CUSTOMER APPROVAL SHEET

Company Name	
MODEL	**A043FW05 V8**
CUSTOMER APPROVED	Title : Name :

- ☐ **APPROVAL FOR SPECIFICATIONS ONLY (Spec. Ver. 0.7)**
- ☐ **APPROVAL FOR SPECIFICATIONS AND ES SAMPLE (Spec. Ver. 0.7)**
- ☐ **APPROVAL FOR SPECIFICATIONS AND CS SAMPLE (Spec. Ver. 0.7)**
- ☐ **CUSTOMER REMARK :**

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Product Specification

4.3" COLOR TFT-LCD MODULE/PANEL

MODEL NAME: A043FW05 V8

Model Name :	A043FW05 V8
Planned Lifetime:	From 2011/April To TBD in agreement
Phase-out Control:	From 2012/June To TBD in agreement
EOL Schedule:	TBD in agreement

< >Preliminary Specification
<◆>Final Specification

Note: The content of this specification is subject to change.

Record of Revision

Version	Revise Date	Page	Content
0.0	2011/3/14		First Draft
0.1	2011/04/26	6	Confirmed drawing Update
0.1	2011/04/26	12	Modify power on sequence, VDD/ VDDIO interval from +/- no limit to + no limit
0.2	2011/05/18	6-7	Double face tape and Kapton tape thickness/ location description. EE component high and component area location description
0.3	2011/06/02	6-7	Move barcode label position
0.4	2011/06/23	6-7	Move barcode label position
0.4	2011/06/23	17	Update Packing form
0.5	2011/06/28	14	Update brightness typical value to 600nits
0.5	2011/06/28	16	Update LTO temperature: -10℃; Add ESD test criteria
0.6	2011/07/11	2	Modify lifetime & EOL schedule as TBD in agreement
0.6	2011/07/11	17	Delete Packing form
0.7	2011/08/31	6-7	Update Mechanical drawing

