



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-1366768ATMQW-00
APPROVED BY	
DATE	

- Approved For Specifications
 Approved For Specifications & Sample

AMPIRE CO., LTD.

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APPROVED BY	CHECKED BY	ORGANIZED BY

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2010/8/17	-	New Release	Kevin

1. FEATURES

AM-1366768A is a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This module is composed of a TFT LCD panel, a driving circuit and a back light system. This TFT LCD has a 12 (16:9) inch diagonally measured active display area with HD (1366(horizontal) x 768 pixel(vertical)pixel) resolution.

- (1) 12.1 (16:9 diagonal) inch configuration
- (2) One channel LVDS interface
- (3) 262K color by 6 bit R.G.B signal input
- (4) RoHS Compliance
- (5) Halogen Free

2. PHYSICAL SPECIFICATIONS

Item	Specifications	Unit	Note
Active area	268.01 (H) ×150.68 (V)	mm	
Number of pixels	1366(H) × 768(V)	pixels	
Pixel pitch	0.1962(H) × 0.1962(V)	mm	
Pixel arrangement	RGB Vertical stripe		
Display colors	262,144	colors	
Display mode	Normally White		
Dimensional outline	279.0 (Typ) ×167.2 (Typ) ×5.1(D)Max	mm	
Weight	250 (Typ.)	gram	
Back-light	White LED		
NTSC	50	%	
Surface treatment	Glare, Hard-Coating (3H)		
Power consumption	Logic system 0.95W (Typ.)	W	

3. ABSOLUTE MAX. RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit.

Item	Symbol	Values		UNIT	Note
		Min.	Max.		
Logic Power Supply	V _{DD}	-0.3	6.0	V	
Operating Temperature	T _{OPA}	0	50	°C	
Storage Temperature	T _{STG}	-20	60	°C	

4. ELECTRICAL CHARACTERISTICS

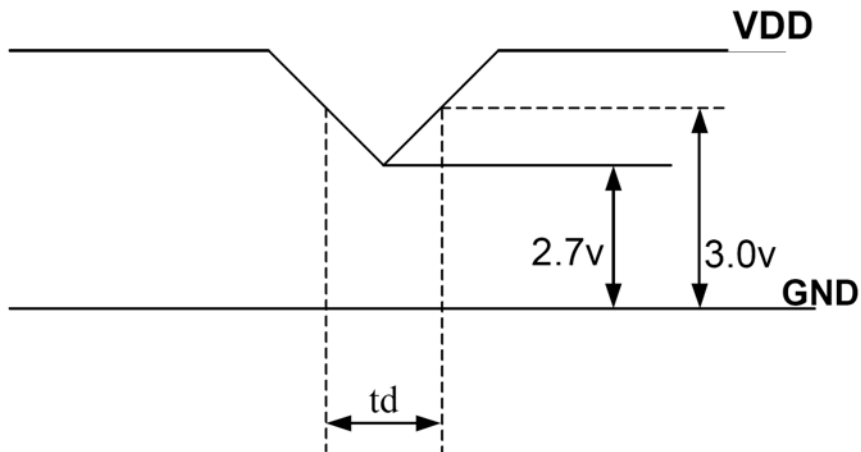
4.1 TFT LCD Module

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	V_{DD}	3.0	3.3	3.6	V	Note (2)
Current of power supply	I_{DD}	-	0.3	-	A	$V_{DD} = 3.3V$ · L0 pattern
Inrush current	I_{RUSH}	-	-	1.50	A	Note (2)

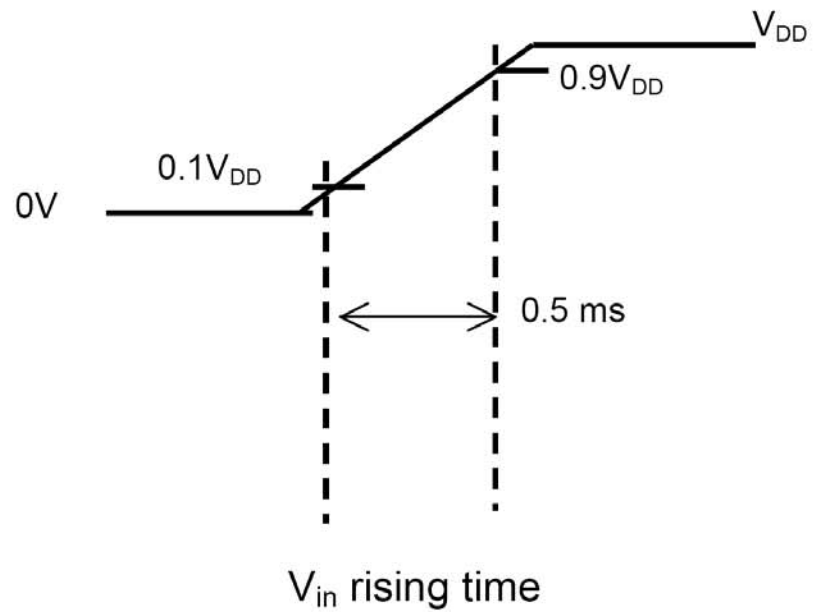
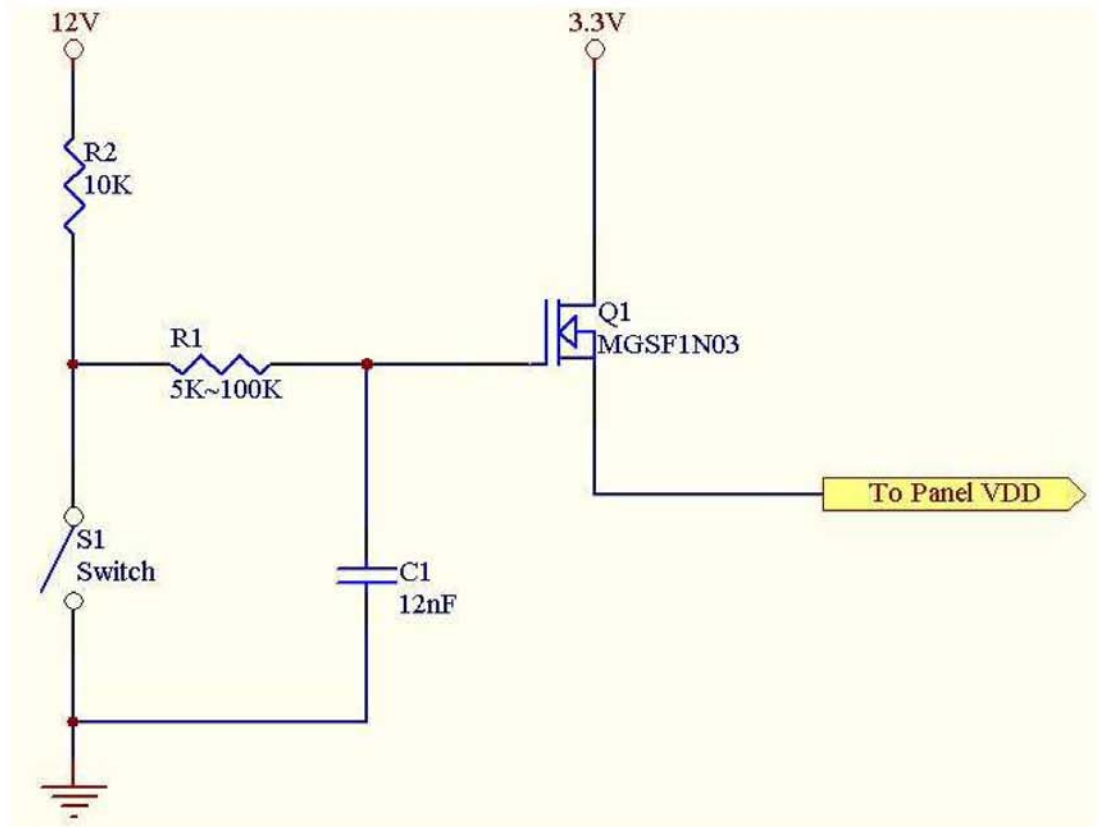
Note (1): V_{DD} -dip condition:

When V_{DD} operating within $2.7V \leq V_{DD} < 3.0V$, $t_d \leq 10ms$, the display may momentarily become abnormal.

$V_{DD} < 2.7V$, V_{DD} dip condition should also follow the Power On/Off conditions for supply voltage.



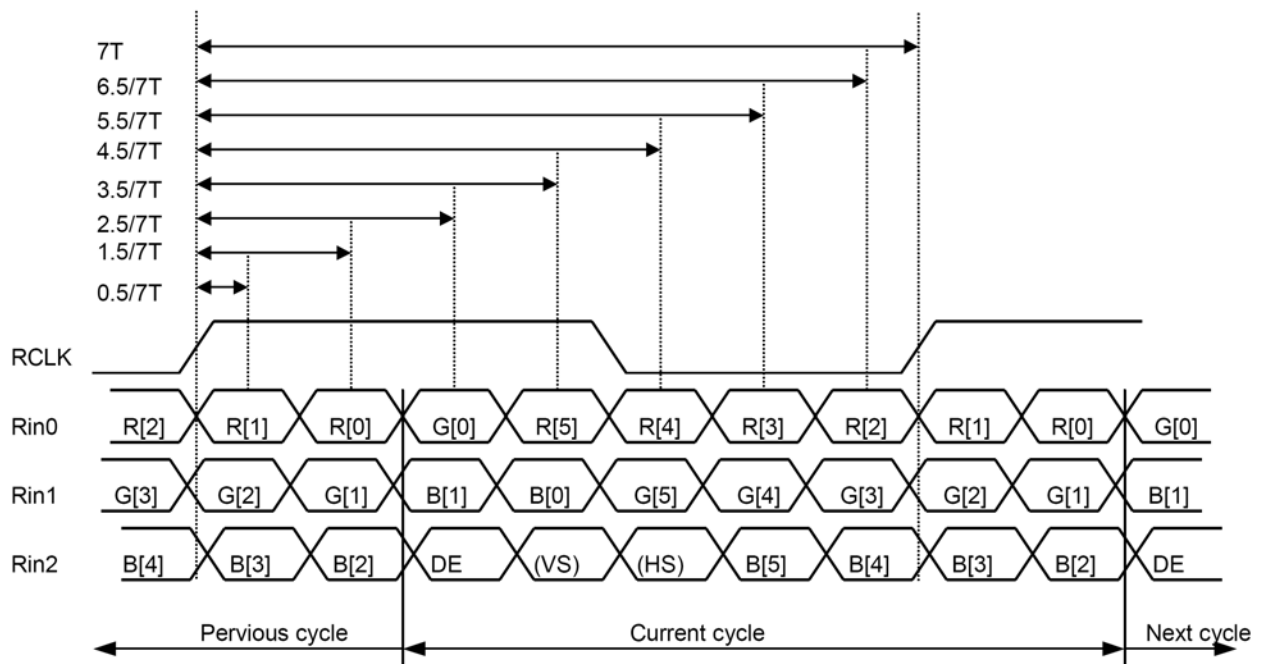
Note : (2) Power on Inrush current test circuit



4.2 Switching Characteristics for LVDS Receiver

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High Threshold	V _{th}	—	—	100	mV	V _{CM} =1.2V
Differential Input Low Threshold	V _{tl}	-100	—	—	mV	
Input Current	I _{IN}	-10	—	+10	uA	
Differential input Voltage	V _{ID}	0.1	—	0.6	V	
Common Mode Voltage Offset	V _{CM}	(V _{ID} /2)	1.25	2.4-(V _{ID} /2)	V	

