



SHENZHEN APTUS INTERNATIONAL CO., LIMITED

PRODUCT SPECIFICATION

6.2" COLOR TFT-LCD MODULE

MODEL NAME: DBC062AEN60L050A

DOC VERSION: 1.0

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DATE: 2025.06.30

FOR CUSTOMER	
CUSTOMER APPROVED	

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A. General Description

DBC062AEN60L050A is an a-Si type Thin Film Transistor Liquid crystal Display (TFT-LCD) with AHVA (Advanced Hyper-Viewing Angle) technology. This model is composed of a TFT-LCD, driver ICs, FPC (flexible printed circuit), and a backlight unit.

B. Features

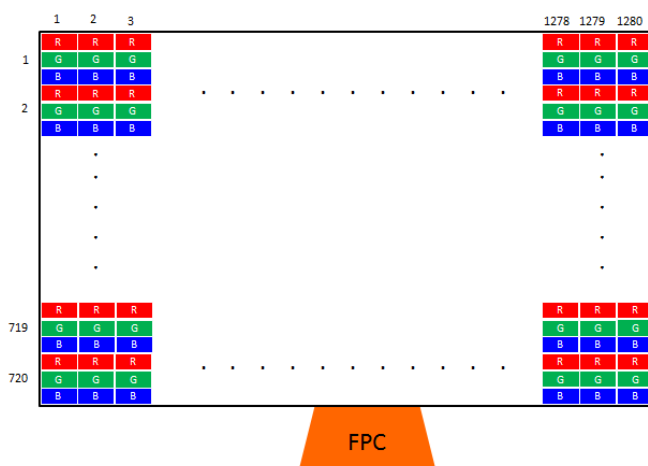
- 6.2"-inch display
- 720 x 720 RGB resolution in RGB stripe dot arrangement
- High brightness
- Interfaces: LVDS (8bit JEIDA)
- AHVA – wide view technology
- RoHS compliance

C. Physical Specifications

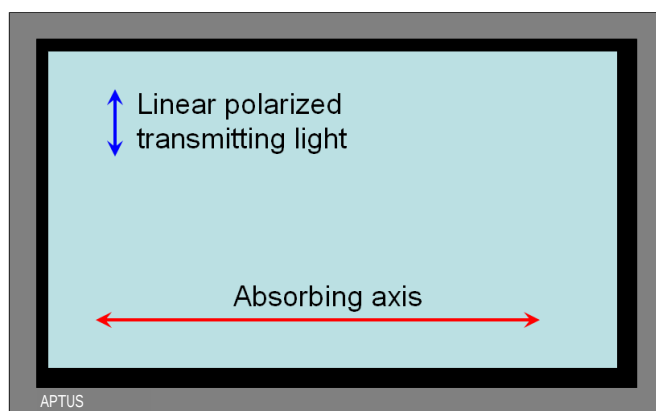
1. TFT LCD Panel

NO.	Item	Unit	Specification	Remark
1	Display Resolution	dot	720 (H)x 720(V) RGB	
2	Active Area	mm	111.78 (H) x 111.78 (V)	
3	Screen Size	inch	6.2(Diagonal)	
4	Dot Pitch	μm	51.75 (R.G.B) x 155.25 (V)	
5	Color Configuration	—	R. G. B. Stripe	
6	Color Depth	—	16.7 M colors	
7	Overall Dimension	mm	126x126x7	
8	Weight	g	T.B.D	
9	Display Mode	—	Normally Black	
10	Surface Treatment	—	AG	

Note 1: Below figure shows dot stripe arrangement.

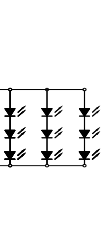
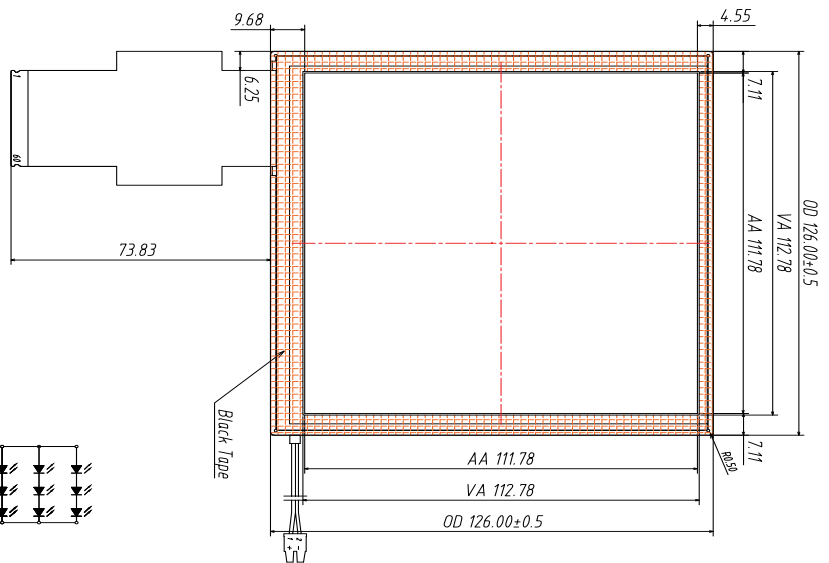


Note 2: Below figure shows dot stripe arrangement.

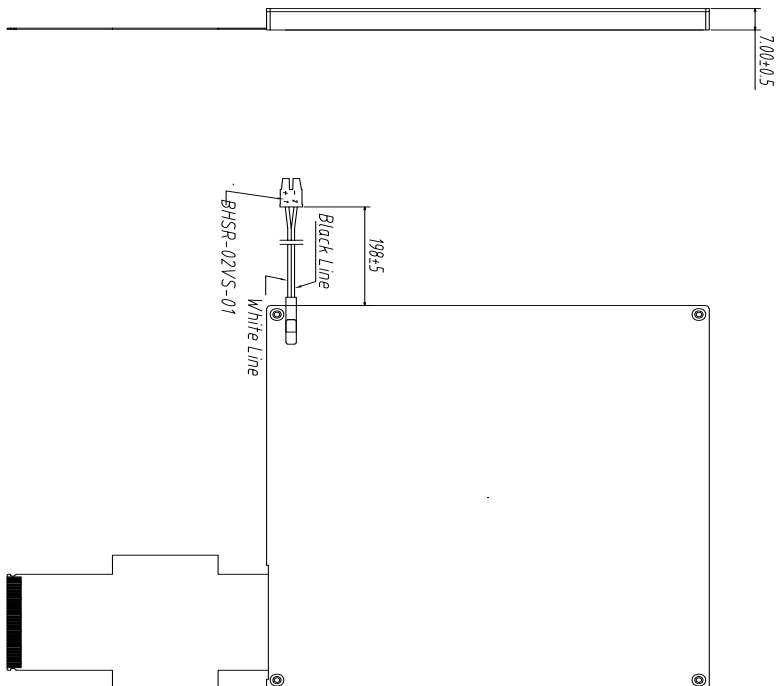


D. Outline Dimension

1. TFT-LCD Module



Voltage: 9.6V
Current: 480mA



NOTE:

1. Display Mode : Normally Black/Transmissive
2. Resolution : 720*(RGB)*720
3. Operating Voltage : 3.3V
4. Viewing Angle : All
5. Interface : LVDS
6. Operating temp : -20°C To +70°C
7. Storage temp : -30°C To +80°C
8. Luminance : 500 cd/m² (TYP)
9. Backlight drive: T.B.D
10. RoHS must be complied
11. Unspecified tolerance: ±0.3mm

Drawn By : Chen Pingping	Material :	APTUS INTERNATIONAL Co., LTD
Checked By :	Drawing Date : 2025/3/3	Product : 6.22 inch 720×720 Square LCD
Confirm By :	First Angle Projection 	Version : 1.0
		Product No. DBC062AEN60L050A

E. Electrical Specifications

1. TFT LCD Panel Pin Assignment

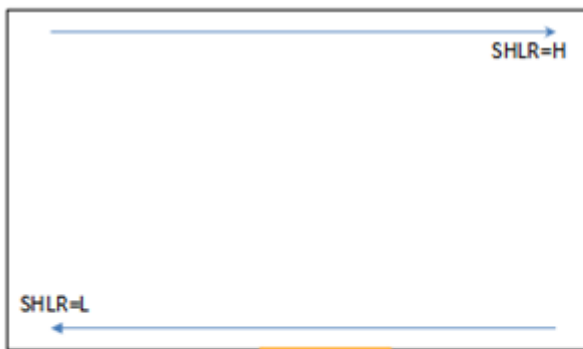
Recommended Connector: 12001S-60B-GFN1

No.	Pin Name	I/O	Description	Remarks
1	VCOM	PI	Common electrode driving voltage	
2	NC	--	NC	
3	VDD	PI	Digital power supply voltage	
4	VDD	PI	Digital power supply voltage	
5	MODE	I	HV/DE Mode selection H:HV Mode, L:DE mode.	
6	UPDN	I	Up/Down selection	Note1
7	SHLR	I	Left/Right selection	Note1
8	GND	G	Ground	
9	V18	PI	Gamma correction voltage reference	
10	V17	PI	Gamma correction voltage reference	
11	V16	PI	Gamma correction voltage reference	
12	V15	PI	Gamma correction voltage reference	
13	V14	PI	Gamma correction voltage reference	
14	V13	PI	Gamma correction voltage reference	
15	V12	PI	Gamma correction voltage reference	
16	V11	PI	Gamma correction voltage reference	
17	V10	PI	Gamma correction voltage reference	
18	GND	G	Ground	
19	CLKP	I	Positive LVDS differential clock input.	
20	CLKN	I	Negative LVDS differential clock input.	
21	GND	G	Ground.	
22	PIND0	I	Positive LVDS differential input.	
23	NIND0	I	Negative LVDS differential input.	
24	GND	G	Ground.	
25	PIND1	I	Positive LVDS differential input.	
26	NIND1	I	Negative LVDS differential input.	
27	GND	G	Ground.	
28	PIND2	I	Positive LVDS differential input.	
29	NIND2	I	Negative LVDS differential input.	
30	GND	G	Ground.	
31	PIND3	I	Positive LVDS differential input.	
32	NIND3	I	Negative LVDS differential input.	
33	GND	G	Ground.	
34	V9	PI	Gamma correction voltage reference	

35	V8	PI	Gamma correction voltage reference	
36	V7	PI	Gamma correction voltage reference	
37	V6	PI	Gamma correction voltage reference	
38	V5	PI	Gamma correction voltage reference	
39	V4	PI	Gamma correction voltage reference	
40	V3	PI	Gamma correction voltage reference	
41	V2	PI	Gamma correction voltage reference	
42	V1	PI	Gamma correction voltage reference	
43	AVDD	PI	Analog power supply voltage.	
44	AVDD	PI	Analog power supply voltage.	
45	NC	NC	NC	
46	STBYB	I	Standby mode. "H" for normal operation. "L" for standby mode.	
47	NC	NC	NC	
48	NC	NC	NC	
49	NC	NC	NC	
50	NC	NC	NC	
51	NC	NC	NC	
52	INV2FB	I	One frame/ Two frame inversion selection. H:one frame inversion, L:two frame inversion.	
53	NC	NC	NC	
54	VGH	PI	Positive power supply voltage for TFT.	
55	NC	NC	Dummy	
56	VGL	PI	Negative power supply voltage for TFT.	
57	NC	NC	Dummy	
58	VCOM	PI	Common electrode driving voltage	
59	NC	NC	NC	
60	GND	G	Ground	

Note1: I: Digital signal input, O: Digital signal output, G: GND, PI: Power input, **NC: not connector**

Note1.