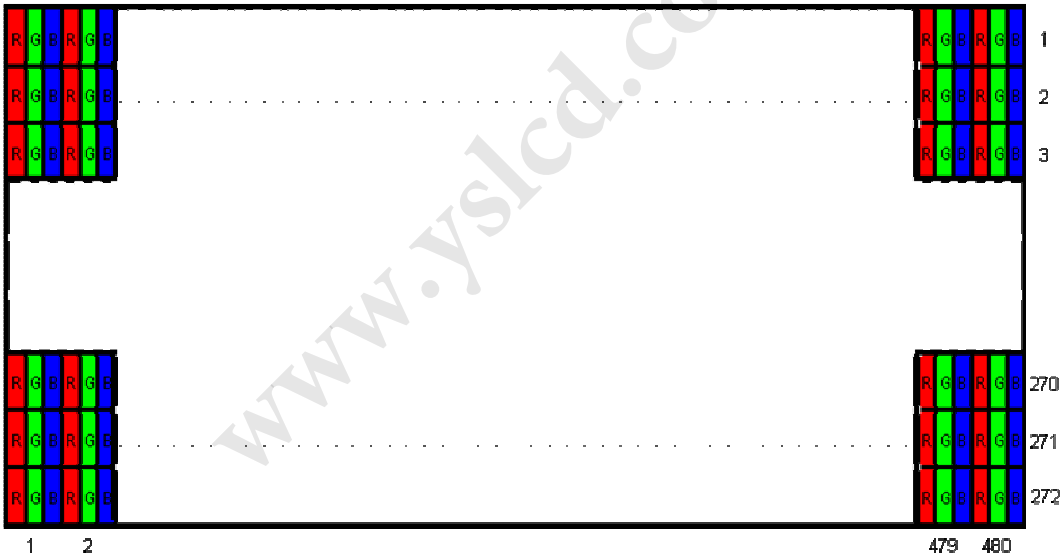
Contents

A. General Information

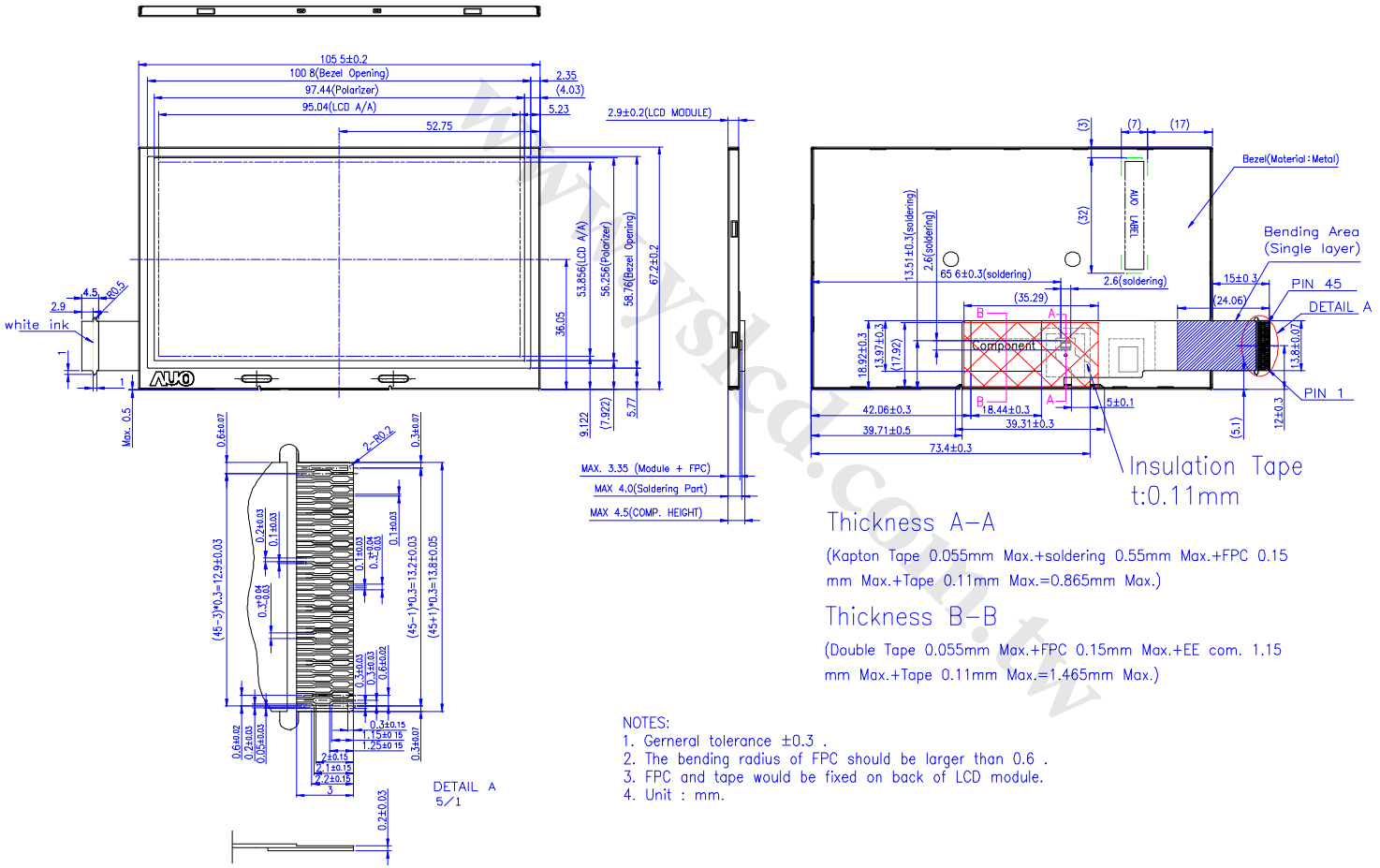
NO.	Item	Unit	Specification	Remark
1	Screen Size	inch	4.3(Diagonal)	
2	Display Resolution	dot	480RGB(H)×272(V)	
3	Overall Dimension	mm	105.5(H) × 67.2(V) × 2.9(T)	Note 1
4	Active Area	mm	95.04(H)×53.856(V)	
5	Pixel Pitch	mm	0.066(R.G.B)×0.198(V)	
6	Color Configuration	--	R. G. B. Stripe	Note 2
7	Color Depth	--	16.7M Colors	
8	NTSC Ratio	%	50	
9	Display Mode	--	Normally White	
10	Polarizer and surface treatment	--	Hard coating 3H	
12	Viewing direction		6 o'clock (gray inversion)	

Note 1: Not include backlight cable and FPC. Refer next page to get further information.

Note 2: Below figure shows dot stripe arrangement.



B. Outline Dimension



Thickness A–A

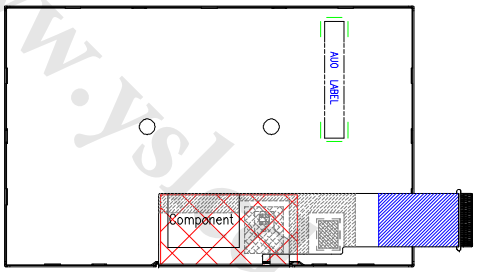
(Kapton Tape 0.055mm Max.+soldering 0.55mm Max.+FPC 0.15 mm Max.+Tape 0.11mm Max.=0.865mm Max.)

