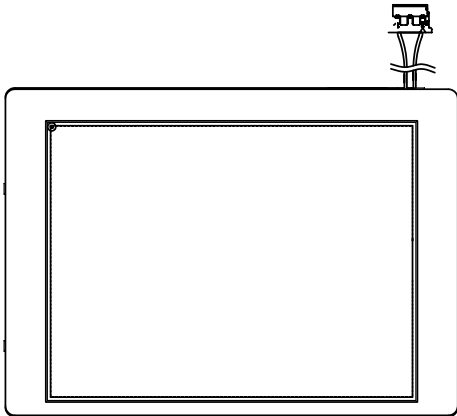




PRODUCT SPECIFICATION

HDA570S-H

5.7", TFT QVGA COLOR
LCD DISPLAY MODULE



| | | | | |
|--|-------|------|-----------|-------------------|
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Application

This specification is applied to the 5.7 inch QVGA supported TFT-LCD module, and can display true 262,144 colors(6 bit/ color). The module is designed for OA, Car TV application and other electronic products which require flat panel display of digital signal interface. This module is composed of a 5.7" TFT-LCD panel, a driver circuit and backlight unit.

Features

- QVGA (320×240 pixels) resolution.
- Digital 18 bit parallel RGB.
- Line inversion mode with stripe type.
- Both DE mode and SYNC mode are supported for digital RGB input data format.
- Luminance : 800 cd/m²

General Specifications

| Item | Specifications | Unit |
|---------------------|--|------|
| Screen Size | 5.7 (Diagonal) | inch |
| Display Format | 320RGB(H)×240(V) | dot |
| Active Area | 115.2(H)×86.4(V) | mm |
| Dot Size | 0.120(H)×0.360(V) | mm |
| Pixel Configuration | RGB Vertical Stripe | - |
| Display Mode | TN Type Transmissive Mode Normally White | - |
| Surface Treatment | Anti-Glare | - |
| Viewing Direction | 12 O'clock (The Gray Inversion will appear at this direction) | - |
| Outline Dimension | 144.0(W)×104.6(H)×13.0(D) | mm |
| Weight | 192 | g |

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7. Absolute Maximum Ratings

7.1 Absolute Ratings of Environment

| Item | Symbol | Value | | Unit | Note |
|-------------------------------|-----------------|-------|------|------|------|
| | | Min. | Max. | | |
| