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-1280800F1TNQW-00
APPROVED BY	
DATE	

☑ Approved For Specifications
☐ Approved For Specifications & Sample

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RECORD OF REVISION

Revision Date	Page	Contents	Editor
2012/5/29	--	New Release	Leo

1. Features

10.1 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 timing controller, voltage reference, common voltage, column driver, and row driver circuit. This TFT LCD has a 10.1-inch diagonally measured active display area with 1280 horizontal × 800 vertical pixel array resolutions.

2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
LCD size	10.1 (Diagonal)	inch
Driver element	a-Si TFT active matrix	
Display resolution	1280 (W) × 3(RGB) x 800(H)	dots
Display mode	Normally white, Transmissive	
Dot pitch	0.0565 (W) x0.1695 (H)	mm
Active area	216.96 (W) x 135.6 (H)	mm
Module size(*Note 1)	229.46 (W) x 149.1 (H) × 3.4 (D)	mm
Surface treatment	Glare	
Color arrangement	R.G.B-stripe	
Interface	Digital	
View direction (Gray Inversion)	12 O'clock	
Backlight power consumption	TBD	
Panel power consumption	TBD	
Weight	207g	

Note 1: Refer to Mechanical Drawing.

3. ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	VALUES		UNIT	REMARK
		MIN	MAX		
Power Voltage	DV_{DD}	-0.3	5.0	V	
	AV_{DD}	6.5	13.5	V	
	V_{GH}	-0.3	42	V	
	V_{GL}	-20	0.3	V	
	V_{GH}-V_{GL}	--	40	V	
Operation Temperature	T_{op}	-20	60	℃	
Storage Temperature	T_{st}	-30	70	℃	
LED Reverse Voltage	V_R	--	5	V	Each LED Note 2
LED Forward Current	I_F	--	20	mA	Each LED

Note 1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. 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 2: V_R Conditions: Zener Diode 20mA

4. ELECTRICAL SPECIFICATIONS

4.1 Typical Operation Conditions

ITEM	SYMBOL	VALUES			UNIT	REMARK
		MIN	TYP.	MAX		
Power Voltage	DV_{DD}	3.0	3.3	3.6	V	Note 2
	AV_{DD}	10.8	11	11.2	V	
	V_{GH}	19.7	20	20.3	V	
	V_{GL}	-6.5	-6.8	-7.1	V	
Input signal voltage	V_{COM}	3.6	TBD	4.0	V	
Input logic high voltage	V_{IH}	$0.7DV_{DD}$	--	DV_{DD}	V	Note 3
Input logic low voltage	V_{IL}	0	--	$0.3DV_{DD}$	V	
Current for Driver	I_{GH}	--	TBD	TBD	mA	V_{GH}=20V
	I_{GL}	--	TBD	TBD	mA	V_{GL}= -6.8V
	I_{DVDD}	--	TBD	TBD	mA	DV_{DD}=3.3V
	I_{AVDD}	--	TBD	TBD	mA	AV_{DD}=11V
Voltage for LED backlight	V_L	--	9.3	10.2	V	Note 4
Current for LED backlight	I_L	--	240	250	mA	
LED life time	--	--	20000	--	Hr	Note 5

(GND=0V, TA=25℃)

Note 1: Be sure to apply DV_{DD} and V_{GL} to the LCD first, and then apply V_{GH}.

Note 2: DV_{DD} setting should match the signals output voltage (refer to Note 3) of customer's system board.

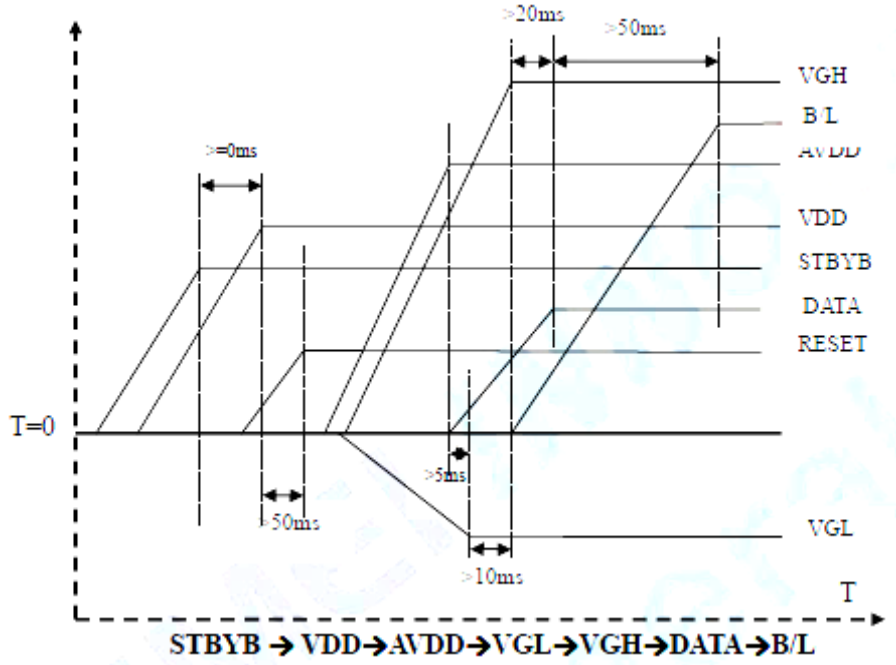
Note 3: LVDS, Reset.

Note 4: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and I_L =240mA.