Pin1 Pin60
Gold Finger down



Pin1 Pin60
Gold Finger down

2. Differential Input Data Format

a. JEIDA format

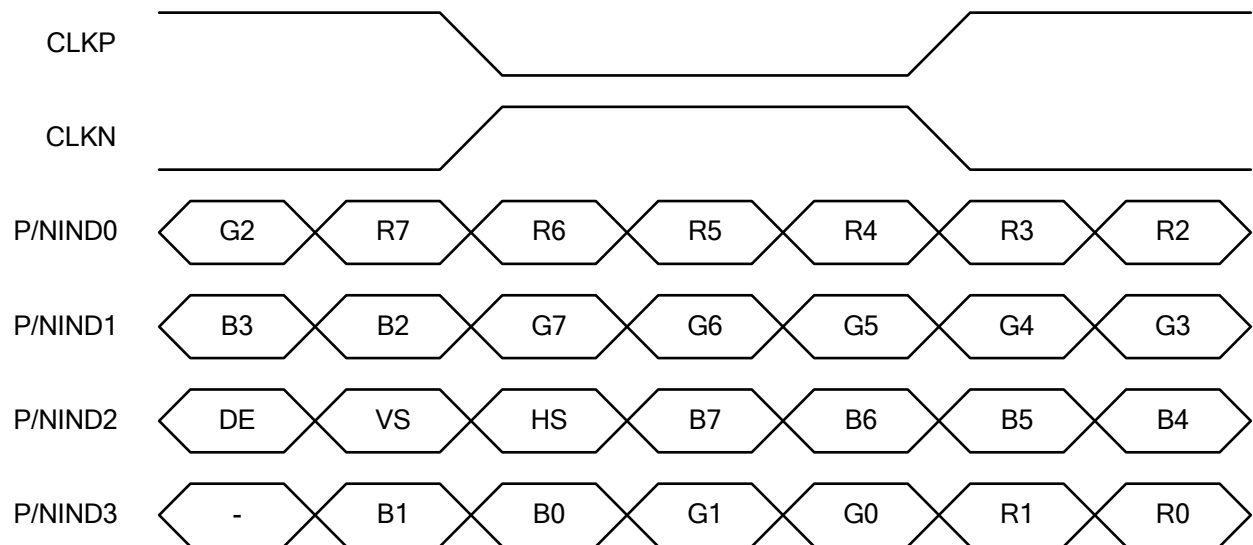


Fig. 1. LVDS input data JEIDA format

3. Input Timing Diagram

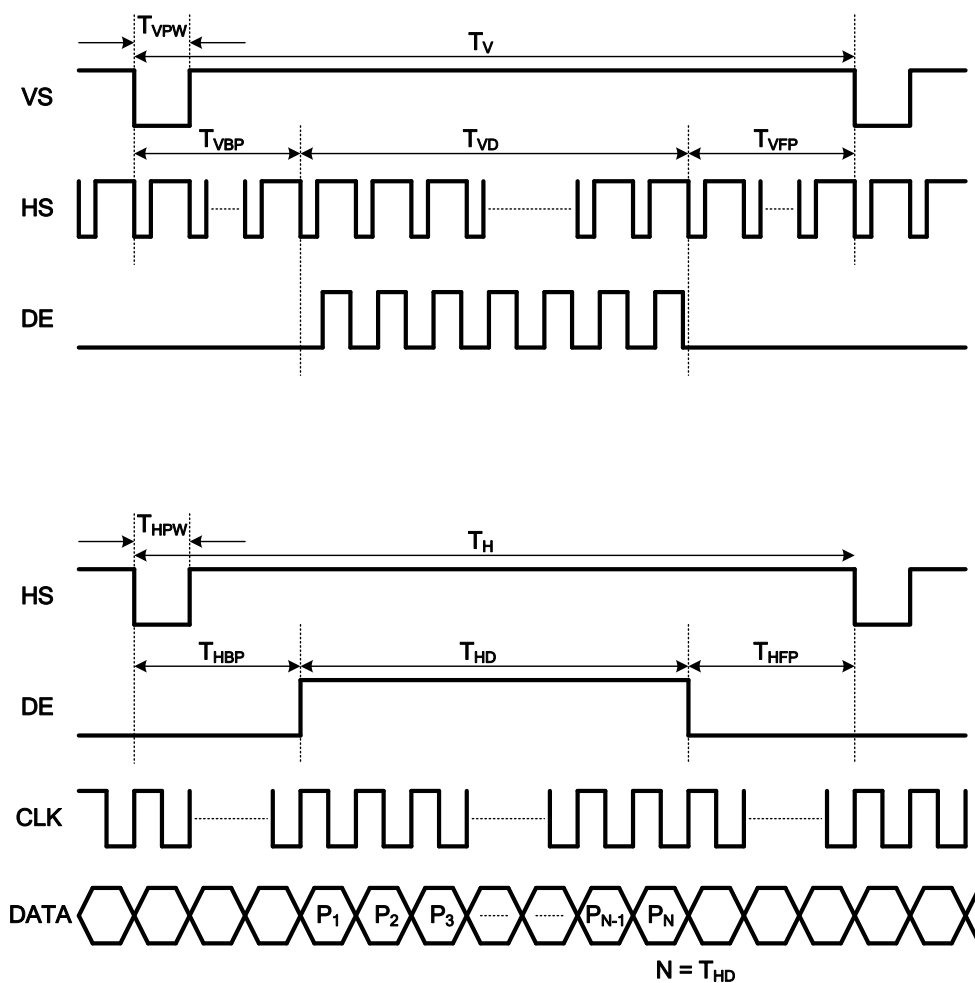


Fig. 2. Input Timing Diagram

HV Mode

Parameter		Symbol	Min.	Typ.	Max.	Unit.	Remark
CLK Frequency		F_{CLK}	69.49	70.825	75.54	MHz	
HSYNC	Period	T_H	1524	1537	1566	CLK	
	Horizontal display area	T_{HD}	1280			CLK	
	Back porch	T_{HBP}	48			CLK	
	Front porch	T_{HFP}	196	209	238	CLK	
	Pulse width	T_{HPW}	1	12	15	CLK	
VSYNC	Period	T_V	760	768	804	HS	
	Vertical display area	T_{VD}	720			HS	
	Back porch	T_{VBP}	30			HS	
	Front porch	T_{VFP}	10	18	54	HS	
	Pulse width	T_{VPW}	1	2	3	HS	

DE Mode

Parameter		Symbol	Min.	Typ.	Max.	Unit.	Remark
CLK Frequency		F_{CLK}	69.49	70.825	75.54	MHz	
HSYNC	Period	T_H	1524	1537	1566	CLK	
	Horizontal display area	T_{HD}	1280			CLK	
	Blanking	$T_{HBP} + T_{HFP}$	244	257	286		
VSYNC	Period	T_V	760	768	804	HS	
	Vertical display area	T_{VD}	720			HS	
	Blanking	$T_{VBP} + T_{VFP}$	40	48	84	HS	
Frame Rate		FR	60			Hz	

4. Absolute Maximum Ratings

Items	Symbol	Values		Unit	Condition
		Min.	Max.		
Power Voltage	VDD	-0.3	5	V	GND = 0
	AVDD	-0.3	15	V	GND = 0
	VGH	-0.3	VGL+40	V	GND = 0
	VGL	-20	+0.3	V	GND = 0
	VGH-VGL	-0.3	40	V	GND = 0
	VCOM	0	7	V	GND = 0
Input signal Voltage	Vi	-0.3	VDD	V	GND = 0
Operation Temperature	Topa	-30	+85	°C	Ambient
Storage Temperature	Tstg	-40	+95	°C	Ambient

Note 1: Functional operation should be restricted under normal ambient temperature.

5. DC Electrical Characteristics

The following items are measured under stable condition and suggested application circuit.

a. Power Specification

