



RAYSTAR

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RFC570B-EIW-DAN

SPECIFICATION

CUSTOMER:

OPTRONICS

| | |
|-------------|--|
| APPROVED BY | |
| PCB VERSION | |
| DATE | |

FOR CUSTOMER USE ONLY

| SALES BY | APPROVED BY | CHECKED BY | PREPARED BY |
|----------|-------------|------------|-------------|
| | | | |

ISSUED DATE:

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1. Revision History

| DATE | VERSION | REVISED PAGE NO. | Note |
|----------|---------|------------------|-------------|
| 2013/2/5 | 1 | | First issue |

RAYSTAR OPTRONICS

2. General Specification

- Resolution: 320 x RGBx240
- Module dimension: 149.0 x 109.0 x 11.5 mm
- Active Area : 115.2 X 86.4 mm
- Dot pitch: 0.12 x 0.36 mm
- LCD type: TFT LCD Transmissive,
- View direction: 12 o'clock
- Gray Scale Inversion Direction: 6 o'clock
- Backlight Type: LED, Normally White
- Driver IC: SSD1963
- Interface: Digital 8080 family MPU

RAYSTAR OPTRONICS

3. Module Coding System

| | | | | | | | | | | | | |
|----------|----------|----------|-----------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|
| R | F | C | 57 | 0B | - | E | I | W | - | D | A | N |
| 1 | 2 | 3 | 4 | 5 | - | 6 | 7 | 8 | - | 9 | 10 | 11 |

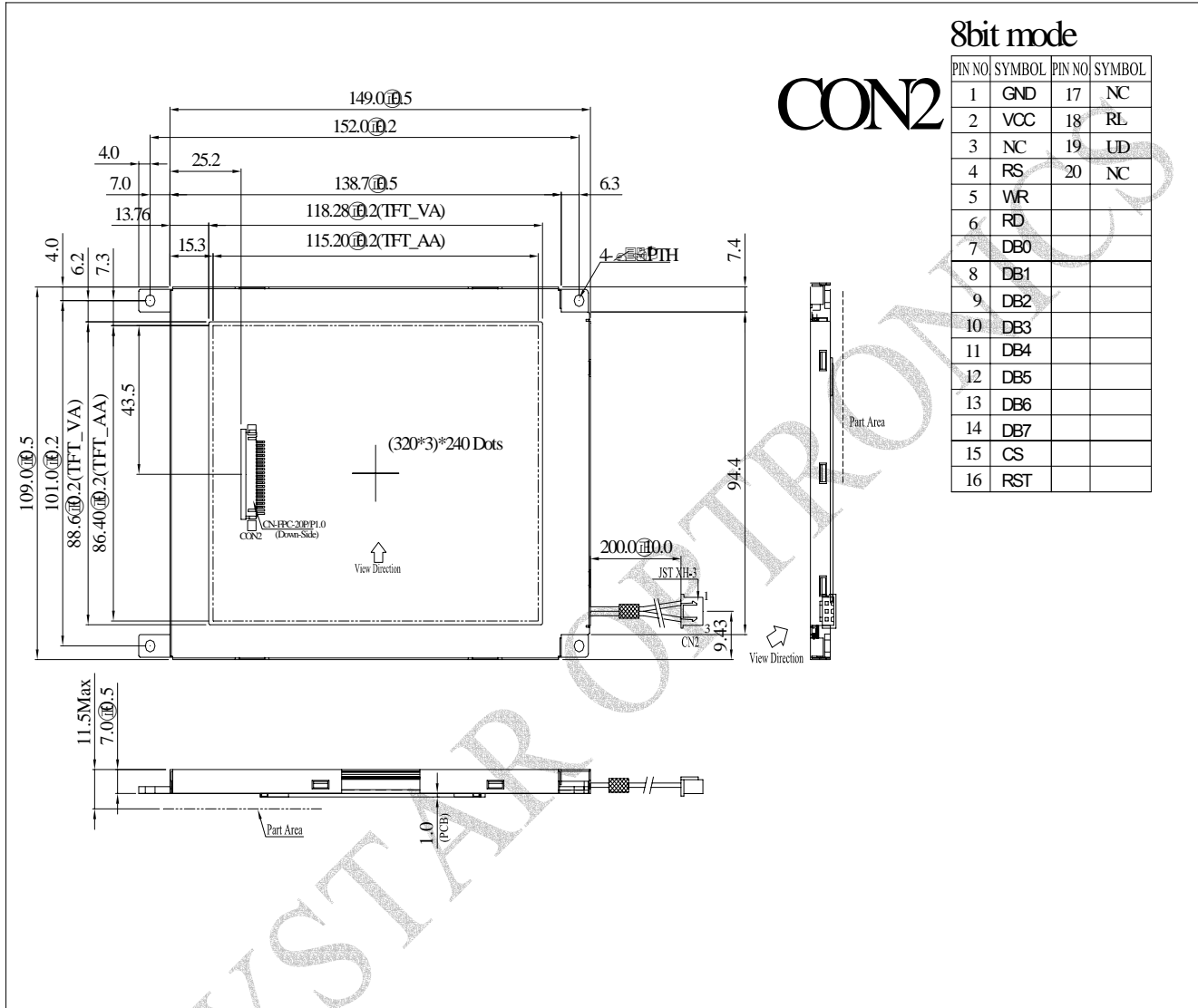
| Item | Description | | |
|------|---|---|-------------------------------------|
| 1 | R : Raystar Optronics Inc. | | |
| 2 | Display Type : TFT Type | | |
| 3 | Solution: A: 128x160 B:320x234 C:320x240 D:480x234 G:640x480 | | |
| 4 | Display Size : 5.7" TFT | | |
| 5 | Version Code. | | |
| 6 | Model serials no. | | |
| 7 | Polarizer Type, Temperature range, View direction | A : Reflective, N.T, 6:00 | K : Transflective, W.T,12:00 |
| | | D : Reflective, N.T, 12:00 | 1 : Transflective, U.T,6:00 |
| | | G : Reflective, W. T, 6:00 | 4 : Transflective, U.T.12:00 |
| | | J : Reflective, W. T, 12:00 | C : Transmissive, N.T,6:00 |
| | | 0 : Reflective, U. T, 6:00 | F : Transmissive, N.T,12:00 |
| | | 3 : Reflective, U. T, 12:00 | I : Transmissive, W. T, 6:00 |
| | | B : Transflective, N.T,6:00 | L : Transmissive, W.T,12:00 |
| | | E : Transflective, N.T.12:00 | 2 : Transmissive, U. T, 6:00 |
| | | H : Transflective, W.T,6:00 | 5 : Transmissive, U.T,12:00 |
| 8 | Backlight | N : Without backlight | Y : LED, Yellow Green |
| | | P : EL, Blue green | A : LED, Amber |
| | | T : EL, Green | W : LED, White |
| | | D : EL, White | O : LED, Orange |
| | | F : CCFL, White | G : LED, Green |
| 9 | Driver Method | D: Digital A: Analog | |
| 10 | Interface | N : without control board A : 8Bit B : 16Bit | |
| 11 | TS | N : Without TS S : resistive touch panel C : capacitive touch panel | |

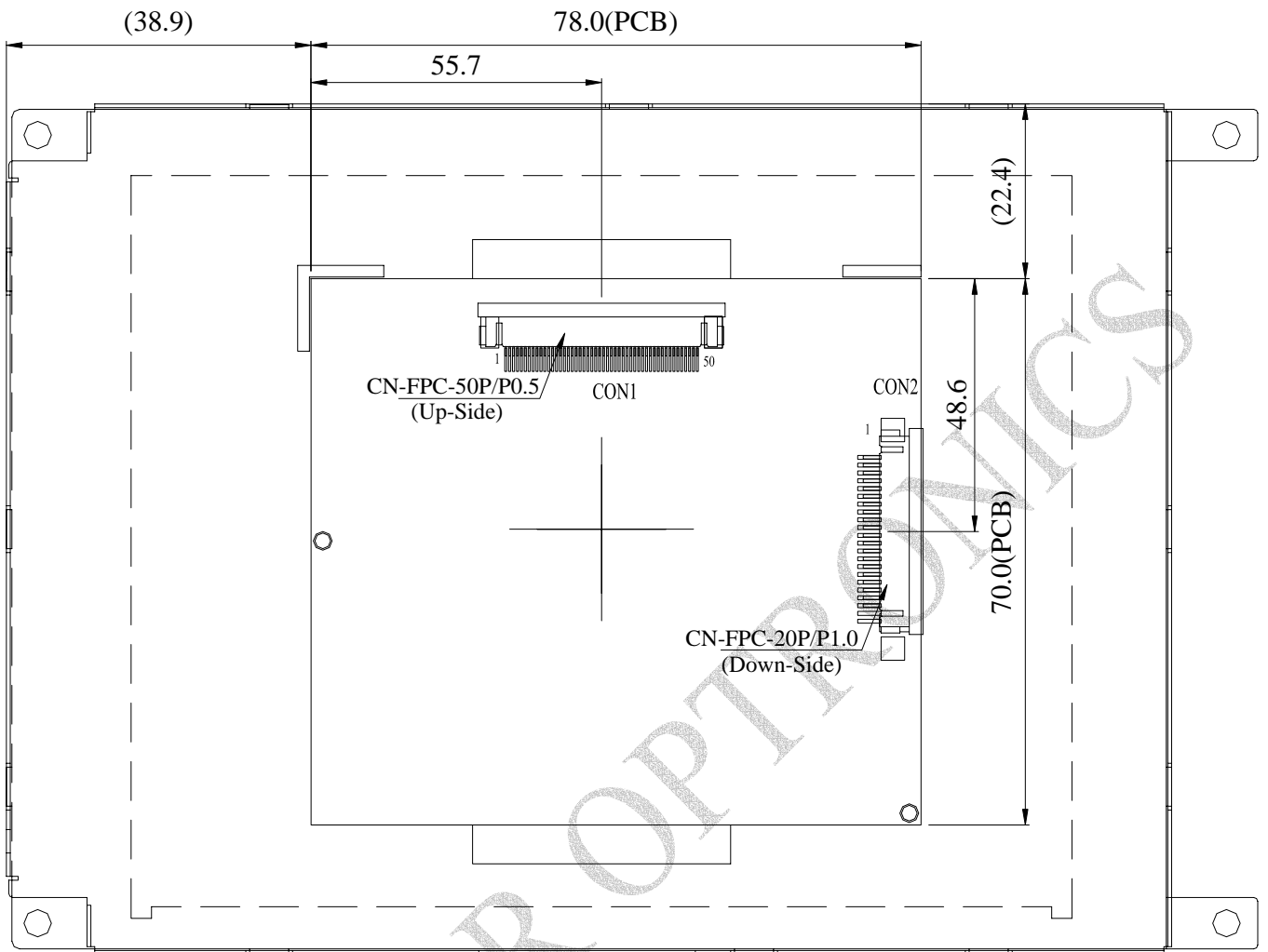
4. Interface Pin Function

4-1 Pins Connection To Control Board

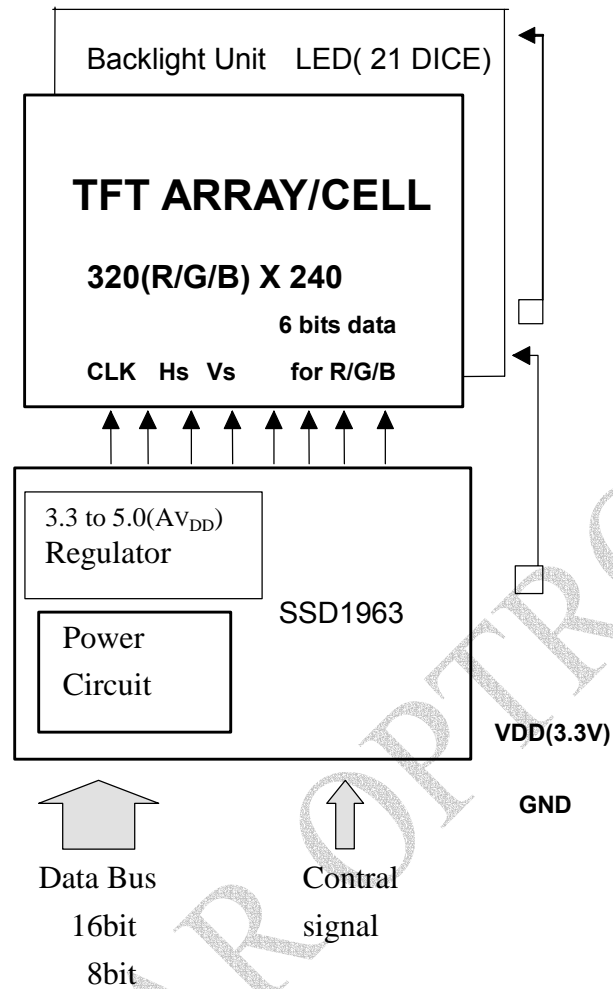
| P/N | Symbol | 8 B IT Function |
|-----|--------|--|
| 1 | GND | Ground |
| 2 | VCC | Power supply for Logic |
| 3 | NC | No connection |
| 4 | RS | Command/Data select(L: Command, H: Data) |
| 5 | WR | 8080 family MPU interface : Write signal |
| 6 | RD | 8080 family MPU interface: Read signal |
| 7 | DB0 | Data bus |
| 8 | DB1 | |
| 9 | DB2 | |
| 10 | DB3 | |
| 11 | DB4 | |
| 12 | DB5 | |
| 13 | DB6 | |
| 14 | DB7 | |
| 15 | CS | Chip select |
| 16 | RES | RESET |
| 17 | NC | No connection |
| 18 | RL | Scan direction |
| 19 | UD | Scan direction |
| 20 | NC | No connection |

5. Contour Drawing





6. Block Diagram



7. Electrical Characteristics

| Item | Symbol | Condition | Min | Typ | Max | Unit |
|--------------------------|------------------|-----------------------|---------|-----|---------|------|
| Supply Voltage For Logic | VDD | V _{DD} -GND | 3.0 | 3.3 | 3.5 | V |
| Input High Volt. | V _{IH} | H Level | 0.7 VDD | — | VDD | V |
| Input Low Volt. | V _{IL} | L Level | 0 | — | 0.3 VDD | V |
| Supply Current | I _{VDD} | V _{DD} =3.3V | — | 121 | — | mA |

8. Electrical Absolute Ratings

| Item | Symbol | Min | Typ | Max | Unit |
|-------------------------|-------------------------------|------|-----|-----|------|
| Power Supply For Logic | V _{DD} (digital-GND) | -0.3 | — | 3.5 | V |
| Power Supply For Analog | AVDD (analog-GND) | -0.3 | — | 5.5 | V |
| Input Voltage | V _I | -0.3 | — | VDD | V |

9. DC Characteristics

Conditions:

Voltage referenced to VSS

VDDD, VDDPLL = 1.2V

VDDIO, VDDLCD = 3.3V

TA = 25°C

DC Characteristics

| Symbol | Parameter | Test Condition | Min | Typ | Max | Unit |
|--------|------------------------|----------------|----------|-----|-----------|------|
| PSTY | Quiescent Power | | | 300 | 500 | uW |
| IIZ | Input leakage current | | -1 | | 1 | uA |
| IOZ | Output leakage current | | -1 | | 1 | uA |
| VOH | Output high voltage | | 0.7VDDIO | | | V |
| VOL | Output low voltage | | | | 0.3VDDIO | V |
| VIH | Input high voltage | | 0.7VDDIO | | VDDIO+0.2 | V |
| VIL | Input low voltage | | | | 0.3VDDIO | V |

10. AC Characteristics

Conditions:

Voltage referenced to VSS

VDDD, VDDPLL = 1.2V

VDDIO, VDDLCD = 3.3V

TA = 25°C

CL = 50pF (Bus/CPU Interface)

CL = 0pF (LCD Panel Interface)

10.1 Clock Timing

Table 10-1: Clock Input Requirements for CLK (PLL-bypass)

| Symbol | Parameter | Min | Max | Units |
|--------|-----------------------------|--------|-----|-------|
| FCLK | Input Clock Frequency (CLK) | | 110 | MHz |
| TCLK | Input Clock period (CLK) | 1/fCLK | | ns |