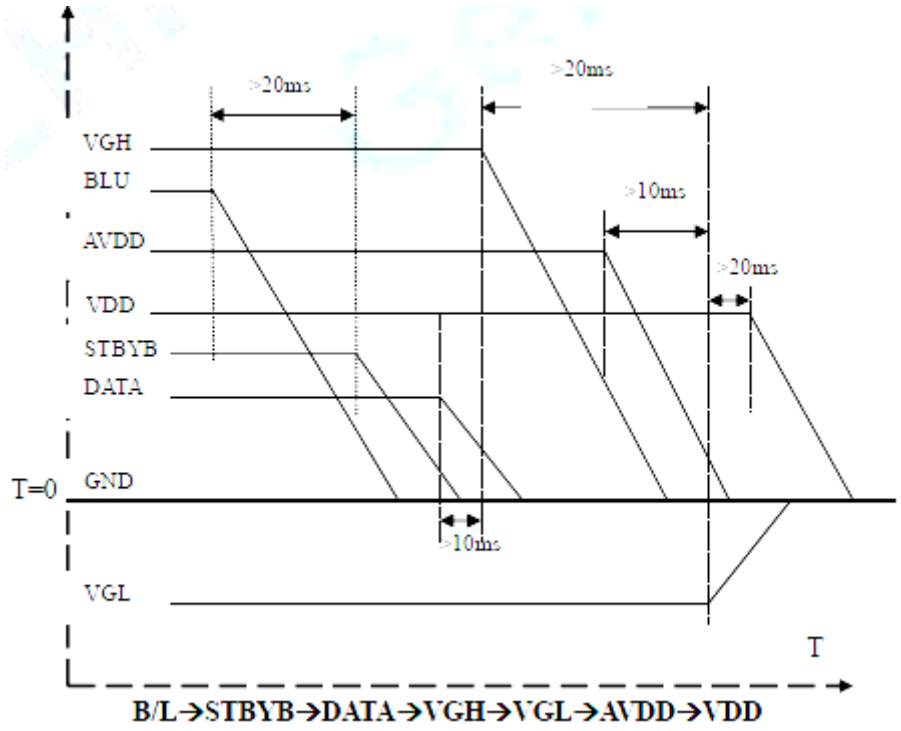
Note 5: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and I_L =240mA. The LED lifetime could be decreased if operating I_L is lager than 240mA.

4.2 Power Sequence

a. Power on:



b. Power off:

