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# Product Specification

## 7" color TFT-LCD module

MODEL NAME: A070VW01

- (    ) Preliminary Specification  
( ..... ) Final Specification

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

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### A. Physical specifications

NO.	Item	Specification	Remark
1	Display resolution(dot)	800RGB(W) $\times$ 480(H)	
2	Active area(mm)	152.40W) $\times$ 91.44(H)	
3	Screen size(inch)	7.0(Diagonal)	
4	Pixel pitch(mm)	0.1905(W) $\times$ 0.1905(H)	
5	Color configuration	R. G. B. stripe	
6	Overall dimension(mm)	165(W) $\times$ 104(H) $\times$ 6(D)	Note 1
7	Weight(g)	170 $\pm$ 10	
8	Surface treatment	AG(5.5%) with WV film	
9	Backlight unit	CCFL	

Note 1: Refer to Fig. 1

## B. Electrical specifications

### 1. Absolute Maximum Ratings

Items	Symbol	Product Specification			Unit
		Min.	Typ.	Max.	
Power Voltage	V <sub>cc</sub>	-0.5		5	V
	AVDD	-0.5		12	V
	V <sub>GH</sub>	-0.3		18	V
	V <sub>GL</sub>	-15		0.3	V
	V <sub>GH-VGL</sub>			33	V
Input Signal Voltage	V <sub>i</sub>	-0.3		V <sub>cc</sub> +0.3	V
	V <sub>ref</sub> (V1~V8)	0.4AVDD		AVDD+0.3	V
	V <sub>ref</sub> (V8~V14)	-0.3		0.6AVDD	V
	V <sub>com</sub>		4.2		V
Operating Temperature	T <sub>opa</sub>	-30		85	
Storage Temperature	T <sub>stg</sub>	-40		95	

### 2. Typical operating conditions (GND=AVSS=0V)

Items	Symbol	Product Specification			Unit
		Min.	Typ.	Max.	
Power Voltage	V <sub>cc</sub>	3.0	3.3	3.6	V
	AVDD	7.8	8.4	9.0	V
	V <sub>GH</sub>	14.3	15	15.7	V
	V <sub>GLAC</sub>	3.5	5	7.5	V
	V <sub>GL_H</sub>	-10.5	-10	-9.5	V
Input Reference Voltage	V1~V7	0.4AVDD	—	AVDD-0.3	V
	V8~V14	0.1	—	0.6AVDD	V
Input H/L level Voltage	V <sub>IH</sub>	0.8V <sub>CC</sub>	—	V <sub>CC</sub>	V
	V <sub>IL</sub>	0	—	0.2V <sub>CC</sub>	V

### 3. Current consumption conditions(GND=Avss=0V)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Current For Driver	I <sub>GH</sub>	V <sub>GH</sub> =15V		50	100	uA
	I <sub>GL</sub>	V <sub>GL</sub> =-10V		-0.2	-0.6	mA
	I <sub>CC</sub>	V <sub>CC</sub> =5V		1.5	4	mA
	I <sub>DD</sub>	AVDD=5V		25	30	mA

#### 4. Backlight driving conditions

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Voltage	VL			(580)	(640)	Vrms
Current	IL			6	7	mA
Frequency	FL			60	80	KHz
Lamp Start Voltage	Vs	T=25			850	Vrms
		T=0			1150	Vrms
		T=-30			1300	Vrms

#### 5. Timing conditions

AC Electrical Characteristics (VCC=3.3V, AVDD=8.4V, AVSS=GND=0V, TA=25 )

Parameter	Symbol	Min.	Typ.	Max.	Unit
CLK frequency	Fclk		40	42	MHz
CLK pulse width	TCW	6			ns
Data set-up time	Tsu	4			ns
Data hold time	Thd	2			ns
Propagation delay of DIO2/1	Tphl	6	10	15	ns
Time that the last data to LD	Tld	1			Tcw
Pulse width of LD	Twld	2			Tcw
Time that LD to DIO1/2	Tlds	5			Tcw
POL set-up time	Tpsu	6			ns
POL hold time	Tphd	6			ns
OEV pulse width	TOEV		12		Tcw
CKV pulse width	TCKV	16	28	40	Tcw
Horizontal display start	TSH		0		Tcw/3
Horizontal display timing range	TDH		800		Tcw/3
STV setup time	TSUV	400			ns
STV hold time	THDV	400			ns
STV pulse width	TSTV			1	TDH
Horizontal lines per field	TV	512	525	610	TDH
Vertical display start	TSV		3		TDH
Vertical display timing range	TDV		480		TDH