Table 10-2: Clock Input Requirements for CLK

| Symbol | Parameter | Min | Max | Units |
|--------|-----------------------------|--------|-----|-------|
| FCLK | Input Clock Frequency (CLK) | 2.5 | 50 | MHz |
| TCLK | Input Clock period (CLK) | 1/fCLK | | ns |

Table 10-3: Clock Input Requirements for crystal oscillator XTAL

| Symbol | Parameter | Min | Max | Units |
|--------|-----------------------|---------|-----|-------|
| FXTAL | Input Clock Frequency | 2.5 | 10 | MHz |
| TXTAL | Input Clock period | 1/fXTAL | | ns |

10.2 MCU Interface Timing

10.2.1 Parallel 6800-series Interface Timing

Table 10-4: Parallel 6800-series Interface Timing Characteristics (Use CS# as clock)

| Symbol | Parameter | Min | Typ | Max | Unit |
|--------|--------------------------|--------------------------|-----|------------|------|
| fMCLK | System Clock Frequency* | 1 | - | 110 | MHz |
| tMCLK | System Clock Period* | 1/fMCLK | - | - | ns |
| tPWCSH | Control Pulse High Width | Write | 13 | 1.5* tMCLK | ns |
| | | Read | 30 | 3.5* tMCLK | |
| tPWCSL | Control Pulse Low Width | Write (next write cycle) | 13 | 1.5* tMCLK | ns |
| | | Write (next read cycle) | 80 | 9* tMCLK | |
| | | Read | 80 | 9* tMCLK | |
| tAS | Address Setup Time | 2 | - | - | ns |
| tAH | Address Hold Time | 2 | - | - | ns |
| tDSW | Data Setup Time | 4 | - | - | ns |
| tDHW | Data Hold Time | 1 | - | - | ns |
| tPLW | Write Low Time | 14 | - | - | ns |
| tPHW | Write High Time | 14 | - | - | ns |
| tPLWR | Read Low Time | 38 | - | - | ns |
| tACC | Data Access Time | 32 | - | - | ns |
| tDHR | Output Hold time | 1 | - | - | ns |
| tR | Rise Time | - | - | 0.5 | ns |
| tF | Fall Time | - | - | 0.5 | ns |

* System Clock denotes external input clock (PLL-bypass) or internal generated clock (PLL-enabled)

Figure 10-1: Parallel 6800-series Interface Timing Diagram (Use CS# as Clock)

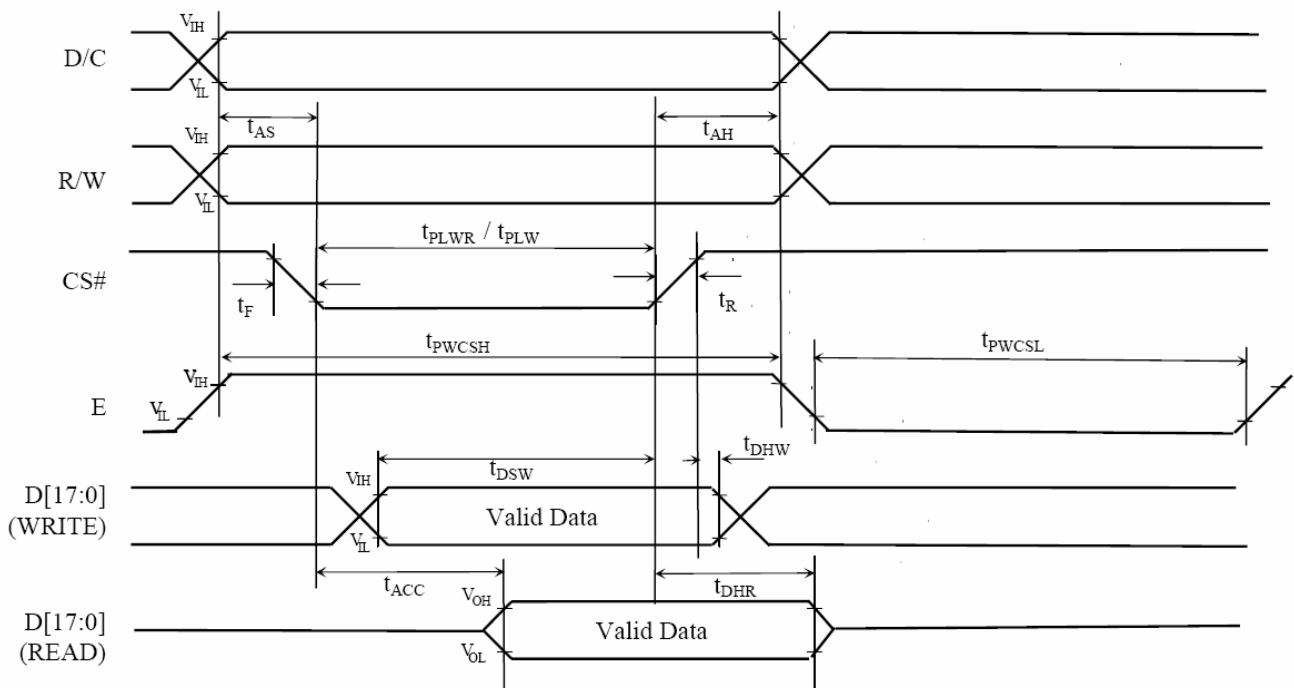
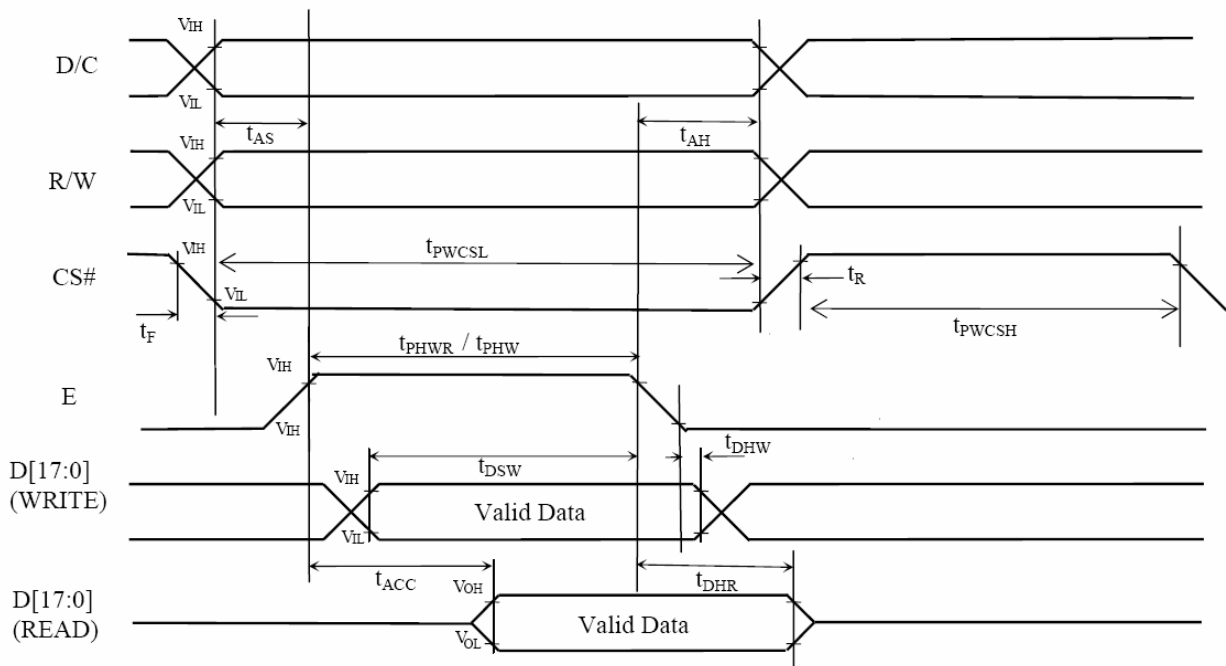