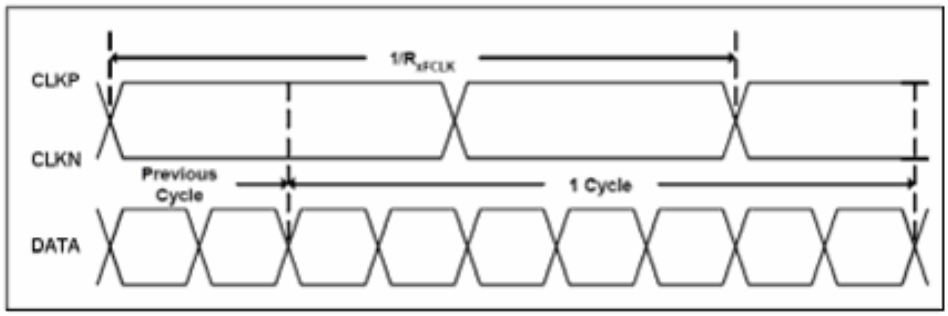


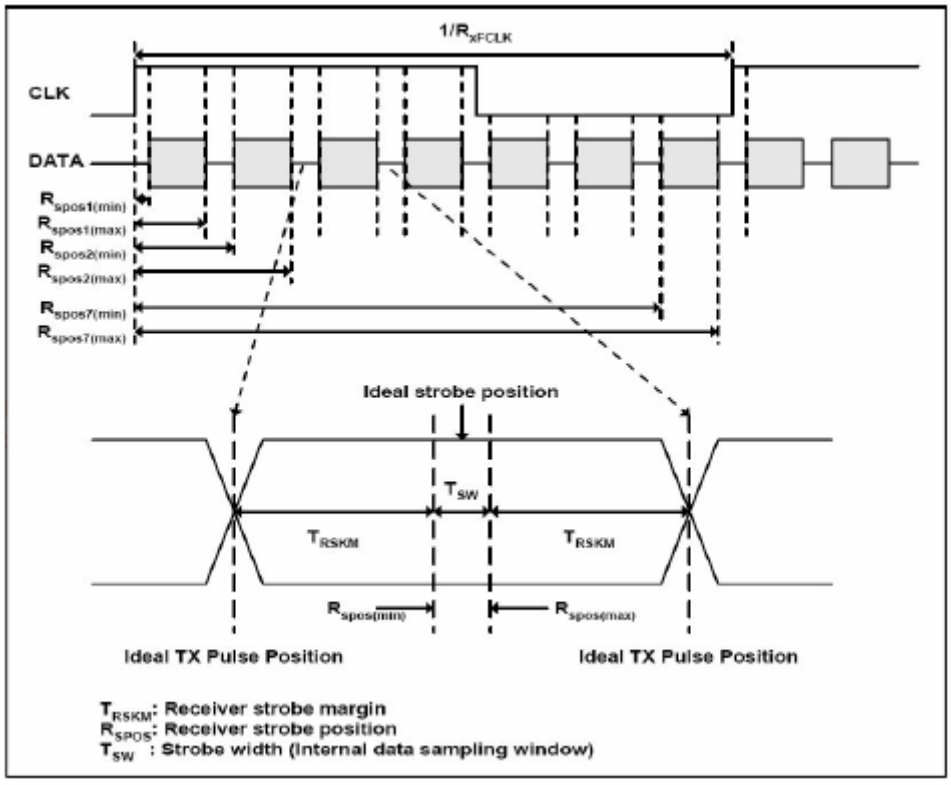
4.3 Timing Characteristics

4.3.1 AC Electrical Characteristics

ITEM	SYMBOL	VALUES			UNIT	REMARK
		MIN	TYP.	MAX		
Clock Frequency	R_{xFCLK}	20	72.4	81	MHz	
Input data skew margin	T_{RSKM}	500	--	--	ps	
Clock high time	T_{LVCH}	--	$4/(7* R_{xFCLK})$	--	ns	
Clock low time	T_{LVCL}	--	$3/(7* R_{xFCLK})$	--	ns	

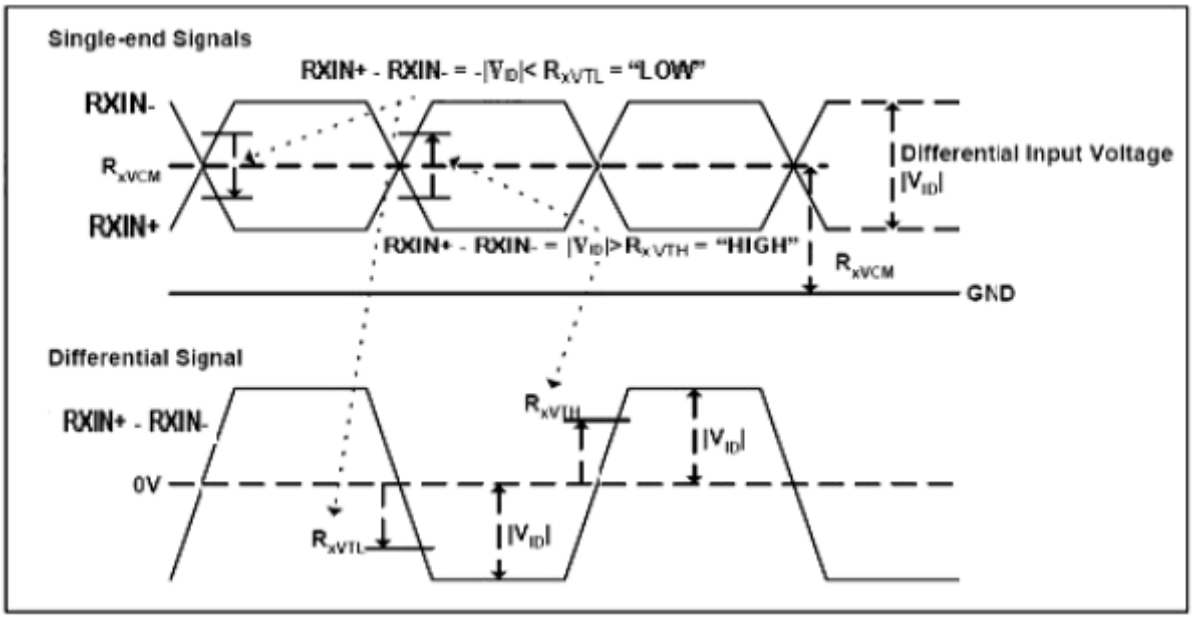
4.3.2. Input Clock and Data Timing Diagram





4.3.3. DC Electrical Characteristics

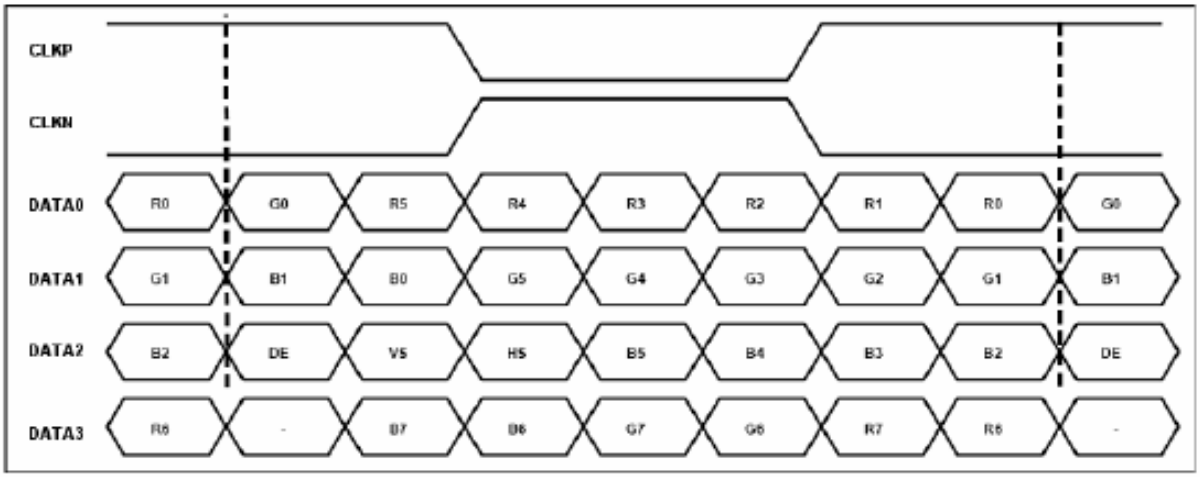
ITEM	SYMBOL	VALUES			UNIT	REMARK
		MIN	TYP.	MAX		
Differential input high Threshold voltage	R_{xVTH}	--	--	+0.1	V	R_{XVCM}=1.2V
Differential input low Threshold voltage	R_{xVTL}	-0.1	--	--	V	
Input voltage range (singled-end)	R_{xVIN}	0	--	V_{DD}-1.2+ $\|V_{ID}\|$/2	V	
Differential input common mode voltage	R_{xVCM}	$\|V_{ID}\|$/2	--	V_{DD}-1.2	V	
Differential voltage	$\|V_{ID}\|$	0.2	--	0.6	V	
Differential input leakage current	RV_{xliz}	-10	--	+10	μA	
LVDS digital Operating Current	I_{ddlvds}	--	TBD	TBD	mA	F_{clk}=81MHz , V_{DD}=3.3V
LVDS digital Standby Current	I_{stlvds}	--	TBD	TBD	μA	Clock & all Functions are stopped