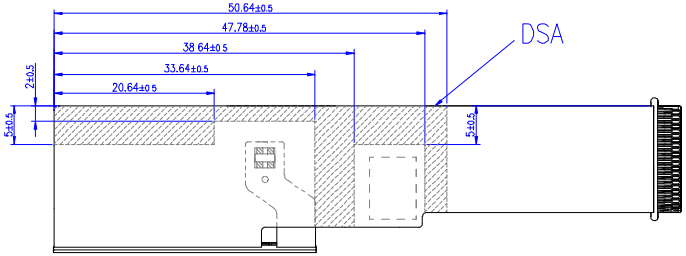
Thickness B–B

(Double Tape 0.055mm Max.+FPC 0.15mm Max.+EE com. 1.15 mm Max.+Tape 0.11mm Max.=1.465mm Max.)

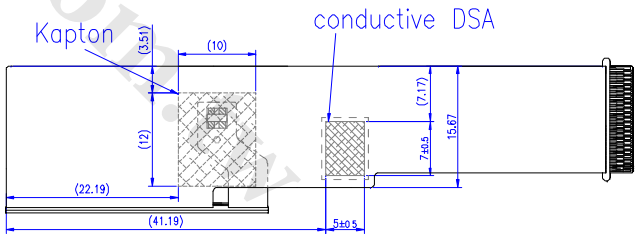
NOTES:
1. Gerneral tolerance ±0.3 .
2. The bending radius of FPC should be larger than 0.6 .
3. FPC and tape would be fixed on back of LCD module.
4. Unit : mm.

Back view for FPC & components structure





FPC detail for DSA t:0.055mm
Scale 2/1



FPC detail for
Kapton t:0.055mm & conductive DSA t:0.1mm
Scale 2/1

C. Electrical Specifications

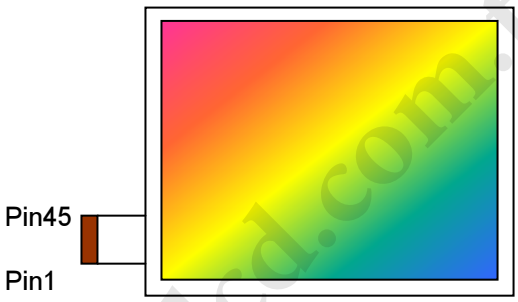
1. TFT LCD Panel Pin Assignment

Recommended connector : 45FXRH-SM1-GAN

Pin no	Symbol	I/O	Description	Remark
1	GND	G	GND	
2	GND	G	GND	
3	VDD	PI	Power supply for analog circuit	
4	VDDIO	PI	Power supply for digital interface	
5	R0	I	Red Data Signal (LSB)	
6	R1	I	Red Data Signal	
7	R2	I	Red Data Signal	
8	R3	I	Red Data Signal	
9	R4	I	Red Data Signal	
10	R5	I	Red Data Signal	
11	R6	I	Red Data Signal	
12	R7	I	Red Data Signal (MSB)	
13	G0	I	Green Data Signal (LSB)	
14	G1	I	Green Data Signal	
15	G2	I	Green Data Signal	
16	G3	I	Green Data Signal	
17	G4	I	Green Data Signal	
18	G5	I	Green Data Signal	
19	G6	I	Green Data Signal	
20	G7	I	Green Data Signal (MSB)	
21	B0	I	Blue Data Signal (LSB)	
22	B1	I	Blue Data Signal	
23	B2	I	Blue Data Signal	
24	B3	I	Blue Data Signal	
25	B4	I	Blue Data Signal	
26	B5	I	Blue Data Signal	
27	B6	I	Blue Data Signal	
28	B7	I	Blue Data Signal (MSB)	
29	GND	G	GND	
30	DCLK	I	Pixel clock	
31	DISP	I	Display on/off signal	
32	NC	-	No connect	
33	NC	-	No connect	
34	DE	I	Data enable	

35	NC		No connect	
36	GND	G	GND	
37	NC		No connect	
38	NC		No connect	
39	NC		No connect	
40	NC		No connect	
41	GND	G	GND	
42	VLED-	PI	LED backlight cathode	
43	VLED+	PI	LED backlight anode	
44	NC		No connect	
45	NC		No connect	

I: Input pin; O: Output pin; PI: Power input; G: Ground pin



2. Absolute Maximum Ratings

Items	Symbol	Values		Unit	Condition
		Min.	Max.		
Power Supply Voltage	VDD	-0.3	6	V	
Interface Supply Voltage	VDDIO	-0.3	6	V	
LED Reverse Voltage	V_r	3.2	3.5	V	One LED
LED Forward Current	I_f	--	25	mA	One LED

Note 1.If the operating condition exceeds the absolute maximum ratings, the TFT-LCD module may be damaged permanently. Also, if the module operated with the absolute maximum ratings for a long time, its reliability may drop.

