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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)×480(H) | |
| 2 | Active area(mm) | 152.40W)×91.44(H) | |
| 3 | Screen size(inch) | 7.0(Diagonal) | |
| 4 | Pixel pitch(mm) | 0.1905(W)×0.1905(H) | |
| 5 | Color configuration | R. G. B. stripe | |
| 6 | Overall dimension(mm) | 165(W)×104(H)×6(D) | Note 1 |
| 7 | Weight(g) | 170 ±0 | |
| 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 _{cc} | -0.5 | | 5 | V |
| | AVDD | -0.5 | | 12 | V |
| | V _{GH} | -0.3 | | 18 | V |
| | V _{GL} | -15 | | 0.3 | V |
| | V _{GH-VGL} | | | 33 | V |
| Input Signal Voltage | V _i | -0.3 | | V _{cc} +0.3 | V |
| | V _{ref} (V1~V5) | 0.4AVDD | | AVDD+0.3 | V |
| | V _{ref} (V6~V10) | -0.3 | | 0.6AVDD | V |
| | V _{com} | | 2.6 | | V |
| Operating Temperature | T _{opa} | -30 | | 85 | °C |
| Storage Temperature | T _{stg} | -40 | | 95 | °C |

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

| Items | Symbol | Product Specification | | | Unit |
|-------------------------|------------------|-----------------------|------|--------------------|------|
| | | Min. | Typ. | Max. | |
| Power Voltage | V _{cc} | 3.0 | 3.3 | 3.6 | V |
| | AVDD | 7.8 | 8.4 | 9.2 | V |
| | V _{GH} | 14.0 | 15.0 | 16.0 | V |
| | V _{COM} | | 2.6 | | V |
| | V _{GL} | -11.0 | -10 | -9.0 | V |
| Input Reference Voltage | V1~V5 | 0.4AVDD | — | AVDD-0.2 | V |
| | V6~V10 | 0.2 | — | 0.6AVDD | V |
| Input H/L level Voltage | V _{IH} | 0.8V _{CC} | — | V _{CC} | V |
| | V _{IL} | 0 | — | 0.2V _{CC} | V |

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

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit |
|--------------------|-----------------|-----------------------|------|------|------|------|
| Current For Driver | I _{GH} | V _{GH} =15V | | 100 | 150 | uA |
| | I _{GL} | V _{GL} =-10V | | -100 | -150 | uA |
| | I _{CC} | V _{CC} =5V | | 3.5 | 5 | mA |
| | I _{DD} | AVDD=5V | | 20 | 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°C | | | 850 | Vrms |
| | | T=0°C | | | 1150 | Vrms |
| | | T=-30°C | | | 1300 | Vrms |

5. Timing conditions

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

| 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 | GND | P | Ground for gate drive | |
| 2 | VCC | P | Digital voltage for gate driver | |
| 3 | VGL | P | TFT low voltage | |
| 4 | VGH | P | TFT high voltage | |
| 5 | STVL | I/O | Start pulse signal input/output (Vertical) | |
| 6 | STVR | I/O | Start pulse signal input/output (Vertical) | |
| 7 | CKV | I | CLK (Vertical) | |
| 8 | U/D | I | Up or Down display control | |
| 9 | OEV | I | Output enable | |
| 10 | VCOM | I | VCOM voltage | |
| 11 | DIO1 | I/O | Start pulse signal input/output (Horizontal) | |
| 12 | AVDD | P | Analog voltage for source driver | |
| 13 | AVSS | P | Analog ground for source driver | |
| 14 | GND | P | Digital ground for source driver | |
| 15 | VCC (DVDD) | P | Digital voltage for source driver | |
| 16 | EDGSL | I | Select raising edge or raising/falling edge | |
| 17 | CLK | I | Sample CLK | |
| 18 | SHL(R/L) | I | Right or Left display control | |
| 19 | R0 | I | Red data | |
| 20 | R1 | I | Red data | |
| 21 | R2 | I | Red data | |
| 22 | R3 | I | Red data | |
| 23 | R4 | I | Red data | |
| 24 | R5 | I | Red data | |
| 25 | G0 | I | Green Data | |
| 26 | G1 | I | Green Data | |
| 27 | G2 | I | Green Data | |
| 28 | G3 | I | Green Data | |
| 29 | G4 | I | Green Data | |
| 30 | G5 | I | Green Data | |
| 31 | V1 | I | Reference voltage | |
| 32 | V2 | I | Reference voltage | |
| 33 | V3 | I | Reference voltage | |
| 34 | V4 | I | Reference voltage | |
| 35 | V5 | I | Reference voltage | |
| 36 | V6 | I | Reference voltage | |
| 37 | V7 | I | Reference voltage | |
| 38 | V8 | I | Reference voltage | |
| 39 | V9 | I | Reference voltage | |
| 40 | V10 | I | Reference voltage | |
| 41 | B0 | I | Blue Data | |