DC Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	Vcc	2.7	3.3	3.6	V
Low Level Input Voltage	Vil	0	-	0.3*Vcc	V
High Level Input Voltage	Vih	0.7*Vcc	-	Vcc	V
High Level Output Voltage	Voh	Vcc-0.4	-	-	V
Low Level Output Voltage	Vol	GND	-	GND+0.4	V
Supply Voltage	AVDD	6.5	8.4	10	V
Sinking Current of Outputs	IOL	-80	-	-	uA
Driving Current of Outputs	IOH	80	-	-	uA

1.Pin assignment

a. TFT-LCD panel driving section

(1.) FH12-50S-0.5SH(Hirose) — FPC I/O Pin Assignment

Pin no	Symbol	I/O	Description	Remark
1	DIO1(STHL)	I/O	Start pulse signal input/output (Horizontal)	
2	AVDD		Analog voltage for source driver	
3	AVSS		Analog GND for source driver	
4	GND		Digital GND for source driver	
5	VCC		Digital voltage for source driver	
6	EDGSL	I	Select raising edge or raising/falling edge	
7	CLK	I	Sample CLK	
8	SHL (R/L)	I	Right or Left display control	
9	R0	I	Red data	
10	R1	I	Red data	
11	R2	I	Red data	
12	R3	I	Red data	
13	R4	I	Red data	
14	R5	I	Red data	
15	G0	I	Green data	
16	G1	I	Green data	
17	G2	I	Green data	
18	G3	I	Green data	
19	G4	I	Green data	
20	G5	I	Green data	
21	V1	I	Reference voltage	
22	V2	I	Reference voltage	
23	V3	I	Reference voltage	
24	V4	I	Reference voltage	
25	V5	I	Reference voltage	
26	V6	I	Reference voltage	
27	V7	I	Reference voltage	
28	V8	I	Reference voltage	
29	V9	I	Reference voltage	
30	V10	I	Reference voltage	
31	B0	I	Blue data	
32	B1	I	Blue data	
33	B2	I	Blue data	
34	B3	I	Blue data	
35	B4	I	Blue data	
36	B5	I	Blue data	
37	LD (OEH)	I	Latch and switch data to output	
38	REV	I	Control data are inverted or not	
39	POL	I	Polarity selection	
40	DIO2(STHR)	I/O	Start pulse signal input/output (Horizontal)	
41	VCOM	I	VCOM voltage	



42	OEV	I	<b>Output enable</b>	
43	U/D	I	<b>Up or Down display control</b>	
44	CKV	I	<b>CLK (Vertical)</b>	
45	STVR	I/O	<b>Start pulse signal input/output (Vertical)</b>	
46	STVL	I/O	<b>Start pulse signal input/output (Vertical)</b>	
47	VGH		<b>TFT high voltage</b>	
48	VGL		<b>TFT low voltage</b>	
49	VDD		<b>Digital voltage for gate driver</b>	
50	VSS		<b>GND for gate driver</b>	

**C. Optical specification (Note 1, Note 2)**

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Response time	Rise	Tr	=0 °	-	12	50	ms	Note 3,5
	Fall	Tf		-	18	60	ms	
Contrast ratio		CR	At optimized Viewing angle	200	300	-		Note 4, 5
Viewing angle	Top		CR 10	30	40	-	deg.	Note 5, 6
	Bottom			50	60	-		
	Left			50	60	-		
	Right			50	60	-		
Viewing angle	Top		CR 5	40	50	-	deg.	Note 5, 6
	Bottom			60	70	-		
	Left			60	70	-		
	Right			60	70	-		
Brightness		Y <sub>L</sub>	I <sub>L</sub> =6mA, 25	350	400	-	nit	Note 7
White chromaticity		X	=0 °	0.26	0.31	0.36		Note 7
		Y	=0 °	0.28	0.33	0.38		