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Power Supply	VDD	3	3.3	3.6	V	
	IVDD	-	35	48	mA	Note 4
	IVDD inrush	-	-	70	mA	Note 5
	AVDD	13	13.5	14	V	
	IAVDD	-	15	36	mA	
	IAVDD inrush	-	-	324	mA	Note 6
	VGH	17	18	19	V	
	IVGH	-	1	2	mA	
	IVGH inrush	-	-	860	mA	Note 7
	VGL	-9	-8	-7	V	
	IVGL	-	1	2	mA	
	IVGL inrush	-	-	40	mA	Note 8
	VCOM	-	4.6~4.9	-	V	
	IVCOM	-	3~3.3	-	mA	
	IVCOM Inrush	-	-	30	mA	Note 9
Input gamma Voltage	V1~V9	0.4AVDD		AVDD-0.2	V	
	V10~V18	0.2		0.6AVDD	V	

Note 1: All conditions should be set typical value

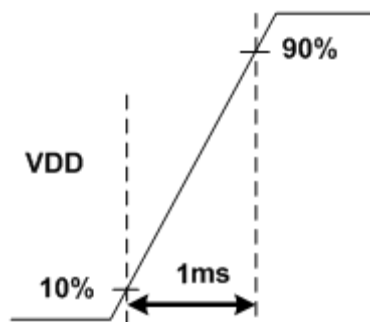
Note 2: The panel can operate normally in the recommended operating condition.

Note 3: Test pattern is as the following picture.

Note 4: The current value is using the following test pattern.



Note 5: Test condition is the VDD voltage 3.3V on the rising time 1ms, Please see below picture.



Note 6: Test condition is the AVDD voltage 13.5V on the rising time 14ms,

Note 7: Test condition is the VGH voltage 18V on the rising time 14ms,

Note 8: Test condition is the VGL voltage -8V on the rising time 6ms,

Note 9: Test condition is the VCOM voltage 4.75V on the rising time 14ms

b. Signal DC Electrical Characteristics

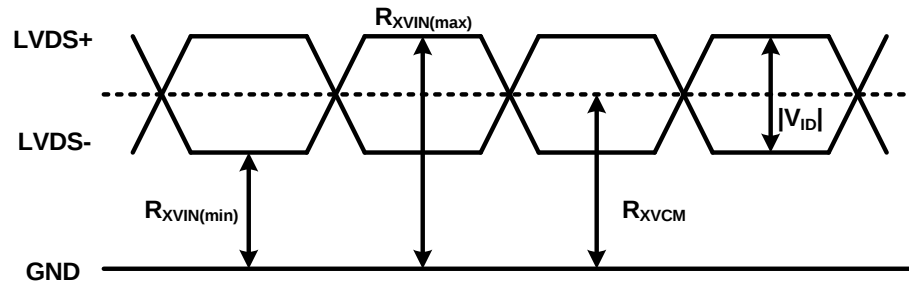
Parameter	Symbol	Min	Typ	Max	Unit	Notes
Input signal voltage	V_i	-0.3	-	$VDD + 0.3$	V	Note 1
Input high level voltage	V_{IH}	0.7VDD	-	VDD	V	Note 1
Input low level voltage	V_{IL}	GND	-	0.3VDD	V	Note 1
Differential input high threshold	R_{XVTH}	0.16	-	-	V	Note 2
Differential input low threshold	R_{XVTL}	-	-	-0.16	V	Note 2
Input voltage range (singled-end)	R_{XVIN}	0	-	(VDD-1.2)	V	Note 2
Input differential voltage	$ V_{ID} $	0.16	-	0.6	V	Note 2
Differential Input Common Mode Voltage	R_{XVCM}	$ V_{ID} /2$	-	(VDD-1.2) $- V_{ID} /2$	V	Note 2