| | | | | |
|----|----------|-----|--|--|
| 42 | B1 | I | Blue Data | |
| 43 | B2 | I | Blue Data | |
| 44 | B3 | I | Blue Data | |
| 45 | B4 | I | Blue Data | |
| 46 | B5 | I | Blue Data | |
| 47 | LD (OEH) | I | Latch and switch data to output | |
| 48 | REV | I | Control data are inverted or not | |
| 49 | POL | I | Polarity selection | |
| 50 | DIO2 | I/O | Start pulse signal input/output (Horizontal) | |

C. Optical specification (Note 1, Note 2)

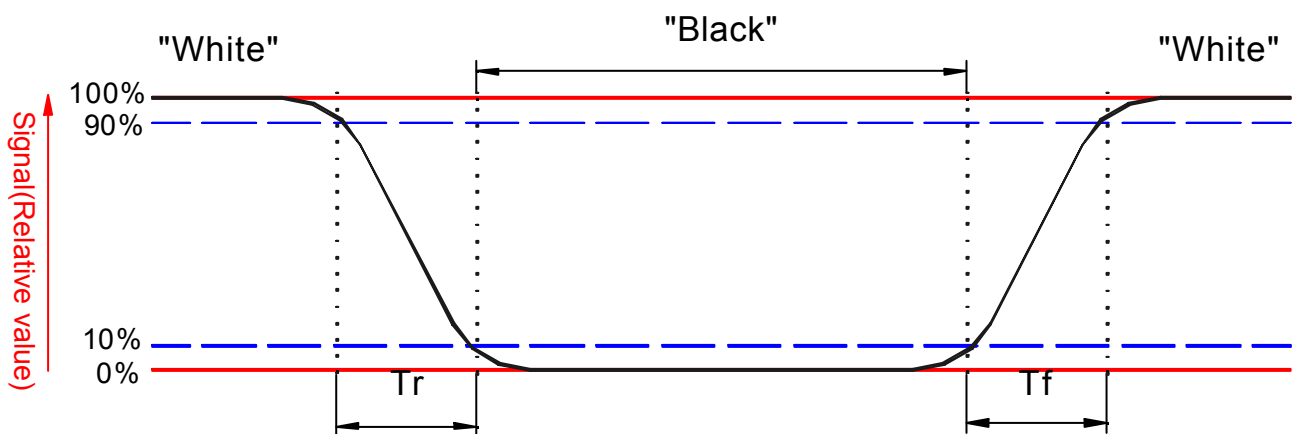
| Item | Symbol | Condition | Min. | Typ. | Max. | Unit | Remark |
|--------------------|--------|--------------------------------------|------|------|------|------|-----------|
| Response time | Rise | $\theta = 0^\circ$ | - | 12 | 50 | ms | Note 3,5 |
| | Fall | | - | 18 | 60 | ms | |
| Contrast ratio | CR | At optimized Viewing angle | 200 | 300 | - | | Note 4, 5 |
| Viewing angle | Top | $CR \geq 10$ | 30 | 40 | - | deg. | Note 5, 6 |
| | Bottom | | 50 | 60 | - | | |
| | Left | | 50 | 60 | - | | |
| | Right | | 50 | 60 | - | | |
| Viewing angle | Top | $CR \geq 5$ | 40 | 50 | - | deg. | Note 5, 6 |
| | Bottom | | 60 | 70 | - | | |
| | Left | | 60 | 70 | - | | |
| | Right | | 60 | 70 | - | | |
| Brightness | Y_L | $I_L = 6\text{mA}, 25^\circ\text{C}$ | 350 | 400 | - | nit | Note 7 |
| White chromaticity | X | $\theta = 0^\circ$ | 0.26 | 0.31 | 0.36 | | Note 7 |
| | Y | $\theta = 0^\circ$ | 0.28 | 0.33 | 0.38 | | |