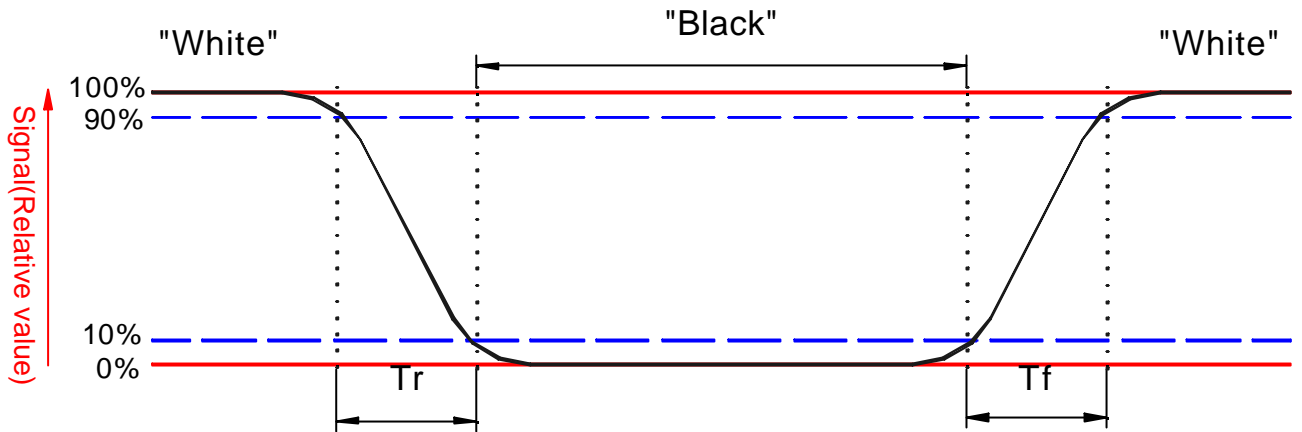
Note 1 : Ambient temperature =25 °C, and lamp current I<sub>L</sub> = 6 mA. To be measured in the dark room.

Note 2 : To be measured on the center area of panel with a viewing cone of 1° by Topcon luminance meter BM-5, after 10 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.

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

Note 5. White  $V_i = V_{i50} + 1.5V$

Black  $V_i = V_{i50} \pm 2.0V$

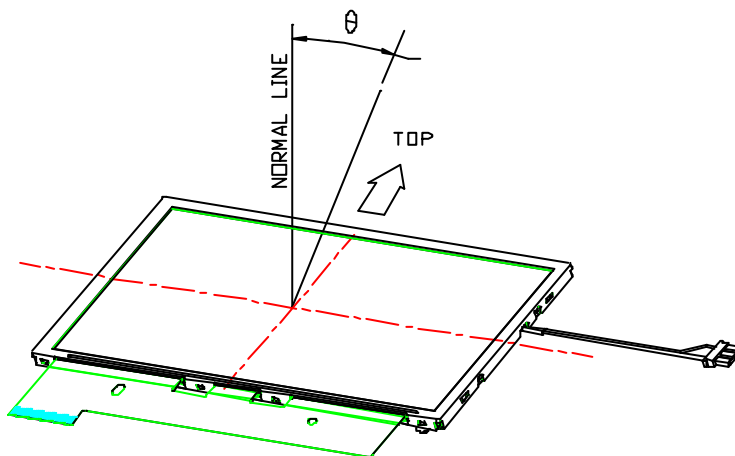
“±” means that the analog input signal swings in phase with  $V_{COM}$  signal.

“∓” means that the analog input signal swings out of phase with  $V_{COM}$  signal.

$V_{i50}$  : The analog input voltage when transmission is 50%

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

Note 6. Definition of viewing angle, Refer to figure as below.



