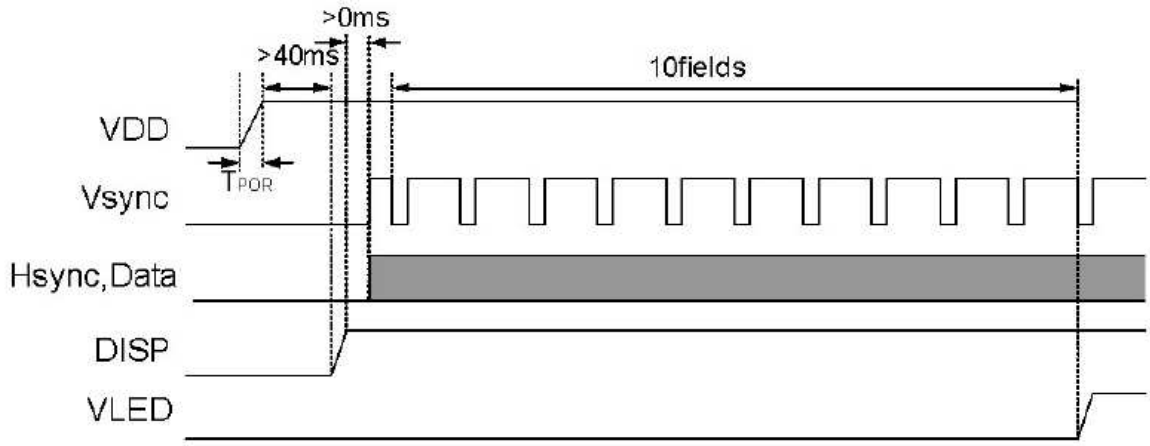
Clock and Data Input Timing Diagram



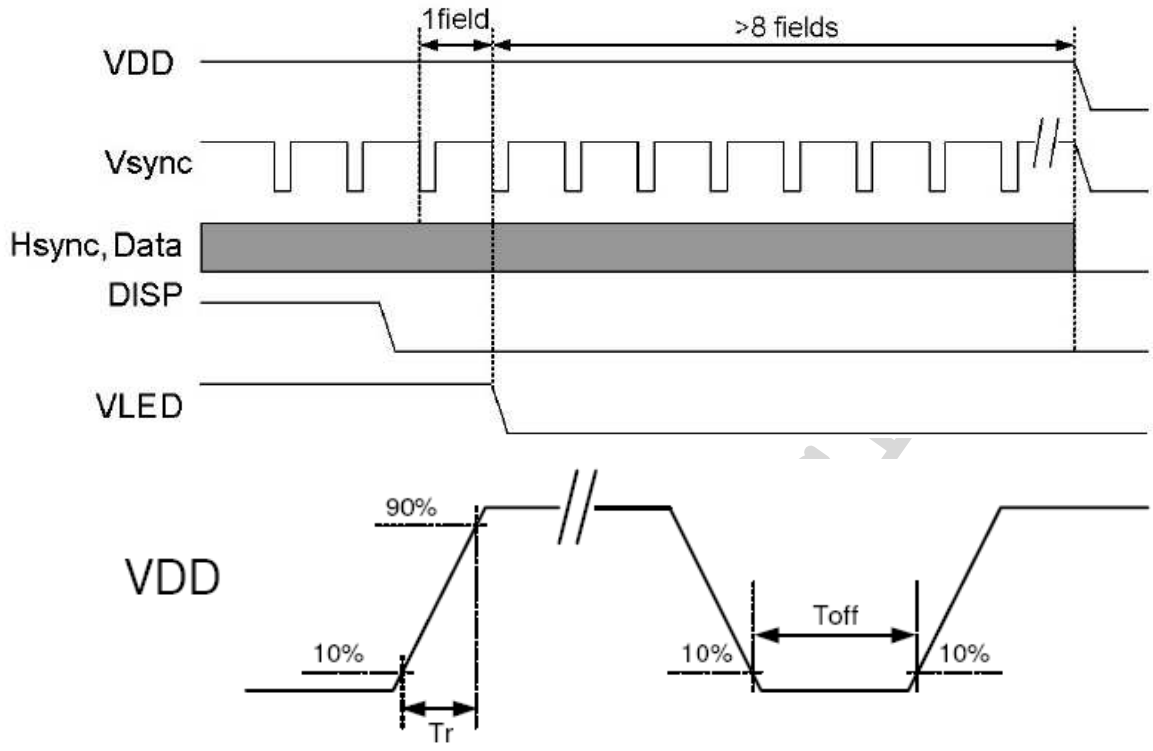


8.3 Power Sequence

Power On Sequence



Power Off Sequence



VDD power input timing

Notes:

Data include R0~R7, G0~G7, B0~B7, HSD, VSD, DCLK, DE
Power on sequence: VDD → DISP → Data → V_{LED}
Power off sequence: DISP → V_{LED} → Data → VDD
VDD power input timing: 0.5ms < Tr < 10ms; Toff > 500ms

9. QUALITY AND RELIABILITY

9.1 TEST CONDITIONS

Tests should be conducted under the following conditions :

Ambient temperature : 25 ± 5°C

Humidity : 60 ± 25% RH.

9.2 SAMPLING PLAN

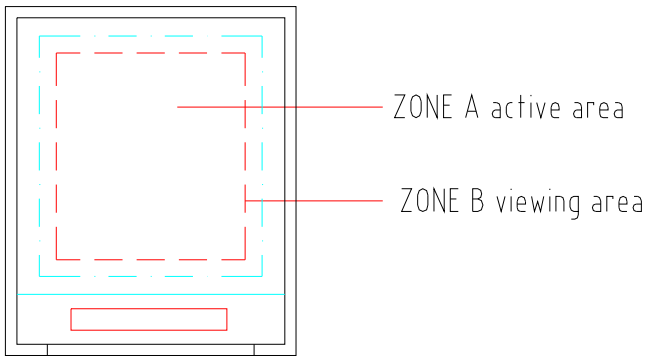
Sampling method shall be in accordance with MIL-STD-105E , level II, normal single sampling plan .

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



9.5 RELIABILITY TEST CONDITIONS

Test Item	Test Conditions	Note
High Temperature Operation	Ta=70°C, 240 hrs	
Low Temperature Operation	Ta=-20°C, 240 hrs	
High Temperature Storage	Ta=80°C, 240 hrs	
Low Temperature Storage	Ta=-30°C, 240 hrs	
High Temperature and High Humidity (Operation)	Ta=+60°C, 90%RH, 240 hrs	
Thermal Cycling Test (non operation)	-30°C(30min)→+80°C(30min), 200 cycles	
Electrostatic Discharge	±200V, 200pF(0Ω) 1 time/each terminal	
Vibration	1. Random: 1.04Grms, 5~500Hz, X/Y/Z, 30min/each direction 2. Sine: Ferq. Range : 8~33.3Hz Stoke : 1.3mm Sweep:2.9G, 33.3~400Hz X/Z : 2hr, Y: 4hr, cyc: 15min	
Shock	100G, 6ms, ±X, ±Y, ±Z 3 time for each direction	JIS C7021, A-10 (Condition A)
Vibration (with carton)	Random: 0.015G^2/Hr, 5~20Hz -6dB/Octave, 200~400Hz XYZ each direction:2hr	
Drop (with carton)	Height : 60cm 1 corner, 3 edges, 6 surfaces	JIS Z0202

Note : There is no display function NG issue occurred, all the cosmetic specification is judged before the reliability stress.

10. GENERAL PRECAUTION

10-1 Use Restriction

This product is not authorized for use in life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic.

10-2 Disassembling or Modification

Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. Ampire does not warrant the module, if customers disassemble or modify the module.

10-3 Breakage of LCD Panel

(1) If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid crystal, and do not contact liquid crystal with skin.
(2) If liquid crystal contacts mouth or eyes, rinse out with water immediately.
(3) If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.
(4) Handle carefully with chips of glass that may cause injury, when the glass is broken.

10-4 Electric Shock

(1) Disconnect power supply before handling LCD module.
(2) Do not pull or fold the LED cable.
(3) Do not touch the parts inside LCD modules and the fluorescent LED's connector or cables in order to prevent electric shock.

10-5 Absolute Maximum Ratings and Power Protection Circuit

(1) Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental temperature, etc., otherwise LCD module may be damaged.
(2) Please do not leave LCD module in the environment of high humidity and high temperature for a long time.
(3) It's recommended to employ protection circuit for power supply.

10-6 Operation

(1) Do not touch, push or rub the polarizer with anything harder than HB pencil lead.

(2) Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.

(3) When the surface is dusty, please wipe gently with absorbent cotton or other soft material.