Table 10-5: Parallel 6800-series Interface Timing Characteristics (Use E as clock)

| Symbol | Parameter | Min | Typ | Max | Unit | |
|--------|--------------------------|--------------------------|-----|------------|------|----|
| fMCLK | System Clock Frequency* | 1 | - | 110 | MHz | |
| tMCLK | System Clock Period* | 1/ fMCLK | - | - | ns | |
| tPWCSH | Control Pulse Low Width | Write (next write cycle) | 13 | 1.5* tMCLK | - | ns |
| | | Write (next read cycle) | 80 | 9* tMCLK | | |
| | | Read | 80 | 9* tMCLK | | |
| tPWCSL | Control Pulse High Width | Write | 13 | 1.5* tMCLK | - | ns |
| | | Read | 30 | 3.5* tMCLK | | |
| tAS | Address Setup Time | 2 | - | - | ns | |
| tAH | Address Hold Time | 2 | - | - | ns | |
| tDSW | Data Setup Time | 4 | - | - | ns | |
| tDHW | Data Hold Time | 1 | - | - | ns | |
| tPLW | Write Low Time | 14 | - | - | ns | |
| tPHW | Write High Time | 14 | - | - | ns | |
| tPLWR | Read Low Time | 38 | - | - | ns | |
| tACC | Data Access Time | 32 | - | - | ns | |
| tDHR | Output Hold time | 1 | - | - | ns | |
| tR | Rise Time | - | - | 0.5 | ns | |
| tF | Fall Time | - | - | 0.5 | ns | |

* System Clock denotes external input clock (PLL-bypass) or internal generated clock (PLL-enabled)

Figure10-2: Parallel 6800-series Interface Timing Diagram (Use E as Clock)



10.2.2 Parallel 8080-series Interface Timing

Table 10-6: Parallel 8080-series Interface

| Symbol | Parameter | Min | Typ | Max | Unit |
|--------|--------------------------------------|----------|------------|-----|------|
| fMCLK | System Clock Frequency* | 1 | - | 110 | MHz |
| tMCLK | System Clock Period* | 1/ fMCLK | - | - | ns |
| tPWCSL | Control Pulse High Width | 13 | 1.5* tMCLK | - | ns |
| tPWCSH | Control Pulse Low Width | 30 | 3.5* tMCLK | - | ns |
| tAS | Address Setup Time | 1 | - | - | ns |
| tAH | Address Hold Time | 2 | - | - | ns |
| tDSW | Write Data Setup Time | 4 | - | - | ns |
| tDHW | Write Data Hold Time | 1 | - | - | ns |
| tPWLW | Write Low Time | 12 | - | - | ns |
| tDHR | Read Data Hold Time | 1 | - | - | ns |
| tACC | Access Time | 32 | - | - | ns |
| tPWLR | Read Low Time | 36 | - | - | ns |
| tR | Rise Time | - | - | 0.5 | ns |
| tF | Fall Time | - | - | 0.5 | ns |
| tCS | Chip select setup time | 2 | - | - | ns |
| tCSH | Chip select hold time to read signal | 3 | - | - | ns |

* System Clock denotes external input clock (PLL-bypass) or internal generated clock (PLL-enabled)

Figure 10-3: Parallel 8080-series Interface Timing Diagram (Write Cycle)

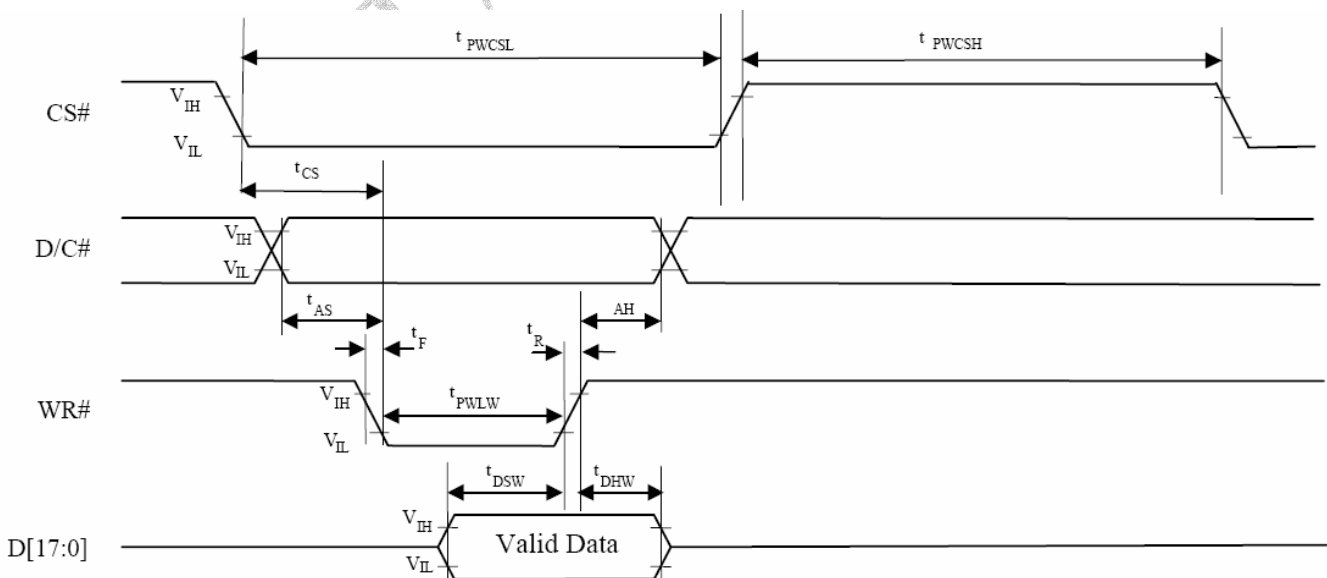
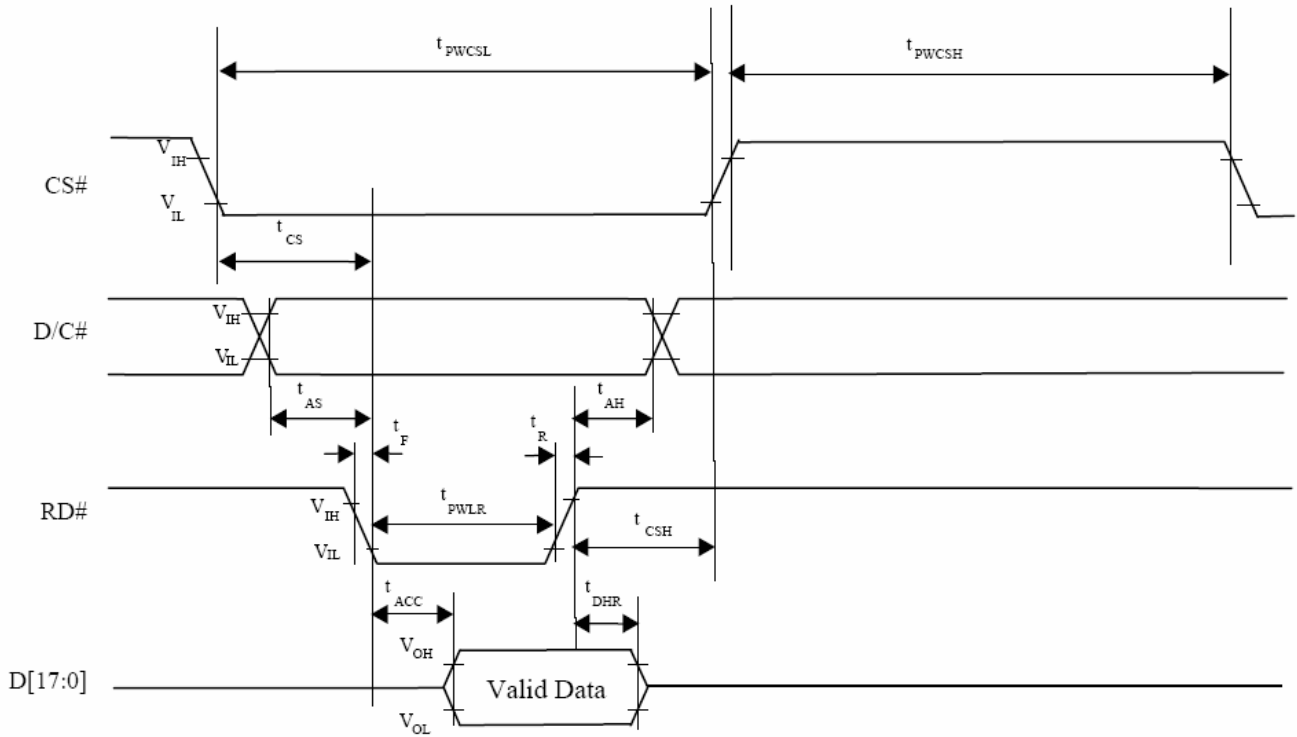


Figure 10-4: Parallel 8080-series Interface Timing Diagram (Read Cycle)



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11. Data transfer order Setting

Pixel Data Format

Both 6800 and 8080 support 8-bit, 9-bit, 16-bit, 18-bit and 24-bit data bus. Depending on the width of the data bus, the display data are packed into the data bus in different ways.

Table 11-1: Pixel Data Format

| Interface | Cycle | D[23] | D[22] | D[21] | D[20] | D[19] | D[18] | D[17] | D[16] | D[15] | D[14] | D[13] | D[12] | D[11] | D[10] | D[9] | D[8] | D[7] | D[6] | D[5] | D[4] | D[3] | D[2] | D[1] | D[0] |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|------|------|
| 24 bits | 1st | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 | G7 | G6 | G5 | G4 | G3 | G2 | G1 | G0 | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 |
| 18 bits | 1st | | | | | | | R5 | R4 | R3 | R2 | R1 | R0 | G5 | G4 | G3 | G2 | G1 | G0 | B5 | B4 | B3 | B2 | B1 | B0 |
| 16 bits (565 format) | 1st | | | | | | | | | R5 | R4 | R3 | R2 | R1 | G5 | G4 | G3 | G2 | G1 | G0 | B5 | B4 | B3 | B2 | B1 |
| | 1st | | | | | | | | | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 | G7 | G6 | G5 | G4 | G3 | G2 | G1 | G0 |
| 16 bits | 2nd | | | | | | | | | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 |
| | 3rd | | | | | | | | | G7 | G6 | G5 | G4 | G3 | G2 | G1 | G0 | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 |
| 12 bits | 1st | | | | | | | | | | | | | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 | G7 | G6 | G5 | G4 |
| | 2nd | | | | | | | | | | | | G3 | G2 | G1 | G0 | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 | |
| 9 bits | 1st | | | | | | | | | | | | | | | | R5 | R4 | R3 | R2 | R1 | R0 | G5 | G4 | G3 |
| | 2nd | | | | | | | | | | | | | | | G2 | G1 | G0 | B5 | B4 | B3 | B2 | B1 | B0 | |
| 8 bits | 1st | | | | | | | | | | | | | | | | | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 |
| | 2nd | | | | | | | | | | | | | | | | | G7 | G6 | G5 | G4 | G3 | G2 | G1 | G0 |
| | 3rd | | | | | | | | | | | | | | | | | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 |

12. Register Depiction

Please consult the spec of SSD1963 Version 1.2

13. OPTICAL CHARACTERISTIC

13-1 Optical Char. of LCD Panel

| Parameter | Symbol | Values | | | Unit | Note |
|-----------------------|--------|------------|------|------|------|----------|
| | | Min. | Typ. | Max. | | |
| Response Time | Tr+Tf | — | 50 | — | ms | Note 2,3 |
| Contrast Ratio | C/R | — | 250 | — | — | *A) |
| θ (View Angle) | CR=10 | 12 O'Clock | — | 40 | — | Note 3,5 |
| | | 6 O'Clock | — | 60 | — | |
| ϕ (View Angle) | | 9 O'Clock | — | 60 | — | |
| | | 3 O'Clock | — | 60 | — | |
| θ (View Angle) | CR=5 | 12 O'Clock | — | 60 | — | |
| | | 6 O'Clock | — | 70 | — | |
| ϕ (View Angle) | | 9 O'Clock | — | 70 | — | |
| | | 3 O'Clock | — | 70 | — | |
| Degree of Saturation | NTSC | — | 50 | — | % | |

***A) Contrast Ratio (CR) is define mathematically as :**

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all balck pixels}}$$

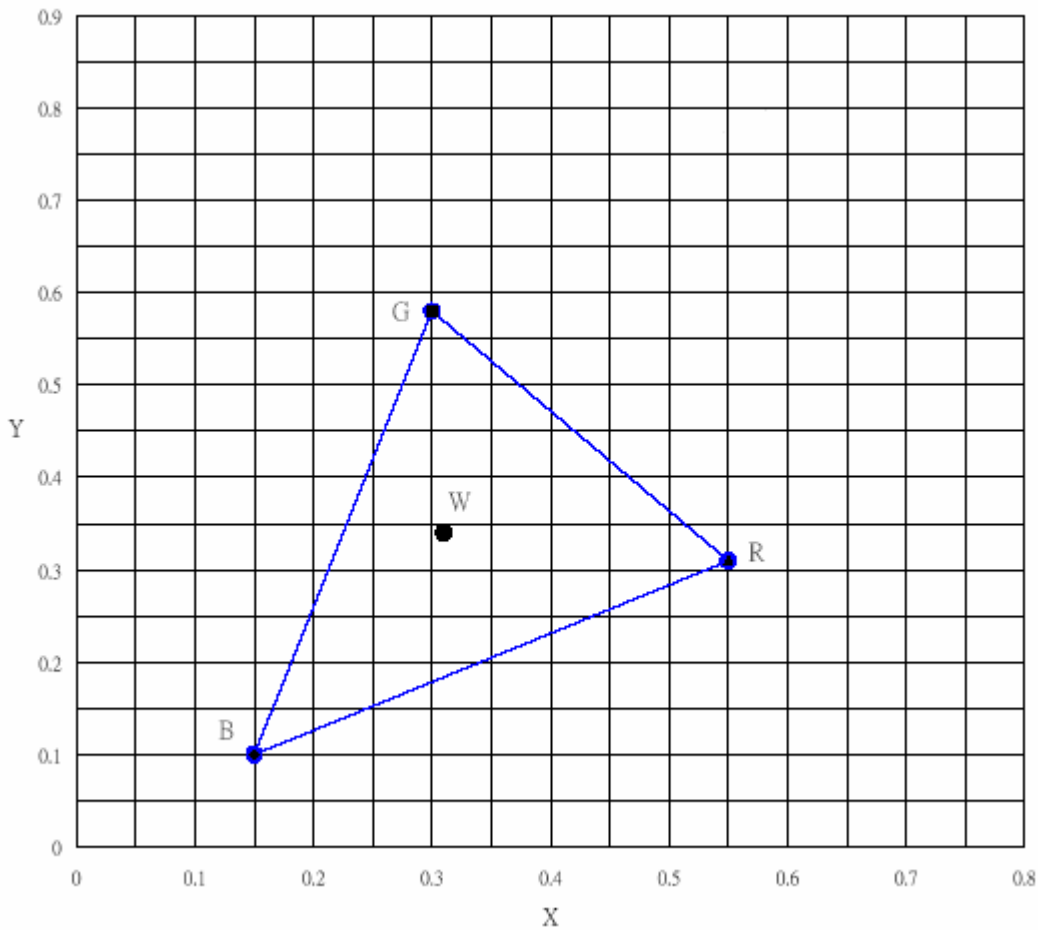
13-2 Color of CIE Coordinate

| ITEM | | SYMBOL | CONDITION | VALUE | | | NOTE |
|-------------------------|-------|--------|-----------------------------------|-------|------|------|-------|
| | | | | MIN. | TYP. | MAX. | |
| Color of CIE Coordinate | Red | x | $\varphi=0^\circ, \theta=0^\circ$ | 0.5 | 0.55 | 0.6 | Note※ |
| | | y | | 0.26 | 0.31 | 0.36 | |
| | Green | x | $\varphi=0^\circ, \theta=0$ | 0.25 | 0.3 | 0.35 | |
| | | y | | 0.53 | 0.58 | 0.63 | |
| | Blue | x | $\varphi=0^\circ, \theta=0^\circ$ | 0.1 | 0.15 | 0.2 | |
| | | y | | 0.05 | 0.1 | 0.15 | |
| | White | x | $\varphi=0^\circ, \theta=0^\circ$ | 0.26 | 0.31 | 0.36 | |
| | | y | | 0.29 | 0.34 | 0.39 | |

Note※ Measuring at position 3 on Fig.1 CIE chromaticity diagram.

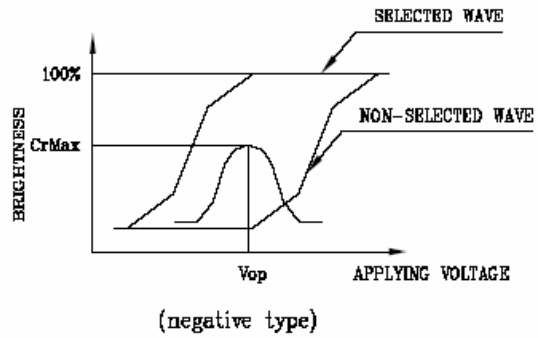
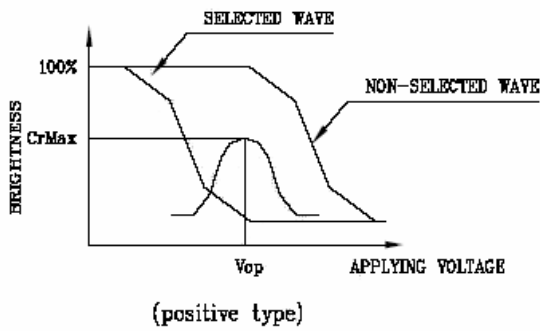
Base on Nan Ya Backlight (CIE X=0.29 ±0.02 , Y=0.29 ±0.02)

Fig.1



(NOTE 1)

Definition of Operation Voltage(Vop)

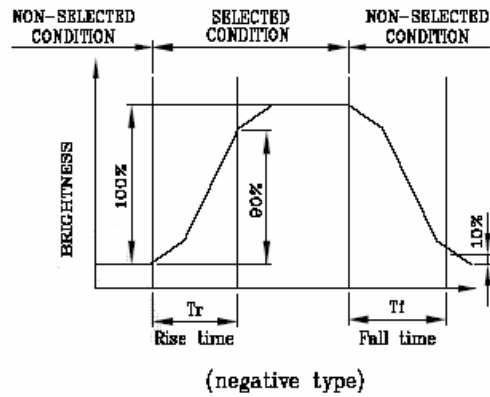
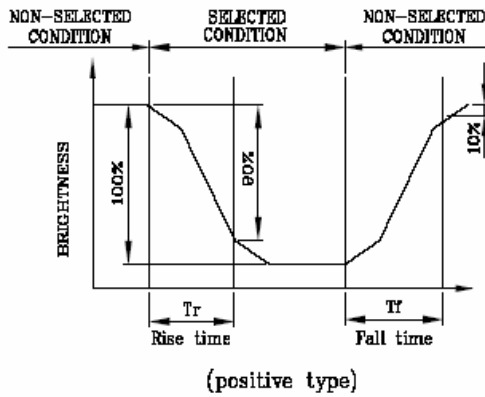


*Conditions

Viewing Angle : 0
 Frame Frequency : 70Hz
 Applying Waveform : 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)

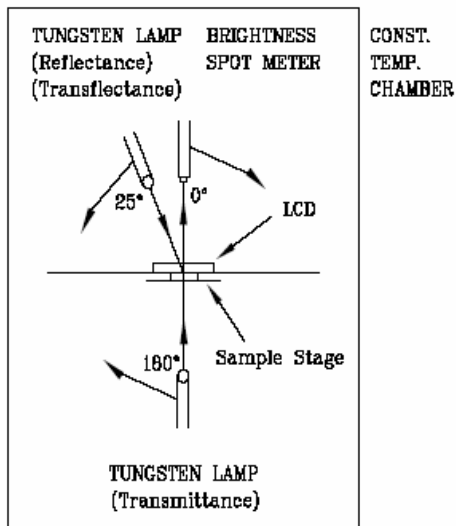


*Conditions

Operating Voltage : Vop
 Viewing Angle (θ,θ) : (0,0)
 Frame Frequency : 70Hz
 Applying Waveform : 1/N duty 1/a bias

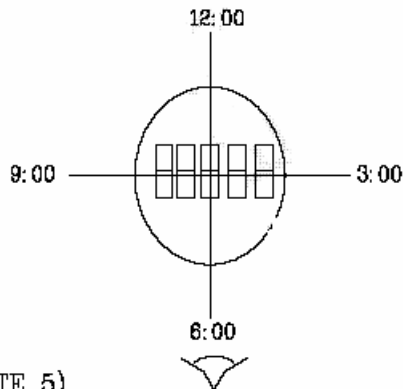
(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



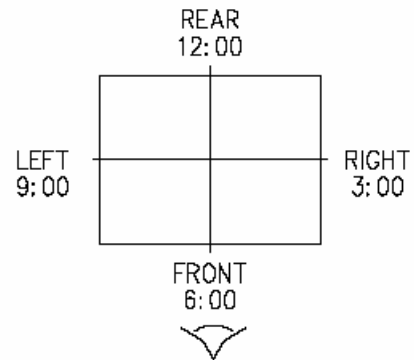
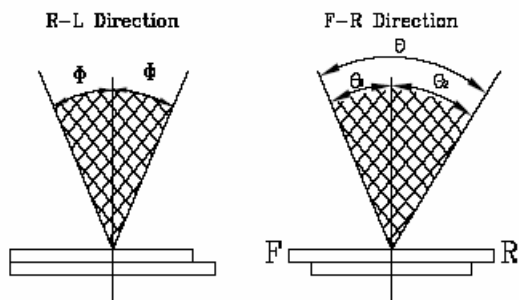
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



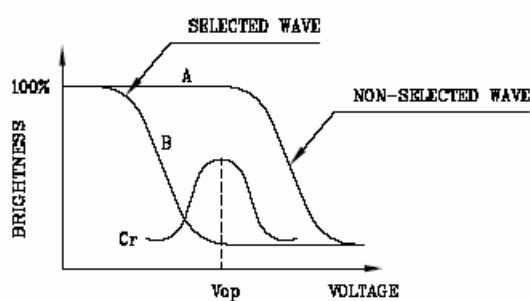
$$\Theta = \Theta_1 + \Theta_2$$

*Conditions

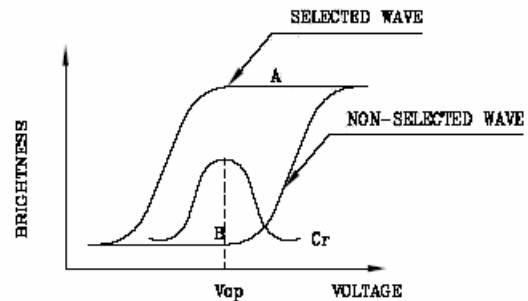
- Operating Voltage : V_{op}
- Frame Frequency : 70Hz
- Applying Waveform : 1/N duty 1/a bias
- Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



(negative type)

$$\text{Contrast Ratio : } Cr = A/B$$

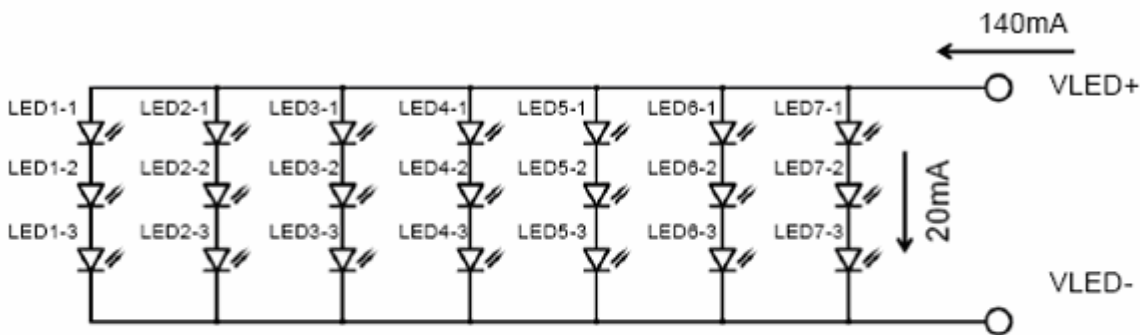
*Conditions

- Viewing Angle : 0
- Frame Frequency : 70Hz

14. LED driving conditions

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Remark |
|--------------------|-----------|------|------|------|-------------------|------------|
| LED Current | I_{LED} | ---- | 140 | ---- | mA | Note1 |
| LED voltage | V_{LED} | 9.0 | ---- | 10.5 | V | Note6 |
| LED life Time | - | ---- | 50K | ---- | - | Note 2,3,5 |
| Luminous Intensity | IV | 300 | ---- | ---- | CD/M ² | Note 4 |

Note 1: There are 7 Groups LED shown as below, =9.9 V(Min)



Note 2 : $T_a = 25^{\circ}\text{C}$,

Note 3 : Brightness to be decreased to 50% of the initial value.