4.3.4 Timing Table

ITEM	SYMBOL	VALUES			UNIT	REMARK
		MIN	TYP.	MAX		
Clock Frequency	f_{clk}	66.6	72.4	78.9	MHz	Frame rate =60Hz
Horizontal display area	t_{HD}		1280			
HS period time	t_H	1370	1440	1500	DCLK	
HS Blanking	t_{HB}	90	160	220	DCLK	
Vertical display area	t_{VD}		800		H	
VS period time	tv	810	838	877	H	
VS Blanking	t_{VB}	10	38	77	H	

4.3.5. Data Input Format



5. INTERFACE

FPC Connector is used for the module electronics interface. The model is F62240-H1210A manufactured by Vigorconn.

Pin No.	Symbol	I/O	Function	Remark
1	VCOM	P	Common Voltage	
2	VDD	P	Power Voltage for digital circuit	
3	VDD	P	Power Voltage for digital circuit	
4	NC	---	No connection	
5	Reset	I	Global reset pin	
6	STBYB	I	Standby mode, Normally pulled high STBYB = "1", normal operation STBYB = "0", timing controller, source driver will turn off, all output are High-Z	
7	GND	P	Ground	
8	RXIN0-	I	- LVDS differential data input	
9	RXIN0+	I	+ LVDS differential data input	
10	GND	P	Ground	
11	RXIN1-	I	- LVDS differential data input	
12	RXIN1+	I	+ LVDS differential data input	
13	GND	P	Ground	
14	RXIN2-	I	- LVDS differential data input	
15	RXIN2+	I	+ LVDS differential data input	
16	GND	P	Ground	
17	RXCLKIN-	I	- LVDS differential clock input	
18	RXCLKIN+	I	+ LVDS differential clock input	
19	GND	P	Ground	
20	RXIN3-	I	- LVDS differential data input	
21	RXIN3+	I	+ LVDS differential data input	
22	GND	P	Ground	
23	NC	---	No connection	
24	NC	---	No connection	

25	GND	P	Ground	
26	NC	---	No connection	
27	DIMO	O	Backlight CABC controller signal output	
28	SELB	I	6bit/8bit mode select	Note1
29	AVDD	P	Power for Analog Circuit	
30	GND	P	Ground	
31	LED-	P	LED Cathode	
32	LED-	P	LED Cathode	
33	L/R	I	Horizontal inversion	Note3
34	U/D	I	Vertical inversion	Note3
35	VGL	P	Gate OFF Voltage	
36	CABCEN1	I	CABC H/W enable	Note2
37	CABCEN0	I	CABC H/W enable	Note2
38	VGH	P	Gate ON Voltage	
39	LED+	P	LED Anode	
40	LED+	P	LED Anode	

I: input, O: output, P: Power

Note1: If LVDS input data is 6 bits, SELB must be set to High; If LVDS input data is 8 bits, SELB must be set to Low.

Note2: When CABC_EN=”00”, CABC OFF.

When CABC_EN=”01”, user interface image.

When CABC_EN=”10”, still picture.

When CABC_EN=”11”, moving image.

When CABC off, don’t connect DIMO, else connect it to backlight.

Note3: When L/R=”0”, set right to left scan direction.

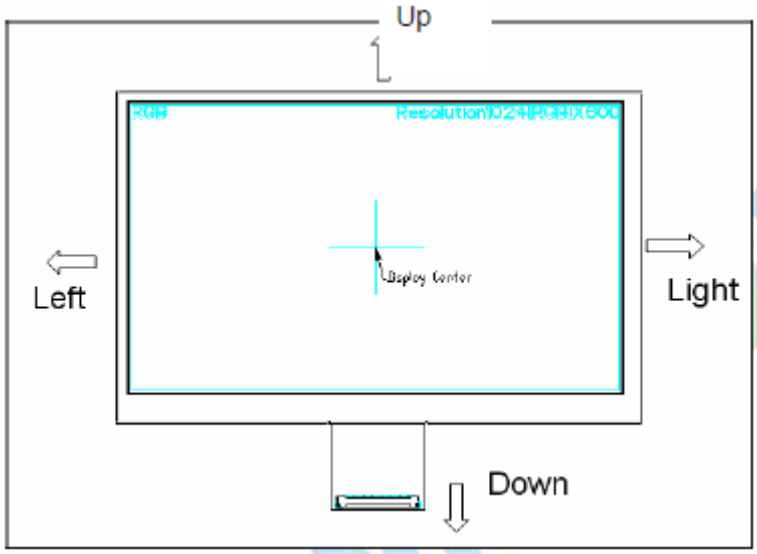
When L/R=”1”, set left to right scan direction.

