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Customer: \_\_\_\_\_  
Model Number: OSD070T1185-45TS  
Specification Type: Production  
Date: 11/17/2011  
Version: A.1

For Customer's Acceptance

| Approved by | Comments |
|-------------|----------|
|             |          |

| Approved by | Reviewed by | Prepared by |
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|             |             |             |





**RoHS  
Compliant**

|                                 |                  |                                 |                 |
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## 1. GENERAL DESCRIPTION

### 1.1 Features

| No. | Item                        | Specification                | Remark |
|-----|-----------------------------|------------------------------|--------|
| 1   | LCD size                    | 7 inch(Diagonal)             |        |
| 2   | Driver element              | a-Si TFT active matrix       |        |
| 3   | Resolution                  | 800X3(RGB)X480               |        |
| 4   | Display mode                | Normally white, Transmissive |        |
| 5   | Dot pitch                   | 0.0635(W)X0.1905(H) mm       |        |
| 6   | Active area                 | 152.4 (W)X91.44 (H) mm       |        |
| 7   | Module size                 | 165(W)X104.2(H)X6.86(D) mm   | Note 1 |
| 8   | Surface treatment           | Anti-Glare                   |        |
| 9   | Color arrangement           | RGB-stripe                   |        |
| 10  | Interface                   | Digital (TTL)                |        |
| 11  | Backlight power consumption | 1.728W(Typ.)                 |        |
| 12  | Panel power consumption     | 0.990W(Typ.)                 | Note2  |
| 13  | Weight                      | TBD(Typ.)                    |        |

Note1: Refer to mechanical drawing

Note2: Includes T-con board power consumption

|                                 |                  |                                 |                 |
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## 2. ABSOLUTE MAXIMUM RATINGS

### 2.1 Electrical Absolute Maximum Ratings

| Item                  | Symbol | Value       | Unit | Note            |
|-----------------------|--------|-------------|------|-----------------|
| Power Supply Voltage  | VCC    | -0.3 ~ 6    | V    | AVSS=0<br>GND=0 |
|                       | VLED   | 5.5(Max)    | V    |                 |
| Input signal Voltage  | Vi     | -0.3 to 6.3 | V    | Note1           |
| Operation Temperature | Top    | -20 to +70  | °C   |                 |
| Storage Temperature   | Tst    | -30 to +80  | °C   |                 |

Note 1: DCLK, DE, HS, VS, R0~ R5, G0~ G5, B0~ B5.

Note 2: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

Note 3: Vr Conditions: Zener Diode 20mA.

|                                 |                  |                                 |                 |
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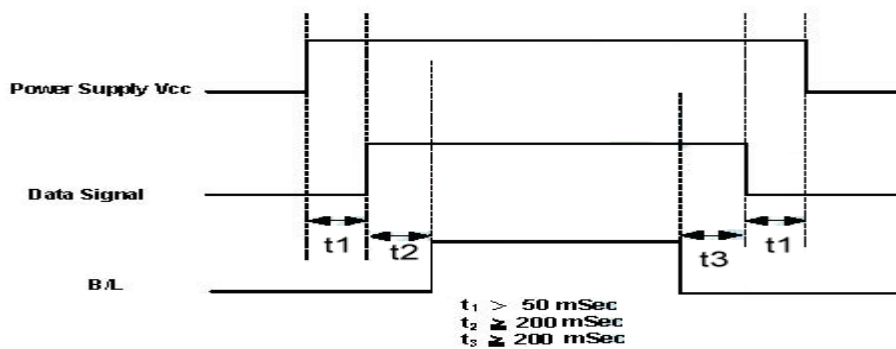
## 2.2 Typical Operation Conditions

| Item                     | Symbol | Value              |      |                    | Unit | Note   |
|--------------------------|--------|--------------------|------|--------------------|------|--------|
|                          |        | Min                | Typ. | Max                |      |        |
| Power Supply Voltage     | VCC    | 3.1                | 3.3  | 3.5                | V    | Note 1 |
|                          | VLED   | 4.8                | 5    | 5.2                | V    | Note 1 |
| Input logic High voltage | VIH    | 0.7V <sub>CC</sub> |      | V <sub>CC</sub>    | V    | Note 2 |
| Input logic Low voltage  | VIL    | 0                  |      | 0.3V <sub>CC</sub> | V    |        |
| LED lift time            |        | 20,000             |      |                    | Hr   | Note 5 |

Note 1: V<sub>CC</sub> setting should match the signals output voltage (refer to Note 2) of customer's system board.

Note 2: DCLK, DE, HS, VS, R0~ R5, G0~ G5, B0~ B5.