Note 7. Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

**D. Reliability test items(Note 2):**

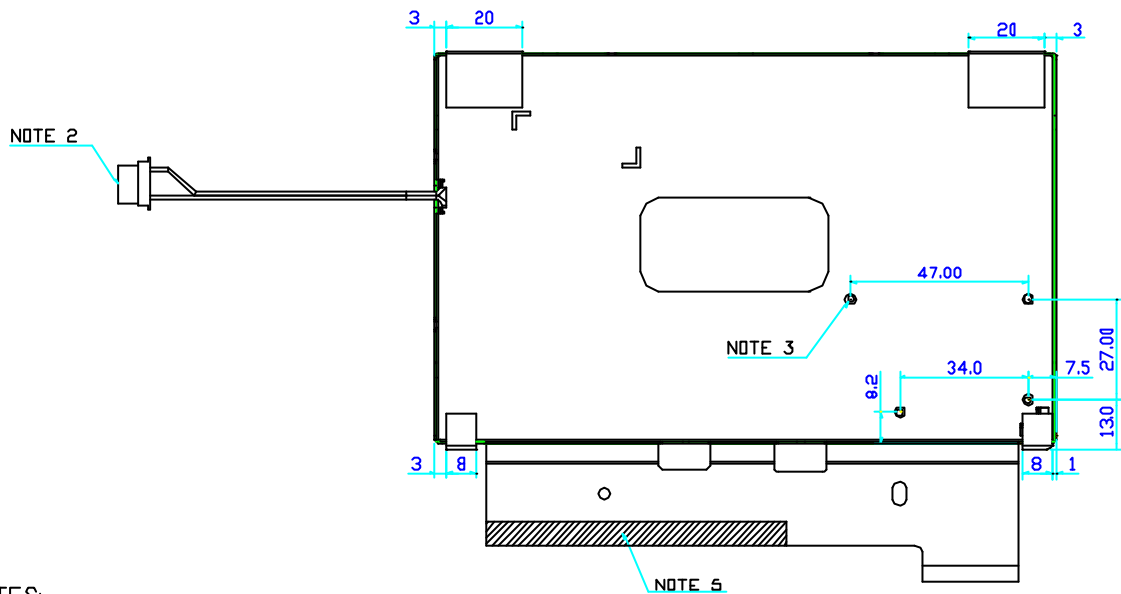
No.	Test items	Conditions	Remark
1	High temperature storage	Ta= 95 240Hrs	
2	Low temperature storage	Ta= -40 240Hrs	
3	High temperature operation	Ta= 85 240Hrs	
4	Low temperature operation	Ta= -30 240Hrs	
5	High temperature and high humidity	Ta= 60 , 90% RH 240Hrs	Operation
6	Heat shock	-30 ~85 /200 cycles 1Hrs/cycle	Non-operation
7	Electrostatic discharge	±200V,200pF(0 ), once for each terminal	Non-operation
8	Vibration	Frequency range : 8~33.3Hz Stoke : 1.3mm Sweep : 2.9G, 33.3 ~ 400Hz Cycle : 15 minutes 2 hours for each direction of X,Z 4 hours for Y direction	JIS C7021, A-10 condition A
9	Mechanical shock	100G, 6ms, ±X, ±Y, ±Z 3 times for each direction	JIS C7021, A-7 condition C
10	Vibration (with carton)	Random vibration: 0.015G <sup>2</sup> /Hz from 5~200Hz -6dB/octave from 200~500Hz	IEC 68-34
11	Drop (with carton)	Height: 60cm 1 corner, 3 edges, 6 surfaces	JIS Z0202

Note1: 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.

**TBD**





NOTES:

- 1.General Tolerance :  $\pm 0.3$
- 2 Lamp connector : JST/BHR-03VS-1
- 3 Boss Spec.(Q'ty: 3):  $\varnothing 3.0\text{mm} \times 2.6\text{L}$  ,M2 screw hole
- 4.Recommend Screw For Boss: Screw M2 X 2.4L
- 5 TWO SIDE TAPE

Fig.2 Outline dimension of TFT-LCD module(Rear side)

■ Timing Diagram 1 ( CHNSL="1" , Default )