3. Electrical DC Characteristics

a. Typical Operation Condition (AGND =GND = 0V)

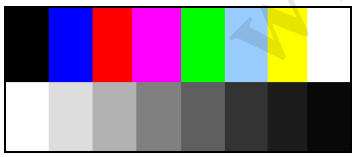
Item		Symbol	Min.	Typ.	Max.	Unit	Remark
Power Voltage		VDD	3.0	3.3	3.6	V	Analog Power Supply
		VDDIO	1.65	--	VDD	V	Digital Power Supply
Input Signal Voltage	H Level	VIH	0.7xVDDIO	--	VDDIO	V	
	L Level	VIL	GND	--	0.3xVDDIO	V	

b. Current Consumption (AGND=GND=0V)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Input Current for VDD	I_{VDD}	VDD=3.3V	-	23	28	mA	Note 1, 2
	I_{VDD} (STANDBY)	VDD=3.3V	-	12	15	uA	Note 3
Input Current for VDDIO	I_{VDDIO}	VDDIO=3.3V	-	20	40	uA	Note 1, 2
	I_{VDDIO} (STANDBY)	VDDIO=3.3V	-	35	40	uA	Note 3

Note 1:Test Condition is under typical Eletrical DC and AC characteristics.

Note 2: Test pattern is the following picture.

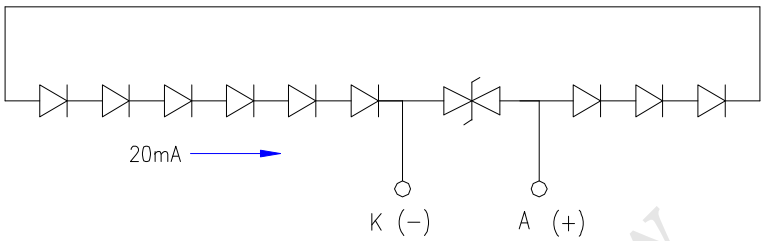


Note 3:In standby mode, all digital signals are stopped. Ex. DCLK, HSYNC ..etc.

c. Backlight Driving Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED Supply Current	I_L		20	22	mA	single serial
Power Consumption	P_{BL}		576	693	mW	

Note 1: LED backlight is 9 LEDs serial type. Suggestion is driven by current 20mA for each LED string.

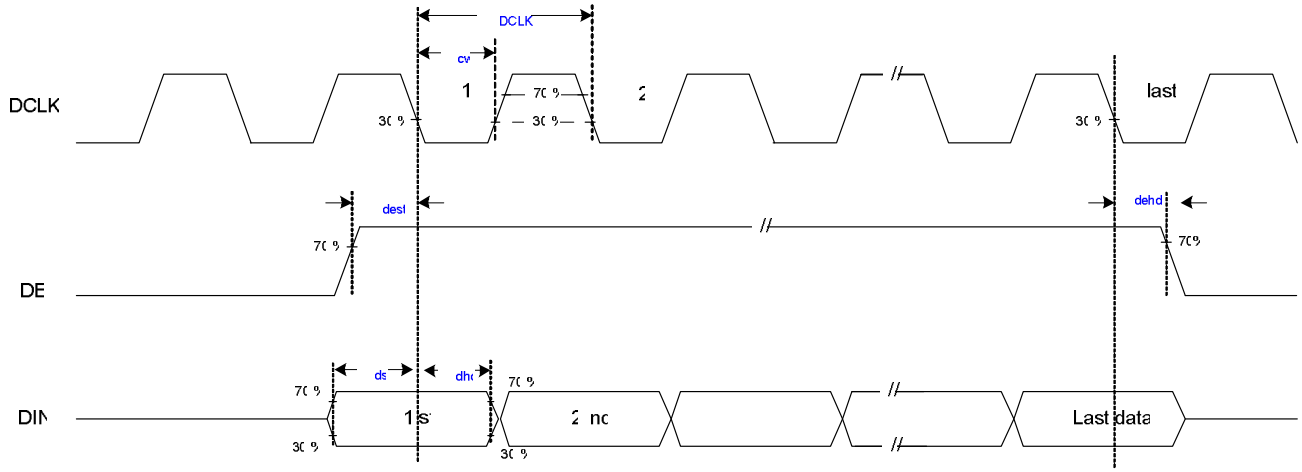


Note 2: If it uses larger LED lightbar voltage/ current more than 25mA, it maybe decreases the LED lifetime