4.3 Bit Mapping & Interface Definition

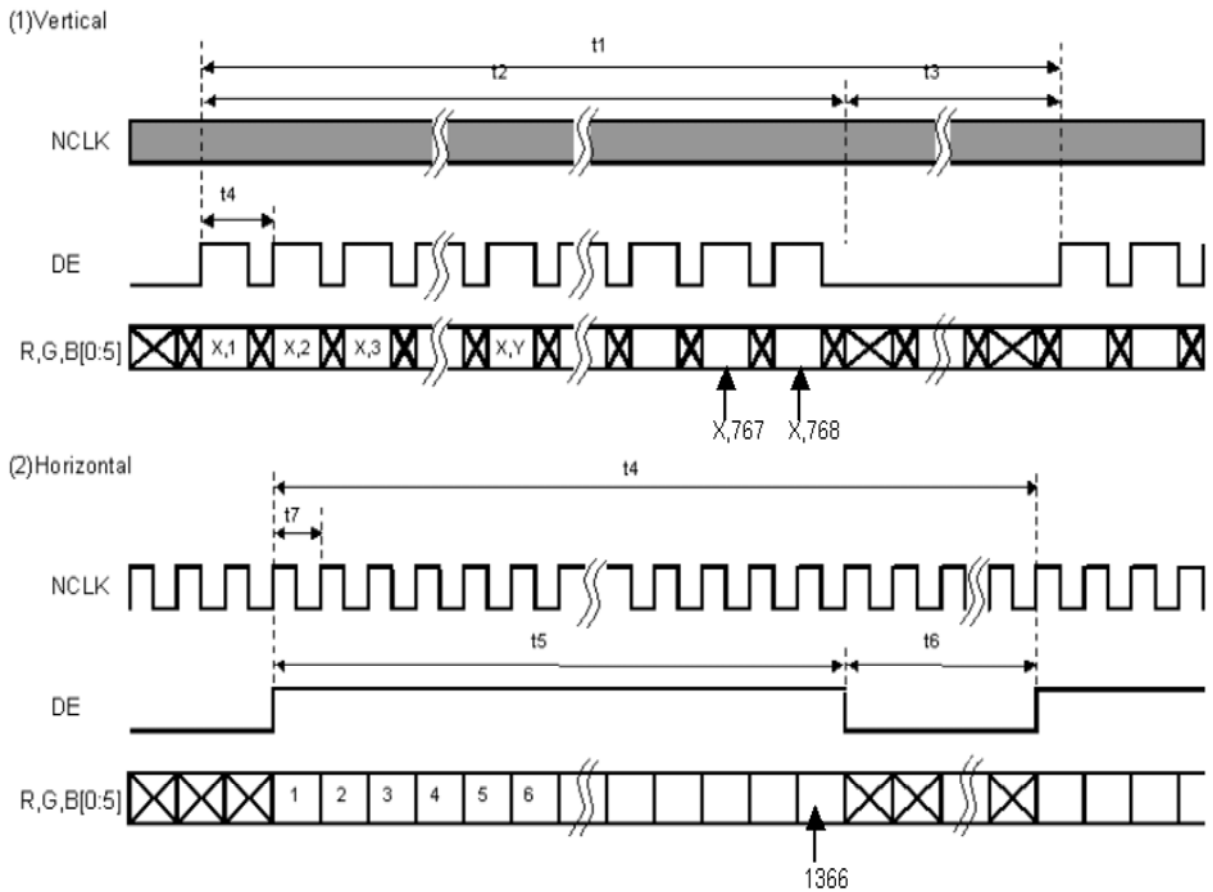


LVDS Receiver Input Timing Definition
for 6bits LVDS input

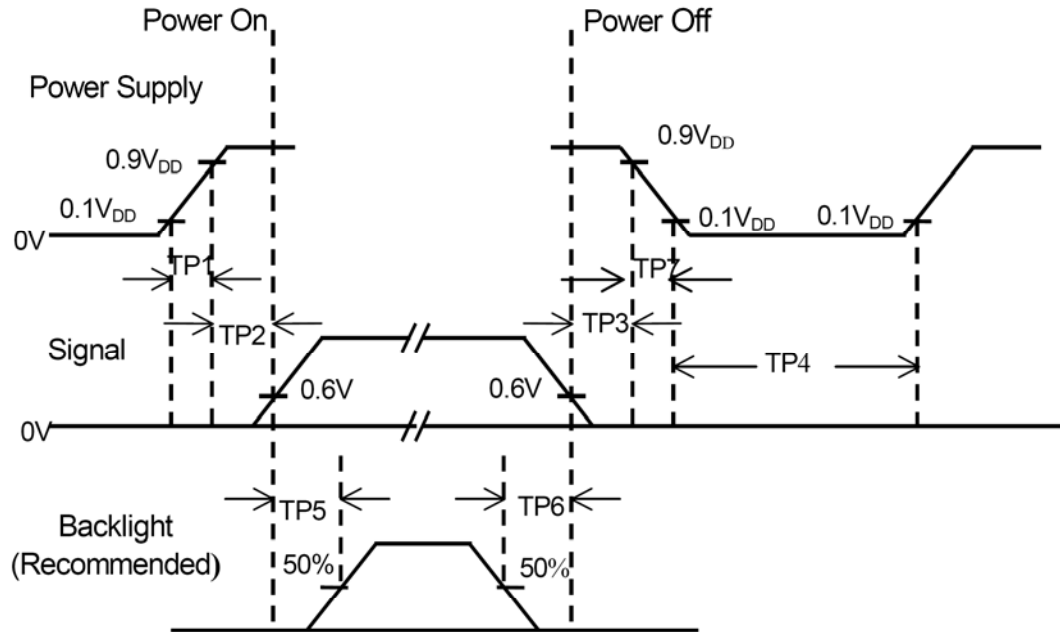
4.4 Interface Timing (DE mode)

Item	Symbol	Min.	Typ.	Max.	Unit
Frame Rate	--	55	60	-	Hz
Frame Period	t1	778	806	888	line
Vertical Display Time	t2	768	768	768	line
Vertical Blanking Time	t3	10	38	120	line
1 Line Scanning Time	t4	1437	1560	1936	clock
Horizontal Display Time	t5	1366	1366	1366	clock
Horizontal Blanking Time	t6	71	194	570	clock
Clock Rate	t7	50.3	75.44	80	MHz

Timing Diagram of Interface Signal (DE mode)



4.5 Power On / Off Sequence



Item	Min.	Typ.	Max.	Unit	Remark
TP1	0.5	--	10	msec	
TP2	0	--	50	msec	
TP3	0	--	50	msec	
TP4	1000	--	--	msec	
TP5	200	--	--	msec	
TP6	200	--	--	msec	
TP7	0.5	--	10	msec	

- Note :**
- (1) The supply voltage of the external system for the module input should be the same as the definition of V_{DD} .
 - (2) Apply the lamp voltage within the LCD operation range. When the back-light turns on before the LCD operation or the LCD turns off before the back-light turns off, the display may momentarily become white.
 - (3) In case of $V_{DD} = \text{off level}$, please keep the level of input signal on the low or keep a high impedance.
 - (4) TP4 should be measured after the module has been fully discharged between power off and on period.
 - (5) Interface signal shall not be kept at high impedance when the power is on.

4.6 Backlight Unit

Parameter	Symbol	Min	Typ	Max	Units	Condition
LED Current	I_F	--	20	20.6	mA	Ta=25°C
LED Voltage	V_F	3.0	3.2	3.4	Volt	Ta=25°C
LED Power consumption	P_{LED}	--	1.92	2.1	Watt	Ta=25°C Note (1)
LED Life-Time	N/A	10,000	--	--	Hour	Ta=25°C $I_F=20mA$ Note (2)

Note (1): Calculator value for reference $P=I_F \times V_F \times N$ (LED Qty')

Note (2): The LED lifetime defines as the estimated time to 50% degradation of final luminous.

4.7 LED Driver

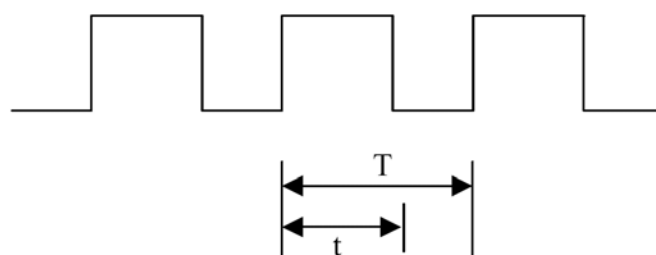
4.7.1 Absolute Maximum Rating

Item	Symbol	Min.	Max.	Unit	Note
LED Power Supply voltage	V_{LED}	-0.3	24	Volt	
LED_EN, PWM pin Voltage	V_{EN}, V_{PWM}	--	5.5	Volt	

