


SPECIFICATIONS FOR LCD MODULE

| | |
|------------------------------|----------------------|
| CUSTOMER | |
| MODEL | SCT028008-V03 |
| CUSTOMER APPROVED | |

| APPROVED BY | CHECKED BY | ORGANIZED BY |
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0158

RECORDS OF REVISIONS

| Revision No | Revision Date | Description |
|--------------------|----------------------|--------------------------------|
| Ver: A0 | 2015-09-23 | First release |
| Ver: A1 | 2015-10-08 | Modify Optical characteristics |
| Ver:A2 | 2015-10-21 | Modify Dc Characteristics |
| Ver: A3 | 2015-11-10 | Modify Optical characteristics |

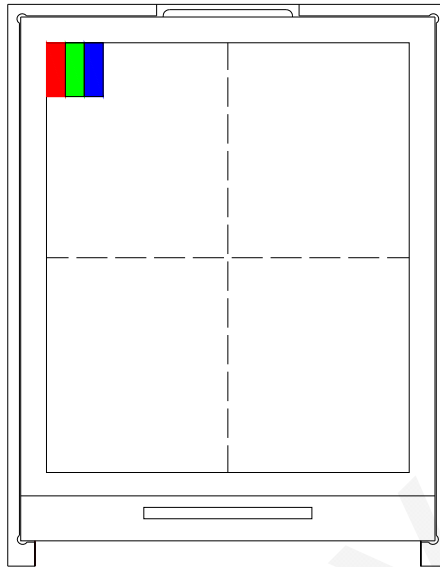
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1. General Description

This LCM [SCT028008-V03](#) is a TFT LCD module, comprising a [720](#)-channel source driver, a [320](#)-channel gate driver, [240 \(RGB\) x 320](#) dots graphic, and power supply circuit. The 262k color can be display.

This TFT-LCD has [2.8](#) inch diagonally measured active display area with [QVGA](#) resolution.



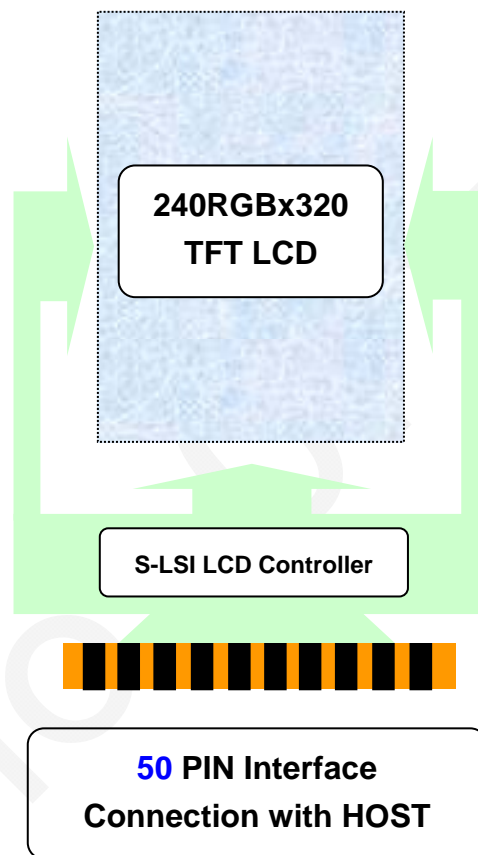
1.1 Mechanical Specifications

| Item | Nominal Dimension | Unit |
|-----------------------|----------------------|--------|
| Dot Matrix | 240 x RGB x 320 | Dots |
| Module Size (W×H×T) | 50.00 x 69.20 x 2.60 | mm. |
| Active Area (W×H) | 43.20 x 57.60 | mm. |
| Pixel arrangement | RGB Stripe | mm. |
| Dot Pitch (W×H) | 0.18 x 0.18 | mm. |
| Color depth | 262K (MAX) | colors |
| Interface | MCU , RGB | - |
| Driving IC Package | COG | - |

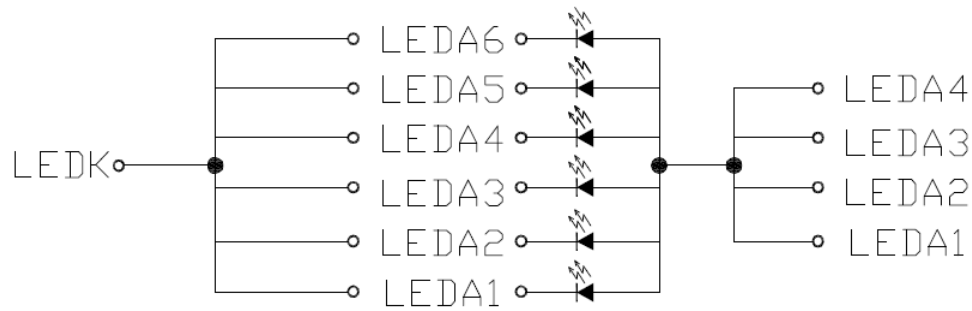
1.2 Display Specifications

| Item | Nominal Dimension | Unit |
|-----------------------|-------------------|------|
| Operating temperature | -20 ~70 | °C |
| Storage temperature | -30~80 | °C |
| LCD Type | a-Si TFT | - |
| LCD Mode | TN/Normal White | - |
| Backlight Type | LED x 6 | PCS |

1.3 Block Diagram



1.4 Back-light Unit



| Item | Symbol | Condition | Min | Typ | Max | Unit |
|---------------------------|--------------------------|--------------------------------|-------|------|-----|---------|
| Forward Voltage | V_f | Ta=25 °C, I _F =13mA | 2.8 | 3.2 | 3.5 | V |
| Forward Current | I_f | Ta=25 °C, V _F =3.5V | - | 90 | - | mA |
| Luminance | vL | - | 4000 | 4500 | - | 2cd / m |
| Uniformity | Avg | - | 80 | 85 | - | % |
| CIE | X Y | - | 0.26 | 0.28 | 0.3 | - |
| | | - | 0.26 | 0.28 | 0.3 | - |
| Power dissipation | P_d | - | - | 288 | - | mW |
| Backlight Driving Voltage | V_{AK} | - | 2.8 | 3.2 | 3.5 | V |
| LED lifetime | - | Ta=25 °C, I _F =90mA | 20000 | | | Hr |
| Drive method | Constant current | | | | | |
| LED Configuration | 6 White LEDs in parallel | | | | | |

Note: The “LED lifetime” is defined as the module brightness decrease to 50% original brightness at Ta=25°C and IL =90mA. The LED lifetime could be decreased if operating IL is larger than 90mA.

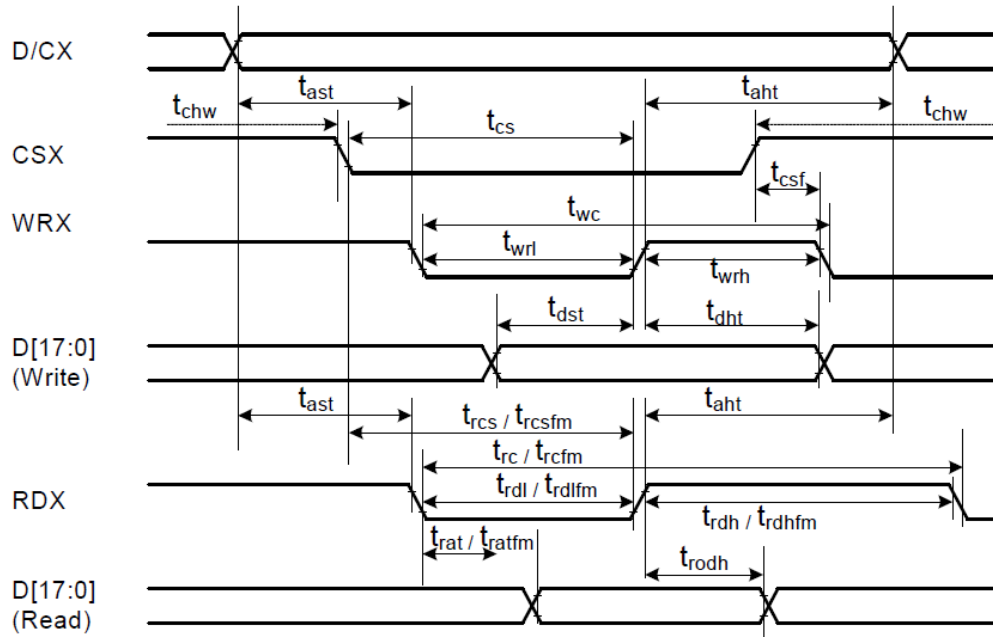
1.5 Interface Pin

| Pin No | Pin Symbol | Level | Description |
|--------|------------|-----------|---|
| 1 | LEDK | - | LED light, cathode. |
| 2 | LEDA1 | - | LED light, anode |
| 3 | LEDA2 | - | LED light, anode |
| 4 | LEDA3 | - | LED light, anode |
| 5 | LEDA4 | - | LED light, anode |
| 6 | IM0 | H/L | MCU Interface Mode Select |
| 7 | IM1 | H/L | |
| 8 | IM2 | H/L | |
| 9 | IM3 | H/L | |
| 10 | RESET | H/L | Reset signal |
| 11 | VSYNC | H/L | Vertical Synchronizing Signal in RGB Interface |
| 12 | HSYNC | H/L | Horizontal Synchronizing Signal in RGB Interface |
| 13 | DOTCLK | H/L | Dot Clock Signal in RGB Interface |
| 14 | DE | H/L | Data ENABLE Signal in RGB Interface |
| 15-32 | DB17-DB0 | H/L | Data bus |
| 33 | SDO | H/L | SPI data out |
| 34 | SDI | H/L | SPI data in |
| 35 | RD | H/L | Read Signal |
| 36 | WRX(D/CX) | H/L | Write Signal (selector of command or parameter in SPI mode) |
| 37 | D/CX(SCL) | H/L | selector of command or parameter (SPI clock in SPI mode) |
| 38 | CSX | H/L | Chip Select |
| 39 | TE | H/L | Tearing effect output |
| 40-41 | IOVCC | 1.65-3.3V | Power supply for logic |
| 42 | VCI | 2.5-3.3V | Power supply |
| 43 | GND | 0V | Ground |
| 44 | NC | - | |
| 45 | NC | - | |
| 46 | NC | - | |
| 47 | NC | - | |
| 48-50 | GND | 0V | Ground |

| IM3 | IM2 | IM1 | IM0 | MCU-Interface Mode | Pins in use | |
|-----|-----|-----|-----|---------------------------------------|--------------------------|---------------------------------------|
| | | | | | Register/Content | GRAM |
| 0 | 0 | 0 | 0 | 8080 MCU 8-bit bus interface I | D[7:0] | D[7:0], WRX, RDX, CSX, D/CX |
| 0 | 0 | 0 | 1 | 8080 MCU 16-bit bus interface I | D[7:0] | D[15:0], WRX, RDX, CSX, D/CX |
| 0 | 0 | 1 | 0 | 8080 MCU 9-bit bus interface I | D[7:0] | D[8:0], WRX, RDX, CSX, D/CX |
| 0 | 0 | 1 | 1 | 8080 MCU 18-bit bus interface I | D[7:0] | D[17:0], WRX, RDX, CSX, D/CX |
| 0 | 1 | 0 | 1 | 3-wire 9-bit data serial interface I | SCL, SDA, CSX | |
| 0 | 1 | 1 | 0 | 4-wire 8-bit data serial interface I | SCL, SDA, D/CX, CSX | |
| 1 | 0 | 0 | 0 | 8080 MCU 16-bit bus interface II | D[8:1] | D[17:10], D[8:1], WRX, RDX, CSX, D/CX |
| 1 | 0 | 0 | 1 | 8080 MCU 8-bit bus interface II | D[17:10] | D[17:10], WRX, RDX, CSX, D/CX |
| 1 | 0 | 1 | 0 | 8080 MCU 18-bit bus interface II | D[8:1] | D[17:0], WRX, RDX, CSX, D/CX |
| 1 | 0 | 1 | 1 | 8080 MCU 9-bit bus interface II | D[17:10] | D[17:9], WRX, RDX, CSX, D/CX |
| 1 | 1 | 0 | 1 | 3-wire 9-bit data serial interface II | SCL, SDI, SDO, CSX | |
| 1 | 1 | 1 | 0 | 4-wire 8-bit data serial interface II | SCL, SDI, D/CX, SDO, CSX | |

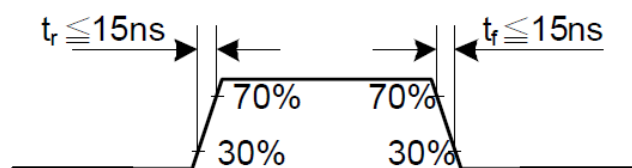
2. Interface Timing

Display Parallel 18/16/9/8-bit Interface Timing Characteristics (8080- I system)

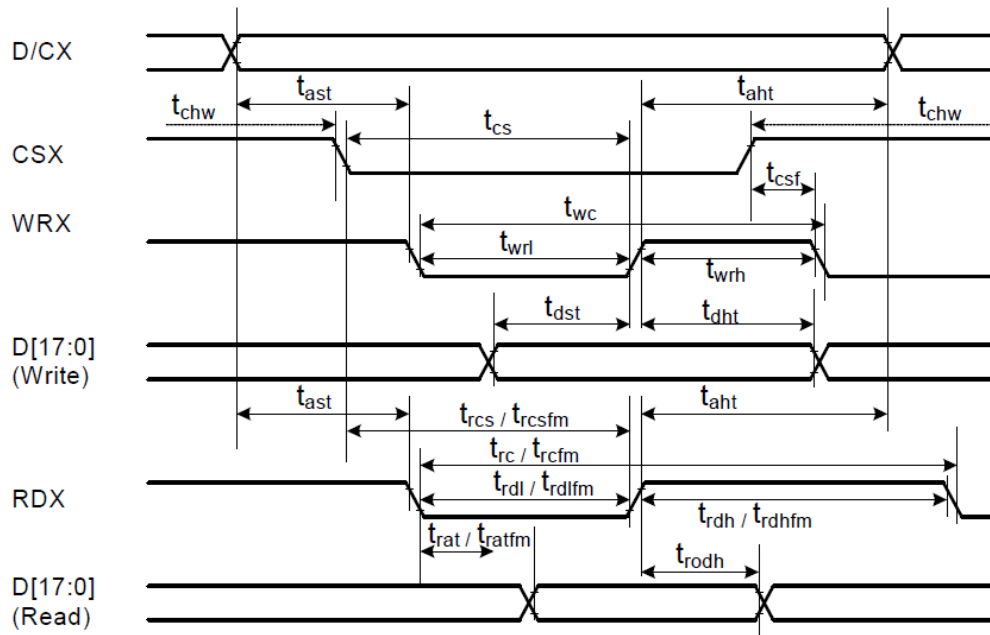


| Signal | Symbol | Parameter | min | max | Unit | Description |
|---|--------------------|------------------------------------|-----|-----|------|---|
| DCX | t _{ast} | Address setup time | 0 | - | ns | |
| | t _{ah} | Address hold time (Write/Read) | 0 | - | ns | |
| CSX | t _{chw} | CSX "H" pulse width | 0 | - | ns | |
| | t _{cs} | Chip Select setup time (Write) | 15 | - | ns | |
| | t _{rcs} | Chip Select setup time (Read ID) | 45 | - | ns | |
| | t _{rcsfm} | Chip Select setup time (Read FM) | 355 | - | ns | |
| | t _{csf} | Chip Select Wait time (Write/Read) | 10 | - | ns | |
| WRX | t _{wc} | Write cycle | 66 | - | ns | |
| | t _{wrh} | Write Control pulse H duration | 15 | - | ns | |
| | t _{wrl} | Write Control pulse L duration | 15 | - | ns | |
| RDX (FM) | t _{rcfm} | Read Cycle (FM) | 450 | - | ns | |
| | t _{rdhfm} | Read Control H duration (FM) | 90 | - | ns | |
| | t _{rdlfm} | Read Control L duration (FM) | 355 | - | ns | |
| RDX (ID) | t _{rc} | Read cycle (ID) | 160 | - | ns | |
| | t _{rdh} | Read Control pulse H duration | 90 | - | ns | |
| | t _{rdl} | Read Control pulse L duration | 45 | - | ns | |
| D[17:0], D[15:0], D[8:0], D[7:0] | t _{dst} | Write data setup time | 10 | - | ns | For maximum CL=30pF For minimum CL=8pF |
| | t _{dht} | Write data hold time | 10 | - | ns | |
| | t _{rat} | Read access time | - | 40 | ns | |
| | t _{ratfm} | Read access time | - | 340 | ns | |
| | t _{rod} | Read output disable time | 20 | 80 | ns | |

Note: T_a = -30 to 70 °C, VDDI=1.65V to 3.3V, VCI=2.5V to 3.3V, VSS=0V

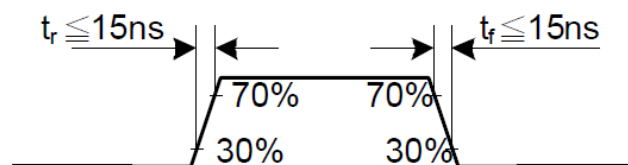


Display Parallel 18/16/9/8-bit Interface Timing Characteristics(8080- II system)