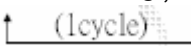
Note 4: The luminous is measured through LCD panel.

Note5: 50K hours is only an estimate for reference.

Note6: The LED of B/L is drive by current only ; driving voltage is only for reference .

15. Reliability Test

WIDE TEMPERATURE RELIABILITY TEST

| NO | ITEM | CONDITION | | | STANDARD | NOTE |
|----|---------------------------------|--|---------|--|---------------------------|-----------|
| 1 | High Temp. Storage | 80°C | 240 Hrs | | Appearance without defect | |
| 2 | Low Temp. Storage | -30°C | 240 Hrs | | Appearance without defect | |
| 3 | High Temp. & High Humi. Storage | 60 °C 90%RH | 240 Hrs | | Appearance without defect | |
| 4 | High Temp. Operating Display | 70°C | 240 Hrs | | Appearance without defect | |
| 5 | Low Temp. Operating Display | -20°C | 240 Hrs | | Appearance without defect | |
| 6 | Thermal Shock | -20 °C, 30min. → 70°C, 30min. <div style="text-align: center;">  (1cycle) </div> | | | Appearance without defect | 10 cycles |

Inspection Provision

1. Purpose

The RAYSTAR inspection provision provides outgoing inspection provision and its expected quality level based on our outgoing inspection of RAYSTAR LCD produces.

2. Applicable Scope

The RAYSTAR inspection provision is applicable to the arrangement in regard to outgoing inspection and quality assurance after outgoing.

3. Technical Terms

3-1 RAYSTAR Technical Terms



4. Outgoing Inspection

4-1 Inspection Method

MIL-STD-105E Level II Regular inspection

4-2 Inspection Standard

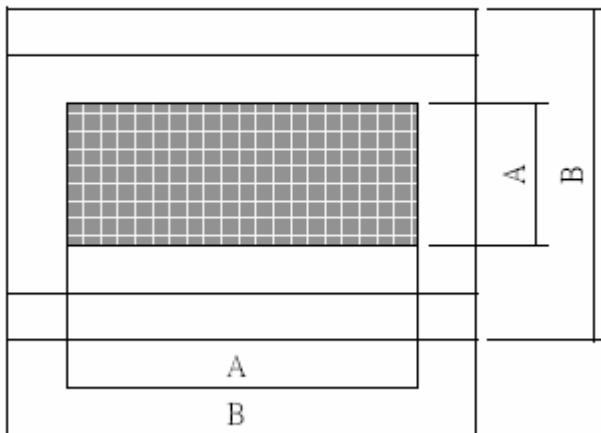
| | Item | AQL(%) | Remarks |
|--------------|--|--------|--|
| Major Defect | Dots Opens Shorts Erroneous operation | 0.4 | Faults which substantially lower the practicality and the initial purpose difficult to achieve |
| | Solder appearance Shorts Loose | | |
| | Cracks Display surface cracks | | |

| | Dimensions | External from Dimensions | AQL | Remarks |
|--------------|-------------------|---|------|--|
| Minor Defect | Inside the glass | Black spots | 0.65 | Faults which appear to pose almost no obstacle to the practicality, effective use, and operation |
| | Polarizing plate | Scratches, foreign Matter, air bubbles, and peeling | | |
| | Dots | Pinhole, deformation | | |
| | Color tone | Color unevenness | | |
| | Solder appearance | Cold solder Solder projections | | |

4-3 Inspection Provisions

*Viewing Area Definition

Fig. 1



A : Zone Viewing Area
 B : Zone Glass Plate Outline

*Inspection place to be 500 to 1000 lux illuminance uniformly without glaring.
 The distance between luminous source(daylight fluorescent lamp and cool white fluorescent lamp)
 and sample to be 30 cm to 50 cm.

*Test and measurement are performed under the following conditions, unless otherwise specified.

Temperature $20 \pm 15^{\circ}\text{C}$
 Humidity $65 \pm 20\%\text{R.H.}$
 Pressure 860~1060hPa(mmbar)

In case of doubtful judgment, it is performed under the following conditions.

Temperature $20 \pm 2^{\circ}\text{C}$
 Humidity $65 \pm 5\%\text{R.H.}$
 Pressure 860~1060hPa(mmbar)

5.Specification for quality check

5-1-1 Electrical characteristics :

| NO. | Item | Criterion |
|-----|--------------------|------------------------|
| 1 | Non operational | Fail |
| 2 | Miss operating | Fail |
| 3 | Contrast irregular | Fail |
| 4 | Response time | Within Specified value |

5-1-2 Components soldering :

Should be no defective soldering such as shorting, loose terminal cold solder, peeling of printed circuit board pattern, improper mounting position, etc.

5-2 Inspection Standard for TFT panel

5-2-1 The environmental condition of inspection :

The environmental condition and visual inspection shall be conducted as below.

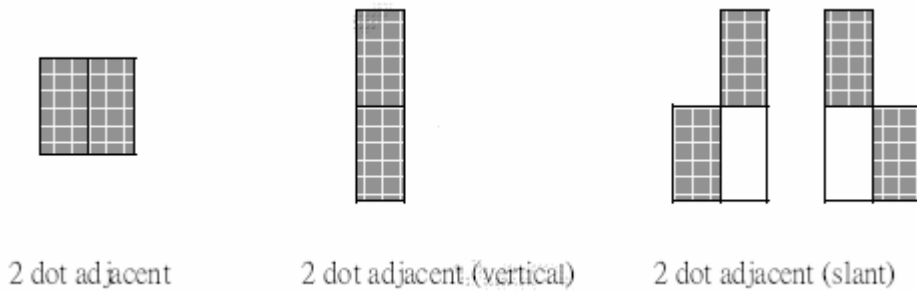
- (1) Ambient temperature : $25\pm 5^{\circ}\text{C}$
- (2) Humidity : 25~75% RH
- (3) External appearance inspection shall be conducted by using a single 20W fluorescent lamp or equivalent illumination.
- (4) Visual inspection on the operation condition for cosmetic shall be conducted at the distance 30cm or more between the LCD panels and eyes of inspector. The viewing angle shall be 90 degree to the front surface of display panel.
- (5) Ambient Illumination : 300~500 Lux for external appearance inspection.
- (6) Ambient Illumination : 100~200 Lux for light on inspection.