4. Electrical AC Characteristics

a. Signal AC Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK time	t_{DCLK}	33	37	188	ns	
DCLK width	t_{CW}	13.2	--	--	ns	D_{CW} =50%
DCLK duty cycle	D_{CW}	40	50	60	%	t_{cw} / t_{DCLK} x100%
Data Setup Time	t_{dst}	6	--	--	ns	Input data to DCLK
Data Hold Time	t_{dhd}	6	--	--	ns	Input data to DCLK
DE Setup Time	t_{dest}	6	--	--	ns	DE to DCLK
DE Hold Time	t_{dehd}	6	--	--	ns	DE to DCLK

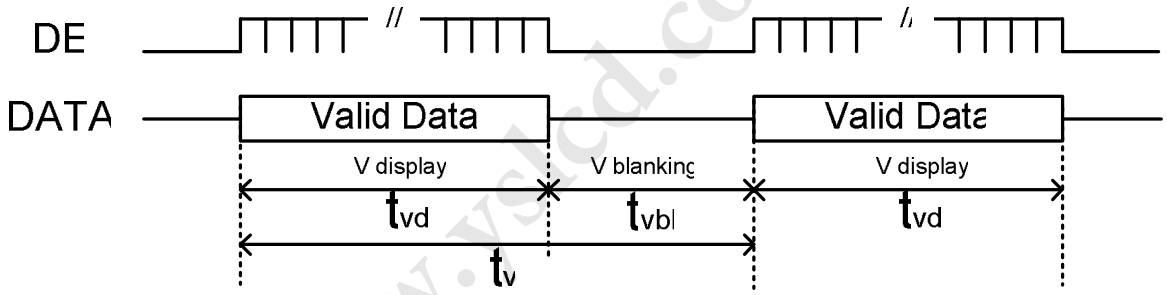


b. Input Timing

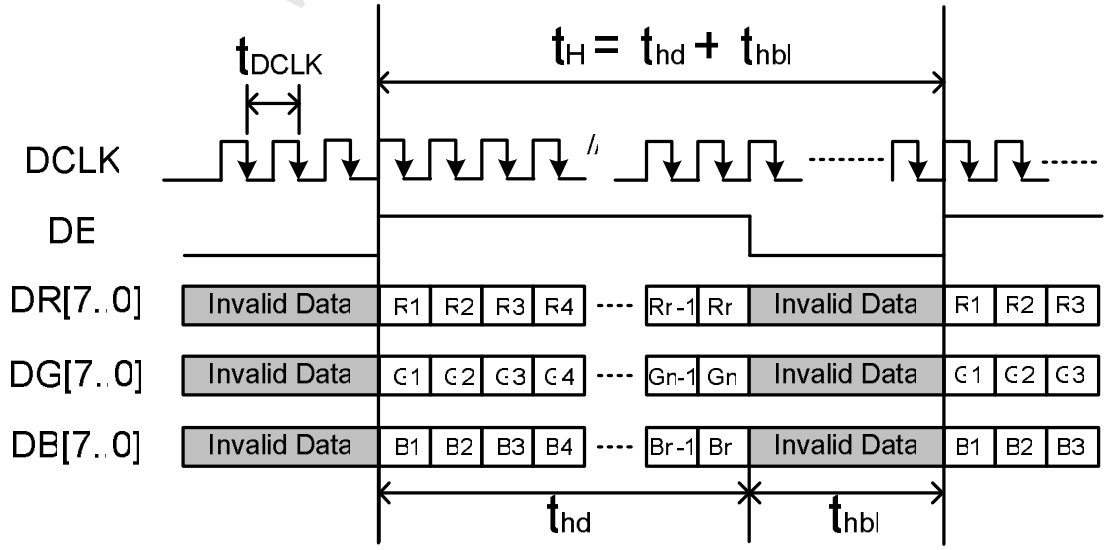
Parameter		Symbol	Min.	Typ.	Max.	Unit.	Remark
DCLK	Frequency	$1/t_{DCLK}$	5	9	12	MHz	
Frame Frequency	Cycle			16.7		ms	
1 Frame Scanning Time	Cycle	t_v	282	288	400	t_H	
	Display Period	t_{vd}		272		t_H	
	Blanking	t_{vbl}	10	16	128	t_H	
1 Line Scanning Time	Cycle	t_H	495	525	800	t_{DCLK}	
	Display Period	t_{hd}		480		t_{DCLK}	
	Blanking	t_{hbl}	15	45	320	t_{DCLK}	