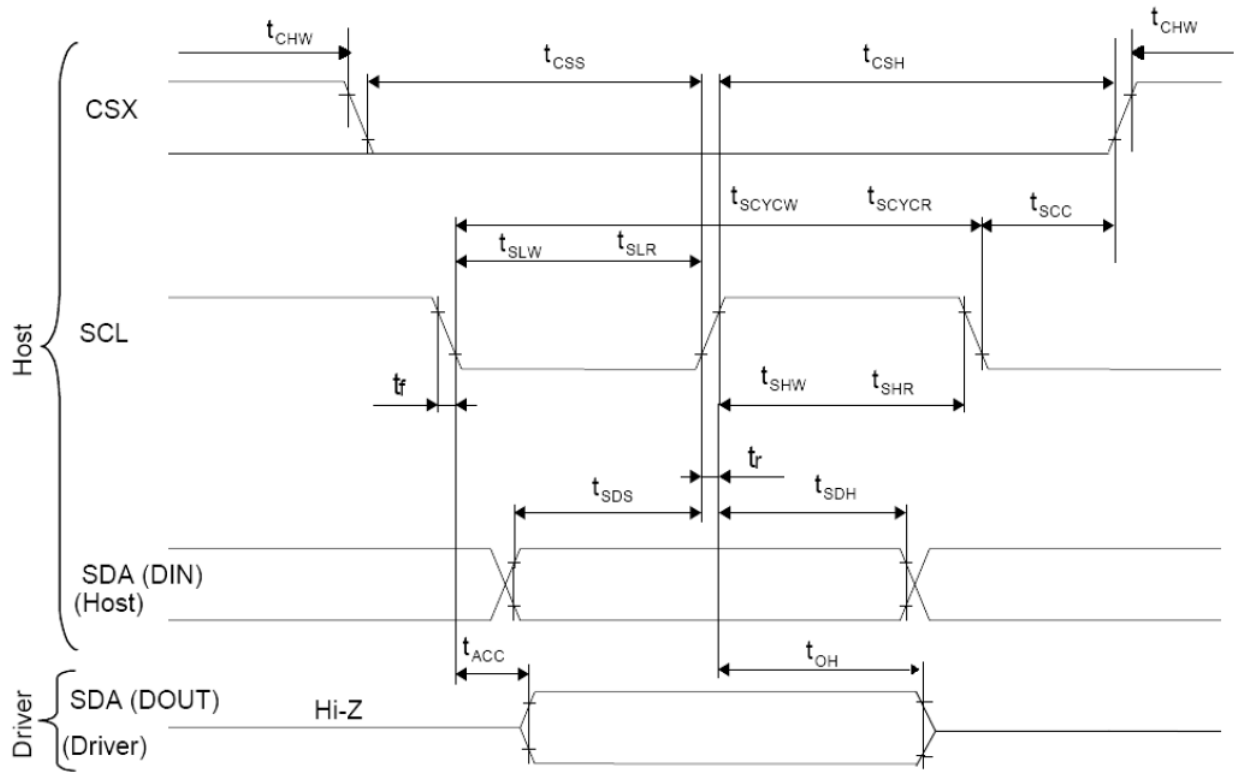


| Signal | Symbol | Parameter | min | max | Unit | Description |
|--|--------|------------------------------------|-----|-----|------|---|
| DCX | tast | Address setup time | 0 | - | ns | |
| | taht | Address hold time (Write/Read) | 0 | - | ns | |
| CSX | tchw | CSX "H" pulse width | 0 | - | ns | |
| | tcs | Chip Select setup time (Write) | 15 | - | ns | |
| | trcs | Chip Select setup time (Read ID) | 45 | - | ns | |
| | trcsfm | Chip Select setup time (Read FM) | 355 | - | ns | |
| | tcsf | Chip Select Wait time (Write/Read) | 10 | - | ns | |
| WRX | twc | Write cycle | 66 | - | ns | |
| | twrh | Write Control pulse H duration | 15 | - | ns | |
| | twrl | Write Control pulse L duration | 15 | - | ns | |
| RDX (FM) | trcfm | Read Cycle (FM) | 450 | - | ns | |
| | trdhfm | Read Control H duration (FM) | 90 | - | ns | |
| | trdlfm | Read Control L duration (FM) | 355 | - | ns | |
| RDX (ID) | trc | Read cycle (ID) | 160 | - | ns | |
| | trdh | Read Control pulse H duration | 90 | - | ns | |
| | trdl | Read Control pulse L duration | 45 | - | ns | |
| D[17:0], D[17:10]&D[8:1], D[17:10], D[17:9] | tdst | Write data setup time | 10 | - | ns | For maximum CL=30pF For minimum CL=8pF |
| | tdht | Write data hold time | 10 | - | ns | |
| | trat | Read access time | - | 40 | ns | |
| | tratfm | Read access time | - | 340 | ns | |
| | trod | Read output disable time | 20 | 80 | ns | |

Note: $T_a = -30$ to 70 °C, $V_{DDI}=1.65V$ to $3.3V$, $V_{CI}=2.5V$ to $3.3V$, $V_{SS}=0V$.

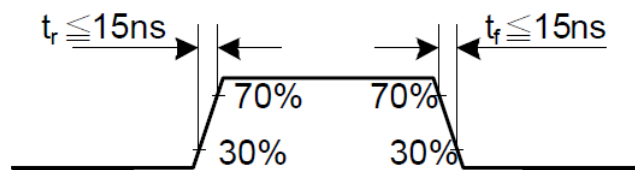


Display Serial Interface Timing Characteristics (3-line SPI system)

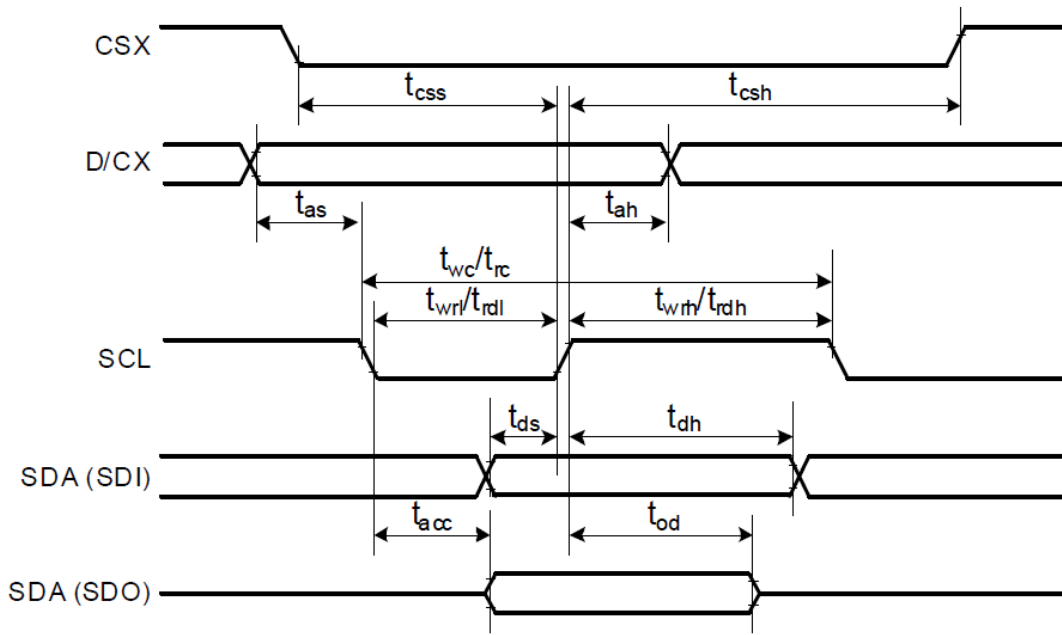


| Signal | Symbol | Parameter | min | max | Unit | Description |
|--------------------|--------|-----------------------------|-----|-----|------|-------------|
| SCL | tscycw | Serial Clock Cycle (Write) | 100 | - | ns | |
| | tshw | SCL "H" Pulse Width (Write) | 40 | - | ns | |
| | tslw | SCL "L" Pulse Width (Write) | 40 | - | ns | |
| | tscycr | Serial Clock Cycle (Read) | 150 | - | ns | |
| | tshr | SCL "H" Pulse Width (Read) | 60 | - | ns | |
| | tslr | SCL "L" Pulse Width (Read) | 60 | - | ns | |
| SDA / SDI (Input) | tsds | Data setup time (Write) | 30 | - | ns | |
| | tsdh | Data hold time (Write) | 30 | - | ns | |
| SDA / SDO (Output) | tacc | Access time (Read) | 10 | - | ns | |
| | toh | Output disable time (Read) | 10 | 50 | ns | |
| CSX | tsc | SCL-CSX | 20 | - | ns | |
| | tch | CSX "H" Pulse Width | 40 | - | ns | |
| | tcss | CSX-SCL Time | 60 | - | ns | |
| | | | 65 | - | ns | |

Note: $T_a = 25\text{ }^\circ\text{C}$, $V_{DDI}=1.65\text{V to }3.3\text{V}$, $V_{CI}=2.5\text{V to }3.3\text{V}$, $AGND=V_{SS}=0\text{V}$

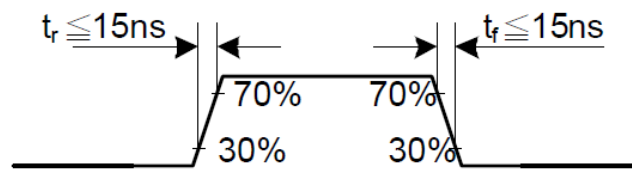


Display Serial Interface Timing Characteristics (4-line SPI system)