When U/D=”0”, set top to bottom scan direction.

When U/D=”1”, set bottom to top scan direction.

Note: Definition of scanning direction.

Refer to the figure as below:



6. OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing angle (CR≥ 10)	θ_L	Φ=180°(9 o'clock)	65	75	-	degree	Note 1
	θ_R	Φ=0°(3 o'clock)	65	75	-		
	θ_T	Φ=90°(12 o'clock)	65	75	-		
	θ_B	Φ=270°(6 o'clock)	60	70	-		
Response time	T_{ON}	Normal θ=Φ=0°	-	10	20	msec	Note 3
	T_{OFF}		-	15	30	msec	Note 3
Contrast ratio	CR		500	700	-	-	Note 4
Color chromaticity	W_X		0.26	0.31	0.36	-	Note 2 Note 5 Note 6
	W_Y		0.28	0.33	0.38	-	
Luminance	L		200	250	-	cd/m²	Note 6
Luminance uniformity	Y_U		70	75	-	%	Note 7

Test Conditions:

1. VDD=3.3V, IL=240mA (Backlight current), the ambient temperature is 25℃.
2. The test systems refer to Note 2.

Note 1: Definition of viewing angle range

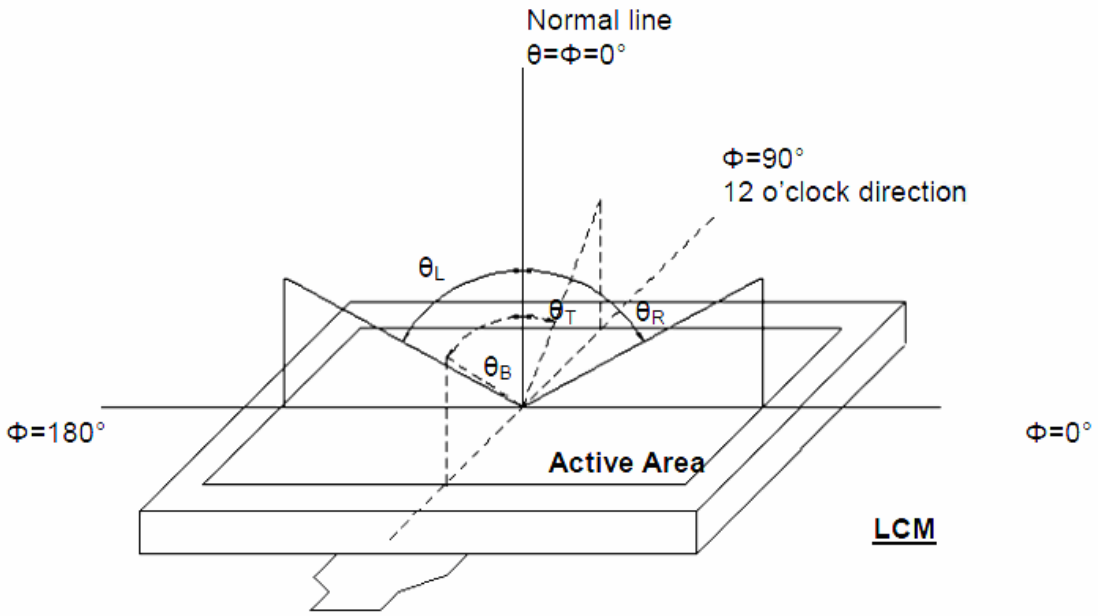


Fig. 6-1 Definition of viewing angle

Note 2: Definition of optical measurement system.

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.)