Note 2: TTL interface signal DC characteristics

Note 3: LVDS interface signal DC characteristic

Note 4: The VID of transceiver suggest up to +/-400mV, this is better solution for receivers at high speed transmission

Single-end Signal



Differential Signal

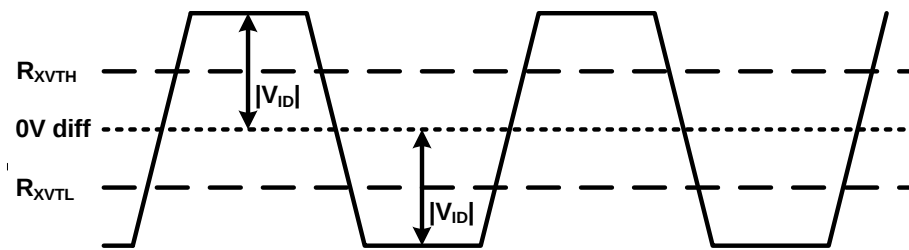


Fig. 3. LVDS DC characteristics diagram

c. Recommend Gamma Voltage

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Gamma Voltage	V1	-	(11.995)	-	V	
	V2	-	(11.765)	-	V	
	V3	-	(10.38)	-	V	
	V4	-	(9.85)	-	V	
	V5	-	(9.189)	-	V	
	V6	-	(8.598)	-	V	
	V7	-	(8.1)	-	V	
	V8	-	(7.002)	-	V	
	V9	-	(6.914)	-	V	
	V10	-	(6.086)	-	V	
	V11	-	(5.998)	-	V	
	V12	-	(4.9)	-	V	
	V13	-	(4.402)	-	V	
	V14	-	(3.811)	-	V	
	V15	-	(3.15)	-	V	
	V16	-	(2.62)	-	V	
	V17	-	(1.235)	-	V	
	V18	-	(1.005)	-	V	

d. Backlight Driving Conditions (Note 1)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED Supply Current	I_L		450	480	mA	single serial (Note 3)
LED Supply Voltage	V_L	9.0		9.6	V	single serial (Note 3)
LED Life Time	L_L	10,000			h	Note 2

Note 1: light-bar has 21 pieces of LED (7 strings, 3 pieces for each string).

Note 2: LED life time defining the 50% decreasing of the original brightness is 10,000 hours under the 450 mA of LED current in 25 °C..

Note 3: The LED supply power is for 3 string of LED.

Note 4: LED current should follow below de-rating curve:

6. AC Electrical Characteristics

a. Input AC characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Time interval between VDD and INV2FB	T_{INV_ON}	1	-	-	ms	
INV2FB high interval	T_{INV_H}	1	-	-	s	
INV2FB low interval	T_{INV_L}	1	-	-	s	

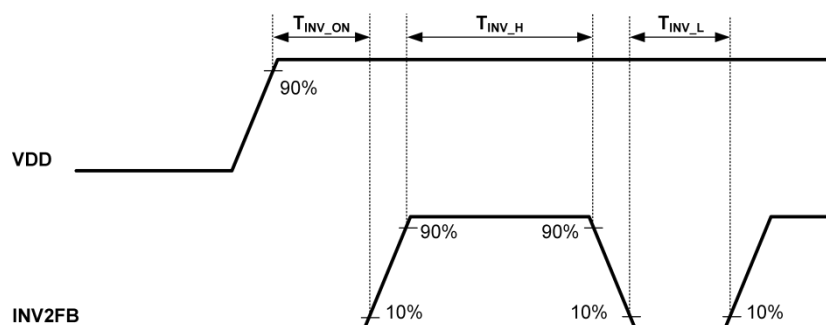


Fig. 6. INV2FB timing diagram

b. Differential signal AC characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Clock frequency	R_{XFCLK}	69.49	70.825	75.54	MHz	
Input data skew margin	T_{RSKM}			0.25	UI	

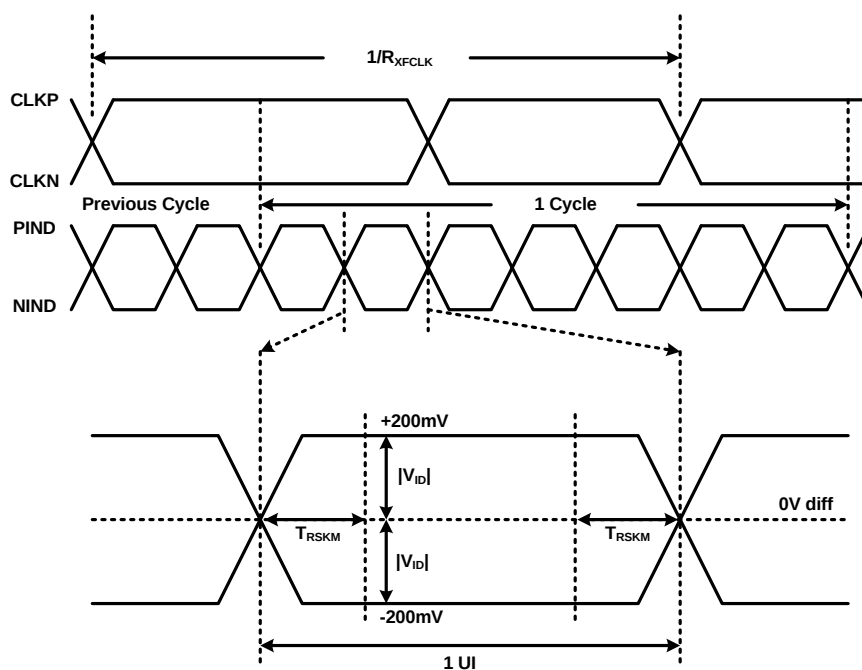


Fig. 7 LVDS AC characteristics diagram

7. Power on/off sequence

The LCD adopts high voltage driver IC, so it could be permanently damaged under a wrong power on/off sequence. The suggested LCD power sequence is below:

a. Power on sequence:

VDD → Digital input → STBYB → LVDS → VGL → AVDD & Vcom & Gamma Voltage & VGH → LED

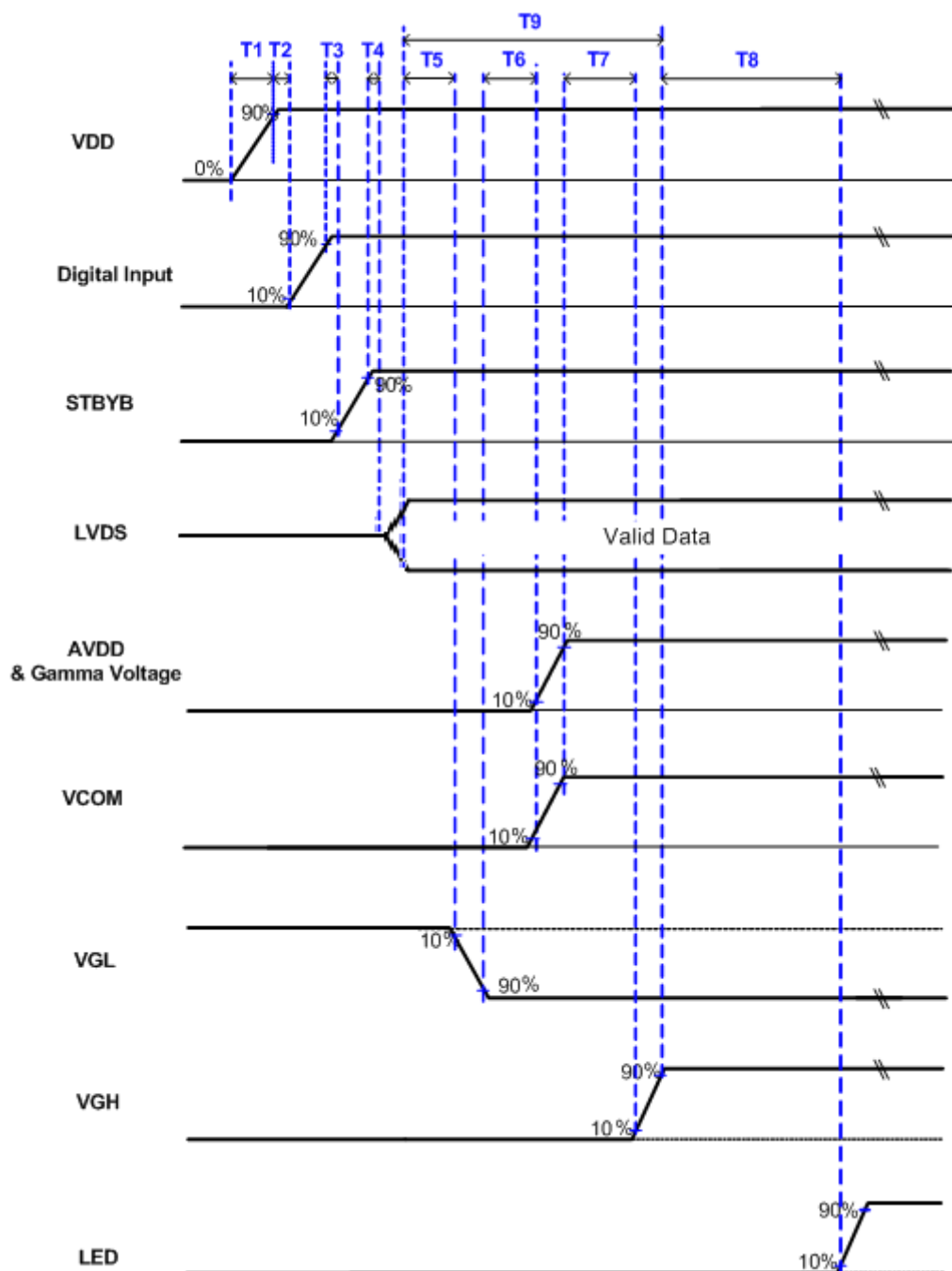


Fig. 8. Power on sequence

Power on timing:

Parameter	Value			Units
	Min.	Typ.	Max.	
T1	10	--	--	ms
T2	1	--	--	ms
T3	0	--	--	ms
T4	0	--	--	ms
T5	0	--	--	ms
T6	0	--	--	ms
T7	0	--	--	ms
T8	100	--	--	ms
T9	--	--	80	ms

b. Power Off sequence:

LED → STBYB → VCOM → LVDS → VGL → AVDD & Gamma Voltage & VGH → Digital Input & VDD