Note 1 : Ambient temperature =25°C, and lamp current $I_L = 6 \text{ mArms}$. 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 $V_i = V_{i50} \pm 2.0V$

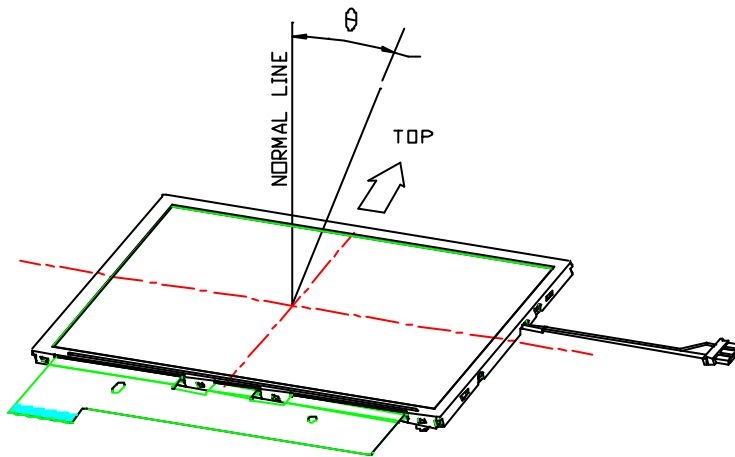
" \pm " means that the analog input signal swings in phase with V_{COM} signal.

" $\bar{+}$ " 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°C 240Hrs | |
| 2 | Low temperature storage | Ta= -40°C 240Hrs | |
| 3 | High temperature operation | Tp= 85°C 240Hrs | |
| 4 | Low temperature operation | Ta= -30°C 240Hrs | |
| 5 | High temperature and high humidity | Tp= 60°C, 90% RH 240Hrs | Operation |
| 6 | Heat shock | -30°C~85°C/200 cycles 1Hrs/cycle | Non-operation |
| 7 | Electrostatic discharge | ±200V,200pF(0Ω), 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 ² /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.

Note2: Tp: Panel Surface Temperature

Note3: In the standard conditions, there is not display function NG issue occurred. All the cosmetic specification is judged before the reliability stress.