4.7.2 DC Electrical Characteristics

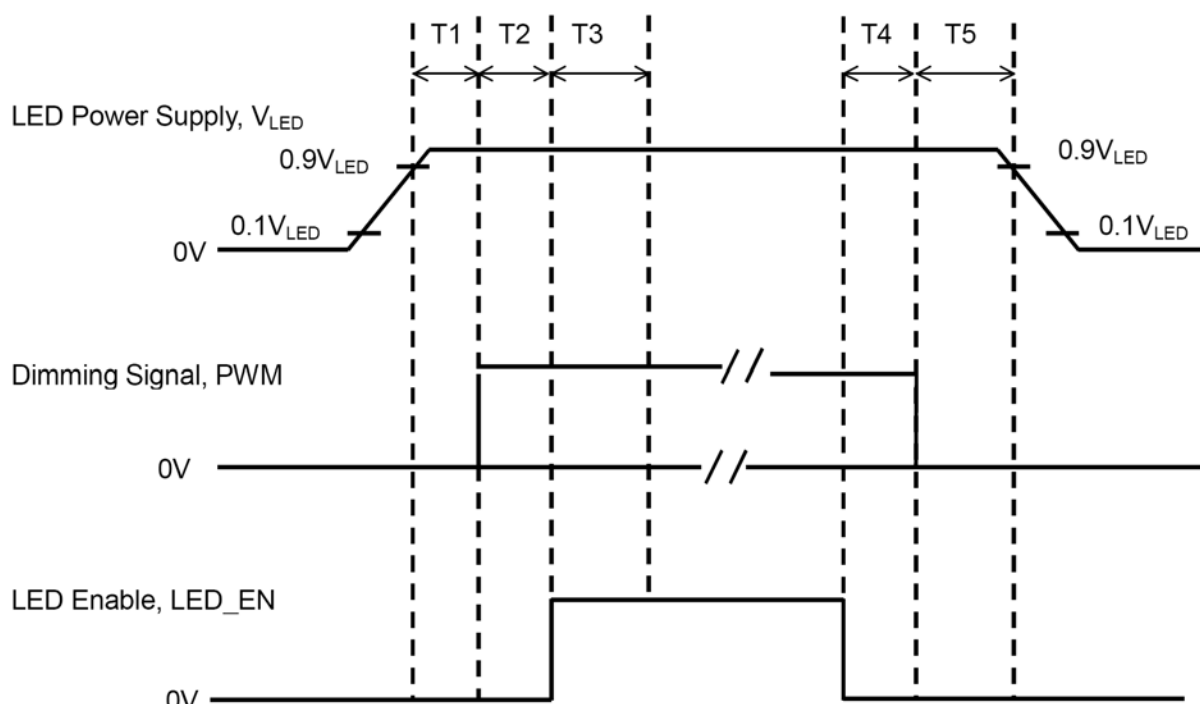
Parameter	Symbol	Min	Typ	Max	Units	Remark
LED Power Supply Voltage	V_{LED}	7.0	--	21.0	Volt	
LED_EN High Threshold	V_{ENH}	2.0	--	--	Volt	
LED_EN Low Threshold	V_{ENL}	--	--	0.3	Volt	
PWM High Threshold	V_{PWMH}	2.0	--	--	Volt	
PWM Low Threshold	V_{PWML}	--	--	0.15	Volt	
PWM Frequency	F_{PWM}	225	--	275	Hz	
PWM Duty Cycle	T_D	10	--	100	%	Note(1)

Note (1): PWM Duty Cycle



$$\text{Duty Cycle} = (t / T) * 100\%$$

4.7.3 LED Power on/off sequence



Symbol	Value			Unit
	Min	Typ	Max	
T1	10	--	--	ms
T2	10	--	--	
T3	50	--	--	
T4	0	--	--	
T5	10	--	--	

Note (1): The duty of LED dimming signal should be more than 20% in T2 and T3

Note (2): PWM can adjust brightness to control Pin. Pulse duty the bigger the brighter

5. OPTICAL SPECIFICATION

5.1 Optical specification

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Contrast	CR	$\Theta=0$ Normal viewing angle	400	500	—		(1)(2)(4)	
Response time	Rising		Tr	—	3	6	msec	(1)(3)
	Falling		Tf	—	9	18		
White luminance (5 point)	Y_L			160	200	—	cd/m ²	(1)(4)(5) ($I_L=20mA$)
Color chromaticity (CIE1931)	Red		R_x	0.561	0.591	0.621		
			R_y	0.324	0.354	0.384		
	Green		G_x	0.293	0.322	0.352		
			G_y	0.517	0.547	0.577		
	Blue		B_x	0.123	0.153	0.183		
			B_y	0.068	0.098	0.128		
	White	W_x	0.283	0.313	0.343			
		W_y	0.299	0.329	0.359			
Viewing angle	Hor.	Θ_L	40	45	—		(1)(4)	
		Θ_R	40	45	—			
	Ver.	Θ_U	10	15	—			
		Θ_D	30	35	—			
Brightness uniformity	B_{UNI}	$\Theta=0$ (5point)	80	—	—	%	(6)	
Brightness Uniformity	B_{UNI}	$\Theta=0$ (13 points)	70	—	—	%	(6)	

5.2 Measuring Condition

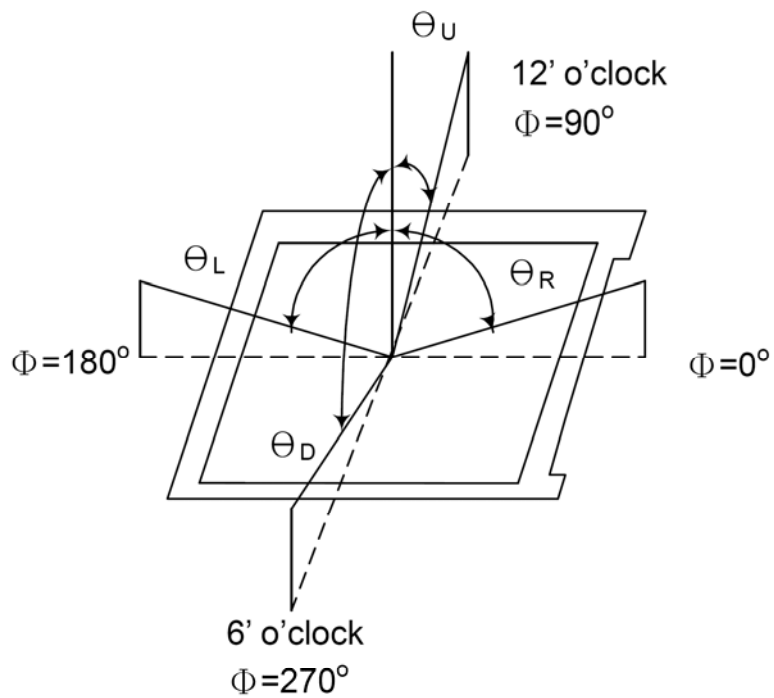
- Measuring surrounding : dark room
- Ambient temperature : $25\pm 2^\circ\text{C}$
- 15min. warm-up time

