

Company Name	
MODEL	C090XVC01.0
CUSTOMER APPROVED	Title : Name :

C. Physical Specifications

1. TFT LCD Panel

NO.	Item	Unit	Specification	Remark
1	Display Resolution	dot	768 RGB(H)x1024(V) (XGA)	Portrait type
2	Active Area	mm	138.24 (H) x 184.32 (V)	
3	Screen Size	inch	9 (Diagonal)	
4	Sub Pixel Pitch	μm	60 x 180	
5	Color Configuration	--	R. G. B. Stripe	
6	Color Depth	--	256 x 256 x 256	
7	Overall Dimension	mm	159.36 (H) x 198.5 (V)x 7.77 (T)	
8	Weight	g	(425± 10 %)	
9	Display Mode	--	Normally Black	
10	Surface Treatment		HCAR	
11	Surface Reflectance	%	<1 @ 550nm <0.5 @ 550nm	SCI SCE

E. Electrical Specifications

1. TFT LCD Panel Pin Assignment

Recommended Connector: FH52-50S-0.5SH

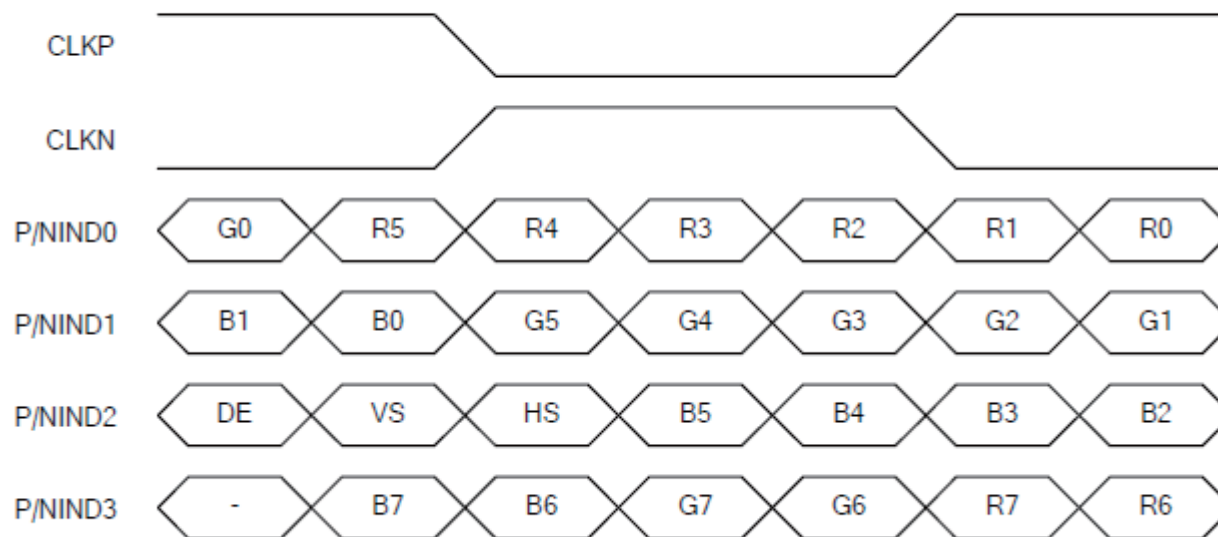
No.	Pin Name	I/O	Description	Remarks
1	VCOM	PI	Common electrode driving voltage.	
2	LVFMT	I	8-bit input format selection for LVDS mode. "H"→VESA format; "L"→JEIDA format.	Setting to "L"
3	LR	I	Horizontal scan direction control. "H"→Left to Right; "L"→Right to Left.	Note1
4	VDD	PI	Digital power supply voltage.	
5	GRB	I	Global reset pin. (low active)	
6	STBYB	I	Standby mode. "H" for normal operation. "L" for standby mode.	
7	GND	G	Ground.	
8	CLKP	I	Positive LVDS differential clock input.	
9	CLKN	I	Negative LVDS differential clock input.	
10	GND	G	Ground.	
11	PIND0	I	Positive LVDS differential input.(R7-R2, G2)	
12	NIND0	I	Negative LVDS differential input.(R7-R2, G2)	
13	GND	G	Ground.	
14	PIND1	I	Positive LVDS differential input.(G7-G3, B3-B2)	
15	NIND1	I	Negative LVDS differential input. (G7-G3, B3-B2)	
16	GND	G	Ground.	
17	PIND2	I	Positive LVDS differential input.(B7-B4, DE, VS, HS)	