E. Packing form

TBD

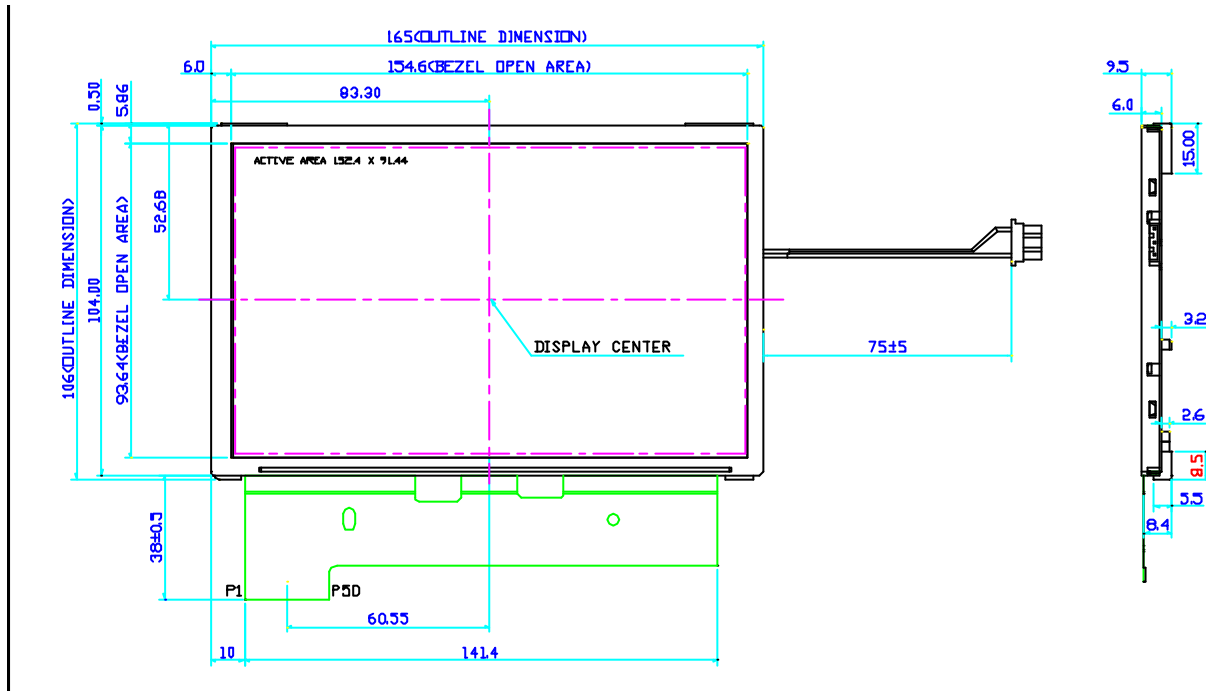
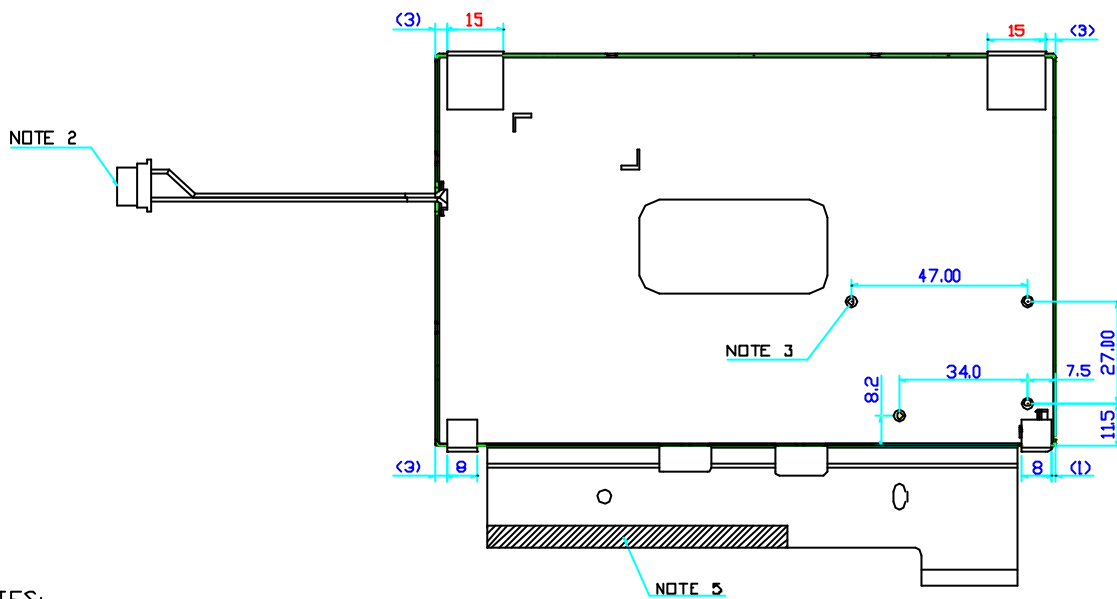


Fig.1 Outline dimension of TFT-LCD module(Front side)



NOTES:

- 1.General Tolerance : ± 0.3
- 2.Lamp connector : JST/BHR-03VS-1
- 3.Boss Spec.(Q'ty: 3): $\phi 3.0\text{mm} \times 2.6\text{L}$, M2 screw hole
- 4.Recommend Screw For Boss: Screw M2 X 2.4L
- 5.TWO SIDE TAPE 80X6 mm

