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-12001600ATZQW-01H**
Approved by	
Date	

☐ **Preliminary Specification**
☑ **Formal Specification**

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Approved by	Checked by	Organized by
Patrick	*Lawlite*	*Kokai*

This Specification is subject to change without notice.

RECORD OF REVISION

| Revision Date	Page	Contents	Editor
2022/8/31	-	New Release	Kokai

1. Features

11.8" TFT Liquid Crystal Display module is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. It is composed of a TFT LCD panel, a driving circuit and a back light system. This TFT LCD has a 11.8 inch diagonally measured active display area with HD (1200 horizontal by 1600 vertical pixels) resolution.

(1) Construction: 11.8 " a-Si TFT active matrix and White LED Backlight .

(2) Resolution (pixel): 1200(R.G.B) X 1600

(3) Number of the Colors : Support 16.7M (8bits)

(4) LCD type : Transmissive , Normally Black.

(5) LCD Interface : 2 channel LVDS.

(6) Power Supply Voltage: 3.3V single power input for TFT panel.

2. Physical Specifications

Item	Specifications	Remark
LCD size	11.8 inch(Diagonal)	
Driver element	a-Si TFT active matrix	
Display resolution	1200 (W) × 3(RGB) x1600(H) dots	
Display mode	IPS, Normally Black	
Dot pitch	0.1500(W) x0.1500 (H) mm	
Active Area	180.0(H) x 240.0 (V) mm	
Color arrangement	RGB Vertical Stripe	
LCD Surface treatment	Anti-glare, Hardness 3H	
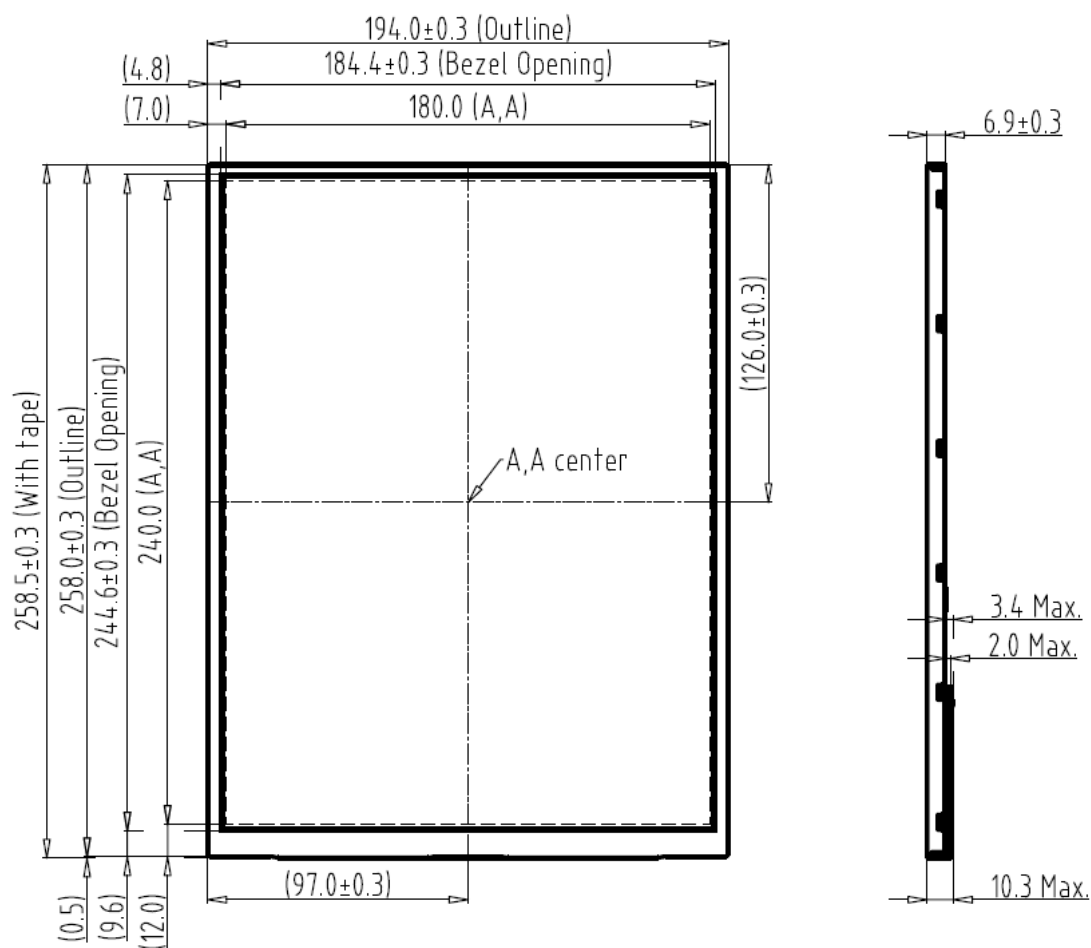
3. Absolute Maximum Ratings

Item	Symbol	Values		Unit	Remark
		Min	Max		
LCD Power Voltage	VDD	-0.3	4.0	V	
Logic Input Signal Voltage	Vsignal	-0.3	1.9	V	LVDS
LED Driver Power Voltage	VCC	-0.3	13.2	V	
Operation Temperature	TOP	**-30**	**85**	℃	
Storage Temperature	TST	**-40**	**95**	℃	

Note(1) The absolute maximum rating values of this product are not allowed to be exceeded at any times.