## 2.3 Power Sequence



Note

|                                 |                  |                                 |                 |
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### 3. TOUCH SCREEN PANEL SPECIFICATIONS

#### Electronic characteristics

| Item                  | Min.   | Typ. | Max. | Unit | Note |  |
|-----------------------|--------|------|------|------|------|--|
| Linearity             | -      | -    | 1.5  | %    |      |  |
| Circuit Resistance    | X-axis | 140  | -    | 370  | Ω    |  |
|                       | Y-axis | 580  | -    | 1030 | Ω    |  |
| Insulation Resistance | 20     | -    | -    | MΩ   |      |  |
| Operating Voltage     | -      | -    | 5    | V    |      |  |
| Chattering            | -      | -    | 10   | ms   |      |  |
| Transmittance         | 78     | -    | -    | %    |      |  |

#### Mechanical & Reliability Characteristics

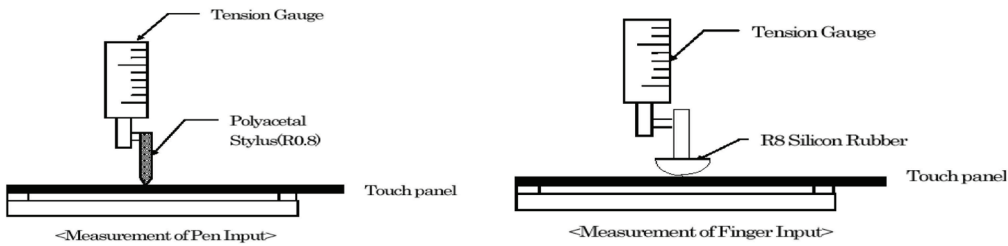
| Item                   | Min.      | Typ. | Max. | Unit       | Note   |
|------------------------|-----------|------|------|------------|--------|
| Activation force       | 30        | -    | 60   | g          | Note.1 |
| Pen Writing Durability | 100,000   | -    | -    | characters | Note.2 |
| Pitting Durability     | 1,000,000 | -    | -    | touches    | Note.3 |
| Surface hardness       | 3         | -    | -    | H          |        |

Note.1 : Operation force with R0.8mm silicone finger.

Note.2 : With the silicon Rubber R8mm on the same point of the touch panel with 250g force, frequency 240 times/min.

Note.3 : Writing with R0.8mm plastic stylus pen; writing force 150g in active area. Speed is 60mm/sec.

|                                 |                  |                                 |                 |
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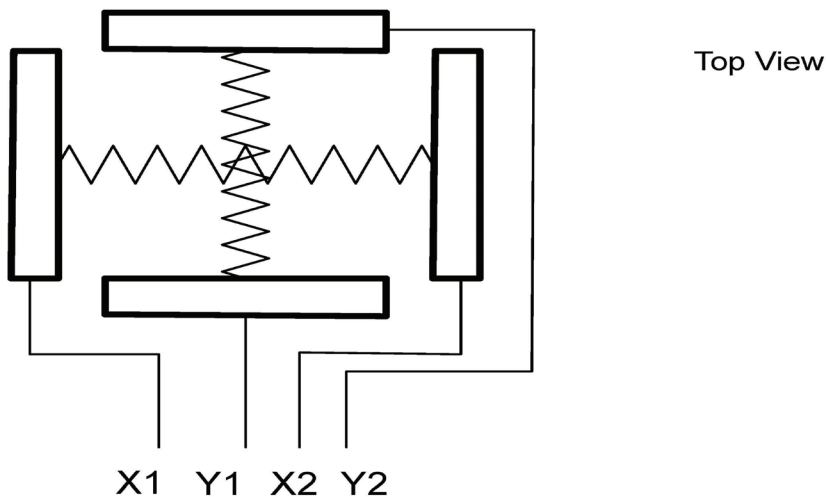
**Note 2: Measurement for surface area.**

- Scratch 100,000 times straight line on the film with a stylus change every 20,000 times.
- Force: 250gf.
- Speed: 60mm/sec.
- Stylus: R0.8 polyacetal tip.

**Note 3: Pit 1,000,000 times on the film with a R0.8 silicon rubber.**

- Force: 250gf.
- Speed: 2times/sec.

**Touch Screen Panel Block**



**Touch Screen Panel Pin Definition**

| Pin No. | Symbol | I/O    | Function                               | Remark |
|---------|--------|--------|--|--------|
| 1       | Y2     | Top    | Top electrode – differential analog    |        |
| 2       | X2     | Right  | Right electrode – differential analog  |        |
| 3       | Y1     | Bottom | Bottom electrode – differential analog |        |
| 4       | X1     | Left   | Left electrode – differential analog   |        |



|                                 |                  |                                 |                 |
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## 4. AC CHARACTERISTICS