5.3 Measuring Equipment

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

- Measuring spot size : 20 ~ 21 mm

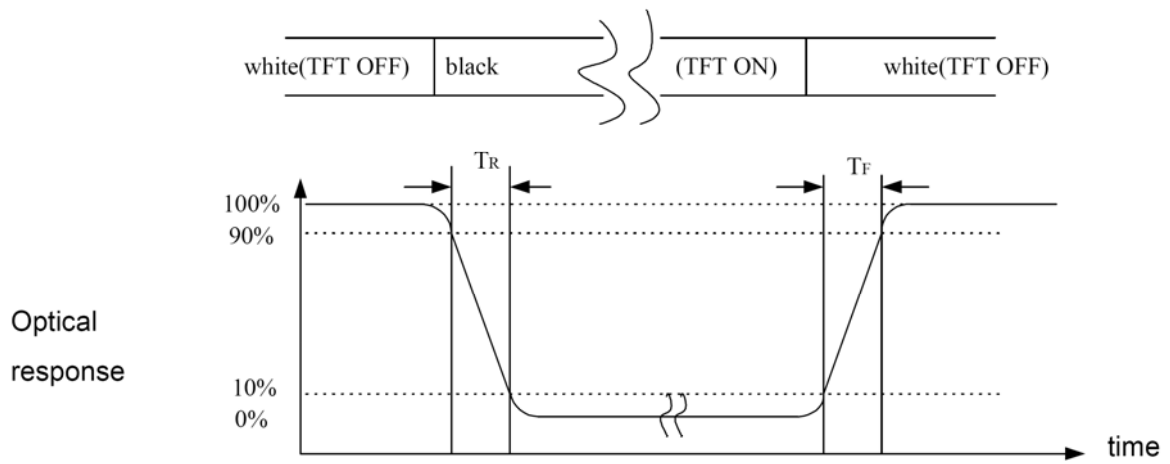
Note (1) Definition of Viewing Angle:



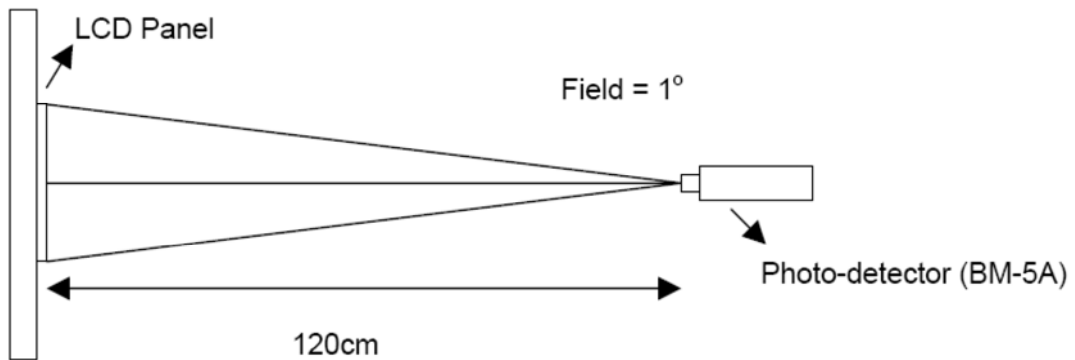
Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

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

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

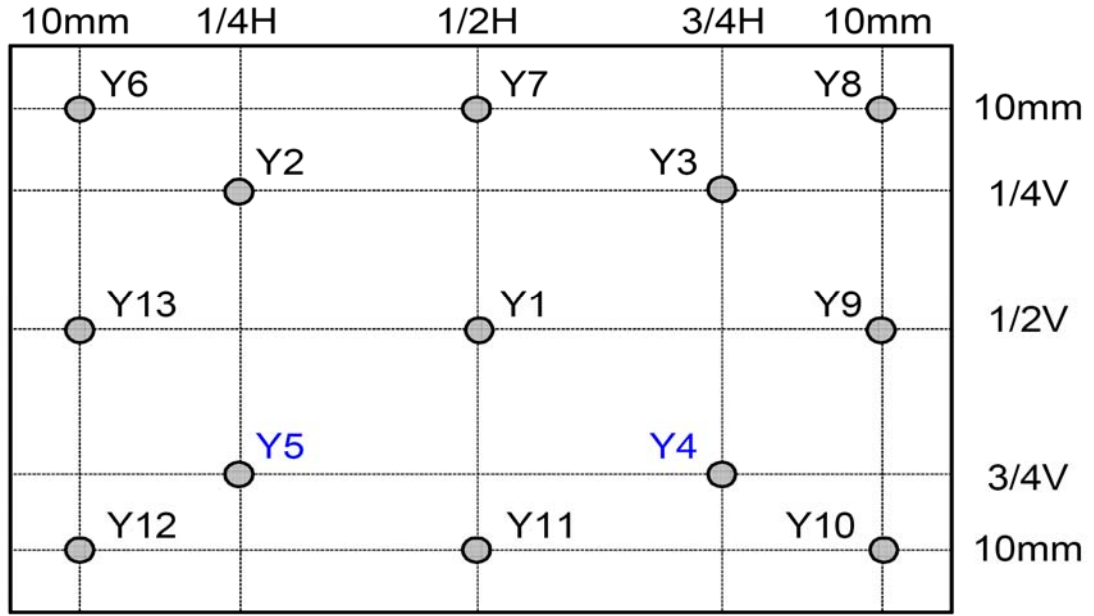


Note (4) Definition of optical measurement setup



Note (5) Definition of Average Luminance Uniformity of White (5 Point)

$$\text{Average Luminance Uniformity} = \frac{Y_1+Y_2+Y_3+Y_4+Y_5}{5}$$



Note (6) Definition of brightness uniformity

$$\text{Luminance uniformity(5 points)} = \frac{(\text{Min Luminance of 5 points})}{(\text{Max Luminance of 5 points})} \times 100\%$$

$$\text{Luminance uniformity(13points)} = \frac{(\text{Min Luminance of 13 points})}{(\text{Max Luminance of 13 points})} \times 100\%$$