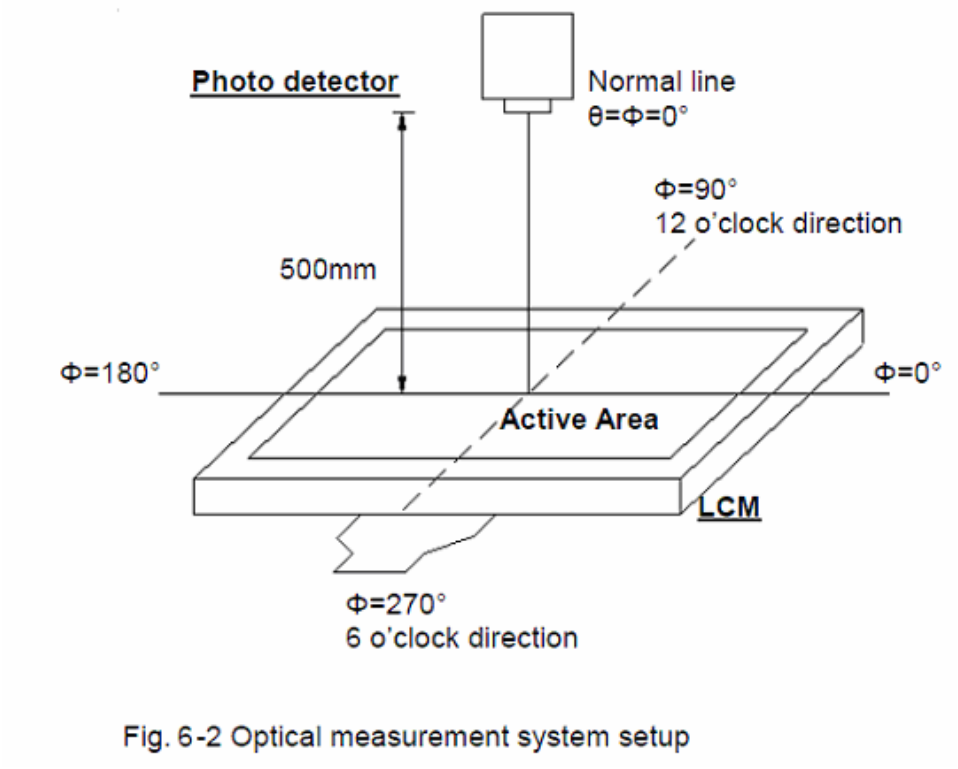


Fig. 6-2 Optical measurement system setup

Note 3: Definition of Response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.

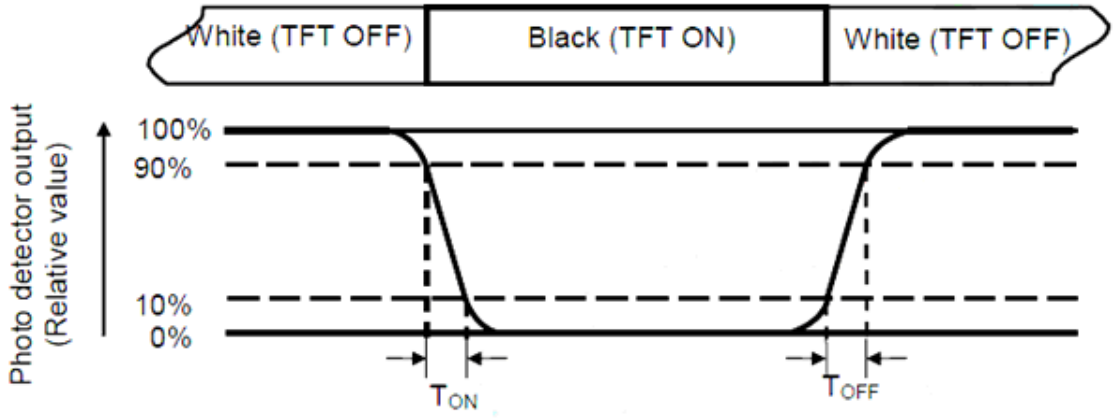


Fig. 6-3 Definition of response time

Note 4: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Brightness @ "White" state}}{\text{Brightness @ "Black" state}}$$

Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6: All input terminals LCD panel must be ground while measuring the center area of the panel.

The LED driving condition is I_L=240mA.

Note 7: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer to Fig. 6-4).

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

$$Luminance\ \ Uniformity\ (Yu) = \frac{B_{min}}{B_{max}}$$

L-------Active area length W----- Active area width

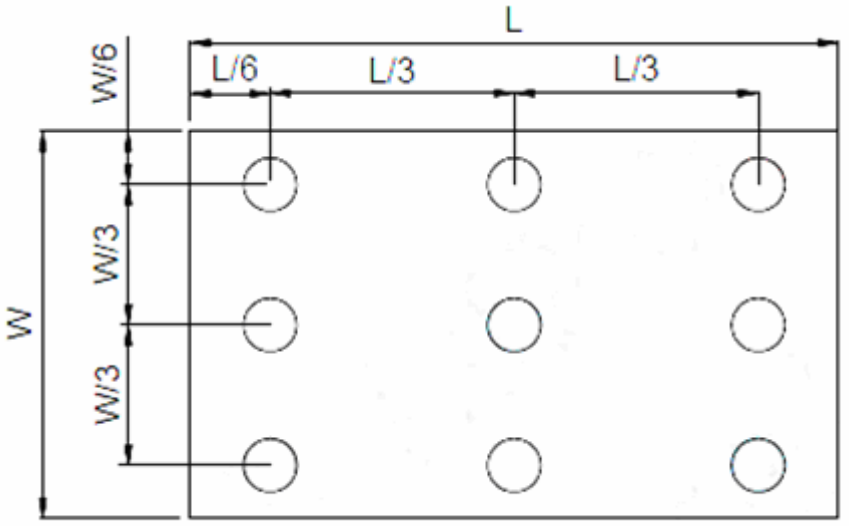


Fig. 6-4 Definition of measuring points

B_{max}: The measured maximum luminance of all measurement position.

B_{min}: The measured minimum luminance of all measurement position.

7. RELIABILITY TEST CONDITIONS

Item	Test Conditions	Note
High Temperature Storage	Ta = 60℃ 240 hrs	Note 1,Note 4
Low Temperature Storage	Ta = -20℃ 240 hrs	Note 1,Note 4
High Temperature Operation	Ts = 50℃ 240 hrs	Note 2,Note 4
Low Temperature Operation	Ts = -10℃ 240 hrs	Note 1,Note 4
High Temperature and High Humidity (operation)	Ta = +40℃, 90%RH 240 hrs	Note 4
Thermal Cycling Test (non operation)	-10℃ (30min) → +50℃ (30min), 100cycles, Start with cold temperature and end with high temperature.	Note 4
Vibration	Frequency range:10~55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X. Y. Z. (6 hours for total)	
Mechanical Shock	100G 6ms,±X, ±Y, ±Z 3 times for each direction	
Electro Static Discharge	± 2KV, Human Body Mode, 100pF/1500Ω	

Note 1: Ta is the ambient temperature of samples.