Note(2) Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

Note(3) Maximum Wet-Bulb should be 57.8℃ and no condensation..
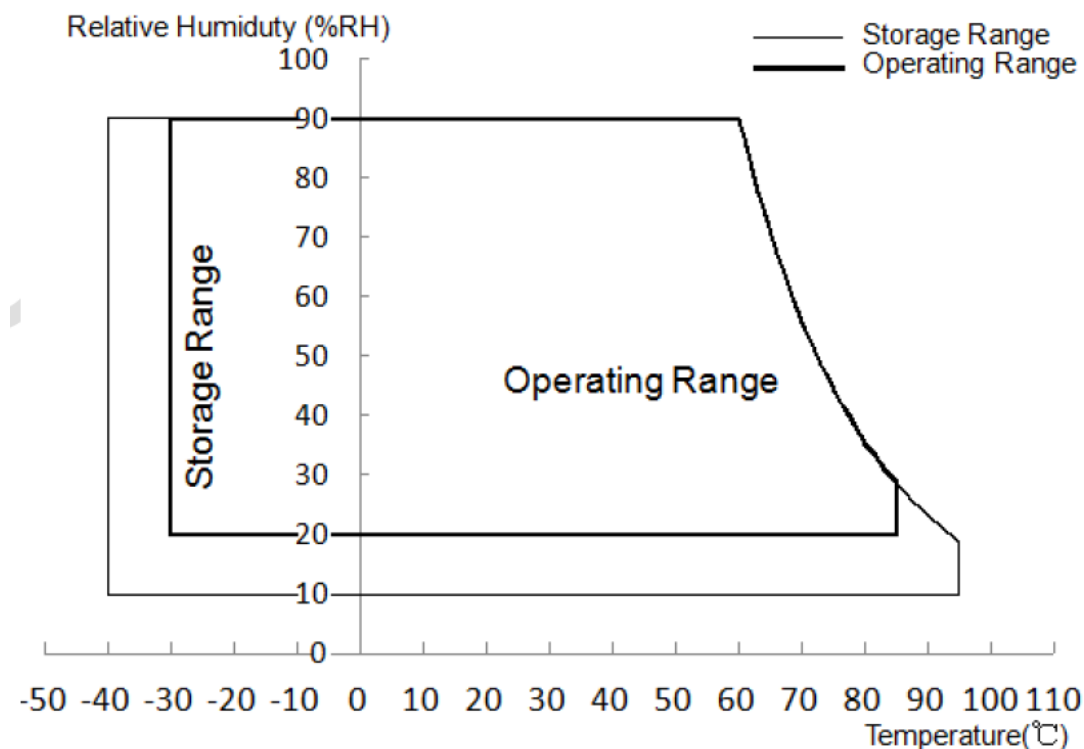
4. Electrical Specifications

4.1 TFT LCD module
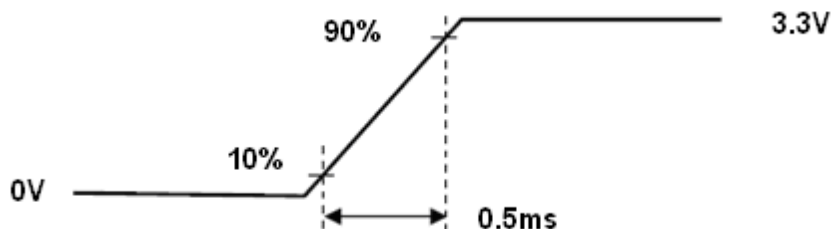
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	VDD	3.0	3.3	3.6	V	(1)(2)
Current of power supply	IDD	—	--	0.17	A	(1)(4)
LCD Power Consumption	P$_{VDD}$	--	--	0.56	W	(1)
Inrush current	IRUSH	—	—	2	A	Note 1
Allowable VDD ripple voltage	VDDrp	—	--	200	mV p-p	VDD =3.3V
STVD	VIH	VDD-0.4	--	VDD	V	(1)
STVD	VIL	GND	--	GND+0.4	V	(1)
RESET	VIH	0.7*VDD	--	VDD	V	(1)
RESET	VIL	GND	--	0.3*VDD	V	(1)

Note (1) All of the specifications are guaranteed under normal conditions. Normal conditions are defined as follow: Temperature: 25℃, Humidity: 55± 10%RH.

Note (2) All of the absolute maximum ratings specified in the table, if exceeded, may cause faulty operation or unrecoverable damage. It is recommended to follow the typical value.

Note (3) The specified VDD current and power consumption are measured under the VDD = 3.3 V, FV= 60 Hz condition and White pattern.

Note (4) The figures below is the measuring condition of VDD. Rush current can be measured when TRUSH is 0.5 ms.
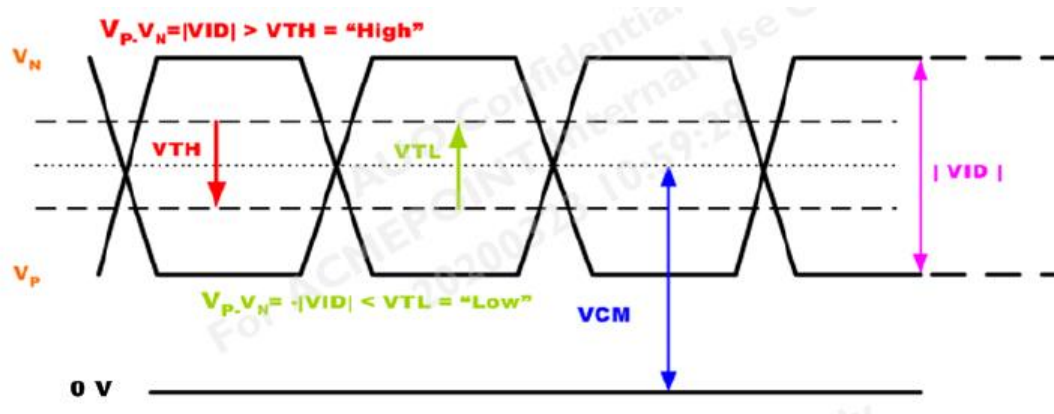
4.2 Switching Characteristics for LVDS Receiver