### 4.1 Timing conditions

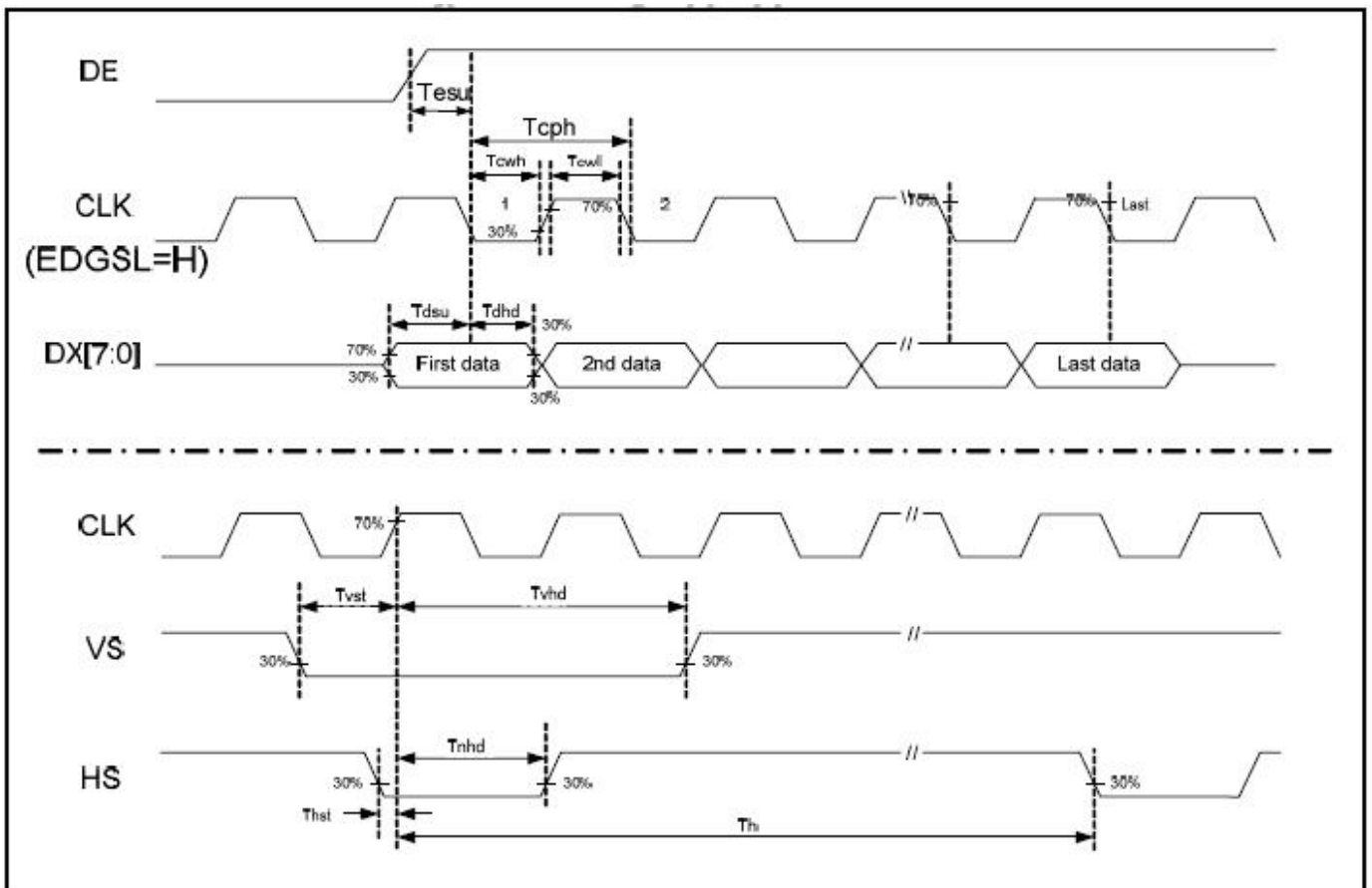
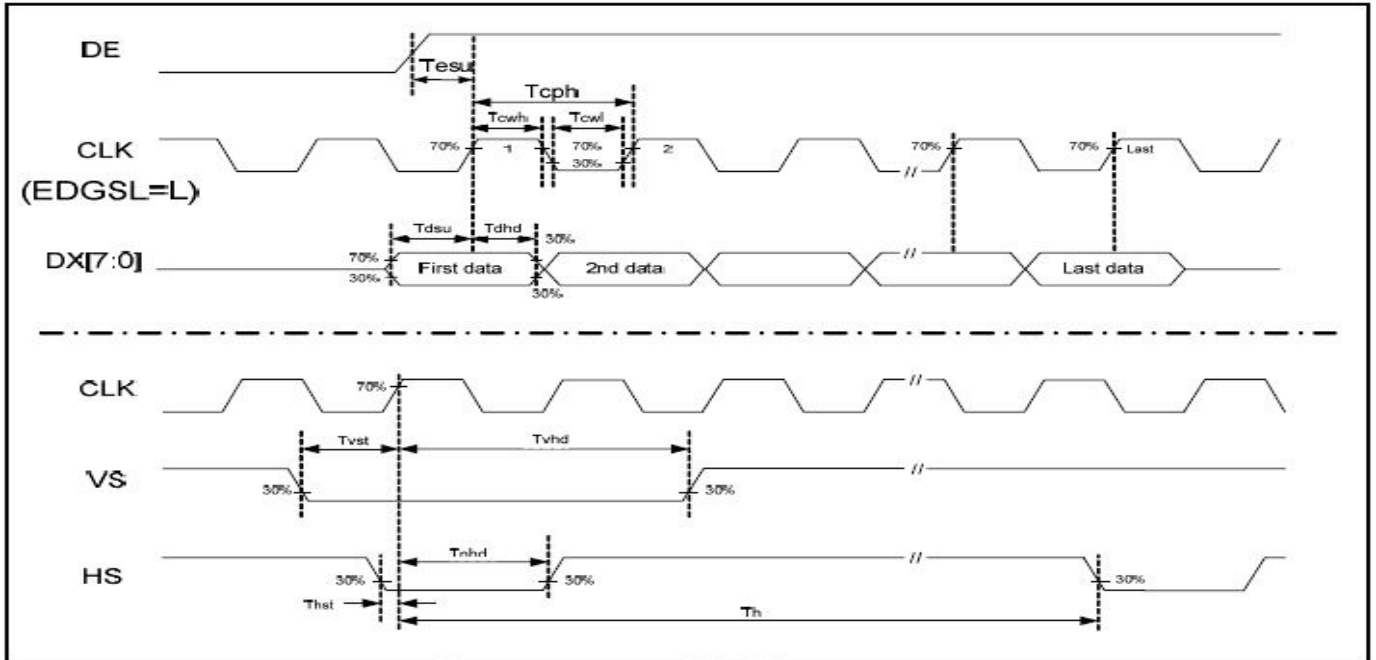
| Parameter                   | Symbol    | Spec. |      |      | Unit    |
|-----------------------------|-----------|-------|------|------|---------|
|                             |           | Min.  | Typ. | Max. |         |
| HS setup time               | $T_{hst}$ | 6     | -    | -    | ns      |
| HS hold time                | $T_{hhd}$ | 6     | -    | -    | ns      |
| VS setup time               | $T_{vst}$ | 6     | -    | -    | ns      |
| VS hold time                | $T_{vhd}$ | 6     | -    | -    | ns      |
| Data setup time             | $T_{dsu}$ | 6     | -    | -    | ns      |
| Data hold time              | $T_{dhd}$ | 6     | -    | -    | ns      |
| DE setup time               | $T_{esu}$ | 6     | -    | -    | ns      |
| Source output settling time | $T_{ST}$  | -     | -    | 15   | $\mu$ s |
| Source output loading R     | $R_{SL}$  | -     | 2    | -    | K ohm   |
| Source output loading C     | $C_{SL}$  | -     | 60   | -    | pF      |

### Sync mode

| Parameter                     | Symbol    | Spec.        |       |       | Unit      |
|-------------------------------|-----------|--------------|-------|-------|-----------|
|                               |           | Min.         | Typ.  | Max.  |           |
| CLK frequency                 | $F_{CPH}$ | 29.93        | 33.26 | 36.59 | MHz       |
| CLK period                    | $T_{CPH}$ | -            | 30.06 | -     | ns        |
| CLK pulse duty                | $T_{CWH}$ | 40           | 50    | 60    | %         |
| HS period                     | $T_H$     | 930          | 1056  | 1057  | $T_{CPH}$ |
| HS pulse width                | $T_{WH}$  | 1            | 128   | -     | $T_{CPH}$ |
| HS-first horizontal data time | $T_{HS}$  | STHD[7:0]+88 |       |       | $T_{CPH}$ |
| HS Active Time                | $T_{HA}$  | -            | 800   | -     | $T_{CPH}$ |
| VS period                     | $T_V$     | 490          | 525   | 526   | $T_H$     |
| VS pulse width                | $T_{WV}$  | 1            | 2     | -     | $T_H$     |
| VS-DE time                    | $T_{VS}$  | STVD[6:0]+8  |       |       | $T_H$     |
| VS Active Time                | $T_{VA}$  | -            | 480   | -     | $T_H$     |

Note: (1)  $T_{HS} + T_{HA} < T_H$

|                                 |                   |                                 |                 |
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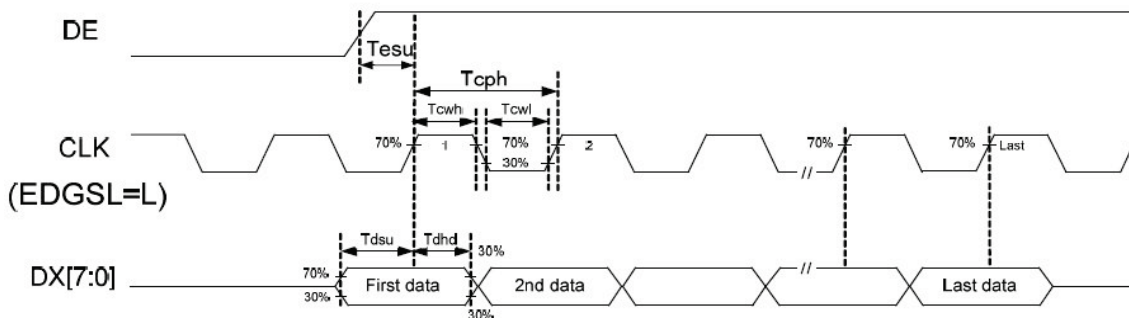