Note 2: Ts is the temperature of panel's surface.

Note 3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

Note 4: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

8. Inspection Specifications

8-1 Scope

Specifications contain

8-1-1 Display Quality Evaluation

8-1-2 Mechanics Specification

8-2 Sampling Plan

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

8-2-1 Lot size: Quantity per shipment as one lot (different model as different lot).

8-2-2 Sampling type: Normal inspection, single sampling.

8-2-3 Sampling level: Level II.

8-2-4 AQL: Acceptable Quality Level

Major defect: AQL=0.65

Minor defect: AQL=1.0

8-3 Panel Inspection Condition

8-3-1 Environment:

Room Temperature: 25±5°C.

Humidity: 65±5% RH.

Illumination: 300 ~ 700 Lux.

8-3-2 Inspection Distance:

35-40 cm

8-3-3 Inspection Angle:

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

8-3-4 Inspection time：

Perceptibility Test Time: 20 seconds max.

8-4 Display Quality

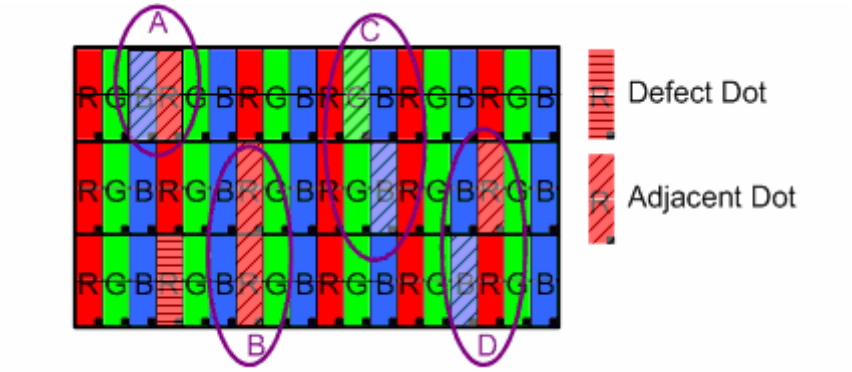
8-4-1 Function Related:

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

8-4-2 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 follows:



(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.

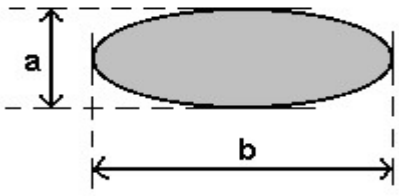
(4) Defects on the Black Matrix, out of Display area, are not considered as a defect or counted.

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

8-4-3 Visual Inspection specifications:

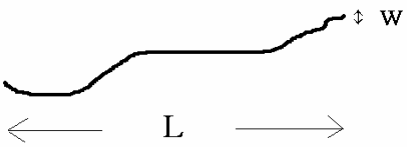
Defect Type	Specification	Count(N)
Dot Shape (Particle、Scratch and Bubbles in display area)	D≤0.25mm	Ignored
	0.25mm < D≤ 0.5mm	N≤ 3
	D > 0.5mm	N=0
Line Shape (Particles、Scratch、Lint and Bubbles in display area)	W≤ 0.07mm	Ignored
	0.07mm<W≤ 0.1mm ，L≤ 5mm	N≤ 3
	W > 0.1mm ， L > 5mm	N=0

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



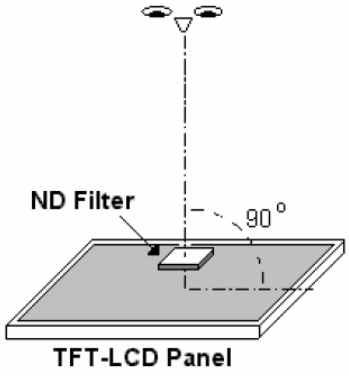
$\phi = (a + b) / 2$

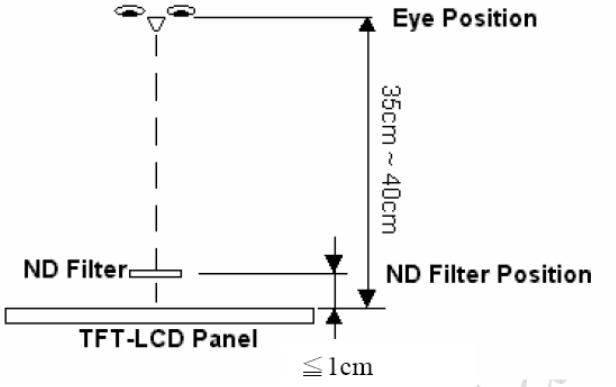
1. (White, black) Spot
2. Polarizer Bubble



1. fiber

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





9. GENERAL PRECAUTION

9.1 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.

9.2 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.

9.3 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.

9.4 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.

9.5 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.

9.6 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.

9.7 Mechanism

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

9.8 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.

9.9 Strong Light Exposure

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

9.10 Disposal

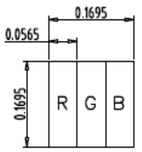
When disposing LCD module, obey the local environmental regulations.