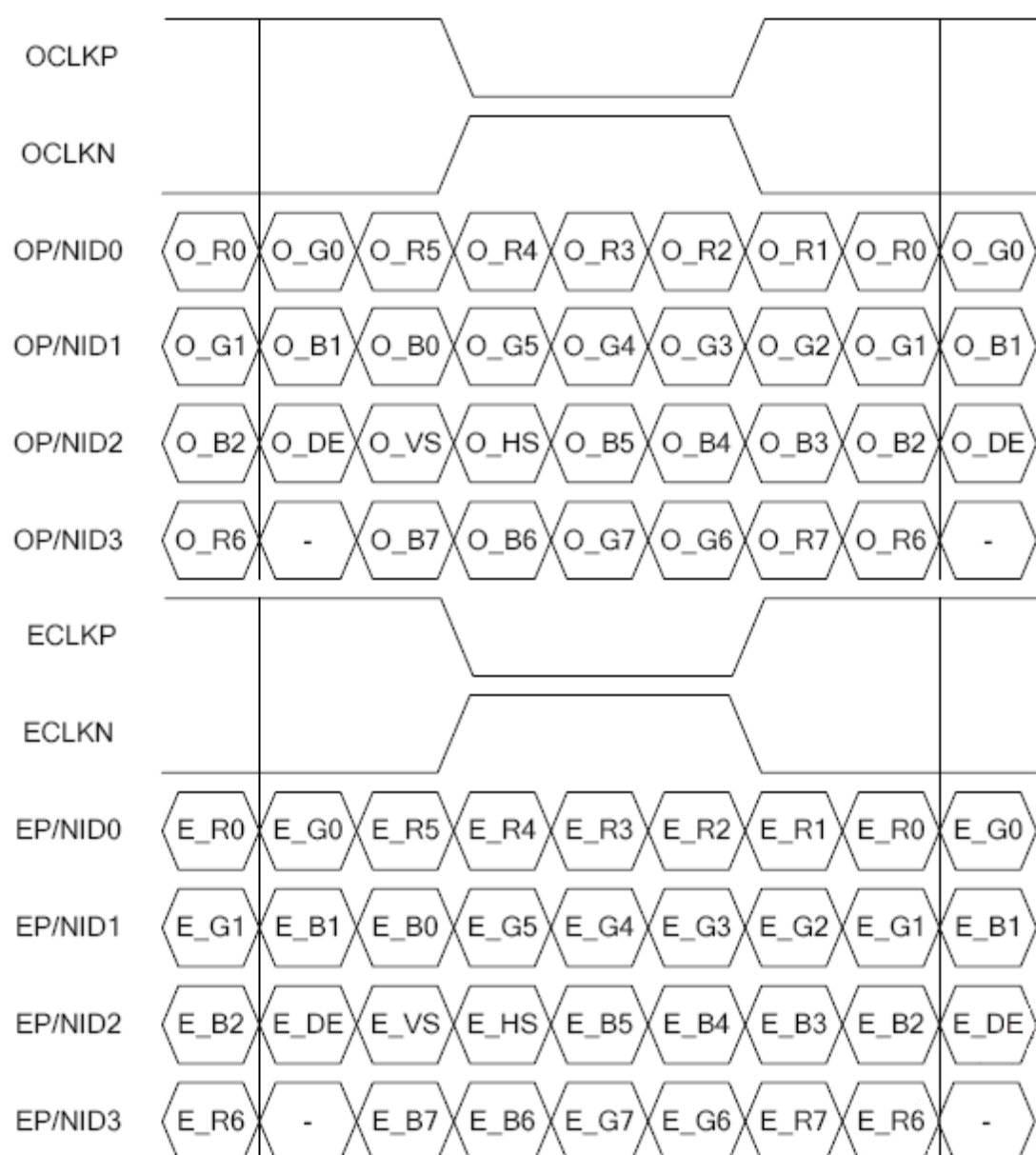| Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High Threshold	VTH	-	-	150	mV	VCM=1.2V
Differential Input Low Threshold	VTL	-150	-	-	mV	
Differential input Voltage	VID	100	-	600	mV	
Differential input common mode voltage	VCM	1.0	-1.2	1.7-|VID|/2	V	

Note (1) Input signals shall be low or Hi- resistance state when VDD is off.

Note (2) All electrical characteristics for LVDS signal are defined and shall be measured at the