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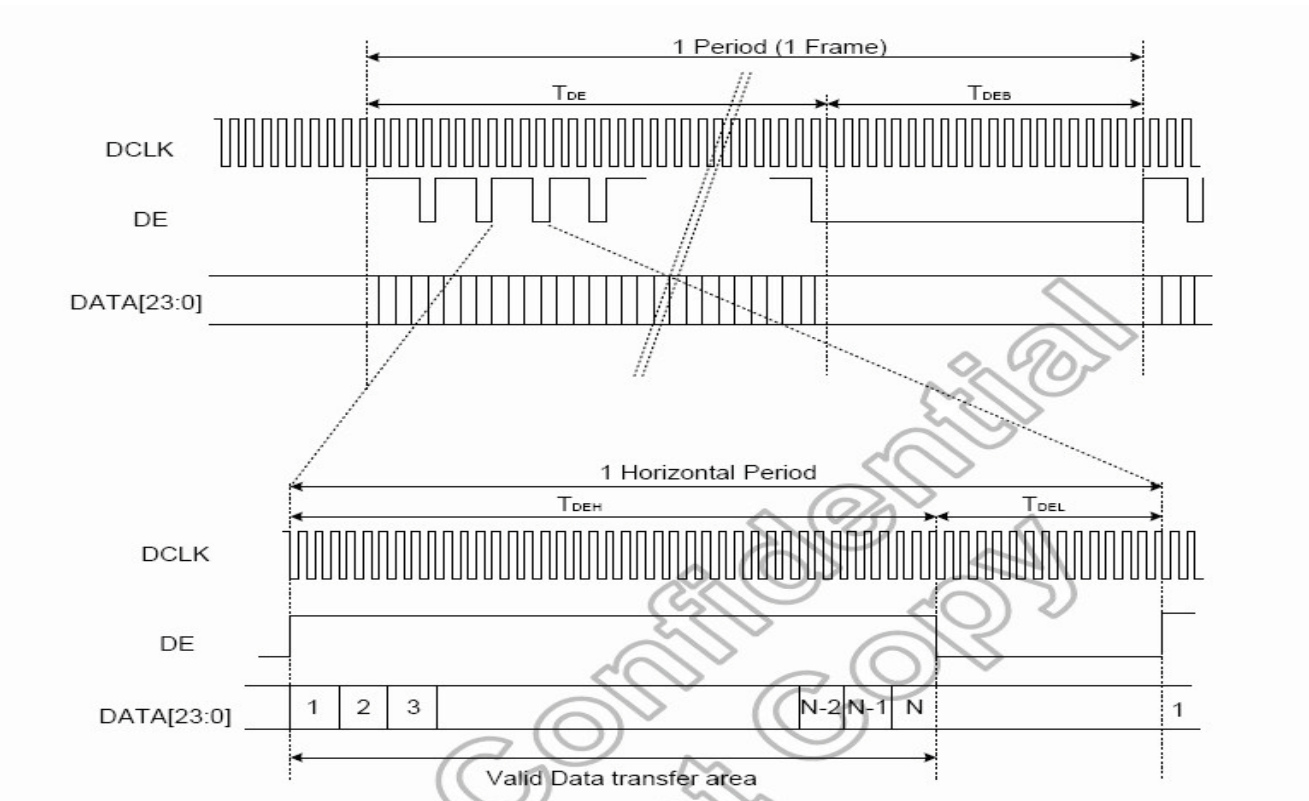
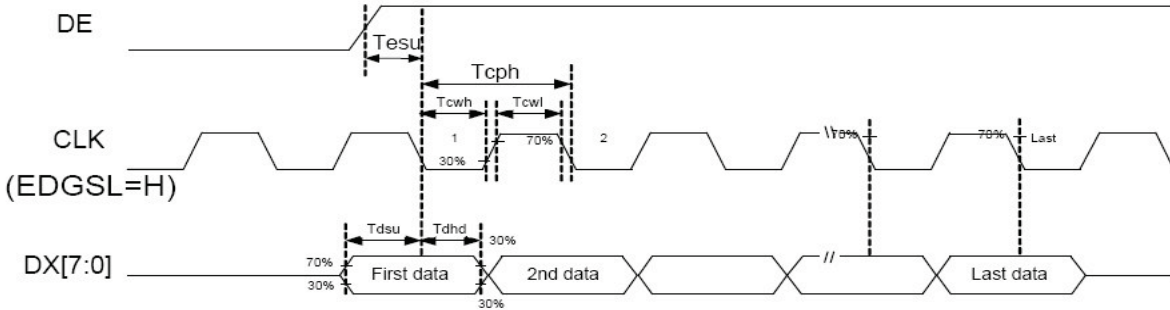
### DE mode Input signal characteristics (800 x 480)

| Item | Symbol         | Value |       |      | Unit                | Note                 |
|------|----------------|-------|-------|------|---------------------|----------------------|
|      |                | Min   | Typ.  | Max  |                     |                      |
| DCLK | Period         |       | 30.06 |      | ns                  | Note1                |
|      | Frequency      |       | 33.26 |      | MHz                 |                      |
|      | Duty           | 0.45  | 0.50  | 0.55 |                     | $t_{CLKL} / t_{CLK}$ |
| DE   | Setup Time     | 6     |       |      | $t_{CLK}$           |                      |
|      | Period         | 1000  | 1056  | 1200 | $t_{CLK}$           |                      |
|      | Pulse width    |       | 800   |      | $t_{CLK}$           |                      |
|      | Frame blanking | 10    | 45    | 110  | $T_{DEH} + T_{DEL}$ |                      |
|      | Frame width    |       | 480   |      | tHP                 |                      |
| DATA | Setup Time     | 6     |       |      | ns                  |                      |
|      | Hold Time      | 6     |       |      | $t_{CLK}$           |                      |

### 3.2 Timing Diagram



|                                 |                   |                                 |                 |
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## 5. OPTICAL CHARACTERISTICS

The following items are measured under stable conditions. The optical characteristics should be measured in a dark room or equivalent state with the methods shown in Note (1).