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

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

<< EDGSL="0", Default >>

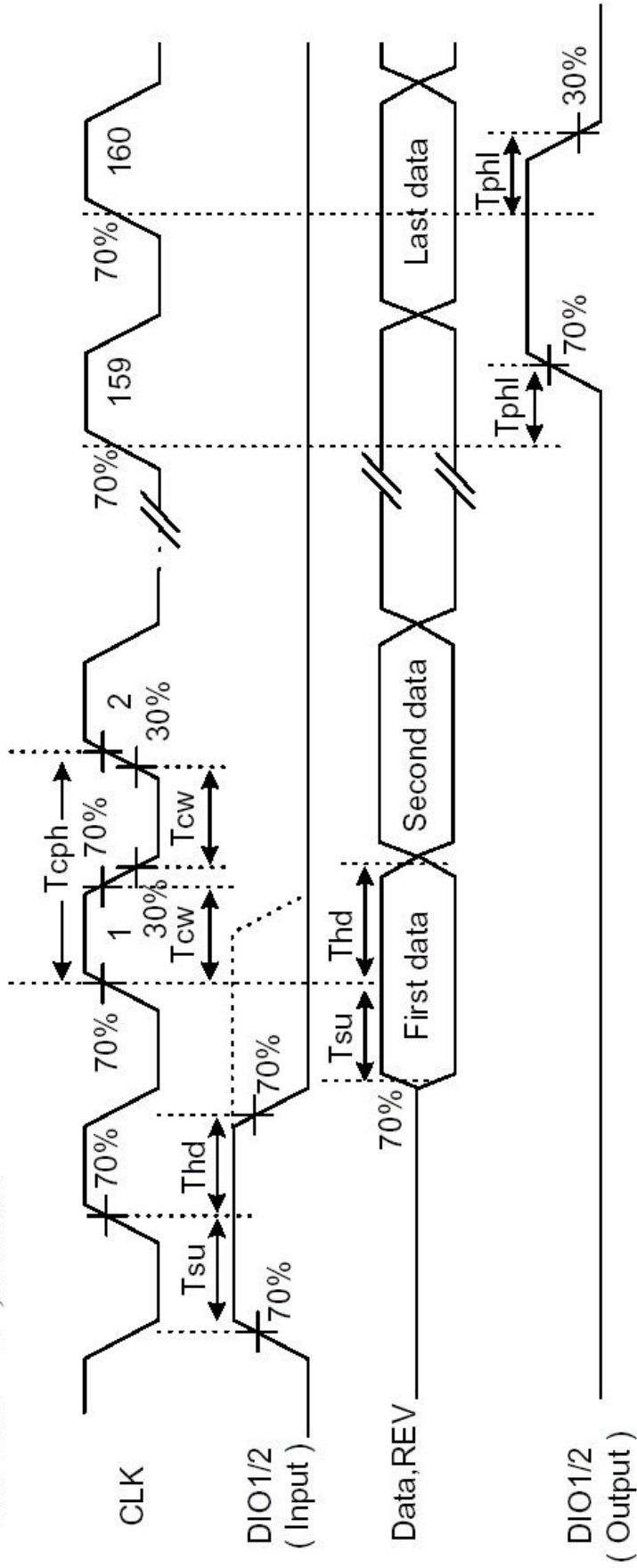


Fig.3 Operation Mode 1

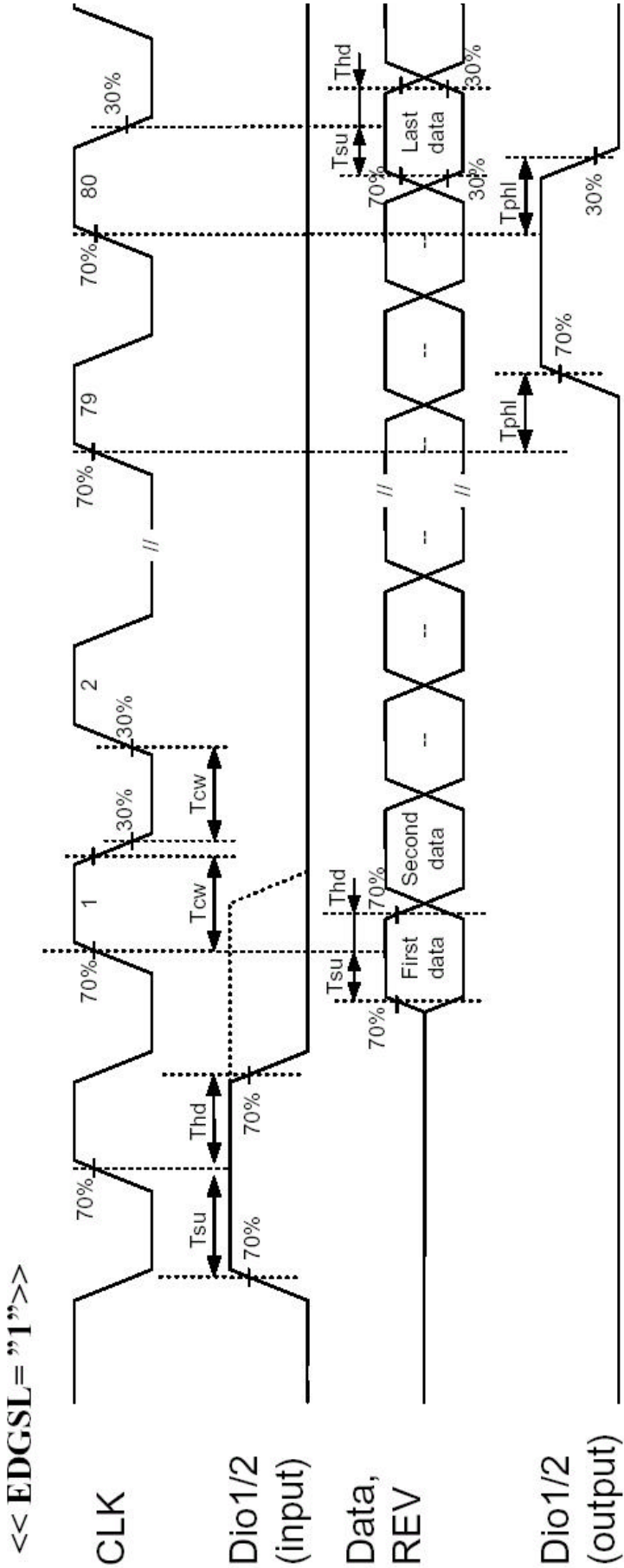