LVDS terminal resistor of LCD

4.3.1 LVDS Data Mapping

4.3.2 LVDS Receiver Internal Circuit

RxECLK- ——▷

100

RxECLK+ ——▷○

PLL
Sampling clocks ——▶ DTUCK

RxEIN0- ——▷

100

RxEIN0+ ——▷○

——▶ G0,R5,R4,R3,R2,R1,R0

RxEIN1- ——▷

100

RxEIN1+ ——▷○

Serial to
Parallel
converter

——▶ B1,B0,G5,G4,G3,G2,G1

RxEIN2- ——▷

100

RxEIN2+ ——▷○

——▶ DE,VS,HS,B5,B4,B3,B2

RxEIN3- ——▷

100

RxEIN3+ ——▷○

——▶ B7,B6,G7,G6,R7,R6
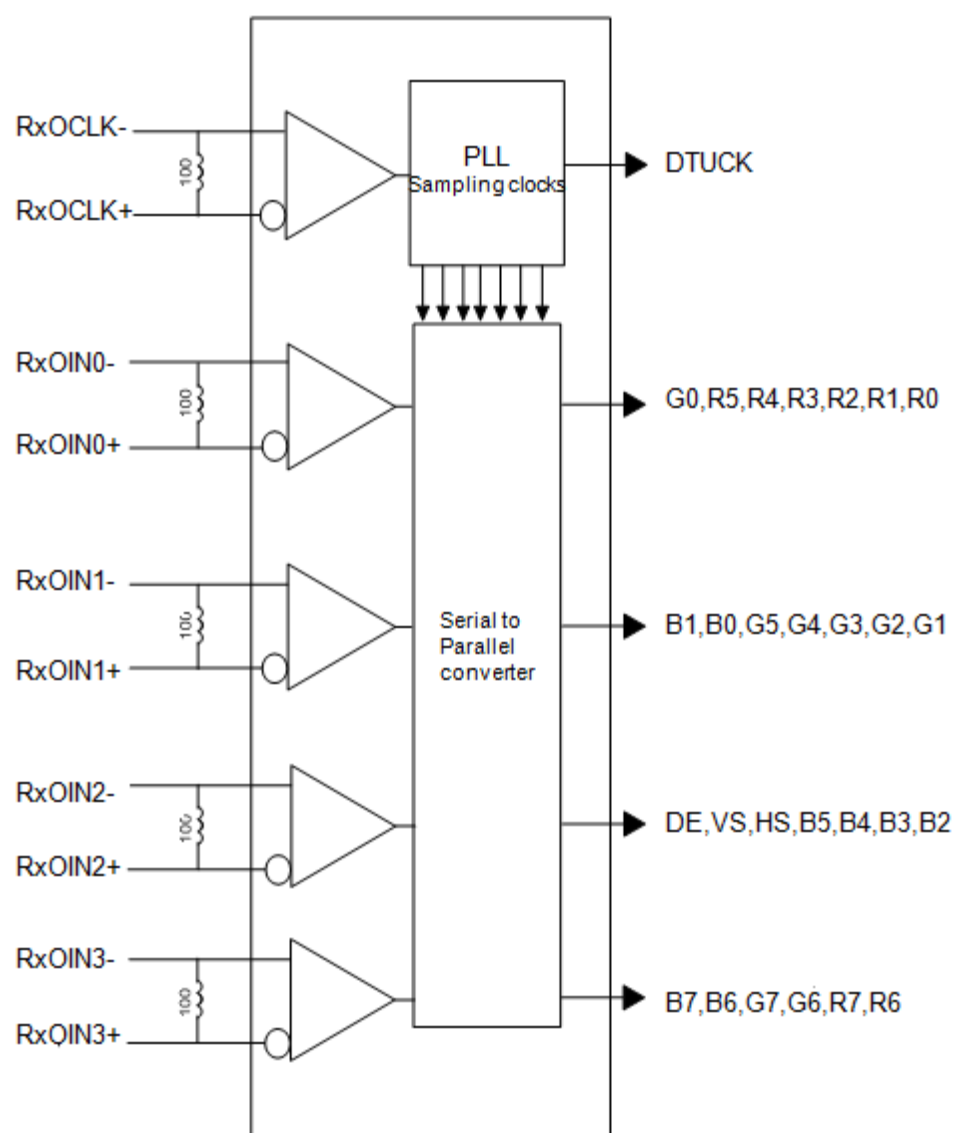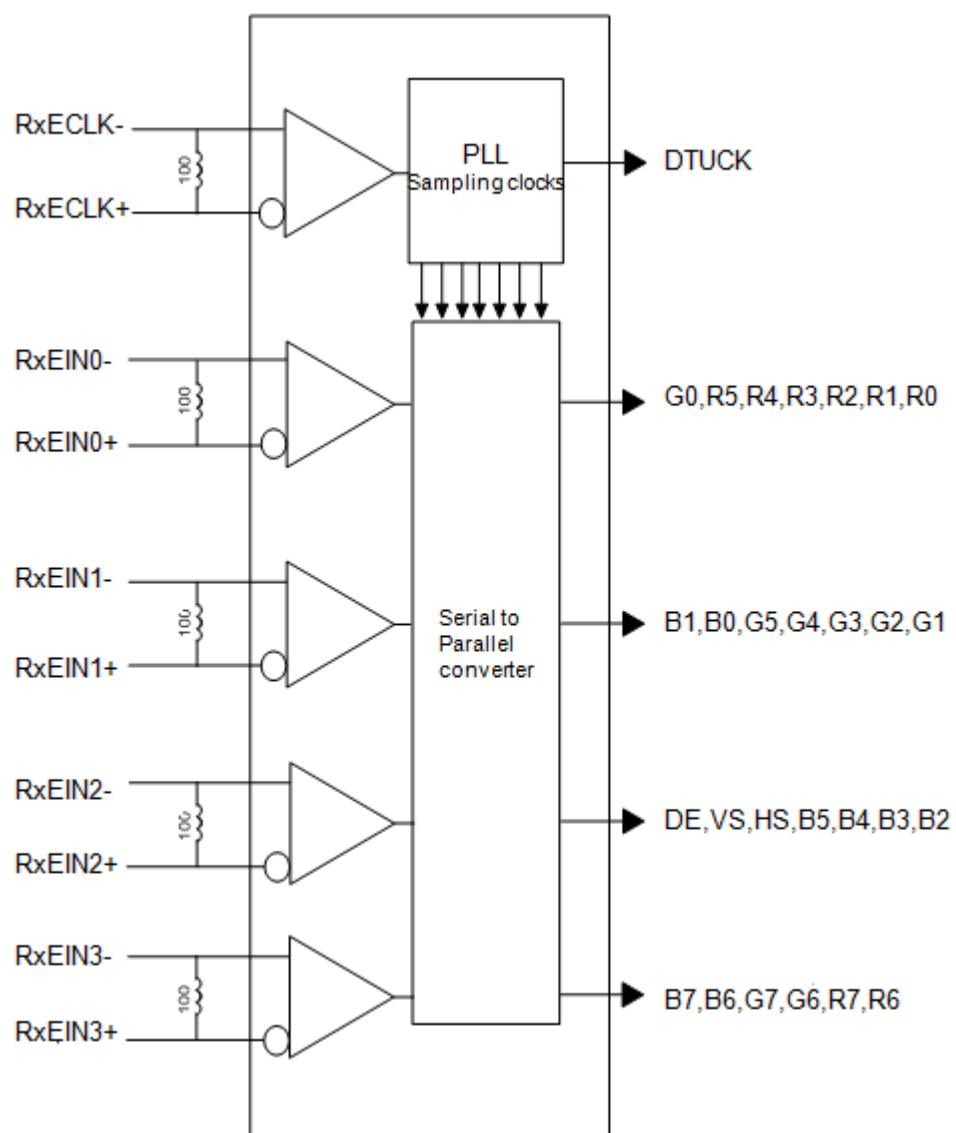
4.3 Interface Timing (DE mode)

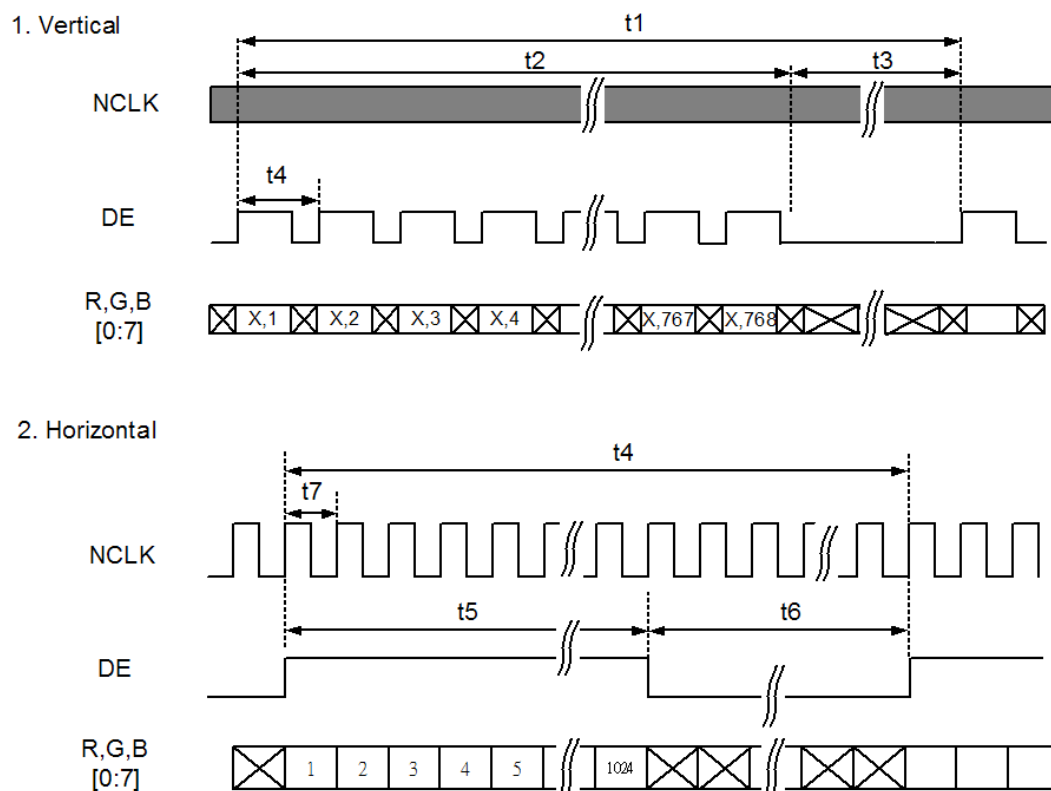| Item	Symbol	Min.	Typ.	Max.	Unit
Vertical Total Time	TV	1606	1608	1729	line
Vertical Display Time	TVD		1600		line
Vertical Blanking Time	TVB	6	8	129	line
Horizontal Total Time	TH	660	664	790	clock
Horizontal Display Time	THD		600		clock
Horizontal Blanking Time	THB	60	64	190	clock
Clock Rate	1/ TClock	63.7	64.1	76.2	MHz

Note1：TH * TV *Frame Frequency≤76.2 MHz

Note2：Dual link LVDS

Note3: All reliabilities are specified for timing specification based on refresh rate of 60Hz. M118AW41 R0 is secured only for function under lower refresh rate; 60Hz at Normal mode, 55Hz at Power save mode. Don't care flicker level (power save mode).