9.11 Others

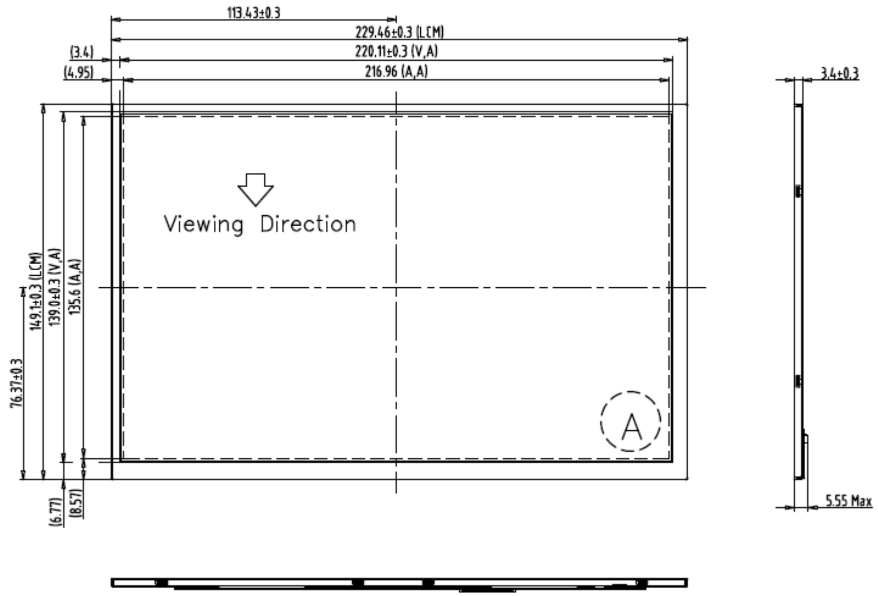
AMIPRE will provide one year warrantee for all products and three months warrantee for all repairing products.

10. OUTLINE DIMENSION

REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	05-30-12'	Henry



A Block



Connector A

1	VCOM	21	RXIN3+
2	VDD	22	GND
3	VDD	23	NC
4	NC	24	NC
5	RESET	25	GND
6	STBYB	26	NC
7	GND	27	DIMO
8	RXIN0–	28	SELB
9	RXIN0+	29	AVDD
10	GND	30	GND
11	RXIN1–	31	LED–
12	RXIN1+	32	LED–
13	GND	33	L/R
14	RXIN2–	34	U/D
15	RXIN2+	35	VGL
16	GND	36	CABCEN1
17	RXCLKIN–	37	CABCEN0
18	RXCLKIN+	38	VGH
19	GND	39	LED+
20	RXIN3–	40	LED+

Note:

1. Unless indicated, Tolerance "±0.3"
2. UV Glue For OLB Protection.
3. Connector A (40PIN): F62240–H12100 or equivalent.

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

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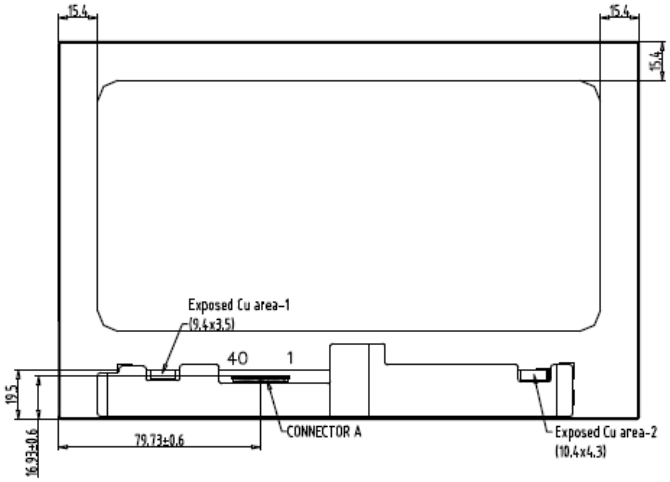
DIM. MM	DWN. Henry	DATE 05-30-12'	TITLE 1280800F1 (10.1")
IE NO.	CHK.	DATE	
PARTS NO. LCM 1280800F1	APPD.	DATE	DWG. NO. *120597MA — SHEET 1 OF 1

REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	05-30-12	Henry

Connector A

1	VCOM	21	RXIN3+
2	VDD	22	GND
3	VDD	23	NC
4	NC	24	NC
5	RESET	25	GND
6	STBYB	26	NC
7	GND	27	DIMO
8	RXIN0−	28	SELB
9	RXIN0+	29	AVDD
10	GND	30	GND
11	RXIN1−	31	LED−
12	RXIN1+	32	LED−
13	GND	33	L/R
14	RXIN2−	34	U/D
15	RXIN2+	35	VGL
16	GND	36	CABCEN1
17	RXCLKIN−	37	CABCEN0
18	RXCLKIN+	38	VGH
19	GND	39	LED+
20	RXIN3−	40	LED+



Note:
1. Unless indicated, Tolerance "±0.3"
2. UV Glue For OLB Protection.
3. Connector A (40PIN): F62240−H12100 or equivalent.

				TOLERANCE GRADE(±)	A	B	DIM. MM	DWN. Henry	DATE 05−30−12	TITLE 1280800F1 (10.1")	
1		7									
2		8					IE NO.	CHK.	DATE		
3		9									
4		10					PARTS NO. LCM−1 1280800F1	APPD.	DATE	DWG. NO. *120598MA	SHEET 1 OF 1
5		11									
6		12									

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AMPIRE CO., LTD.

Date : 2012/5/29