(4) Wipe off saliva or water drops as soon as possible. If saliva or water drops contact with polarizer for a long time, they may causes deformation or color fading.

(5) When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzine or other adequate solvent.

10-7 Mechanism

Please mount LCD module by using mounting holes arranged in four corners tightly.

10-8 Static Electricity

(1) Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.

(2) Because LCD module use CMOS-IC on circuit board and TFT-LCD panel, it is very weak to electrostatic discharge. Please be careful with electrostatic discharge. Persons who handle the module should be grounded through adequate methods.

10-9 Strong Light Exposure

The module shall not be exposed under strong light such as direct sunlight. Otherwise, display characteristics may be changed.

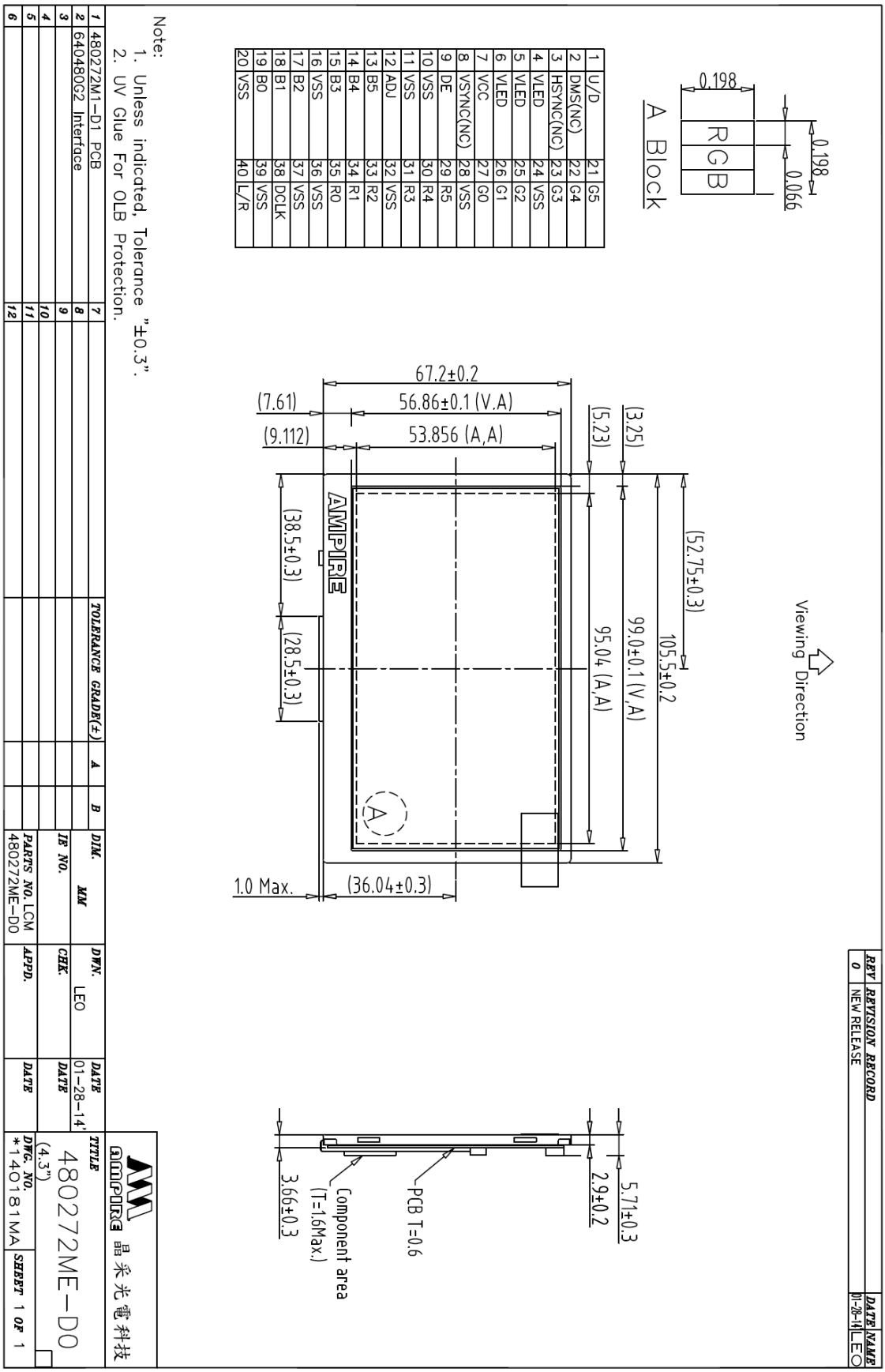
10-10 Disposal

When disposing LCD module, obey the local environmental regulations.