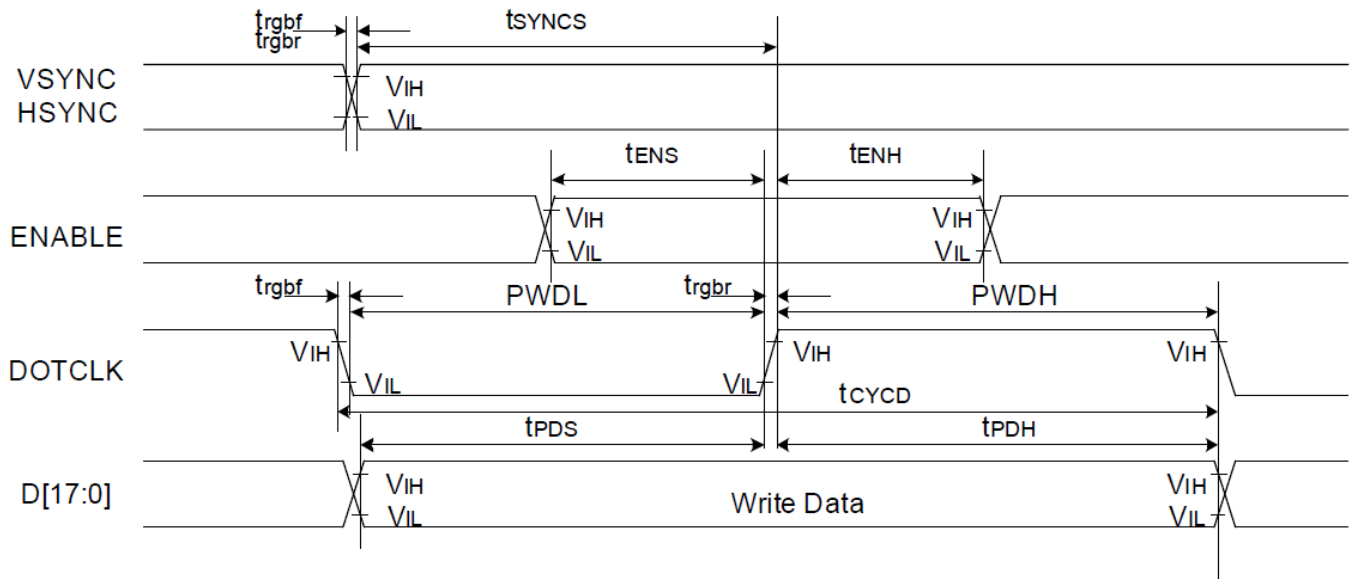


| Signal | Symbol | Parameter | min | max | Unit | Description |
|--------------------|--------|-------------------------------|-----|-----|------|---------------------|
| CSX | tcss | Chip select time (Write) | 40 | - | ns | |
| | tcsh | Chip select hold time (Read) | 40 | - | ns | |
| SCL | twc | Serial clock cycle (Write) | 100 | - | ns | |
| | twrh | SCL "H" pulse width (Write) | 40 | - | ns | |
| | twrl | SCL "L" pulse width (Write) | 40 | - | ns | |
| | trc | Serial clock cycle (Read) | 150 | - | ns | |
| | trdh | SCL "H" pulse width (Read) | 60 | - | ns | |
| | trdl | SCL "L" pulse width (Read) | 60 | - | ns | |
| D/CX | tas | D/CX setup time | 10 | - | | |
| | tah | D/CX hold time (Write / Read) | 10 | - | | |
| SDA / SDI (Input) | tds | Data setup time (Write) | 30 | - | ns | |
| | tdh | Data hold time (Write) | 30 | - | ns | |
| SDA / SDO (Output) | tacc | Access time (Read) | 10 | - | ns | For maximum CL=30pF |
| | tod | Output disable time (Read) | 10 | 50 | ns | For minimum CL=8pF |

Note: $T_a = 25\text{ }^\circ\text{C}$, $V_{DDI}=1.65\text{V to }3.3\text{V}$, $V_{CI}=2.5\text{V to }3.3\text{V}$, $AGND=VSS=0\text{V}$

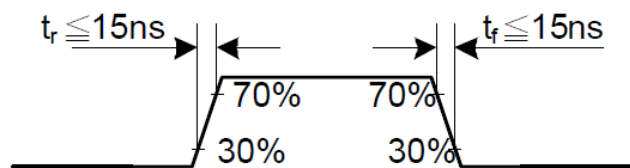


Parallel 18/16/6-bit RGB Interface Timing Characteristics



| Signal | Symbol | Parameter | min | max | Unit | Description |
|---------------|----------------------|-----------------------------------|-----|-----|------|----------------------------------|
| VSYNC / HSYNC | t_{SYNCS} | VSYNC/HSYNC setup time | 15 | - | ns | 18/16-bit bus RGB interface mode |
| | t_{SYNCH} | VSYNC/HSYNC hold time | 15 | - | ns | |
| DE | t_{ENS} | DE setup time | 15 | - | ns | |
| | t_{ENH} | DE hold time | 15 | - | ns | |
| D[17:0] | t_{POS} | Data setup time | 15 | - | ns | |
| | t_{PDH} | Data hold time | 15 | - | ns | |
| DOTCLK | PWDH | DOTCLK high-level period | 15 | - | ns | |
| | PWDL | DOTCLK low-level period | 15 | - | ns | |
| | t_{CYCD} | DOTCLK cycle time | 100 | - | ns | |
| | t_{rgrb}, t_{rgbf} | DOTCLK,HSYNC,VSYNC rise/fall time | - | 15 | ns | |
| VSYNC / HSYNC | t_{SYNCS} | VSYNC/HSYNC setup time | 15 | - | ns | 6-bit bus RGB interface mode |
| | t_{SYNCH} | VSYNC/HSYNC hold time | 15 | - | ns | |
| DE | t_{ENS} | DE setup time | 15 | - | ns | |
| | t_{ENH} | DE hold time | 15 | - | ns | |
| D[17:0] | t_{POS} | Data setup time | 15 | - | ns | |
| | t_{PDH} | Data hold time | 15 | - | ns | |
| DOTCLK | PWDH | DOTCLK high-level pulse period | 15 | - | ns | |
| | PWDL | DOTCLK low-level pulse period | 15 | - | ns | |
| | t_{CYCD} | DOTCLK cycle time | 50 | - | ns | |
| | t_{rgrb}, t_{rgbf} | DOTCLK,HSYNC,VSYNC rise/fall time | - | 15 | ns | |

Note: $T_a = -30$ to 70 °C, $V_{DDI}=1.65V$ to $3.3V$, $V_{CI}=2.5V$ to $3.3V$, $AGND=VSS=0V$