18	NIND2	I	Negative LVDS differential input. (B7-B4, DE, VS, HS)	
19	GND	G	Ground.	
20	PIND3	I	Positive LVDS differential input.(R1-R0, G1-G0, B1-B0)	
21	NIND3	I	Negative LVDS differential input. (R1-R0, G1-G0, B1-B0)	
22	GND	G	Ground.	
23	V18	PI	Gamma correction voltage.	
24	V17	PI	Gamma correction voltage.	
25	V16	PI	Gamma correction voltage.	
26	V15	PI	Gamma correction voltage.	
27	V14	PI	Gamma correction voltage.	
28	V13	PI	Gamma correction voltage.	
29	V12	PI	Gamma correction voltage.	
30	V11	PI	Gamma correction voltage.	
31	V10	PI	Gamma correction voltage.	
32	V9	PI	Gamma correction voltage.	
33	V8	PI	Gamma correction voltage.	

34	V7	PI	Gamma correction voltage.	
35	V6	PI	Gamma correction voltage.	
36	V5	PI	Gamma correction voltage.	
37	V4	PI	Gamma correction voltage.	
38	V3	PI	Gamma correction voltage.	
39	V2	PI	Gamma correction voltage.	
40	V1	PI	Gamma correction voltage.	
41	AVDD	PI	Analog power supply voltage.	
42	AVDD	PI	Analog power supply voltage.	
43	NC	-	Dummy.	
44	GND	G	Ground.	
45	VCOM	PI	Common electrode driving voltage.	
46	GND	G	Ground.	
47	NC	-	Dummy.	
48	VGH	PI	Positive power supply voltage for TFT.	
49	NC	-	Dummy.	
50	VGL	PI	Negative power supply voltage for TFT.	