<< EDGSL="0", Default >>

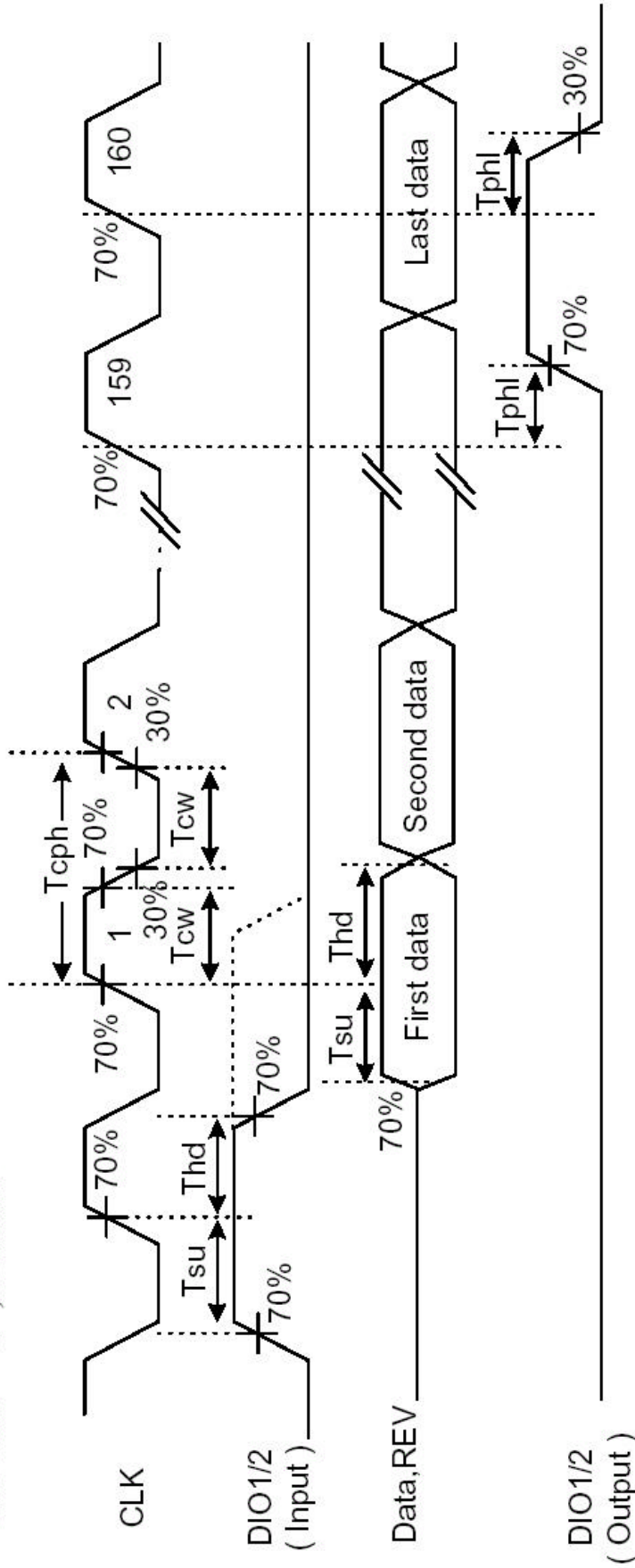
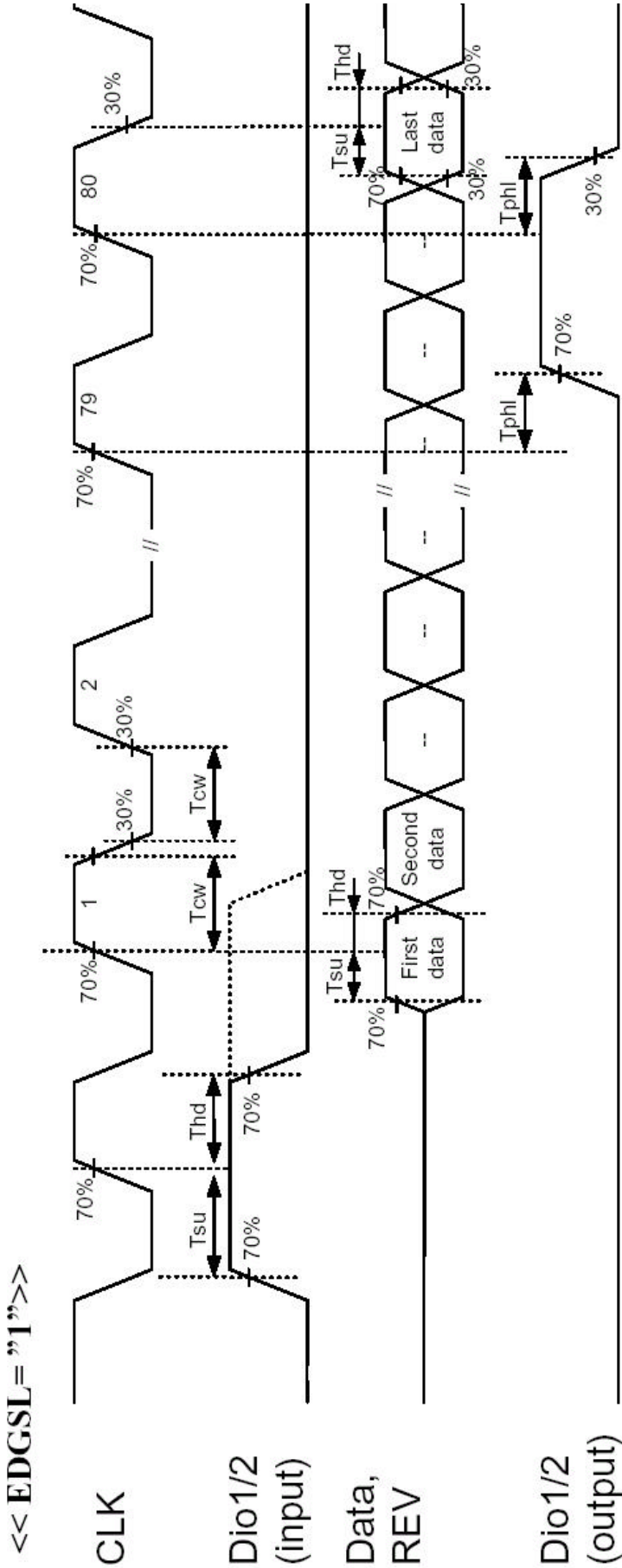