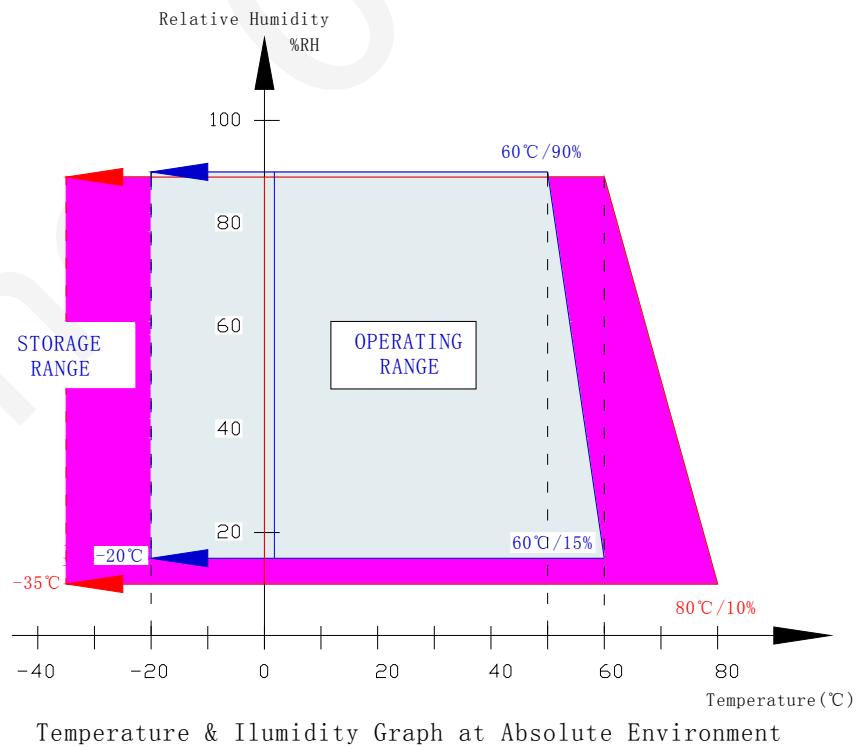
3. Electrical Characteristics

3.1 Absolute Maximum Ratings

| Item | Symbol | Min | Max | Unit |
|--|--------|-----|------|------|
| Supply voltage for System | VCI | 0 | +4.6 | V |
| Supply voltage for Interface Operation | IOVCC | 0 | +4.6 | V |
| Operate temperature range | TOP | -20 | 70 | °C |
| Storage temperature range | TST | -30 | 80 | °C |

Note:

- (1) 90%RH maximum humidity, 60°C maximum wet-bulb temperature When operated at a temperature lower than 0°C, the LCD worked slowly and the screen appeared low-contrast images due to the characteristics of LC(Liquid Crystal).
- (2) If any fixed pattern is displayed on LCD for minutes, image-sticking phenomenon may occur.
- (3) Degradation could occur to pixels' TFT when DC BIOS is input into its gate-signal under POWER OFF WAITING STAND-BY & SLEEP MODE. Therefore, LCD should be turn off then.
- (4) Please operate a LCD module on the basis of the recommended S/W(Register)



DATA). If you want to change any part of the S/W, you must take driver's confirmation.

3.2 DC Characteristics

$T_a = 25^\circ\text{C}$

| Item | Symbol | Min | Typ | Max | Unit | Condition |
|--|-------------------|----------|-----|----------|------|-----------|
| Supply voltage for System | VCI | 2.5 | 2.8 | 3.3 | V | |
| Supply voltage for Interface Operation | IOVCC | 1.65 | 2.8 | 3.3 | V | |
| Input high level voltage | V_{IH} | 0.7IOVCC | -- | IOVCC | V | |
| Input low level voltage | V_{IL} | VSS | -- | 0.3IOVCC | V | |
| Power supply current | $I_{CC} + I_{CI}$ | -- | TBD | -- | mA | |
| Backlight forward voltage | V_F | 2.8 | 3.2 | 3.5 | V | |
| Backlight forward current | I_F | -- | 90 | -- | mA | |

4. Optical characteristics

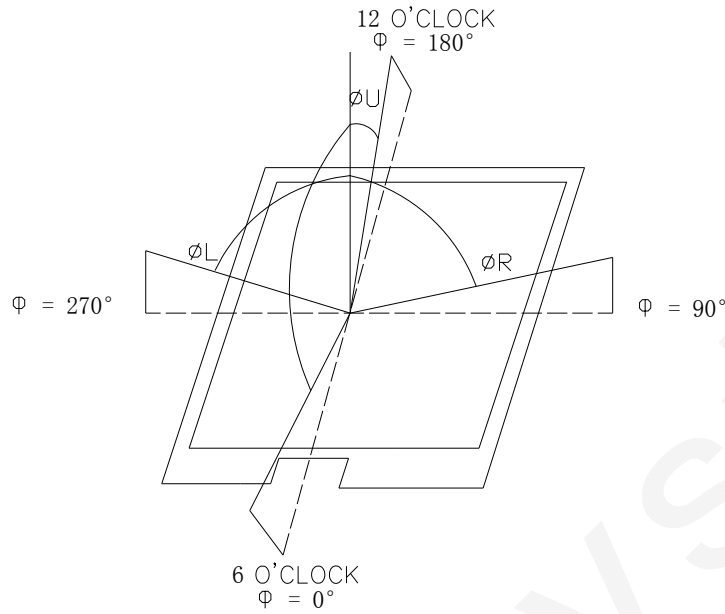
| Parameter | | Symbol | Condition | Min | Typ | Max | Unit | Note |
|---------------------------------|-------|--------|---------------------------------------|-------|-------|-------|-------------------|--------------------|
| Viewing angle | | Left | $CR \geq 10$ | | 45 | | Degree | (2) |
| | | Right | | | 45 | | Degree | |
| | | Up | | | 45 | | Degree | |
| | | Down | | | 20 | | Degree | |
| Color Chromaticity | Red | Rx | $\theta = 0$ Normal viewing angle | 0.602 | 0.652 | 0.702 | - | Color Chromaticity |
| | | Ry | | 0.281 | 0.331 | 0.381 | - | |
| | Green | Gx | | 0.264 | 0.314 | 0.364 | - | |
| | | Gy | | 0.525 | 0.575 | 0.625 | - | |
| | Blue | Bx | | 0.088 | 0.138 | 0.188 | - | |
| | | By | | 0.082 | 0.132 | 0.182 | - | |
| | White | Wx | | 0.286 | 0.336 | 0.386 | - | |
| | | Wy | | 0.359 | 0.409 | 0.459 | - | |
| Contrast ratio | | CR | optimal | - | 300 | | - | (1) |
| Response time | | Tr+Tf | | | 30 | | ms | (3) |
| Luminance on surface If=90mA | | Lv | Normally $\theta_x = \theta_y = 0$ | 180 | 260 | | cd/m ² | |

Note (1) Definition of contrast ratio

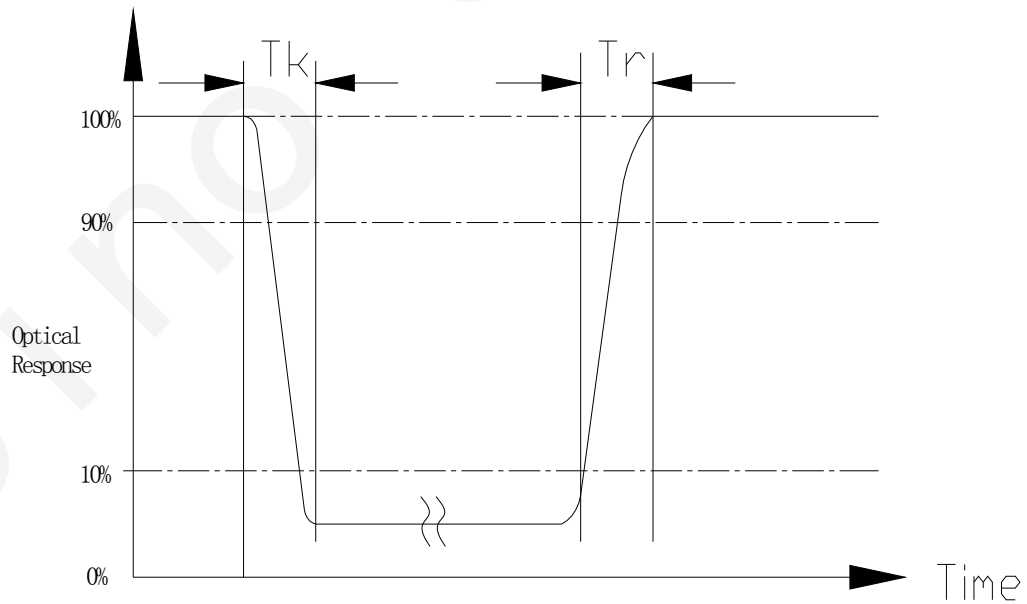
Measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixel white}}{\text{Luminance with all pixel black}}$$