2. Differential Input Data Format

a. LVFMT = "H", VESA format



b. LVFMT = "L", JEIDA format

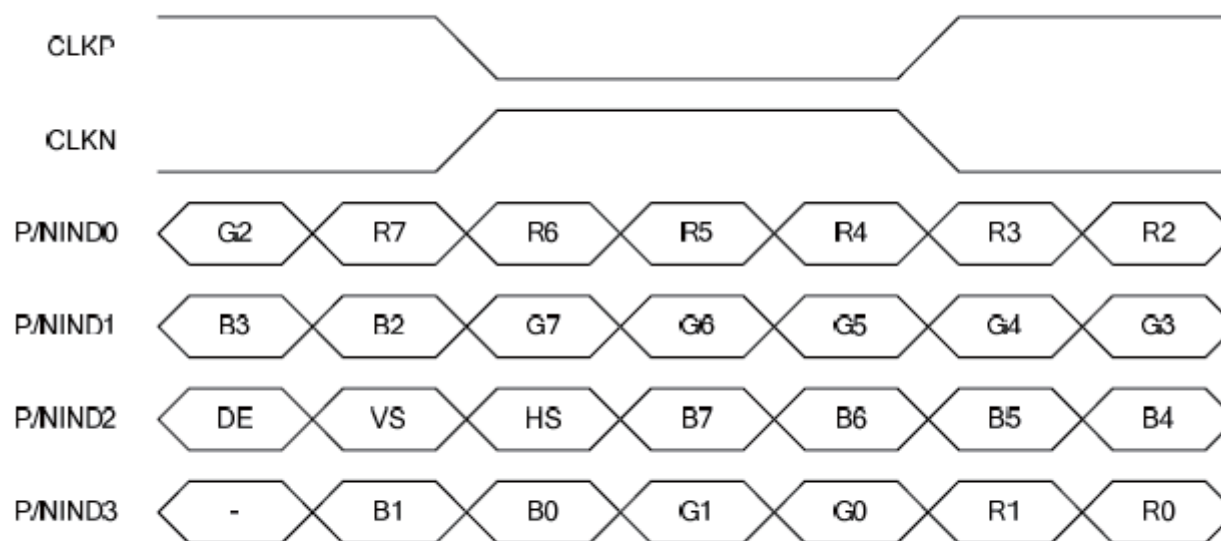


Fig. 2 LVDS input data JEIDA format

3. Input Timing Diagram

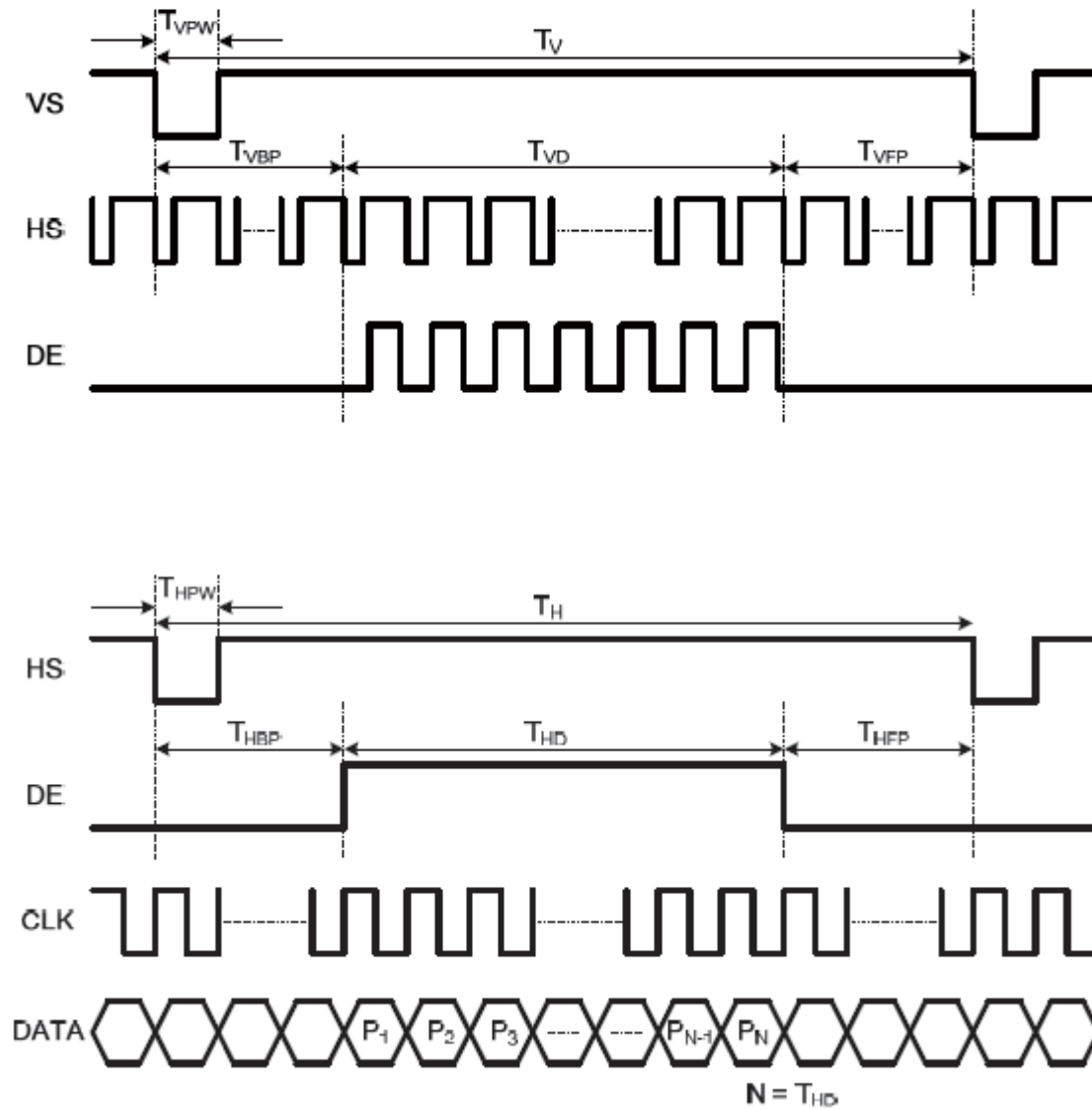


Fig. 3 Input Timing Diagram

HV Mode

Parameter		Symbol	Min.	Typ.	Max.	Unit.	Remark
CLK Frequency		F_{CLK}	51.2	51.5	66.2	MHz	
HSYNC	Period	T_H	828	832	958	CLK	
	Horizontal display area	T_{HD}	768			CLK	
	Back porch	T_{HBP}	48			CLK	
	Front porch	T_{HFP}	12	16	142	CLK	
	Pulse width	T_{HPW}	1	-	15	CLK	
VSYNC	Period	T_V	1030	1032	1153	HS	
	Vertical display area	T_{VD}	1024			HS	
	Back porch	T_{VBP}	3			HS	
	Front porch	T_{VFP}	3	5	126	HS	
	Pulse width	T_{VPW}	1	-	3	HS	

DE Mode

Parameter		Symbol	Min.	Typ.	Max.	Unit.	Remark
CLK Frequency		F_{CLK}	51.2	51.5	66.2	MHz	
HSYNC	Period	T_H	828	832	958	CLK	
	Horizontal display area	T_{HD}	768			CLK	
	Blanking	$T_{HBP} + T_{HFP}$	60	64	190		
VSYNC	Period	T_V	1030	1032	1153	HS	
	Vertical display area	T_{VD}	1024			HS	
	Blanking	$T_{VBP} + T_{VFP}$	6	8	129	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 = 0V
	AVDD	-0.5	15	V	GND = 0V