Fig.4 Operation Mode 2

■ **Timing Diagram 2**

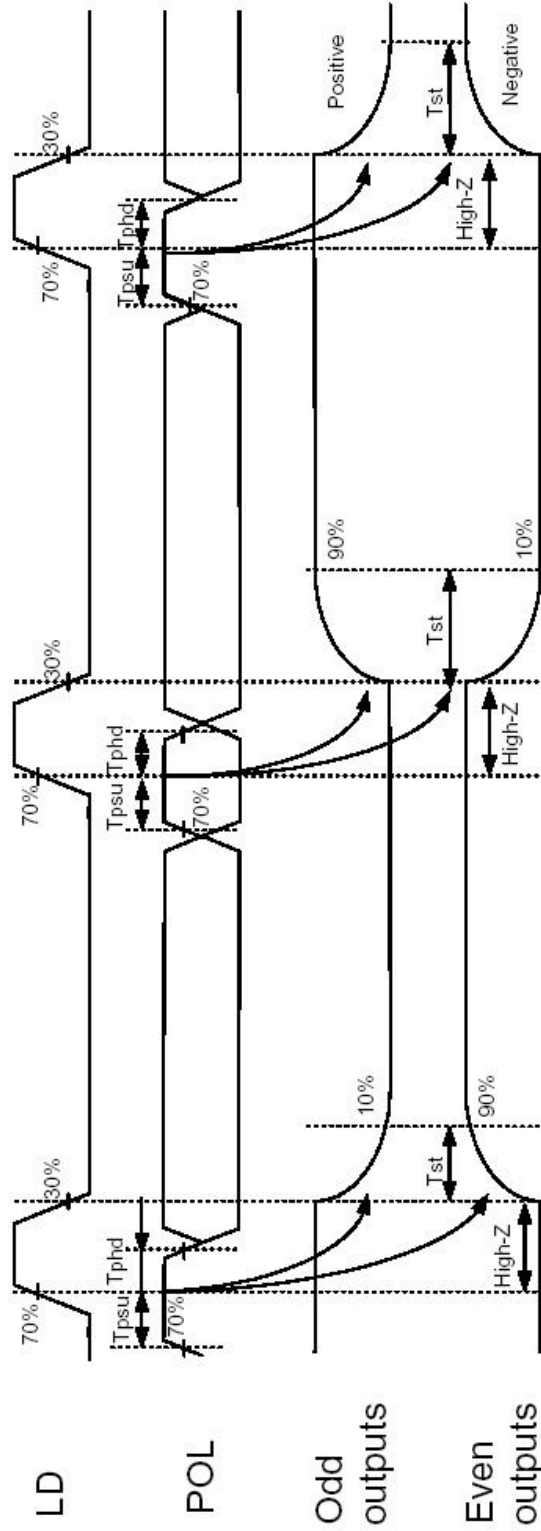
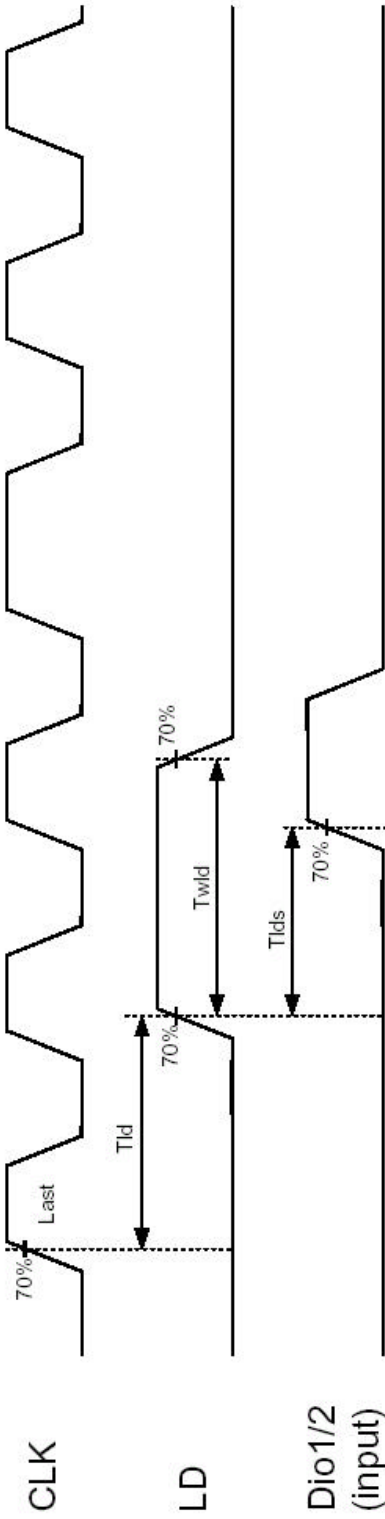