c.Timing Diagram

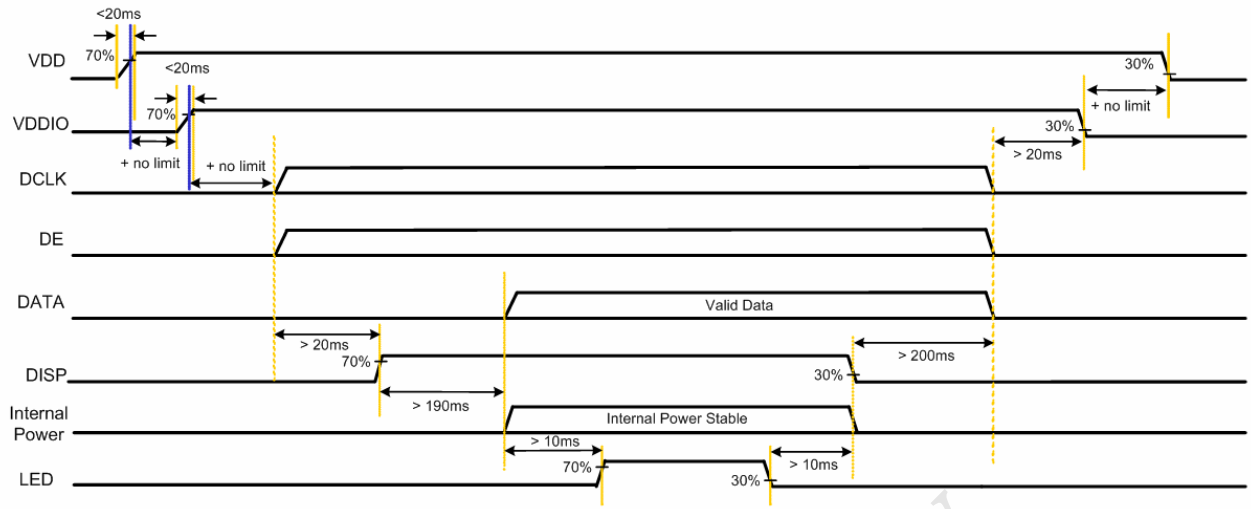
Vertical Timing of Input(DE mode)



Horizontal Timing of Input (DE mode)



5. Power On/Off Characteristics



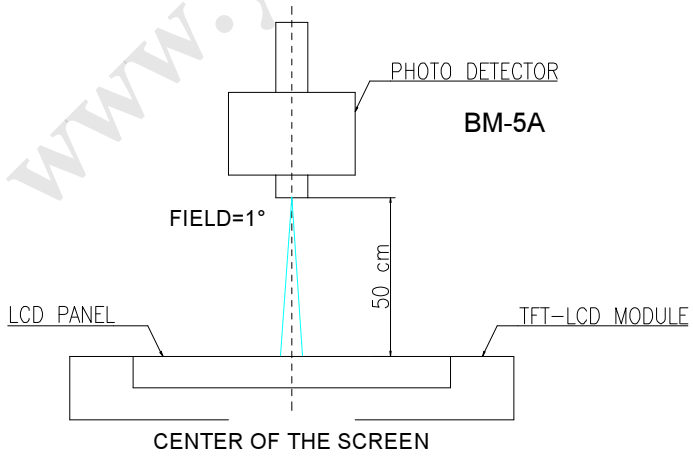
D. Optical Specification

All optical specification is measured under typical condition (Note 1, 2)

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Response Time Rise Fall		 Tr Tf	θ=0°	 -- --	 15 20		 ms ms	Note 3
Contrast ratio		CR	At optimized viewing angle	300	400	--		Note 4
Viewing Angle	Top		CR≧10	35	50	--	deg.	Note 5
	Bottom			40	55	--		
	Left			50	65	--		
	Right			50	65	--		
Brightness		Y_L	θ=0°	450	600	--	cd/m^2	Note 6
Chromaticity	White	X	θ=0°	0.26	0.31	0.36		
		Y	θ=0°	0.27	0.32	0.37		
Uniformity		ΔY_L	%	70	75	--	%	Note 7

Note 1: Measurement should be performed in the dark room, optical ambient temperature =25°C, and backlight current IL=20 mA.