Timing Diagram of Interface Signal (DE mode)

5. Backlight Unit

Item		Symbol	Min.	Typ.	Max.	Unit	Note
LED Backlight Voltage		V_{LED}	--	--	28	V	1,2,3
LED Backlight Power Consumption		P_{LED}	--	--	6.16		1,2,3
LED Backlight Current	Ta=25℃	IF1	-	55	--	mA	1,2,4
	Ta=85℃	IF2	-	18.4	--	mA	1,2,4
LED Life Time			40	50	-	Khr	

Note(1) All of the specifications are guaranteed under normal conditions. Normal conditions are defined as follow: Temperature: 25℃, Humidity: 55± 10%RH.
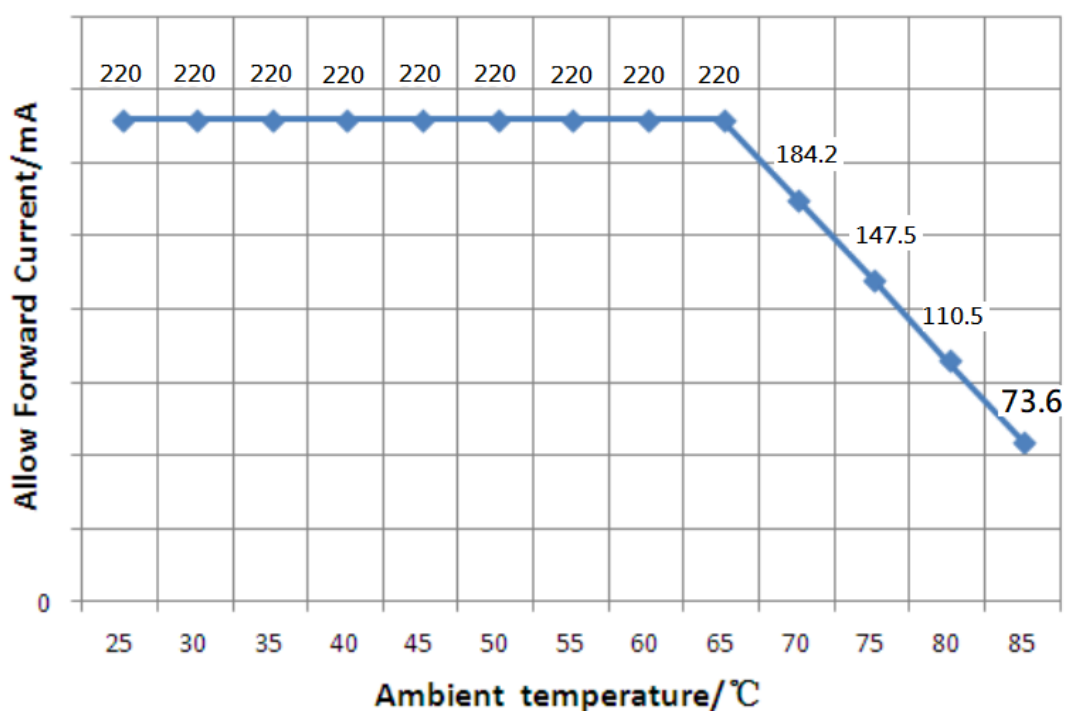
Note(2) All of the absolute maximum ratings specified in the table, if exceeded, may cause faulty operation or unrecoverable damage. It is recommended to follow the typical value.

Note(3) Note (10) Definition of VLED and PLED

VLED =VF×8, ILED =IF×4, PLED = VLED×ILED
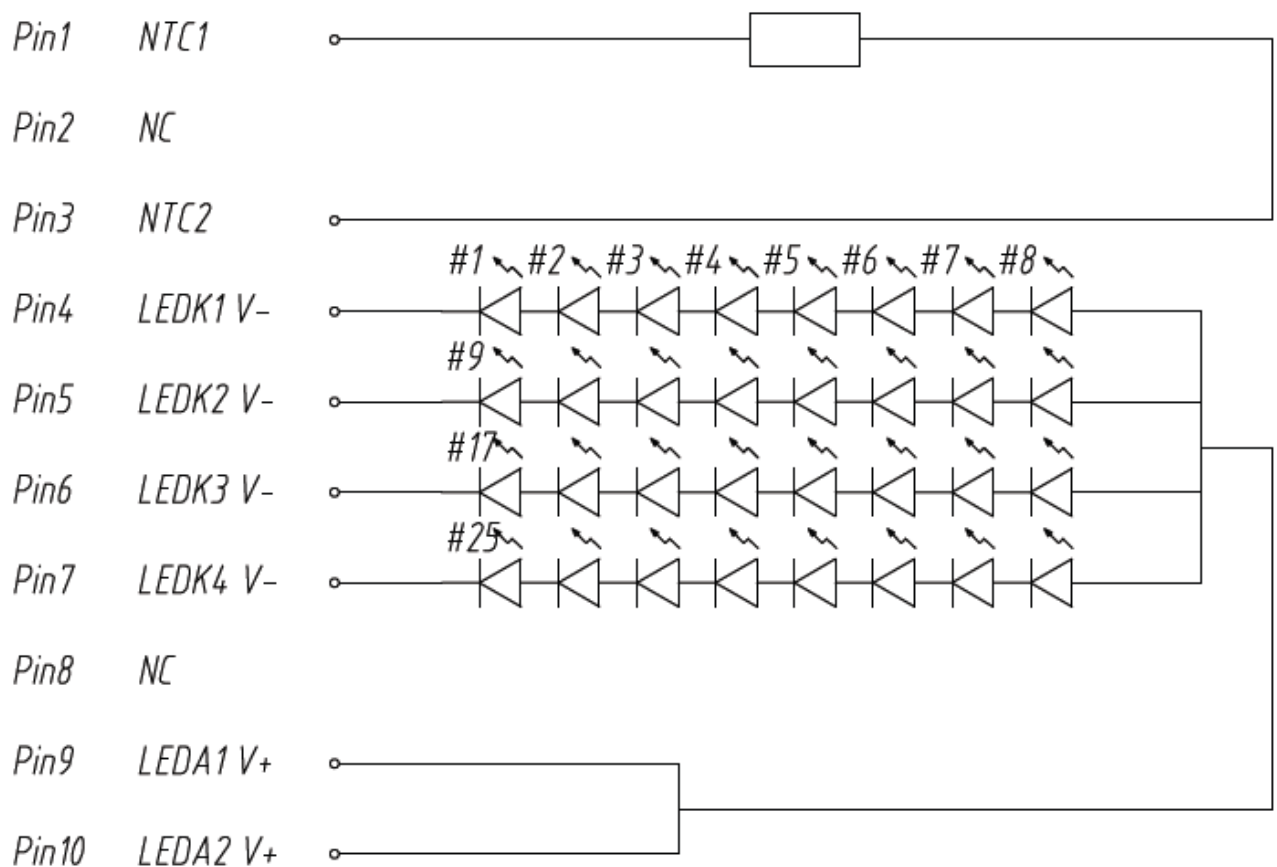
Note(4) Backlight operation must be follow diagram of Ambient temperature and Allowed forward current.