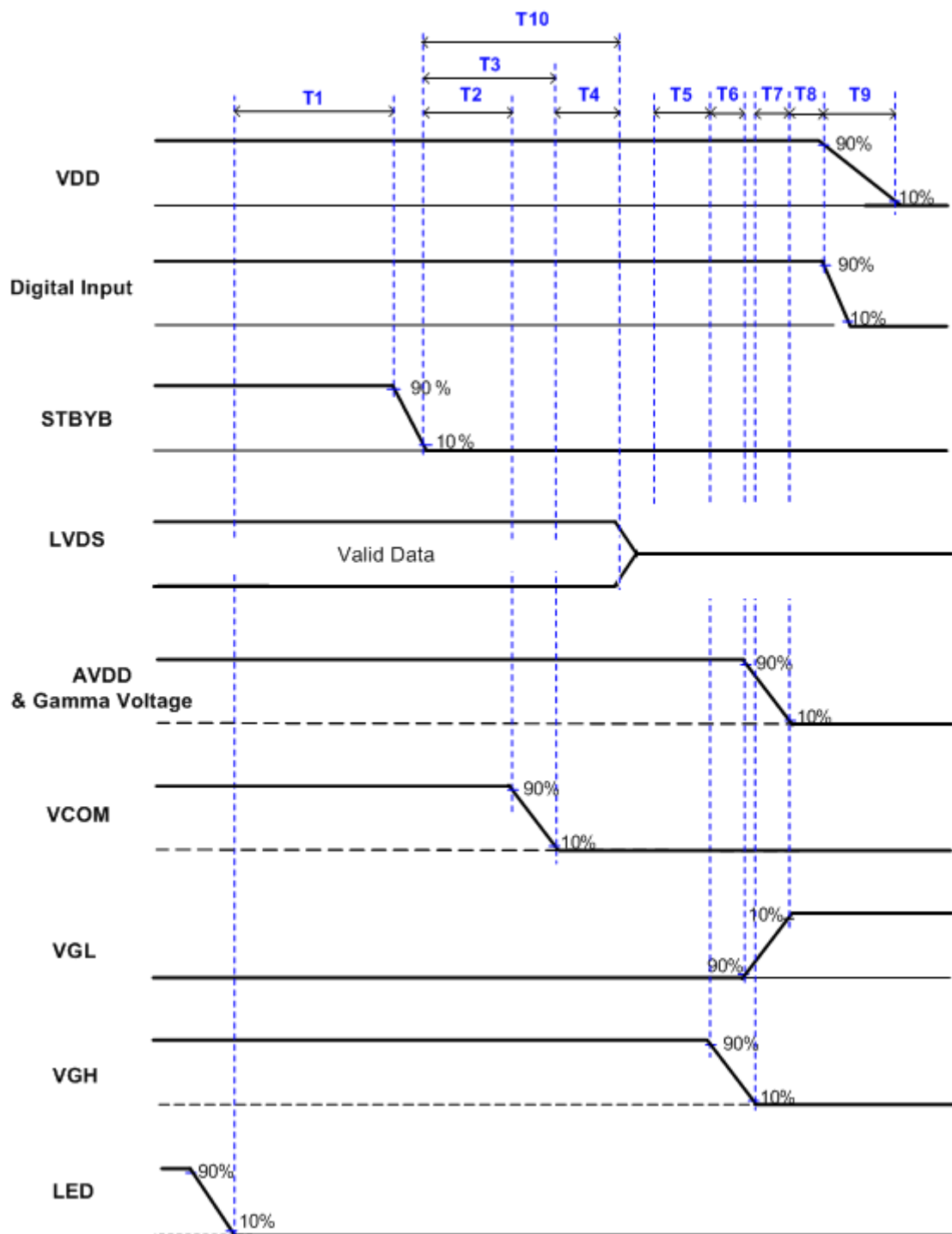


Fig. 9. Power off sequence

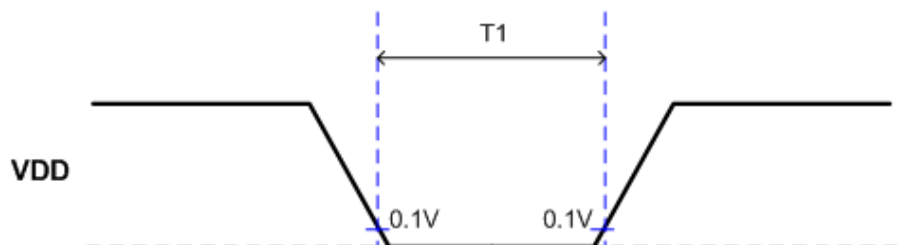
Power off timing:

Parameter	Value			Units
	Min.	Typ.	Max.	
T1	90	100	--	ms
T2	34	--	--	ms
T3	34	--	85	ms
T4	0	--	--	ms
T5	0	--	--	ms
T6	0	--	--	ms
T7	0	--	--	ms
T8	0	--	20	ms
T9	50	--	--	ms
T10	100	--	--	ms

c. VDD off to on timing

Parameter	Value			Unit	Remark
	Min.	Typ.	Max.		
T1	1		--	s	Note 1

Note 1 : Before VDD turns ON, please make sure that AVDD; VGH; VGL; are all below intensity of 0.1V.