Note (2) Definition of viewing angle



Note (3) Definition of response time: Tr+Tf



5. Reliability

5.1 Reliability Condition

| Item No | Item | Condition | Remark |
|---------|--------------------------------------|--|---------------------------------|
| 1 | High temperature Operating | 60°C, 120Hours | Finish product (With polarizer) |
| 2 | Low temperature Operating | -10°C, 120 Hours | Finish product (With polarizer) |
| 3 | High temperature Storage | 70°C, 200 Hours | Finish product (With polarizer) |
| 4 | Low temperature Storage | -20°C, 200 Hours | Finish product (With polarizer) |
| 5 | High temperature & humidity Storage | 50°C, 90%RH, 120 Hours | Finish product (With polarizer) |
| 6 | Thermal Shock Storage (No operation) | -10°C , 30min.<=> 60°C , 30min. 10 Cycles | Finish product (With polarizer) |
| 7 | ESD test | Voltage:±8KV R:330 ohm,C:150pF Air discharge,10 times | Finish product (With polarizer) |
| 8 | Vibration test | 10 => 55 =>10 => 55 => 10 Hz, within 1 minute;Amplitude:1.5mm. 15 minutes for each Direction (X,Y,Z) | Finish product (With polarizer) |
| 9 | Drop test | Packed, 100CM free fall 6 sides, 1 corner, 3edges | Finish product (With polarizer) |

*One single product test for only one item.

* Judgment after test: keep in room temperature for more than 2 hours.

- Current consumption < 2 times of initial value
- Contrast > 1/2 initial value
- Function: work normally

5.2 Inspection plan

| Class | Item | Judgment | Class |
|--------------------|---|---|----------|
| Packing & Indicate | 1.Outside and inside package | "Model no." , "lot no." and "quantity" Should indicate on the package. | Minor |
| | 2.Model mixed and quantity | Other model mixed.....rejected. Quantity short or over....rejected. | Critical |
| | 3.Product indication | "Model no." should indicate on the product | Major |
| Assembly | 4.Dimension,LCD glass scratch And scribe defect | According to specification or drawing | Major |
| Appearance | 5.Viewing area | Polarizer edge or LCD's sealing line is visible in the viewing arearejected | Minor |
| | 6.Blemish 、 black spot 、 White spot in the LCD And LCD glass cracks | According to standard of visual inspection (inside viewing area) | Minor |
| | 7. Blemish 、 black spot White spot and scratch on the polarizer | According to standard of visual inspection (inside viewing area) | Minor |
| | 8.Bubble in polarizer | According to standard of visual inspection (inside viewing area) | Minor |
| | 9.LCD's rainbow color | Strong deviation color (or Newton ring) of LCDrejected. Or according to limited sample (if needed, and inside viewing area) | Minor |
| | 10.FPC | Burned area or wrong part number is on FPC. The symbol, character, and mark of FPC are unidentifiable. The stripped solder mask, A>1.0mm 0.3mm < stripped solder mask or visible circuit, A<1.0mm,and the number is ≧ 4 pieces. Particle between circuits in solder mask.. Circuit is peeled off or cracked. Any circuit risen or exposed. 0.2mm< Area of solder ball, A is ≧0.4mm,the number of solder ball is ≧ 3 pieces. The magnitude of solder ball, A is>0.4mm. | Minor |

5.3 Standard of visual inspection

| Class | Item | Judgment | Class |
|------------|---|---|----------|
| Electrical | 11. Electrical and optical characteristics (contrast、VOP、chromaticity...etc) | According to specification or drawing. (inside viewing area) | Critical |
| | 12. Missing pattern | Missing dot、line、character.....rejected | Critical |
| | 13. Short circuit、wrong pattern display | Non display、wrong pattern display、current consumption out of specification.....rejected | Critical |
| | 14. Pin hole、pattern deformity | According to standard of visual inspection | Minor |
| | 15. Black spot、white spot、black line、white line、slant line、background uneven、color uneven | Strong deviation color.....rejected Or according to limited sample full off screen (all black) ...disregards | Minor |
| | 16. Stick image (retention image) | Fixed test picture within two hours...rejected | Minor |

| Class | Item | Judgment | | | | | | | | | | | | | | | | | | | |
|--------------------|--|--|----------------|-----------------|--------------|-----------|--------------------|-------|-----------------|-----|---------------|-----------|------------|----------------------|---|------------|----------------------|---|-----|------------|-------------------|
| Minor | <ul style="list-style-type: none"> • Blemish、black spot、white spot in the LCD. • Blemish、black spot、white spot and scratch on th polarizer | <p>(A) Round type: unit: mm</p> <table border="1"> <thead> <tr> <th>Diameter (mm.)</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <tr> <td>$0.2 < A$</td> <td>0</td> </tr> </tbody> </table> <p>Note: $A = (\text{Length} + \text{Width}) / 2$</p> <p>(B) Liner type: unit: mm</p> <table border="1"> <thead> <tr> <th>Length</th> <th>Width</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <tr> <td>---</td> <td>$W \leq 0.03$</td> <td>Disregard</td> </tr> <tr> <td>$L \leq 5$</td> <td>$0.03 < W \leq 0.05$</td> <td>3</td> </tr> <tr> <td>$L \leq 5$</td> <td>$0.05 < W \leq 0.07$</td> <td>1</td> </tr> <tr> <td>---</td> <td>$0.07 < W$</td> <td>Follow round type</td> </tr> </tbody> </table> | Diameter (mm.) | Acceptable Q'ty | $0.2 < A$ | 0 | Length | Width | Acceptable Q'ty | --- | $W \leq 0.03$ | Disregard | $L \leq 5$ | $0.03 < W \leq 0.05$ | 3 | $L \leq 5$ | $0.05 < W \leq 0.07$ | 1 | --- | $0.07 < W$ | Follow round type |
| Diameter (mm.) | Acceptable Q'ty | | | | | | | | | | | | | | | | | | | | |
| $0.2 < A$ | 0 | | | | | | | | | | | | | | | | | | | | |
| Length | Width | Acceptable Q'ty | | | | | | | | | | | | | | | | | | | |
| --- | $W \leq 0.03$ | Disregard | | | | | | | | | | | | | | | | | | | |
| $L \leq 5$ | $0.03 < W \leq 0.05$ | 3 | | | | | | | | | | | | | | | | | | | |
| $L \leq 5$ | $0.05 < W \leq 0.07$ | 1 | | | | | | | | | | | | | | | | | | | |
| --- | $0.07 < W$ | Follow round type | | | | | | | | | | | | | | | | | | | |
| Minor | Bubble in polarizer | <p>unit: mm</p> <table border="1"> <thead> <tr> <th>Diameter</th> <th>Acceptable Q'ty</th> </tr> </thead> <tbody> <tr> <td>$A \leq 0.3$</td> <td>Disregard</td> </tr> <tr> <td>$0.3 < A \leq 0.5$</td> <td>1</td> </tr> <tr> <td>$0.5 < A$</td> <td>0</td> </tr> </tbody> </table> | Diameter | Acceptable Q'ty | $A \leq 0.3$ | Disregard | $0.3 < A \leq 0.5$ | 1 | $0.5 < A$ | 0 | | | | | | | | | | | |
| Diameter | Acceptable Q'ty | | | | | | | | | | | | | | | | | | | | |
| $A \leq 0.3$ | Disregard | | | | | | | | | | | | | | | | | | | | |
| $0.3 < A \leq 0.5$ | 1 | | | | | | | | | | | | | | | | | | | | |
| $0.5 < A$ | 0 | | | | | | | | | | | | | | | | | | | | |
| Minor | Pin hole、Pattern deformity | <p>unit: dot size</p> <table border="1"> <thead> <tr> <th>Diameter</th> <th>Acc. Q'ty</th> </tr> </thead> <tbody> <tr> <td>$0.4 < \Phi$</td> <td>0</td> </tr> </tbody> </table> | Diameter | Acc. Q'ty | $0.4 < \Phi$ | 0 | | | | | | | | | | | | | | | |
| Diameter | Acc. Q'ty | | | | | | | | | | | | | | | | | | | | |
| $0.4 < \Phi$ | 0 | | | | | | | | | | | | | | | | | | | | |