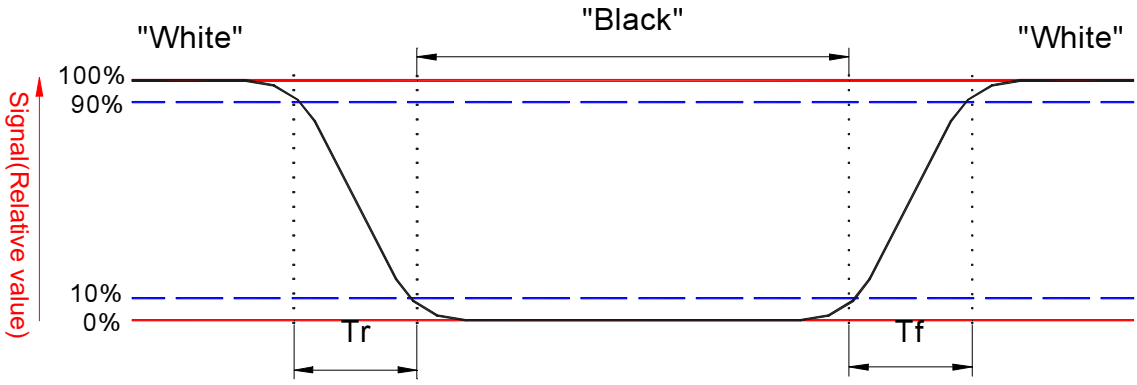
Note 2: To be measured on the center area of panel with a viewing cone of 1° by Topcon luminance meter BM-5A, after 15 minutes operation.



Note 3: Definition of response time:

The output signals of photo detector are measured when the input signals are changed from "black" to "white"(falling time) and from "white" to "black"(rising time), respectively.

The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below.

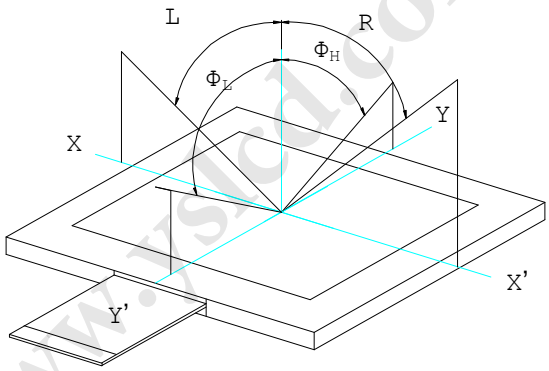


Note 4.Definition of contrast ratio:

Contrast ratio is calculated with the following formula.

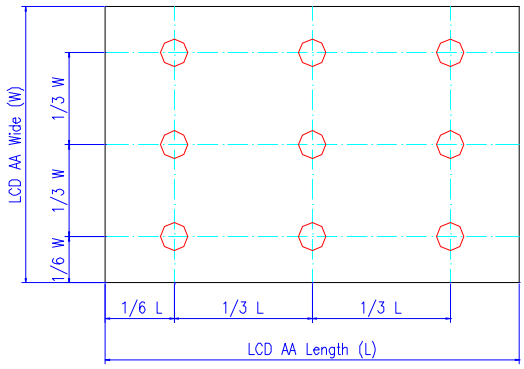
$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at "White" status}}{\text{Photo detector output when LCD is at "Black" status}}$$

Note 5. Definition of viewing angle, θ, Refer to figure as below.



Note 6. Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

Note 7: Luminance Uniformity of these 9 points is defined as below:



$$\text{Uniformity} = \frac{\text{minimum luminance in 9 points (1-9)}}{\text{maximum luminance in 9 points (1-9)}}$$

E. Reliability Test Items

No.	Test items	Conditions		Remark
1	High Temperature Storage	Ta= 80°C	240Hrs	
2	Low Temperature Storage	Ta= -30°C	240Hrs	
3	High Temperature Operation	Ta= 70°C	240Hrs	
4	Low Temperature Operation	Ta= -10°C	240Hrs	
5	High Temperature & High Humidity	Ta= 60°C. 90% RH	240Hrs	
6	Heat Shock	-25°C ~70°C, 50 cycle, 2Hrs/cycle		Non-operation
7	Vibration (With Carton)	Random vibration: 0.015G^2/Hz from 5~200Hz –6dB/Octave from 200~500Hz		IEC 68-34
8	Drop (With Carton)	Height: 76~66cm 1 corner, 3 edges, 6 surfaces		
9	Electrostatic Discharge	Contact Discharge: +/- 4KV Air Discharge : +/- 8KV		IEC61000-4-2 standard