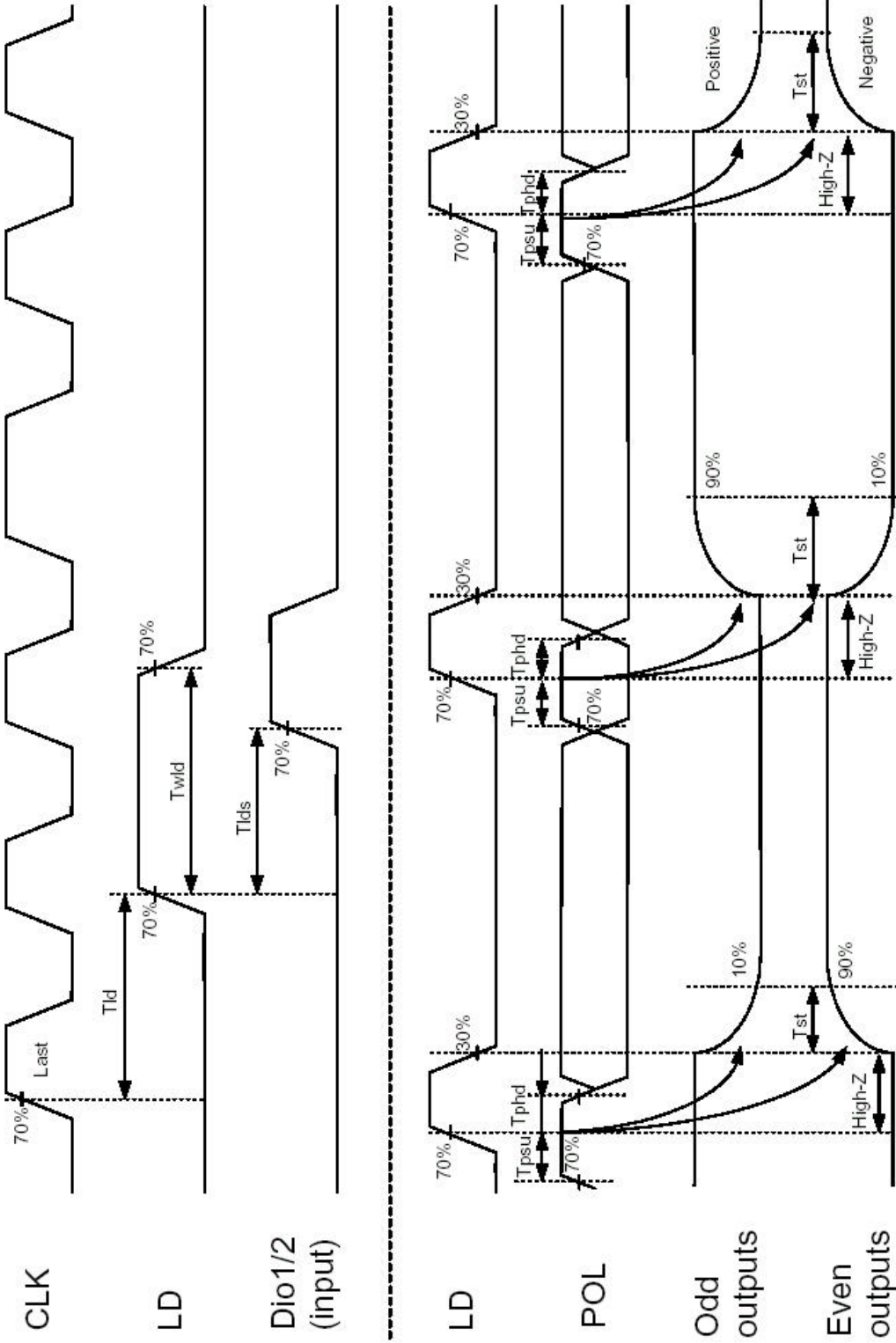
Fig.3 Operation Mode 1



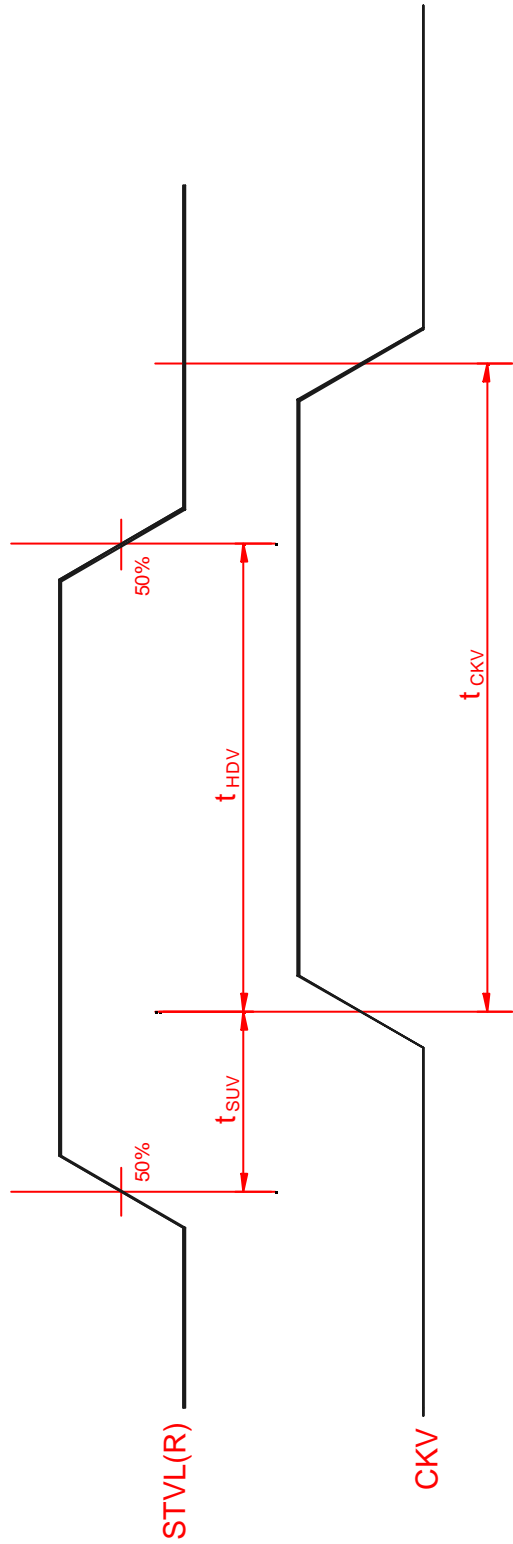