	V1-V18	GND+0.5	AVDD-0.5	V	GND = 0V
	VGH	-0.3	40	V	GND = 0V
	VGL	-20	0.3	V	GND = 0V
	VGH-VGL	-0.3	40	V	GND = 0V
	VCOM	-0.3	10	V	GND = 0V
Input Signal Voltage	Vi	-0.3	VDD+0.3	V	GND = 0V
Operation Temperature	Topa	-30	85	°C	Ambient
Storage Temperature	Tstg	-40	95	°C	Ambient



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	50	65	80	mA	
	AVDD	V1+0.5	13	13.5	V	
	IAVDD	14	32	50	mA	
	V1-V9	0.4*AVDD	-	AVDD-0.5	V	
	V10-V18	0.5	-	0.6*AVDD	V	
	VGH	14	15	16	V	
	IVGH	0.1	0.3	1	mA	
	VGL	-10	-9	-8	V	
	IVGL	0.1	0.3	1	mA	
	VCOM	4.3	4.8	5.3	V	
	IVCOM	0.1	0.2	1	uA	

b. Signal DC Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Notes
Input signal voltage	V_i	-0.3	-	$V_{DD}+0.3$	V	Note 1
Input high level voltage	V_{IH}	$0.7 \times V_{DD}$	-	VDD	V	Note 1
Input low level voltage	V_{IL}	GND	-	$0.3 \times V_{DD}$	V	Note 1
Differential input high threshold	R_{XVTH}	-	-	0.2	V	Note 2
Differential input low threshold	R_{XVTL}	-0.2	-	-	V	Note 2
Input voltage range (singled-end)	R_{XVIN}	0	-	2.4	V	Note 2
Input differential voltage	$ V_{ID} $	0.2	-	0.6	V	Note 2
Differential Input Common Mode Voltage	R_{XVCM}	1.1	1.2	1.3	V	Note 2

c. Backlight Driving Conditions (Note 1)