Note (5) NTC Thermistor Specification (Type:NCP18XH103F03RC)

Temperature/℃	Resistance/Kohm	Temperature/℃	Resistance/Kohm
-40	195.652	45	4.917
-35	148.171	50	4.161
-30	113.347	55	3.535
-25	87.559	60	3.014
-20	68.237	65	2.586
-15	53.65	70	2.228
-10	42.506	75	1.925
-5	33.892	80	1.669
0	27.219	85	1.452
5	22.021	90	1.268
10	17.926	95	1.11
15	14.674	100	0.974
20	12.081	105	0.858
25	10	110	0.758
30	8.315	115	0.672
35	6.948	120	0.596
40	5.834	125	0.531

6. Interface

6.1 Interface Connector (Input signal):

HRS/ FH41-40S-0.5SH(05) or equivalent.

No.	Symbol	I/O	Description	Remarks
1	GND	G	Power ground	-
2	GND	G	Power ground	-
3	RxOIN0-	I	Negative LVDS differential data input(Odd data)	-
4	RxOIN0+	I	Positive LVDS differential data input(Odd data)	-
5	GND	G	Power ground	-
6	RxOIN1-	I	Negative LVDS differential data input(Odd data)	-
7	RXOIN1+	I	Positive LVDS differential data input(Odd data)	-
8	GND	G	Power ground	-
9	RxOIN2-	I	Negative LVDS differential data input(Odd data)	-
10	RxOIN2+	I	Positive LVDS differential data input(Odd data)	-
11	GND	G	Power ground	-
12	RxOCLK-	I	Negative LVDS differential data input(Odd clock)	-
13	RxOCLK+	I	Positive LVDS differential data input(Odd clock)	-
14	GND	G	Power ground	-
15	RxOIN3-	I	Negative LVDS differential data input(Odd data)	-
16	RxOIN3+	I	Positive LVDS differential data input(Odd data)	-
17	GND	G	Power ground	-
18	RxEIN0-	I	Negative LVDS differential data input(Even data)	-
19	RxEIN0+	I	Positive LVDS differential data input(Even data)	-
20	GND	G	Power ground	-
21	RxEIN1-	I	Negative LVDS differential data input(Even data)	-
22	RxEIN1+	I	Positive LVDS differential data input(Even data)	-
23	GND	G	Power ground	-
24	RxEIN2-	I	Negative LVDS differential data input(Even data)	-
25	RxEIN2+	I	Positive LVDS differential data input(Even data)	-
26	GND	G	Power ground	-
27	RxECLK-	I	Negative LVDS differential data input(Even clock)	-
28	RxECLK+	I	Positive LVDS differential data input(Even clock)	-
29	GND	G	Power ground	-
30	RxEIN3-	I	Negative LVDS differential data input(Even data)	-
31	RxEIN3+	I	Positive LVDS differential data input(Even data)	-
32	GND	G	Power ground	-
33	STVD	O	Feedback signal	-
34	RESET	I	Global reset pin	-
35	VDD	P	Power input	-
36	VDD	P	Power input	-
37	VDD	P	Power input	-
38	VDD	P	Power input	-
39	GND	G	Power ground	-
40	GND	G	Power ground	-

6.2 Backlight Pin Assignment

Connector: HRS FH52-10S-0.5SH(05) (or equivalent)

Pin No.	Symbol	I/O	Description	Remarks
1	THERMISTORS	Rout	Thermistor	-
2	NC	NA	No Use	-
3	THERMISTORS	Rin	Thermistor	-
4	CATHODE 4	G4	LED Cathode(Negative)	-
5	CATHODE 3	G3	LED Cathode(Negative)	-
6	CATHODE 2	G2	LED Cathode(Negative)	-
7	CATHODE 1	G1	LED Cathode(Negative)	-
8	NC	NA	No Use	-
9	ANODE 1	V_{LED}	LED power supply voltage	-
10	ANODE 1	V_{LED}	LED power supply voltage	-

7. Optical Specifications

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast		CR		700	1000	—		(1)(2)
Response time	25℃	TR+TF		—	25	35	msec	(1)(3)
	-20℃			—	150	200		
	-30℃			—	300	350		
White luminance (Center)		YL	Θ=0 Normal viewing angle	400	500	—	cd/m^2	(1)(4)
Color chromaticity (CIE1931)	White	Wx		Typ. -0.05	0.307	Typ. +0.05		(1)(4)
		Wy			0.327			
	Red	Rx			0.652			
		Ry			0.339			
	Green	Gx			0.315			
		Gy			0.630			
	Blue	Bx			0.145			
		By			0.069			
Viewing angle	Hor.	ΘL	CR>10	80	85	—		
		ΘR		80	85	—		
	Ver.	ΘU		80	85	—		
		ΘD		80	85	—		
Brightness uniformity		BUNI	Θ=0	75	80	—	%	(5)
NTSC			--	--	55	--	%	