Measuring equipment: BM-5A, BM-7

(Ta = 25 +/- 2°C, Vcc = 3.3V, VLED=5.0V)

| Item                 | Symbol | Condition                  | Min. | Typ.   | Max. | Unit              | Remark   |
|----------------------|--------|----------------------------|------|--------|------|-------------------|----------|
| Response time        | Rise   | 25C                        | -    | (10)   | (20) | ms                | Note 4   |
|                      | Fall   |                            |      | (15)   | (30) |                   |          |
| Contrast ratio       | CR     | At optimized viewing angle | 250  | 400    | -    |                   | Note 5,6 |
| Viewing angle        | Top    | CR≥10                      | 40   | 50     | -    | deg.              | Note 7   |
|                      | Bottom |                            | 60   | 70     | -    |                   |          |
|                      | Left   |                            | 60   | 70     | -    |                   |          |
|                      | Right  |                            | 60   | 70     | -    |                   |          |
| Brightness           | B1     | θ=0°                       | 300  | 350    | -    | cd/m <sup>2</sup> |          |
| Luminance Uniformity | Yu     | θ=0°                       | 70   | 75     |      | %                 |          |
| White chromaticity   | x      | θ=0°                       | 0.26 | (0.31) | 0.36 |                   |          |
|                      | y      | θ=0°                       | 0.28 | (0.33) | 0.38 |                   |          |

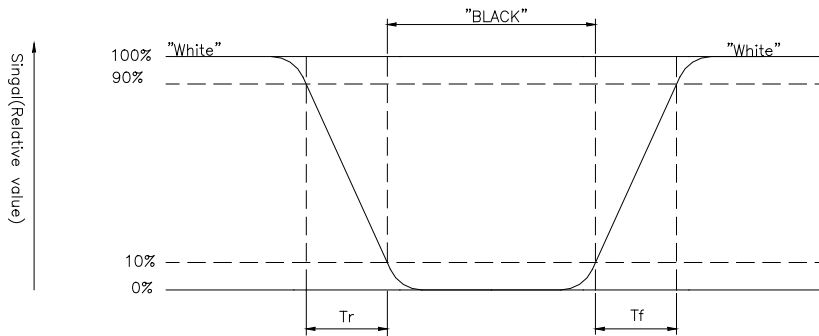
Note 1: Ambient temperature =25C and LED current IL=20mA.

Note 2: To be measured in the dark room.

Note 3: To be measured on the center area of panel with a viewing cone of 1° by Topcon luminance meter BM-5A, after 10 minutes operation.

Note 4: 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 shown below.

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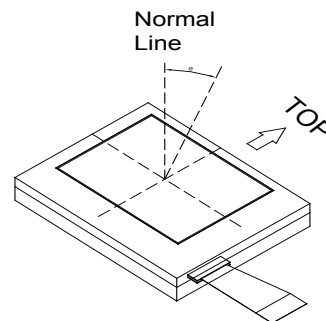
Note 5: Contrast ratio is calculated with the following formula.

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

Note 6: 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 VCOM signal.  
 “∓” means that the analog input signal swings out of phase with VCOM 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.

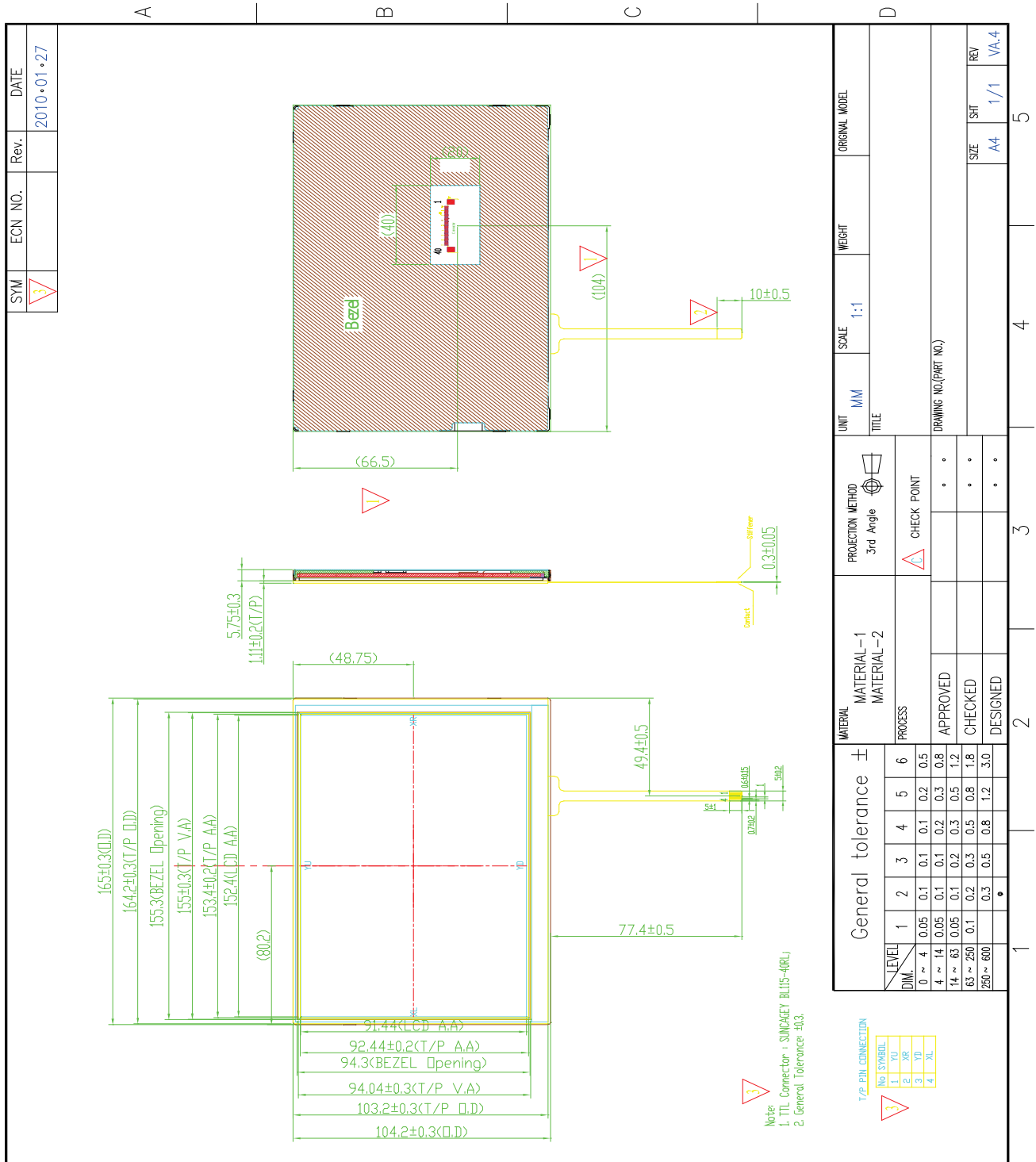
Note 7: Definition of viewing angle:  
 Refer to figure as below.