6. INTERFACE

6.1 Electrical Interface Connection

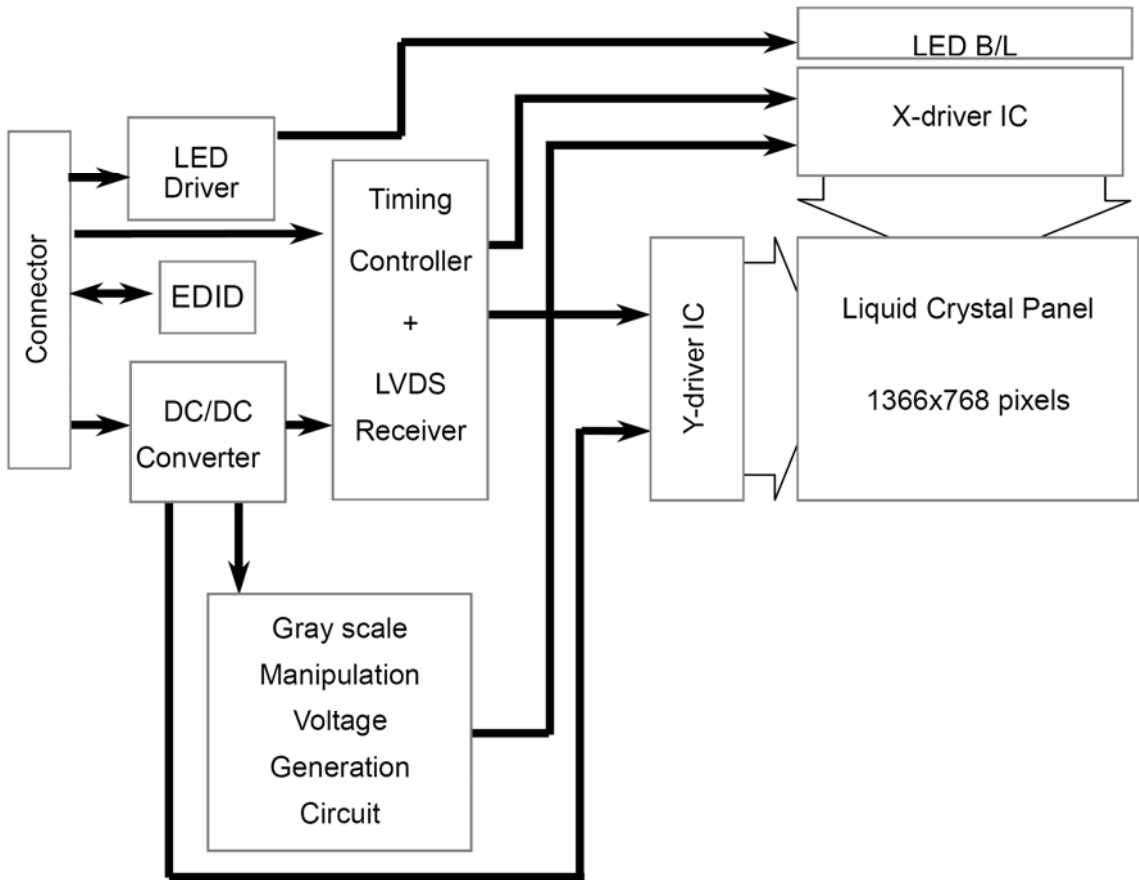
CN1 : (Input signal) : IPEX 20455-040E-12 (IPEX or equivalent)

Pin No.	Signal	Description
1	NC	Not connection
2	AVDD	Power Supply, 3.3V (typical)
3	AVDD	Power Supply, 3.3V (typical)
4	DVDD	DDC 3.3V power
5	NC	No Connection
6	SCL	EDID Clock
7	SDA	EDID Data
8	Rin0-	- LVDS differential data input (R0-R5,G0)
9	Rin0+	+LVDS differential data input (R0-R5,G0)
10	GND	Ground
11	Rin1-	- LVDS differential data input(G1-G5,B0-B1)
12	Rin1+	+LVDS differential data input (G1-G5,B0-B1)
13	GND	Ground
14	Rin2-	- LVDS differential data input (B2-B5,HS,VS,DE)
15	Rin2+	+LVDS differential data input (B2-B5,HS,VS,DE)
16	GND	Ground
17	CIKIN-	-LVDS differential clock input
18	CIKIN+	+LVDS differential clock input
19	GND	Ground
20	NC	No Connection
21	NC	No Connection
22	GND	Ground-Shield
23	NC	No Connection
24	NC	No Connection
25	GND	Ground-Shield
26	NC	No Connection
27	NC	No Connection
28	GND	Ground-Shield
29	NC	No Connection
30	NC	No Connection
31	VLED_GND	LED Ground
32	VLED_GND	LED Ground
33	VLED_GND	LED Ground
34	NC	No Connection
35	PWM	PWM Signal for LED dimming control
36	LED_EN	LED Enable Pin (+3V Input)
37	NC	No Connection
38	VLED	LED Power Supply 7-21V
39	VLED	LED Power Supply 7-21V
40	VLED	LED Power Supply 7-21V

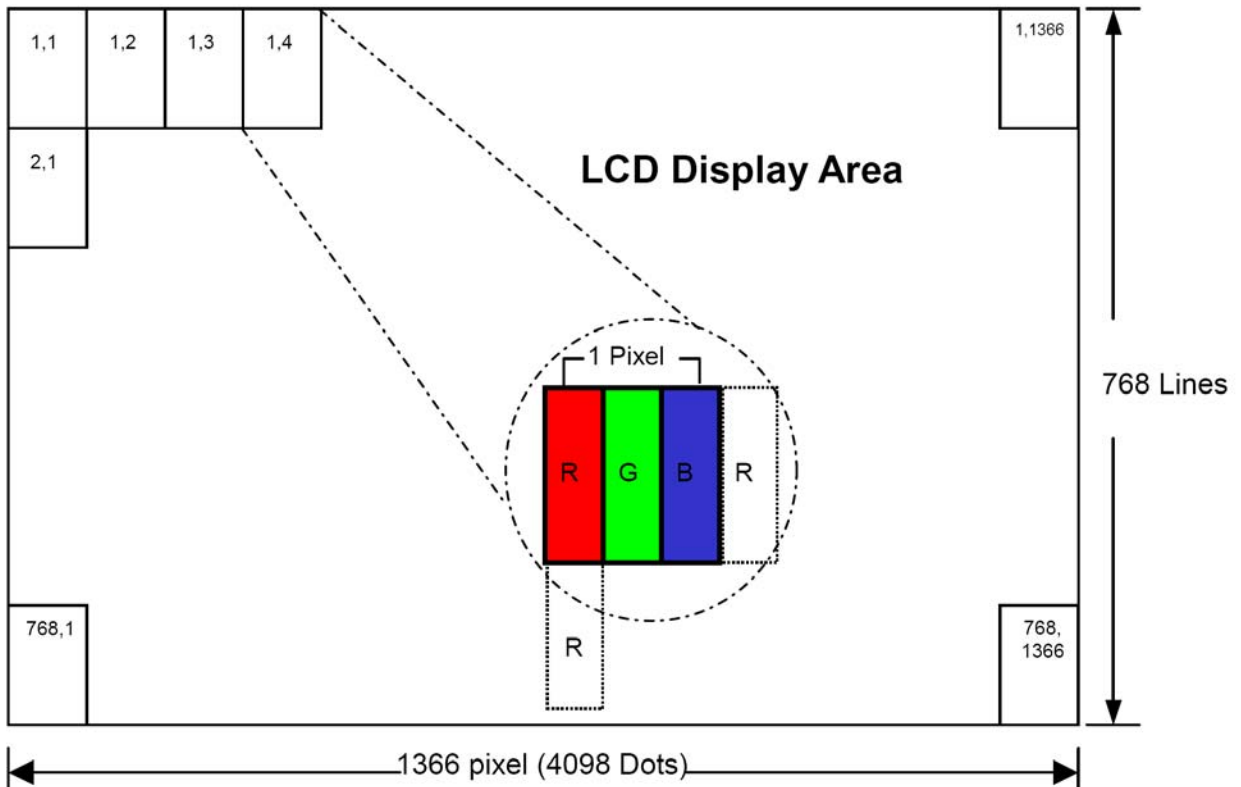
Note : The brightness of LCD panel could be changed by adjusting PWM