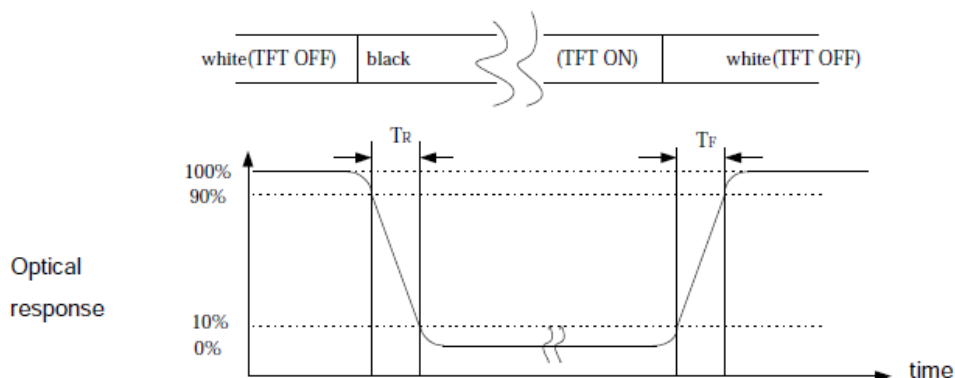Note(1)   Definition of Viewing Angle :
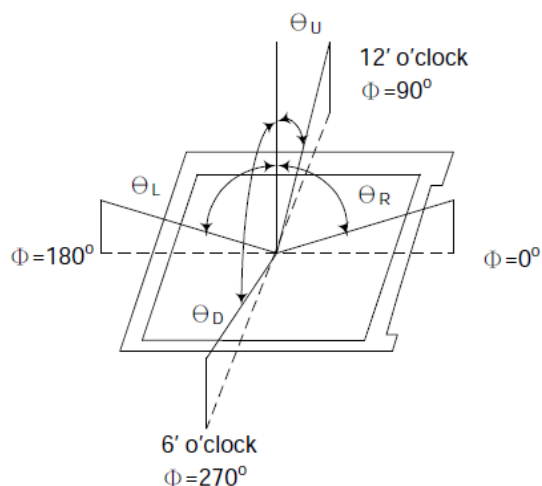
Note(2) Definition of Contrast Ratio (CR) : Measured at the center point of panel

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

Note(3) Definition of Response Time : Sum of TR and TF

Note(4) Definition of optical measurement setup
The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/Field of view: 1° / Height: 500mm.)

Photo detector Normal line θ=Φ=0°

Φ=90°
12 o'clock direction

500mm

Φ=180°   Φ=0°
Active Area

LCD Panel

Φ=270°
6 o'clock direction
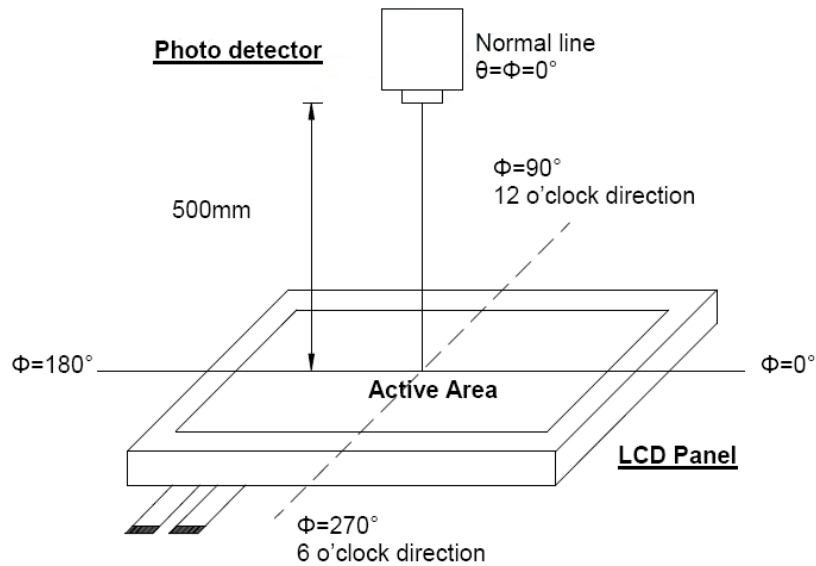
Note(5) Definition of brightness uniformity

Active area is divided into 9 measuring areas (Refer to bellow figure).

Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (Yu)} = \frac{\text{Bmin}}{\text{Bmax}}$$

L ----- Active area length   W ----- Active area width
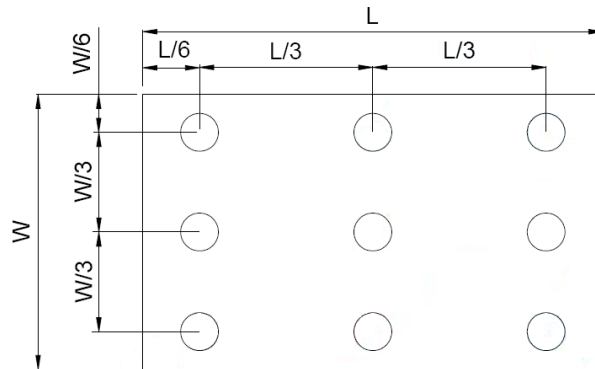
Bmax: The measured maximum luminance of all measurement position.

Bmin: The measured minimum luminance of all measurement position.

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

8. Power On / Off Sequence

1. Interface signals are also shown in the chart. Signals from any system shall be Hi-resistance state or low level when VDD voltage is off.

2. When system first start up, should keep the VDD high time longer than 200ms, otherwise may cause image sticking when VDD drop off.
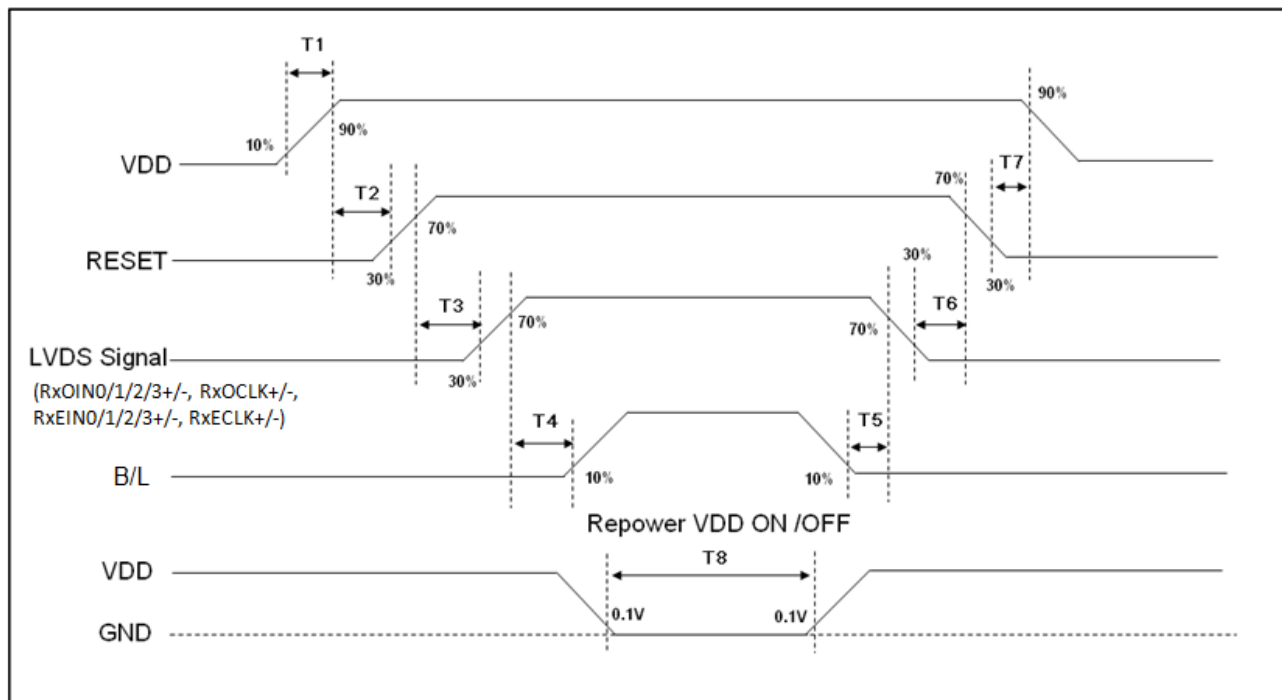