Note 8: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

|                                 |                   |                                 |                 |
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## 6. OUTLINE DIMENSION



|                                 |                   |                                 |                 |
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## 7. INTERFACE PIN CONNECTION

TTL Connector is used for the module electronics interface. The recommended model is BL115-40RL-0.5SH manufactured by Suncagey.

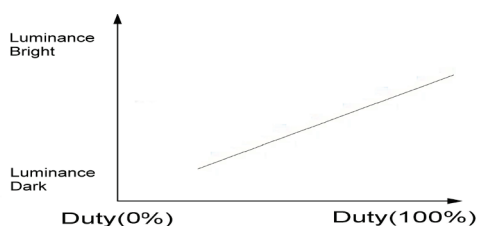
| Pin No. | Symbol | I/O | Function                                 | Remark  |
|---------|--------|-----|--|---------|
| 1       | VLED   | P   | Power voltage for LED Driver             |         |
| 2       | VLED   | P   | Power voltage for LED Driver             |         |
| 3       | ADJ    | I   | Adjust the LED brightness with PWM Pulse | Note1,2 |
| 4       | GLED   | P   | Ground for LED circuit                   |         |
| 5       | GLED   | P   | Ground for LED circuit                   |         |
| 6       | VCC    | P   | Power voltage for digital circuit        |         |
| 7       | VCC    | P   | Power voltage for digital circuit        |         |
| 8       | NC     |     | No Connection                            |         |
| 9       | DE     | I   | Data enable                              |         |
| 10      | VS     | I   | VSYNC signal input                       |         |
| 11      | HS     | I   | HSYNC signal input                       |         |
| 12      | GND    | P   | Power ground                             |         |
| 13      | B5     | I   | Blue data input (MSB)                    |         |
| 14      | B4     | I   | Blue data input                          |         |
| 15      | B3     | I   | Blue data input                          |         |
| 16      | GND    | P   | Power ground                             |         |
| 17      | B2     | I   | Blue data input                          |         |
| 18      | B1     | I   | Blue data input                          |         |
| 19      | B0     | I   | Blue data input(LSB)                     |         |
| 20      | GND    | P   | Power ground                             |         |



|                                 |                   |                                 |                 |
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|    |      |   |   |          |
|----|------|---|---|----------|
| 21 | G5   | I | Green data input(MSB)                   |          |
| 22 | G4   | I | Green data input                        |          |
| 23 | G3   | I | Green data input                        |          |
| 24 | GND  | P | Power ground                            |          |
| 25 | G2   | I | Green data input                        |          |
| 26 | G1   | I | Green data input                        |          |
| 27 | G0   | I | Green data input(LSB)                   |          |
| 28 | GND  | P | Power ground                            |          |
| 29 | R5   | I | Red data input(MSB)                     |          |
| 30 | R4   | I | Red data input                          |          |
| 31 | R3   | I | Red data input                          |          |
| 32 | GND  | P | Power ground                            |          |
| 33 | R2   | I | Red data input                          |          |
| 34 | R1   | I | Red data input                          |          |
| 35 | R0   | I | Red data input(LSB)                     |          |
| 36 | GND  | P | Power ground                            |          |
| 37 | DCLK | I | Sample clock                            |          |
| 38 | GND  | P | Power ground                            |          |
| 39 | L/R  | I | Select left or right scanning direction | Note 3,4 |
| 40 | U/D  | I | Select up or down scanning direction    | Note 3,4 |

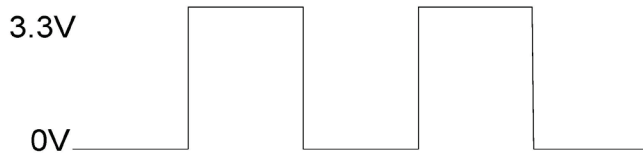
Note1:ADJ adjust brightness to control Pulse Duty Cycle the bigger brighter



|                                 |                   |                                 |                 |
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Note2: ADJ signal=0~3.3V,operation frequency:100~300Hz