7. BLOCK DIAGRAM

7.1 TFTLCD Module



7.2 Pixel format



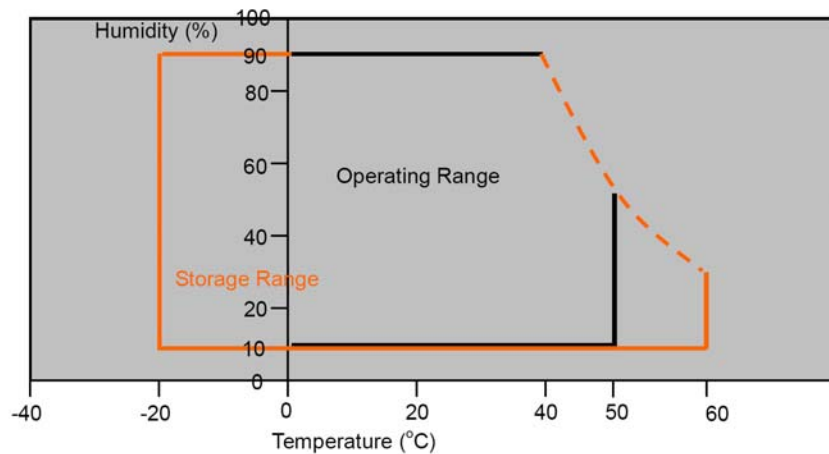
7.3 Relationship Between Displayed color and input

	Display	MSB						LSB						MSB						LSB						Gray scale level
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0							
Basic color	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	-						
	Blue	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	-						
	Green	L	L	L	L	L	L	H	H	H	H	H	H	L	L	L	L	L	L	-						
	Light Blue	L	L	L	L	L	L	H	H	H	H	H	H	H	H	H	H	H	H	-						
	Red	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	-						
	Purple	H	H	H	H	H	H	L	L	L	L	L	L	H	H	H	H	H	H	-						
	Yellow	H	H	H	H	H	H	H	H	H	H	H	H	L	L	L	L	L	L	-						
	White	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-						
Gray scale of Red	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0						
	Dark ↑ ↓ Light	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L1						
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L2						
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	L3...L60							
		H	H	H	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L61						
		H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L62						
	Red	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	Red L63						
	Gray scale of Green	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0					
Dark ↑ ↓ Light		L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L1						
		L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L2							
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	L3...L60							
		L	L	L	L	L	L	H	H	H	H	L	H	L	L	L	L	L	L	L61						
		L	L	L	L	L	L	H	H	H	H	H	L	L	L	L	L	L	L	L62						
Green		L	L	L	L	L	L	H	H	H	H	H	H	L	L	L	L	L	L	Green L63						
Gray scale of Blue		Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0					
	Dark ↑ ↓ Light	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L1						
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L2						
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	L3...L60							
		L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	L	H	L61						
		L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	L	L62						
	Blue	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	Blue L63						
	Gray scale of White & Black	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0					
Dark ↑ ↓ Light		L	L	L	L	L	H	L	L	L	L	L	H	L	L	L	L	L	H	L1						
		L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	H	L	L2							
		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	L3...L60							
		H	H	H	H	L	H	H	H	H	H	L	H	H	H	H	H	L	H	L61						
		H	H	H	H	H	L	H	H	H	H	H	L	H	H	H	H	H	L	L62						
White		H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	White L63						

8. RELIABILITY TEST CONDITIONS

No.	Item	Conditions	Remark
1	High Temperature Storage	Ta=+60°C, 240hrs	
2	Low Temperature Storage	Ta=-20°C, 240hrs	
3	High Temperature Operation	Ta=+50°C, 500hrs	
4	Low Temperature Operation	Ta=0°C, 500hrs	
5	Thermal Cycling Test (non operation)	-20°C(30min)→+60°C(30min), 100 cycles	
6	Vibration	Sine Wave 1.5G, 5~500Hz, XYZ 30min/each direction	
7	Shock	Half-Sine, 200G, 2ms, ±XYZ, 1time	

Storage / Operating temperature



Note .Max wet bulb temp.=39°C

9. HANDLING & CAUTIONS

9.1 Cautions when taking out the module

Pick the pouch only, when taking out module from a shipping package.

9.2 Cautions for handling the module

9.2.1 As the electrostatic discharges may break the LCD module, handle the LCD module with care. Peel a protection sheet off from the LCD panel surface as slowly as possible.

9.2.2 As the LCD panel and backlight element are made from fragile glass material, impulse and pressure to the LCD module should be avoided.

9.2.3 As the surface of the polarizer is very soft and easily scratched, use a soft dry cloth without chemicals for cleaning.

9.2.4 Do not pull the interface connector in or out while the LCD module is operating.

9.2.5 Put the module display side down on a flat horizontal plane.

9.2.6 Handle connectors and cables with care.

9.3 Cautions for the operation

9.3.1 When the module is operating, do not lose MCLK, DE signals. If any one of these signals were lost, the LCD panel would be damaged.

9.3.2 Obey the supply voltage sequence. If wrong sequence were applied, the module would be damaged.

9.4 Cautions for the atmosphere

9.4.1 Dewdrop atmosphere should be avoided.

9.4.2 Do not store and/or operate the LCD module in a high temperature and/or humidity atmosphere. Storage in an electro-conductive polymer-packing pouch and under relatively low temperature atmosphere is recommended.