Fig.5 Horizontal timing

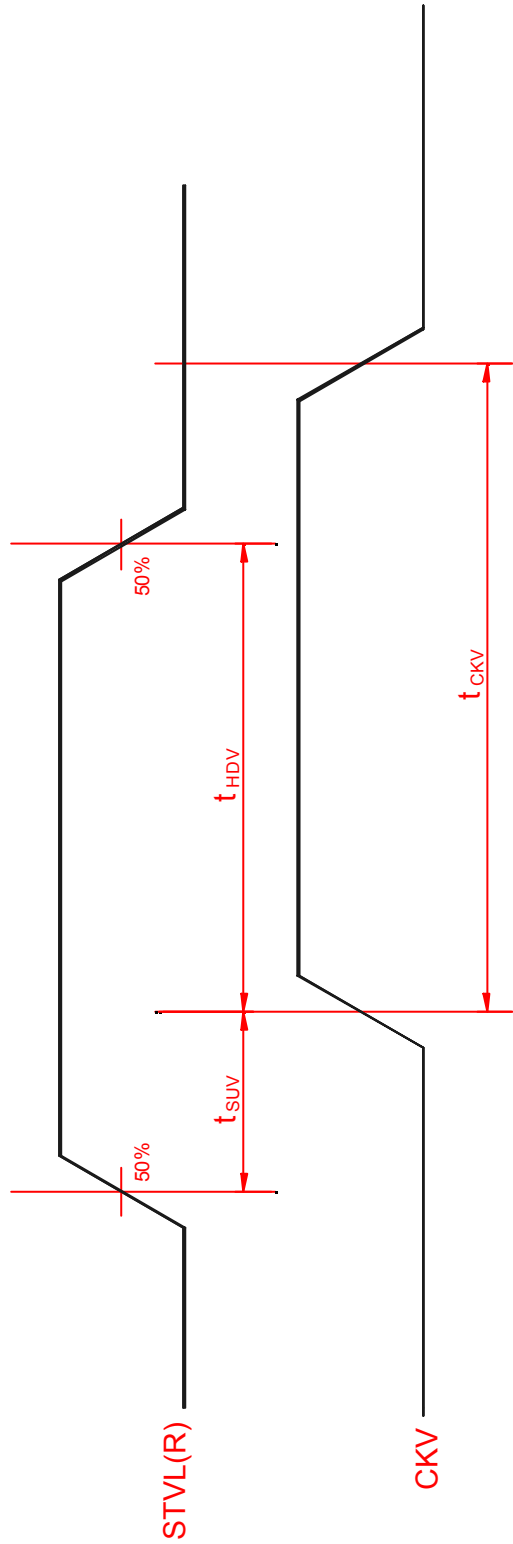


Fig.6 Virtual shift clock timing

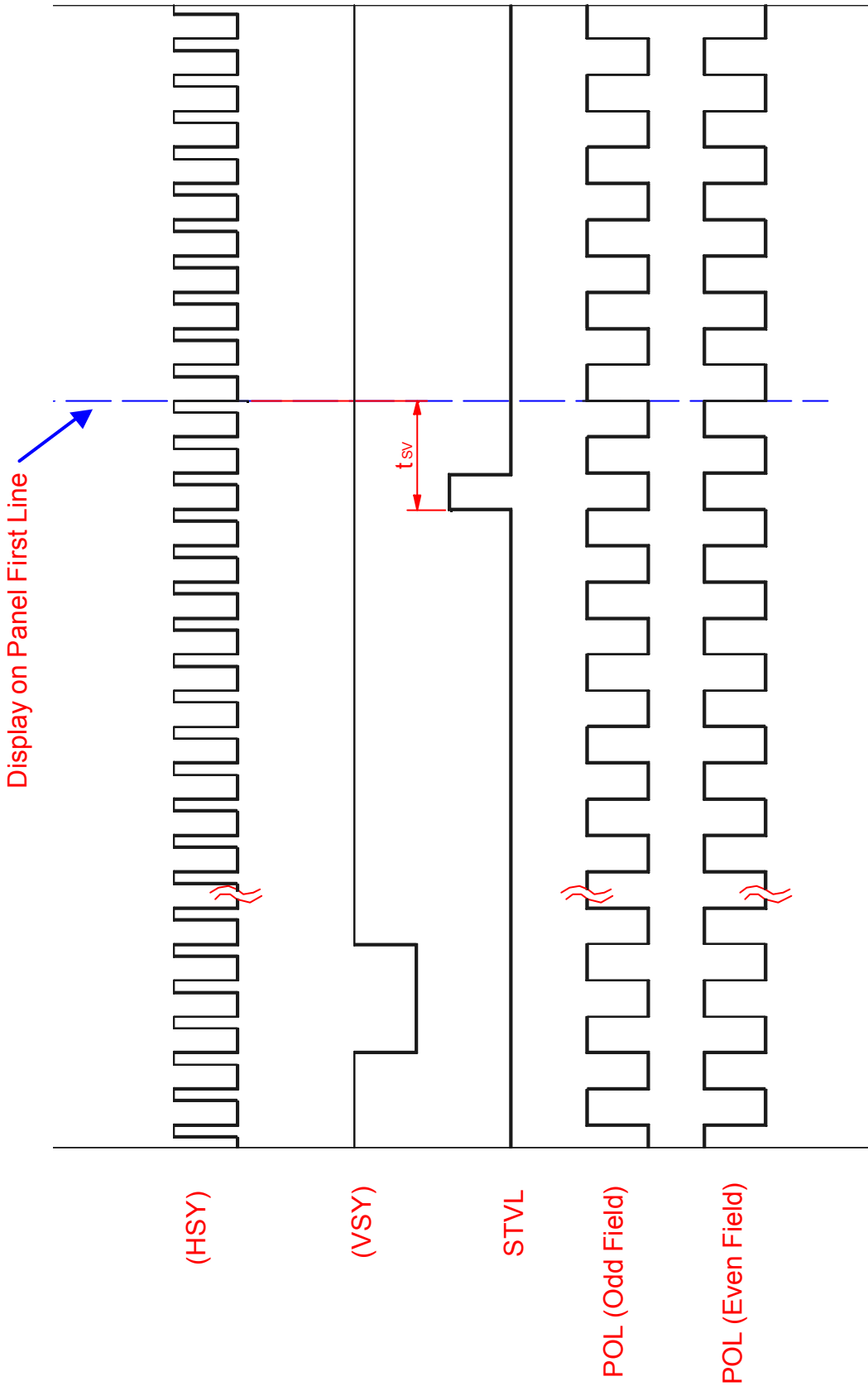


Fig.7 Vertical timing (from up to down)