**Fig.4 Operation Mode 2**

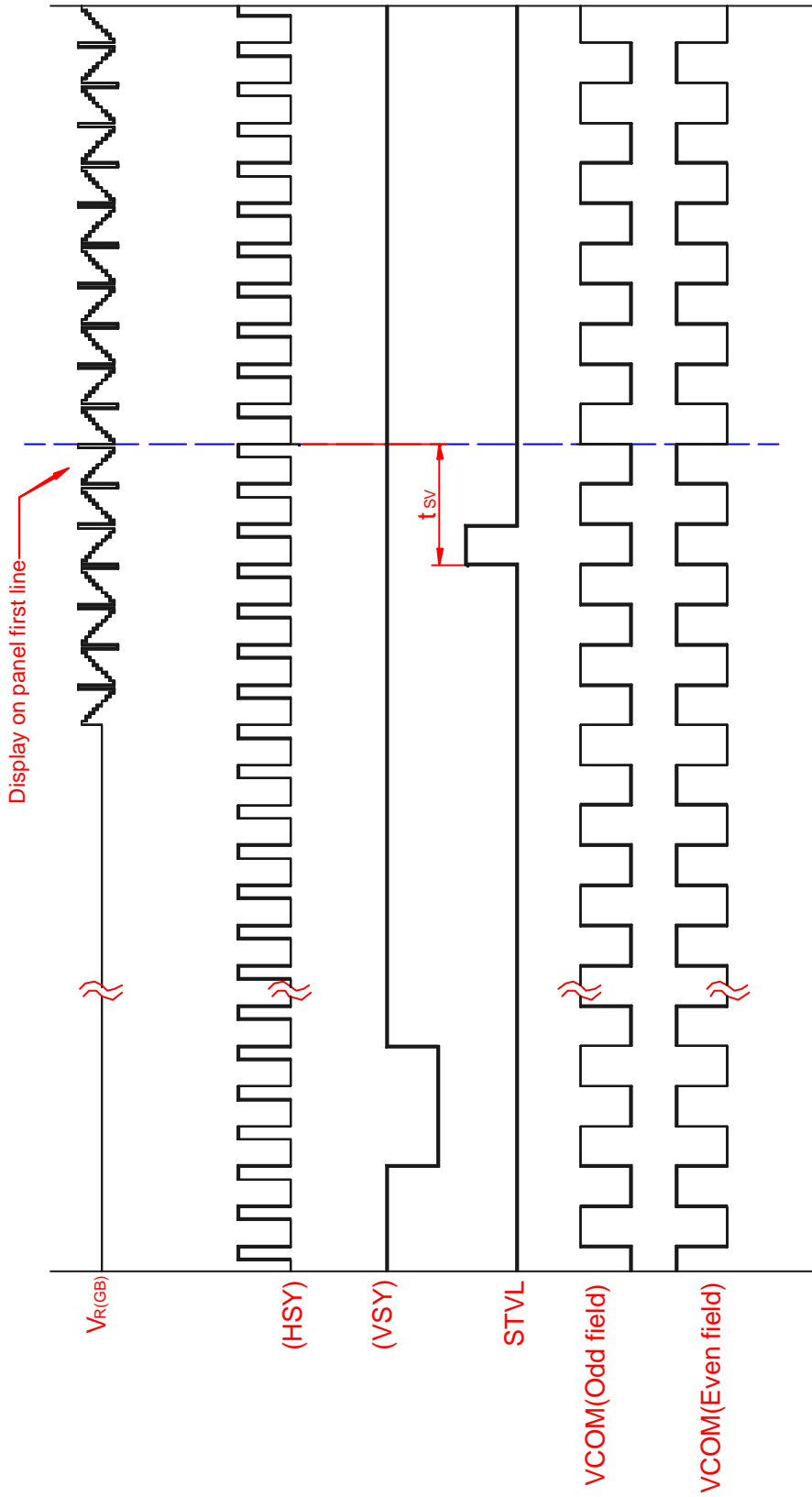
■ **Timing Diagram 2**



**Fig.5 Horizontal timing**



**Fig.6 Virtual shift clock timing**



**Fig.7 Vertical timing (from up to down)**