9.5 Cautions for the module characteristics

9.5.1 Do not apply fixed pattern data signal to the LCD module at product aging.

9.5.2 Applying fixed pattern for a long time may cause image sticking.

9.6 Other cautions

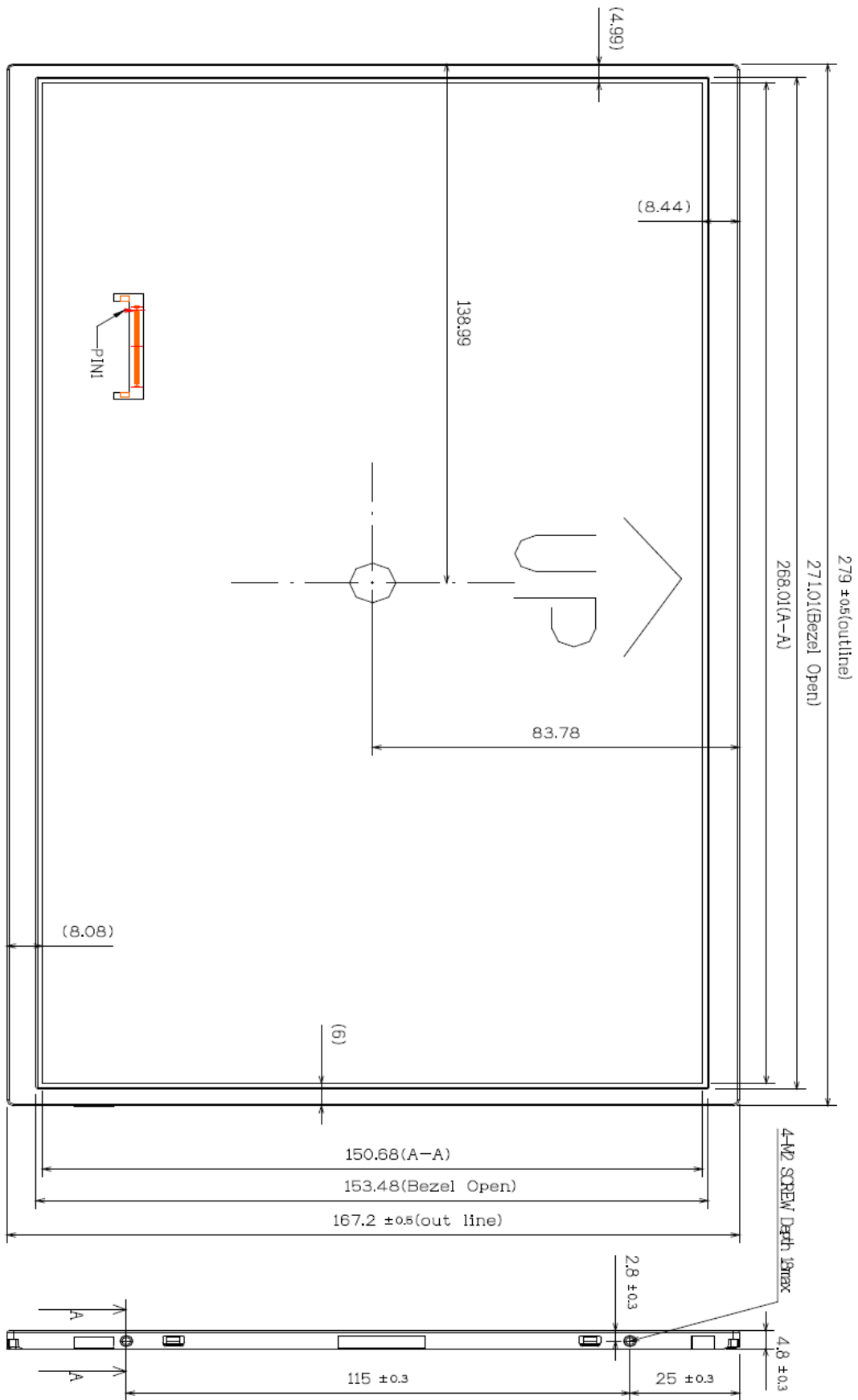
9.6.1 Do not disassemble and/or re-assemble LCD module.

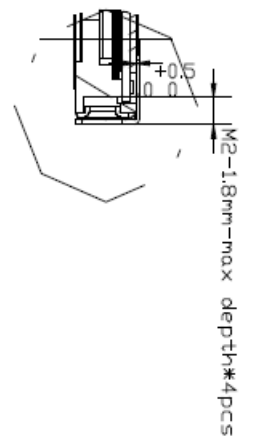
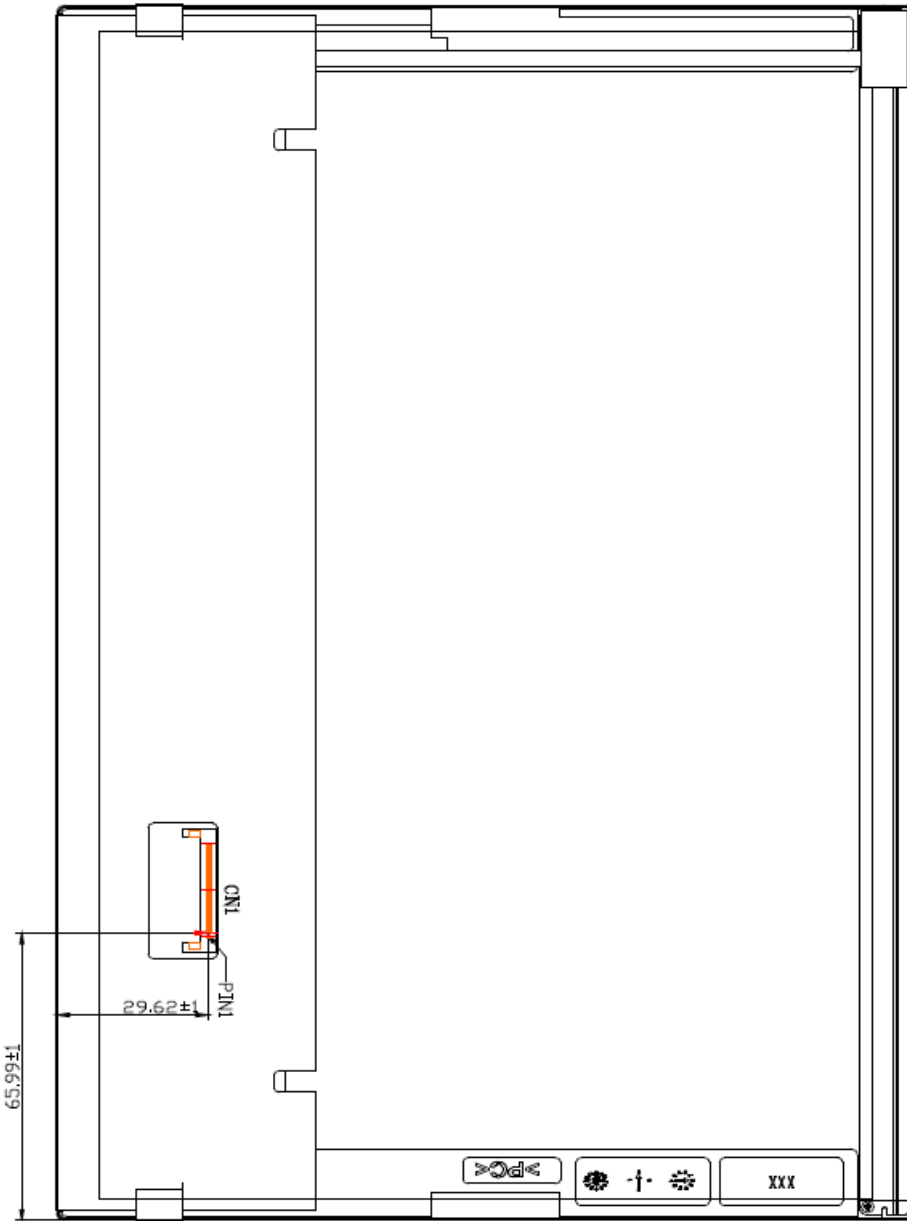
9.6.2 Do not re-adjust variable resistor or switch etc.

9.6.3 When returning the module for repair or etc, please pack the module not to be broken. We recommend using the original shipping packages.

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

10. OUTLINE DIMENSION





1.mch#H302PHM1
 2.outline#279x672*48
 3.customer ruf#-M2nut depth 18mm max
 4.V/F connector#1-XB30SL-FFD
 5.fiber mounting torque spec#Ksf-on
 6.rufcam