5-2-2 Inspection Criteria

(1) Definition of dot defect induced from the panel inside

- a) The definition of dot : The size of a defective dot over 1/2 of whole dot is regarded as one defective dot
- b) Bright dot : Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.
- c) Dark dot : Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue pattern.
- d) 2 dot adjacent = 1 pair = 2 dots

Picture :

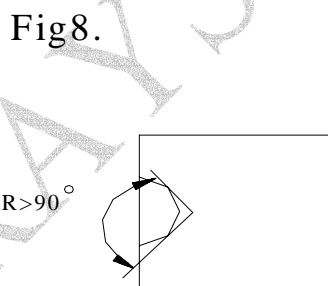
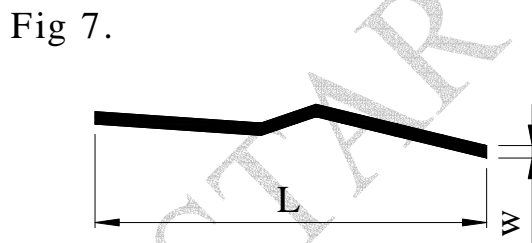
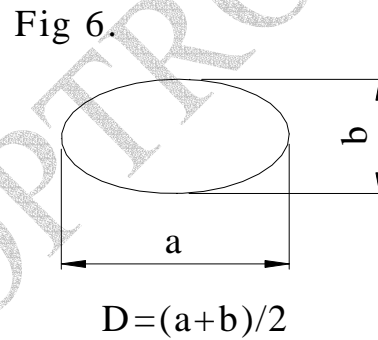
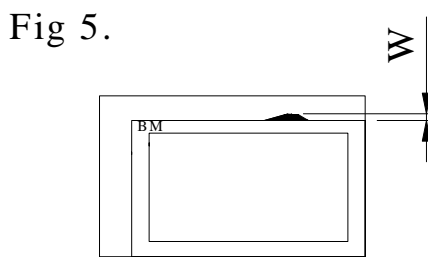
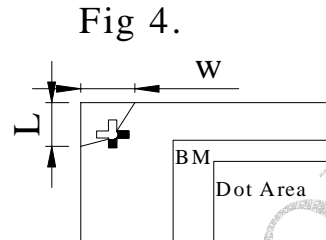
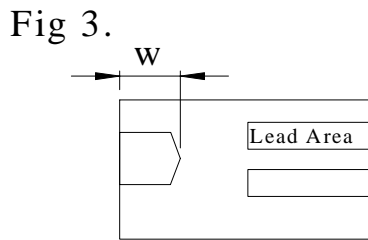
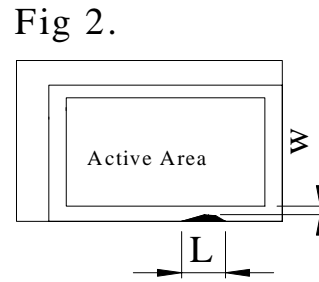
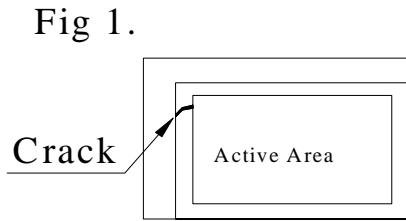


(2) Display Inspection

| NO. | Item | | Acceptable Count | |
|---|---------------------------|--|------------------|------------|
| 1 | Dot defect | Bright Dot | Random | $N \leq 2$ |
| | | | 2 dots adjacent | $N \leq 0$ |
| | | Dark Dot | Random | $N \leq 3$ |
| | | | 2 dots adjacent | $N \leq 1$ |
| | Total bright and dark dot | | | $N \leq 4$ |
| Functional failure (V-line/ H-line/Cross line etc.) | | | Not allowable | |
| | Mura | It's OK if mura is slight visible through 6% ND filter. (Judged by limit sample if it is necessary) | | |
| 2 | Newton ring (touch panel) | Orbicular of interference fringes is not allowed in the optimum contrast within the active area under viewing angle. | | |

(3) Appearance inspection

| NO. | Item | Standards |
|-----|-----------------------------------|--|
| 1 | Panel Crack | Not allow. It is shown in Fig.1. |
| 2 | Broken CF Non -lead Side of TFT | The broken in the area of $W > 2\text{mm}$ is ignored, L is ignored. It is shown in Fig.2. |
| 3 | Broken Lead Side of TFT | FPC lead, electrical line or alignment mark can't be damaged. It is shown in Fig.3. |
| 4 | Broken Corner of TFT at Lead Side | FPC lead. electrical line or alignment mark can't be damaged. It is shown in Fig.4. |
| 5 | Burr of TFT / CF Edge | The distance of burr from the edge of TFT / CF, $W \leq 0.3\text{mm}$. It is shown in Fig.5. |
| 6 | Foreign Black / White/Bright Spot | (1) $0.15 < D \leq 0.5 \text{ mm}$, $N \leq 4$; (2) $D \leq 0.15\text{mm}$, Ignore. It is shown in Fig.6. |
| 7 | Foreign Black / White/Bright Line | (1) $0.05 < W \leq 0.1 \text{ mm}$, $0.3 < L \leq 2 \text{ mm}$, $N \leq 4$. |
| | | (2) $W \leq 0.05\text{mm}$ and $L \leq 0.3\text{mm}$ Ignore. It is shown in Fig.7. |
| 8 | Color irregular | Not remarkable color irregular. |



Notes

- 1.W:Width
- 2.Length
- 3.D:Average Diameter
- 4.N:Count
- 5.All the anhle of the broken must be larger than 90° ~.It is shown in Fig.8.($R > 90^\circ$ ~)

NOTICE:

- SAFETY

1. If the LCD panel breaks, be careful not to get the liquid crystal to touch your skin.
2. If the liquid crystal touches your skin or clothes, please wash it off immediately by using soap and water.

- HANDLING

1. Avoid static electricity which can damage the CMOS LSI.
2. Do not remove the panel or frame from the module.
3. The polarizing plate of the display is very fragile. So, please handle it very carefully.
4. Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
5. Do not use ketonics solvent & Aromatic solvent. Use a soft cloth soaked with a cleaning naphtha solvent.

- STORAGE

1. Store the panel or module in a dark place where the temperature is $25\pm 5^{\circ}\text{C}$ and the humidity is below 65% RH.
2. Do not place the module near organics solvents or corrosive gases.
3. Do not crush, shake, or jolt the module.

- TERMS OF WARRANT

1. Acceptance inspection period

The period is within one month after the arrival of contracted commodity at the buyer's factory site.

2. Applicable warrant period

The period is within twelve months since the date of shipping out under normal using and storage conditions.

LCM Sample Estimate Feedback Sheet

Module Number : _____

1 、 Panel Specification :

| | | |
|----------------------------|-------------------------------|-------------------------------------|
| 1. Panel Type : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 2. View Direction : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 3. Numbers of Dots : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 4. View Area : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 5. Active Area : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 6. Operating Temperature : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 7. Storage Temperature : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 8. Others : | _____ | |

2 、 Mechanical Specification :

| | | |
|-----------------------------|-------------------------------|-------------------------------------|
| 1. PCB Size : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 2. Frame Size : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 3. Material of Frame : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 4. Connector Position : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 5. Fix Hole Position : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 6. Backlight Position : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 7. Thickness of PCB : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 8. Height of Frame to PCB : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 9. Height of Module : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 10. Others : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |

3 、 Relative Hole Size :

| | | |
|-----------------------------|-------------------------------|-------------------------------------|
| 1. Pitch of Connector : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 2. Hole size of Connector : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 3. Mounting Hole size : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 4. Mounting Hole Type : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 5. Others : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |

4 、 Backlight Specification :

| | | |
|---|-------------------------------|-------------------------------------|
| 1. B/L Type : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 2. B/L Color : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 3. B/L Driving Voltage (Reference for LED Type) : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 4. B/L Driving Current : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 5. Brightness of B/L : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 6. B/L Solder Method : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 7. Others : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |

>> Go to page 2 <<

| | | |
|--|-------------------------------|-------------------------------------|
| Module Number : _____ | | |
| 5 、 <u>Electronic Characteristics of Module</u> : | | |
| 1.Input Voltage : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 2.Supply Current : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 3.Driving Voltage for LCD : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 4.Contrast for LCD : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 5.B/L Driving Method : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 6.Negative Voltage Output : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 7.Interface Function : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 8.LCD Uniformity : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 9.ESD test : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 10.Others : | <input type="checkbox"/> Pass | <input type="checkbox"/> NG , _____ |
| 6 、 <u>Summary</u> : | | |
| <div style="display: flex; justify-content: space-between; align-items: flex-end; padding: 10px;"> <div style="width: 45%;"> <p>Sales signature : _____</p> <p>Customer Signature : _____</p> </div> <div style="width: 45%; text-align: right;"> <p>Date : / /</p> </div> </div> | | |

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