6. Precaution

6.1 Handling

- (1) Protect the panel from static, it may cause damage to the CMOS Gate Array IC.
- (2) Use fingerstalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
- (3) 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.
- (4) 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.
- (5) Pins of I/F connector shall not be touched directly with bare hands.
- (6) Refrain from strong mechanical shock and / or any force to the panel. In addition to damage, this may cause improper operation or damage to the panel.
- (7) Note that polarizers are very fragile and could be easily damaged. Do not press or scratch the surface harder than a B pencil lead.
- (8) Wipe off water droplets or oil immediately. If you leave the droplets for a long time, staining and discoloration may occur.
- (9) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.

6.2 Storage

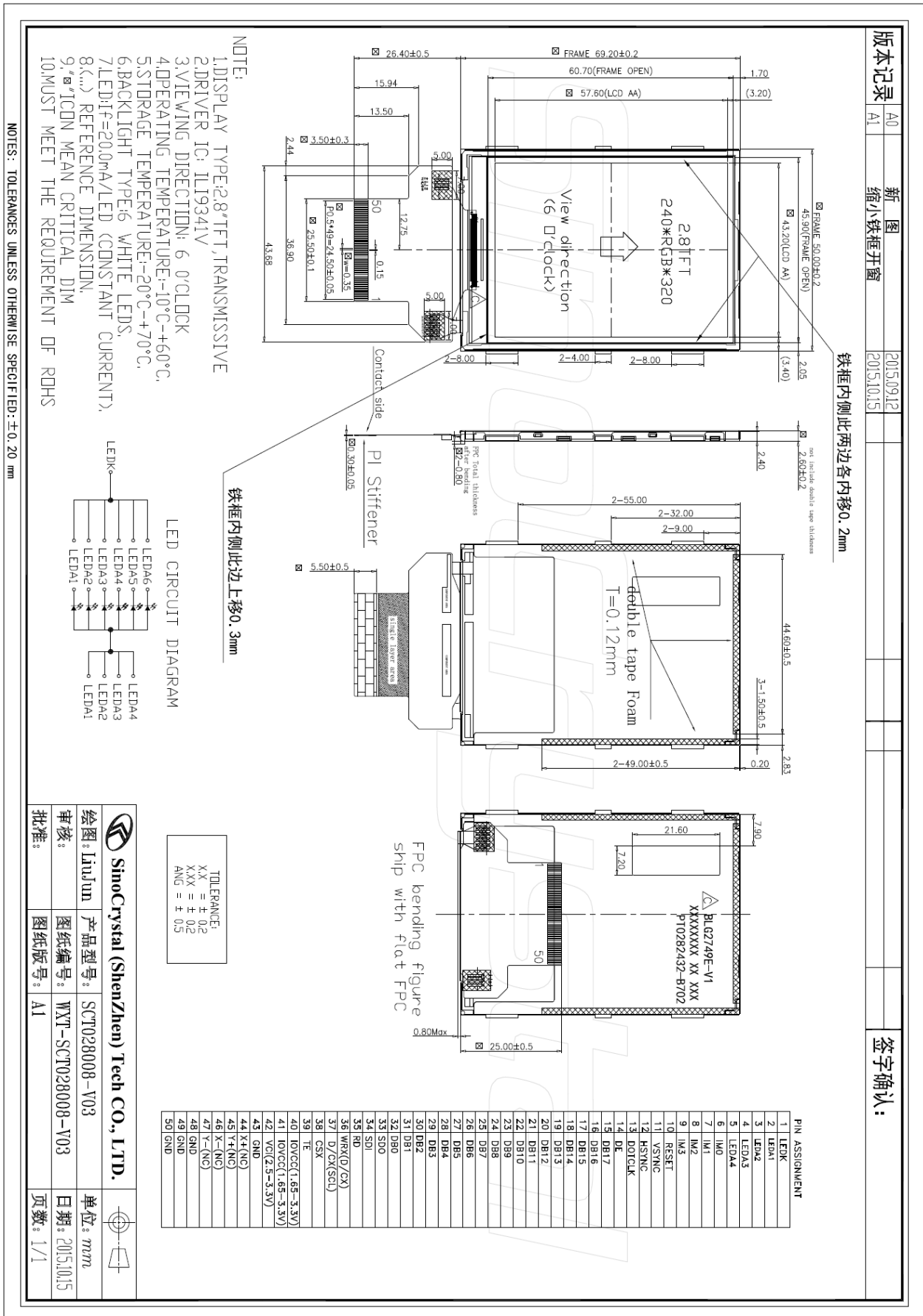
- (1) Do not leave the panel in high temperature, and high humidity for a long time. It is highly recommended to store the panel with temperature from 0 to 35°C and relative humidity of less than 70%.
- (2) The panel shall be stored in a dark place. It is prohibited to apply sunlight or fluorescent light during the store.

6.3 Operation

- (1) The LCD shall be operated within the limits specified. Operation at values outside of these limits may shorten life, and/or harm display images.
- (2) 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.
- (3) 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.

7. Outline Dimension

Refer to SCT028008-V03 drawing.



8. Packing method

8.1 Packing Quantity (TBD)

8.2 Flowing chart (TBD)

Sino Crystal