Parameter	Symbol	Unit	Min.	Typ.	Max.
VDD Rising Time	T1	ms	--	--	15
VDD ready to RESET Rising	T2	ms	1	--	20
RESET ready to LVDS Rising	T3	ms	0	--	20
LVDS ready to LED Power Rising	T4	ms	500	--	--
LED Power shut down over to LVDS off	T5	ms	200	--	--
LVDS shut down over to RESET off	T6	ms	0	--	20
RESET shut down over to VDD off	T7	ms	1	--	20
Repower VDD ON/ OFF time	T8	ms	1000	--	--

9. Reliability Test Conditions

Test Item	Test Conditions	Note
High Temperature Operation	85±3°C ,Dry t=240 hrs	
Low Temperature Operation	-30±3°C, Dry t=240 hrs	
High Temperature Storage	95±3°C , Dry t=240 hrs	1,2
Low Temperature Storage	-40±3°C ,Dry t=240 hrs	1,2
High Temperature/High Humidity Operating Test	60 °C, Humidity 90%, 240hrs	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)

Note(3)   The module shouldn't be tested over one condition, and all the tests are
independent.

Note(4)   All reliability tests should be done without the protective film.

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. General Precaution

8.1 Use Restriction

(1) 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.

8.2 Disassembling or Modification

(1) 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.

8.3 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.

8.4 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.

8.5 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.

8.6 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 cause deformation or color fading.

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

8.7 Static Electricity

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

(2) Because LCD modules 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.

8.8 Strong Light Exposure

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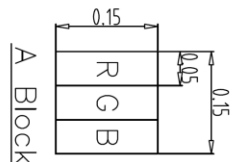
8.9 Disposal

(1) When disposing LCD module, obey the local environmental regulations.

8.10 Others

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

(2) Do not keep the LCD at the same display pattern continually. The residual image will happen and it will damage the LCD. Please use screen saver.

11. Outline Dimension

A Block (R G B) — 0.15, 0.05, 0.15

Pin assignment (CN1 — 40 pins):

Pin	Signal	Pin	Signal
1	GND	21	RxEIN1−
2	GND	22	RxEIN1+
3	RxOIN0−	23	GND
4	RxOIN0+	24	RxEIN2−
5	GND	25	RxEIN2+
6	RxOIN1−	26	GND
7	RxOIN1+	27	RxECLK−
8	GND	28	RxECLK+
9	RxOIN2−	29	GND
10	RxOIN2+	30	GND
11	GND	31	RxEIN3−
12	RxOCLK−	32	GND
13	RxOCLK+	33	STVD
14	GND	34	RESET
15	RxOIN3−	35	VDD
16	RxOIN3+	36	VDD
17	GND	37	VDD
18	GND	38	GND
19	RxEIN0+	39	GND
20	GND	40	GND

CN2 Connector (10 pins):

Pin	Signal
1	THERMISTORS
2	NC
3	THERMISTORS
4	CATHODE 4
5	CATHODE 3
6	CATHODE 2
7	CATHODE 1
8	NC
9	ANODE 1
10	ANODE 1

Note:
1. Unless indicated, Tolerance "±0.5"
2. UV Glue For OLB Protection.
3. CN1 Connector: P0.5/FH41-40S-0.5SH(05)(HRS) or Equivalent
4. CN2 Connector: P0.5/FH52-10S-0.5SH(05)(HRS) or Equivalent

Dimensions:
- 258.5±0.3 (With tape)
- 258.0±0.3 (Outline)
- 244.6±0.3 (Bezel Opening)
- 240.0 (A,A)
- 194.0±0.3 (Outline)
- 184.4±0.3 (Bezel Opening)
- 180.0 (A,A)
- (0.5), (9.6), (12.0), (4.8), (7.0)
- (97.0±0.3)
- (126.0±0.3)
- A,A center
- 10.3 Max, 3.4 Max, 2.0 Max, 6.9±0.3

TOLERANCE GRADE(±)

DIM.	A	B
IF NO.		

PARTS NO. LCM 12001600A

DWN. MILLY CHK. APPD.
DATE 08-29-22' DATE DATE

A Block

| R | G | B |

0.15, 0.05, 0.15

CN1 Connector

1	GND	21	RxEIN1−
2	GND	22	RxEIN1+
3	RxOIN0−	23	GND
4	RxOIN0+	24	RxEIN2−
5	GND	25	RxEIN2+
6	RxOIN1−	26	GND
7	RxOIN1+	27	RxECLK−
8	GND	28	RxECLK+
9	RxOIN2−	29	GND
10	RxOIN2+	30	RxEIN3−
11	GND	31	RxEIN3+
12	RxOCLK−	32	GND
13	RxOCLK+	33	STVD
14	GND	34	RESET
15	RxOIN3−	35	VDD
16	RxOIN3+	36	VDD
17	GND	37	VDD
18	RxEIN0−	38	GND
19	RxEIN0+	39	GND
20	GND	40	GND

CN2 Connector

1	THERMISTORS
2	NC
3	THERMISTORS
4	CATHODE 4
5	CATHODE 3
6	CATHODE 2
7	CATHODE 1
8	NC
9	ANODE 1
10	ANODE 1

Note:
1. Unless indicated, Tolerance "±0.5"
2. UV Glue For OLB Protection.
3. CN1 Connector: P0.5/FH41−40S−0.5SH(05) or Equivalent
4. CN2 Connector: P0.5/FH52−10S−0.5SH(05)(HRS) or Equivalent

Back View

258.0±0.3
194.0±0.3
Gold finger inside
CN1
PIN1
PIN1
CN2
60.0±1.0
(8.5)
55.7±0.5
91.5±1.0
8.5

6								12				
5								11				
4								10				
3								9				
2								8				
1								7				
								TOLERANCE GRADE(±)	A	B	DIM.	
											MM	DMN.

IE NO.
PARTS NO.LCM−12001600A
MM
DWN. MILLY
CHK.
APPD.
DATE
DATE 08−29−22'
DATE