10-11 Others

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

11. OUTLINE DIMENSION



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

Note:
1. Unless indicated, Tolerance "±0.3".
2. UV Glue For OLB Protection.

REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	01-28-14	LEO

1	480272M1-D1 PCB	7					
2	640480G2 Interface	8					
3		9					
4		10					
5		11					
6		12					

		TOLERANCE GRADE(±)	A	B	DIM.	MM
					TB NO.	
					PARTS NO.	LCM 480272ME-DO

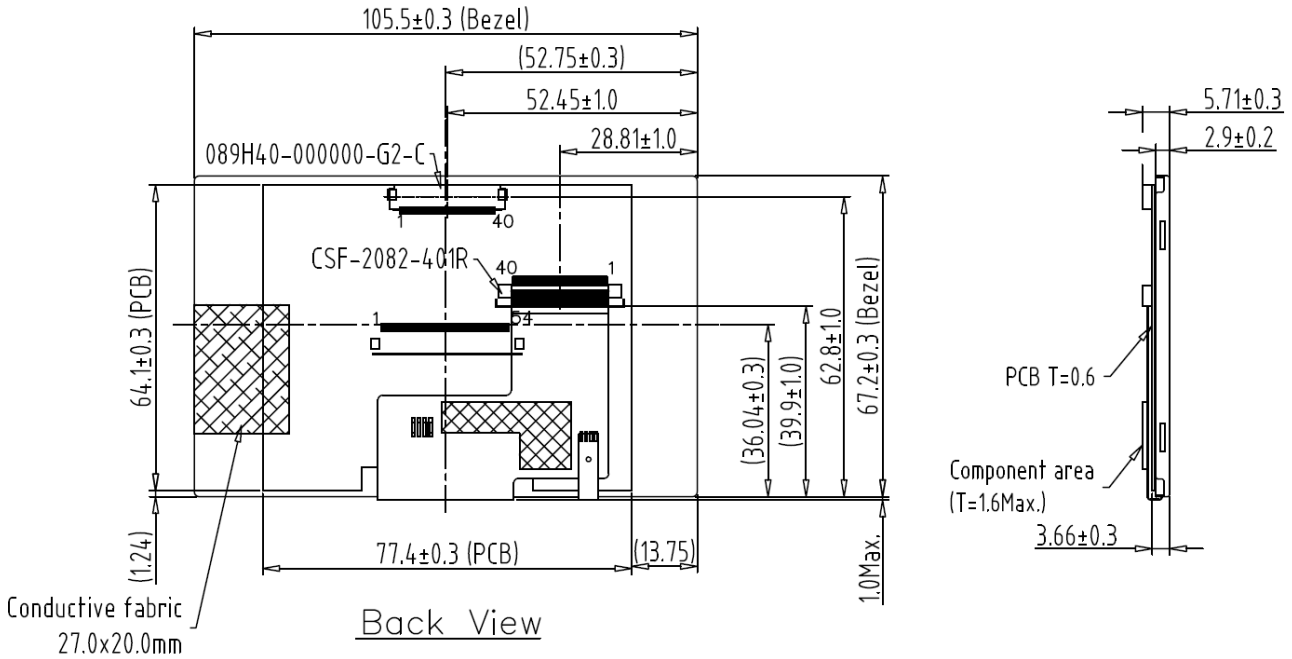
DWN.	LEO	DATE 01-28-14
CHK.		DATE
APPD.		DATE

晶采光電科技

TITLE	480272ME-DO (4.3")
DWG. NO.	*1401 81MA
SHEET 1 OF 1	

REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	01-28-14	LEO

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



Note:
1. Unless indicated, Tolerance "±0.3".
2. UV Glue For OLB Protection.

				TOLERANCE GRADE(±)	A	B	DIM.	DWN.	DATE
1	480272M1-D1 PCB	7					MM	LEO	01-28-14
2	640480G2 Interface	8					IE NO.	CHK.	DATE
3		9							
4		10					PARTS NO. LCM-1	APPD.	DATE
5		11					480272ME-D0		
6		12							

晶采光電科技

TITLE: 480272ME-D0 (4.3")

DWG. NO. *140182MA

SHEET 1 OF 1