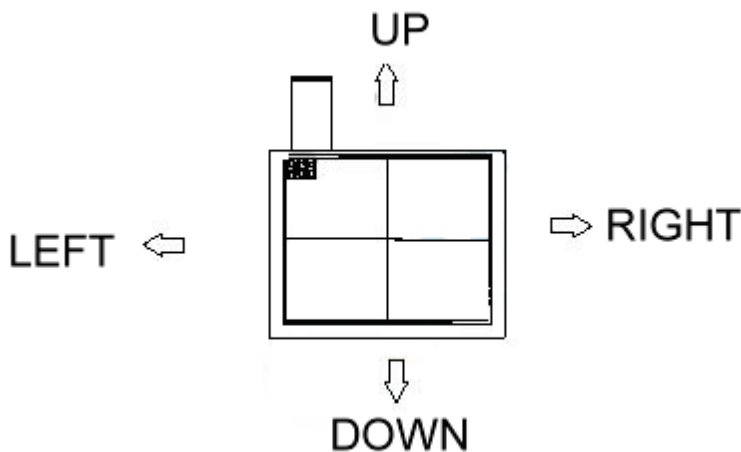
F=100~300Hz



Note 3: Selection of scanning mode.

| Setting of scan control input |                 | Scanning direction        |
|-------------------------------|-----------------|---------------------------|
| U/D                           | R/L             |                           |
| GND                           | V <sub>CC</sub> | Up to down, left to right |
| V <sub>CC</sub>               | GND             | Down to up, right to left |
| GND                           | GND             | Up to down, right to left |
| V <sub>CC</sub>               | V <sub>CC</sub> | Down to up, left to right |

Note 4: Scanning direction refer to the figure below.



|                                 |                   |                                 |                 |
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## 8. RELIABILITY

| No. | Test Items  | Test Conditions                                     |
|-----|---|---|
| 1   | High Temperature Storage Test                     | Ta=80°C, 240 Hrs                                    |
| 2   | Low Temperature Storage Test                      | Ta=-30°C, 240Hrs                                    |
| 3   | High Temperature and High Humidity Operating Test | Ta=40°C, 90% RH, 240Hrs<br>(No condensation of dew) |
| 4   | High Temperature Operating Test                   | Ta=70°C, 240Hrs                                     |
| 5   | Low Temperature Operating Test                    | Ta=-20°C, 240Hrs                                    |
| 6   | Thermal Shock Test                                | Ta=-30°C (0.5H) ~ 80°C (0.5H) /50 cycles            |
| 7   | Electro Static Discharge Test                     | +200V, 200pF (0Ω), 1 time for each terminal         |

Note: (1) Evaluation should be tested after storage at room temperature for 24 hours.

(2) There should be no change that might affect the practical display function when the display quality test is conducted under normal operating conditions.

(3) Judgment:

- a. In the standard condition, there shall be no practical problems that may affect the display function.
- b. No serious image quality degradation.

|                                 |                   |                                 |                 |
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## 9. PRECAUTIONS

### 9.1 Handling

- (1) When the module is assembled, it should be attached to the system firmly. Be careful not to twist and bend the module.
- (2) Refrain from strong mechanical shock and / or any force to the module. In addition to damage, this may cause improper operation or damage to the module and back-light unit.
- (3) Note that the polarizer is very fragile and could be easily damaged. Do not press or scratch the surface harder than a B pencil lead.
- (4) Wipe off water droplets or oil immediately. If you leave the droplets for a long time, staining and discoloration may occur.
- (5) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.
- (6) The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane. Don't use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.
- (7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs or clothes, it must be washed away thoroughly with soap.
- (8) Protect the module from static; it may cause damage to the CMOS Gate Array IC.
- (9) Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
- (10) Do not disassemble the module.

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(11) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.

(12) Pins of I/F connector shall not be touched directly with bare hands.

## 9.2 Storage

(13) Do not leave the panel in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0 to 35oC and relative humidity of less than 70%.

(14) Do not store the TFT-LCD module in direct sunlight.

(15) The module shall be stored in a dark place. It is prohibited to apply sunlight or fluorescent light during the store.

## 9.3 Operation

(16) Do not connect; disconnect the module in the “Power on” condition.

(17) Power supply should always be turned on/off by the chapter 8 TFT-LCD Driver IC Operation Algorithms.

## 9.4 Precautions in use of touch panel

(18) Do not give excessive strain to the product.

(19) To prevent giving distortion to the film of the product and peeling off of the film from the product, do not fix the film and a set case or a shock absorbing material adhered to a set case by adhesion.

(20) Operate it with a polyacetal pen (tip R0.8 or over) or a belly of a finger without applying excessive load. Never use any mechanical pencils, ball point pens and hard fingertips whose tip is hard for input, otherwise malfunctions may result.

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- (21) The input position may be fluctuated a little through long-time use. It is desirable to provide a zero-adjustment function by using a circuit and software.
- (22) Operation at the out of Active Area is out of our guarantee. It causes a serious damage of a transparent electrode. Do not operate at the out of Active Area.

### 9.5 Others

- (23) The Liquid crystal is deteriorated by ultra violet, do not leave it in direct sunlight and strong ultraviolet ray for many hours.
- (24) Avoid condensation of water. It may result in improper operation or disconnection of electrode.
- (25) Do not exceed the absolute maximum rating value. (the supply voltage variation, input voltage variation in part contents and environmental temperature and so on). Otherwise the panel may be damaged.
- (26) If the panel displays the same pattern continuously for a long period of time, it can be the situation when the image" Sticks" to the screen.
- (27) His panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.