F. Optical specifications (Note 1, 2)

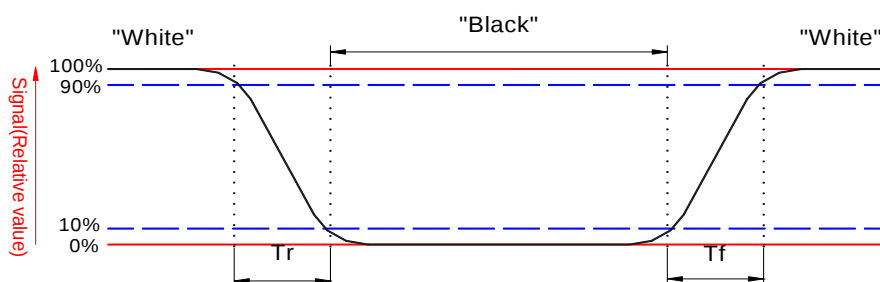
Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Response Time Rise Fall	Tr	$\theta = 0^\circ$	-	-	20	ms	Note 3
	Tf		-	-	20		
Viewing Angle Top Bottom Left Right		$CR \geq 100$	50 50 50 50	60 60 60 60	-	deg.	Note 7, 8
Contrast ratio	CR	$\theta = 0^\circ$	800	1000	-		Note 4, 5, 6
Brightness	Y_L	$\theta = 0^\circ$	-	500	-	cd/m ²	Note 9
White Chromaticity	X	$\theta = 0^\circ$	0.249	0.289	0.329		Note 10
	Y	$\theta = 0^\circ$	0.266	0.306	0.346		
Red Chromaticity	X	$\theta = 0^\circ$	0.593	0.633	0.673		
	Y	$\theta = 0^\circ$	0.289	0.329	0.369		
Green Chromaticity	X	$\theta = 0^\circ$	0.256	0.296	0.336		
	Y	$\theta = 0^\circ$	0.568	0.608	0.648		
Blue Chromaticity	X	$\theta = 0^\circ$	0.111	0.151	0.191		
	Y	$\theta = 0^\circ$	0.012	0.052	0.092		
Uniformity		-	80			%	Note 11

Note 1: Measurement should be performed in the dark room, optical ambient temperature = 25 °C, and backlight current $I_L = 90\text{mA}$.

Note 2: To be measured in the center area of TFT-LCD with a field angle of 1° by Topcon luminance meter SR3, after 10 min operation and warm up 30 min.

Note 3: Definition of response time:

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



Note 4: Based on liquid crystal characteristics, the response time will become slower and the color of panel will become darker than the above optical specification when ambient temperature is below 25 °C.

Note 5: Contrast ratio is calculated with the following formula.

$$\text{Contrast ratio} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector output when LCD is at "Black" state}}$$

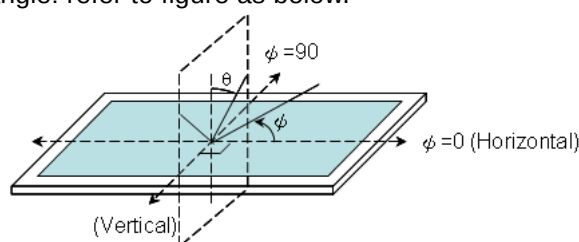
Note 6: White Vdata=V1 or V18

Black Vdata=V9 or V10

(For definition of V1, V9, V10 & V18, please refer to Appendix)

The 100% transmission is defined as the transmission of LCD panel when all the input terminals of module are electrically opened.

Note 7: Definition of viewing angle: refer to figure as below.

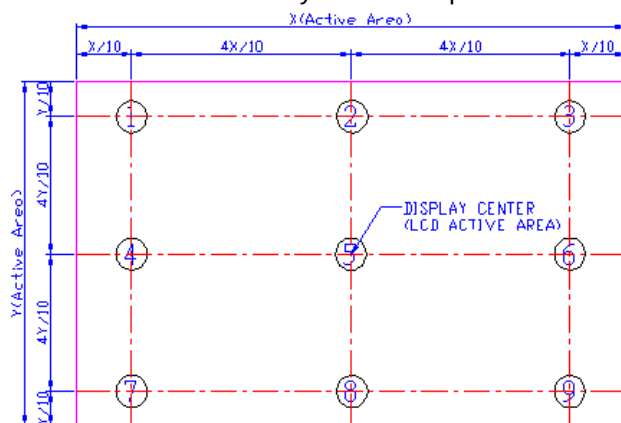


Note 8: Viewing angles are measured at the center of the panel when all the input terminals of LCD oanel are electrically opened.

Note 9: Brightness is measured at the center of the display.

Note 10: The viewing angles are measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

Note 11: Luminance Uniformity of these 9 points is defined as below: (1 : 4 : 4 : 1)



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

G. Reliability Test Items(Note 1~3)

No.	Test items	Conditions		Remark
1	High temperature storage	Ta= 80 °C	240 h	
2	Low temperature storage	Ta= -30 °C	240 h	
3	High temperature operation	Ta= 70°C	240 h	
4	Low temperature operation	Ta= -20 °C	240 h	
5	High temperature and high humidity	Ta= 60 °C, 90 % RH	240 h	Operation
6	Heat shock	-30 °C ~ 85 °C / 100 cycles 1 h/cycle		Non-operation
7	Shock	981 m/s², 6 ms, ±X, ±Y, ±Z 3 times for each direction		
8	Electrostatic Discharge	Contact = ± 8 kV, class B Air = ± 15 kV, class B		IEC61000-4-2
9	Vibration	Frequency range	8 ~ 33.3 Hz	JIS D1601,A10 Condition A
		Stoke	1.3 mm	
		Sweep	28.4 m/s², 33.3 ~ 400Hz	
		Cycle	15 min.	
		2 h for each direction of X, Z 4 h for Y direction		
10	Vibration (with carton)	Random vibration: 0.15 (m/s²)²/Hz from 5 ~ 200 Hz -6 dB/Octave from 200 ~ 500 Hz		IEC 68-34
11	Drop (with carton)	Height: 60 cm 1 corner, 3 edges, 6 surfaces		

Note 1: Ta: Ambient temperature

Note 2: In the standard condition, there is no display function NG issue occurred. All the cosmetic specification is judged before the reliability stress.

Note 3: I_L =450mA



Version 1.0

Page: 25/25

H. Packing and Marking

1. Packing Form

T.B.D