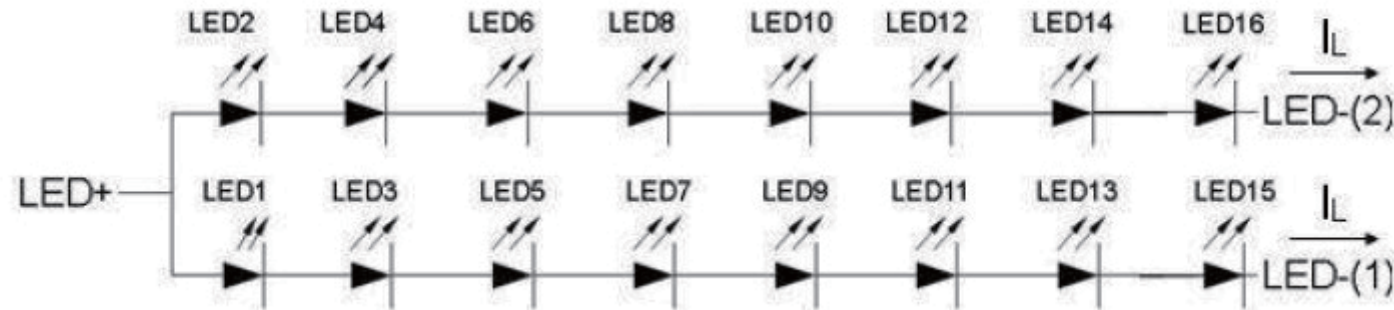
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED Supply Current	I_L		80	85	mA	single serial (Note 3)
LED Supply Voltage	V_L		25.6	28.8	V	single serial Note 3
LED Life Time	L_L	10,000			Hr	Note 2

Note 1: LED backlight has two light-bars. Each light-bar has 16 LEDs (2 strings, 8pcs for each string).

Note 2: The LED lifetime 10000hrs means , after normal use at 80mA, under +25 ° C, the brightness decreases to 50% of original level.

Note 3: The LED supply power is for 2 string of LED.

Note 4: The voltage capacity of LED driver IC must be over max. of LED Voltage.



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 → GRB → STBYB → LVDS → AVDD → VGL → VGH → VCOM → BKLEN

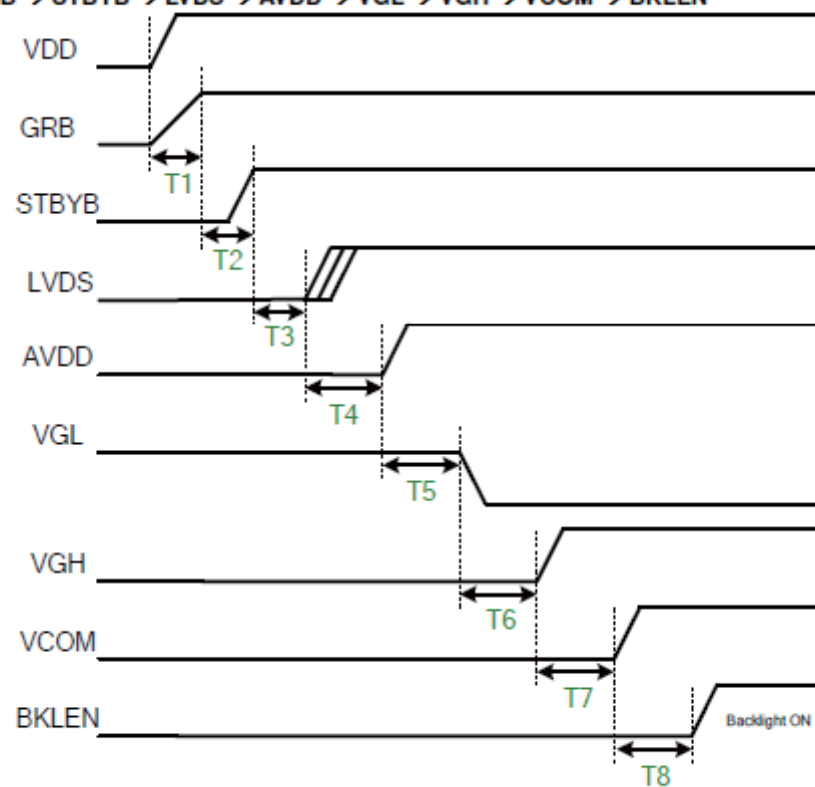


Fig. 8 Power on sequence

Power on timing:

Parameter	Value			Units
	Min.	Typ.	Max.	
T1	5	10	15	ms
T2	1	-	5	ms
T3	1	1.5	2	ms
T4	10	15	16.67	ms
T5	10	15	16.67	ms
T6	10	15	16.67	ms
T7	10	15	16.67	ms
T8	60	80	100	ms

b. Power Off sequence:
BKLEN → STBYB → VCOM → VGH → VGL → AVDD → LVDS → VDD&GRB

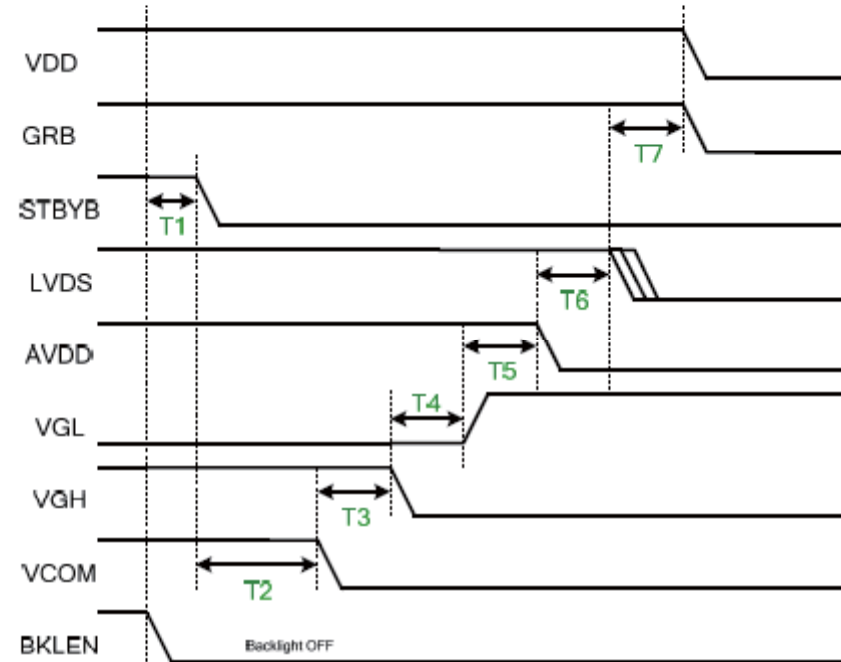


Fig. 9 Power off sequence

Power off timing:

Parameter	Value			Units
	Min.	Typ.	Max.	
T1	1	-	5	ms
T2	90	100	110	ms
T3	10	15	16.67	ms
T4	10	15	16.67	ms
T5	10	15	16.67	ms
T6	10	15	16.67	ms
T7	5	10	15	ms

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F. Optical specifications (Note 1, 2)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Response Time Rise Fall	Tr+Toff	$\theta=0^\circ$, Ta=25°	-		45	ms	Note 3
	Tr+Toff	$\theta=0^\circ$, Ta=-30°	-		1200		
Viewing Angle Top Bottom Left Right		CR $\geq$ 10	70 70 70 70			deg.	Note 4, 5
Contrast ratio	CR	$\theta=0^\circ$	800	1000			Note 6, 7, 8
	CR	$\theta=0^\circ$ $\phi=L/R$ 25°	400				Note.4,7,8
	CR	$\theta=0^\circ$ $\phi=L/R$ 60°	60				Note.4,7,8
Brightness	Y _L	$\theta=0^\circ$	460	600		cd/m ²	Note 9
		$\theta=0^\circ$ $\phi=L/R$ 25°	330	430			