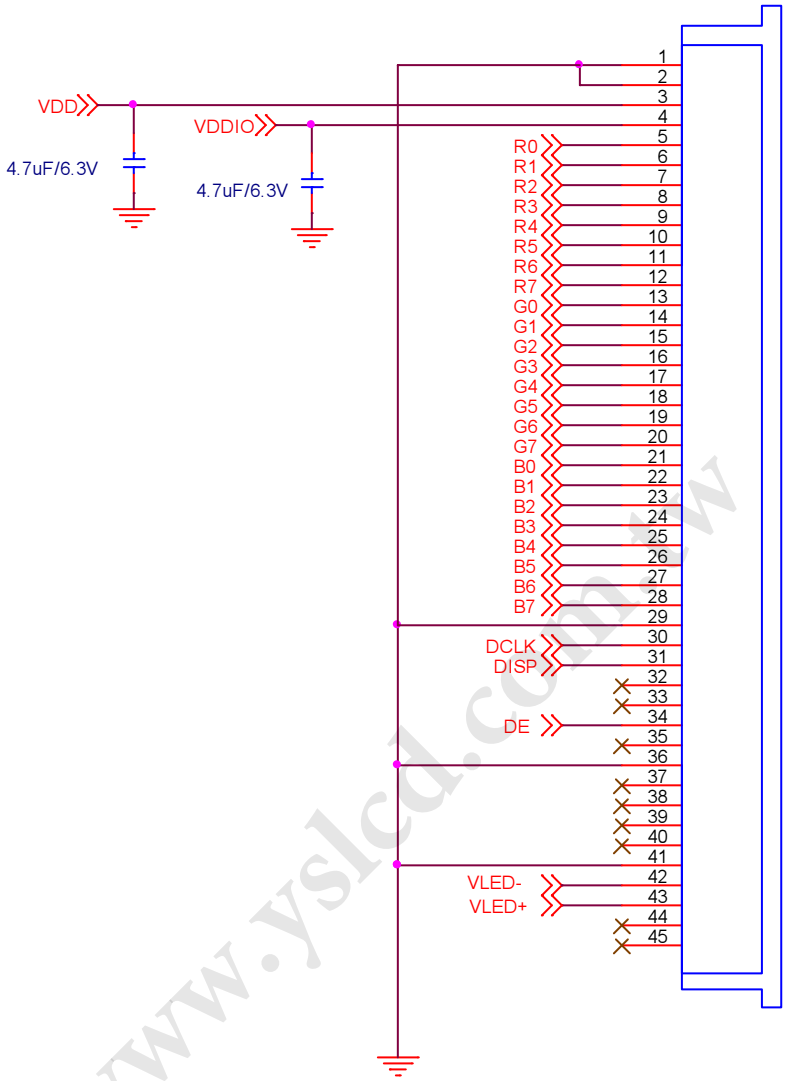
Note 1: Ta: Ambient temperature.

Note 2: In the standard conditions, there is not display function NG issue occurred. All the cosmetic specification is judged before the reliability stress.

Note 3: All the cosmetic specification is judged before the reliability stress.

F. Application Note

1. Application Circuit



G. Precautions

1. Do not twist or bend the module and prevent the unsuitable external force for display module during assembly.
2. Adopt measures for good heat radiation. Be sure to use the module with in the specified temperature.
3. Avoid dust or oil mist during assembly.
4. Follow the correct power sequence while operating. Do not apply the invalid signal, otherwise, it will cause improper shut down and damage the module.
5. Less EMI: it will be more safety and less noise.
6. Please operate module in suitable temperature. The response time & brightness will drift by different temperature.
7. Avoid to display the fixed pattern (exclude the white pattern) in a long period, otherwise, it will cause image sticking.
8. Be sure to turn off the power when connecting or disconnecting the circuit.
9. Polarizer scratches easily, please handle it carefully.
10. Display surface never likes dirt or stains.
11. A dewdrop may lead to destruction. Please wipe off any moisture before using module.
12. Sudden temperature changes cause condensation, and it will cause polarizer damaged.
13. High temperature and humidity may degrade performance. Please do not expose the module to the direct sunlight and so on.
14. Acetic acid or chlorine compounds are not friends with TFT display module.
15. Static electricity will damage the module, please do not touch the module without any grounded device.
16. Do not disassemble and reassemble the module by self.
17. Be careful do not touch the rear side directly.
18. No strong vibration or shock. It will cause module broken.
19. Storage the modules in suitable environment with regular packing.
20. Be careful of injury from a broken display module.
21. Please avoid the pressure adding to the surface (front or rear side) of modules, because it will cause the display non-uniformity or other function issue.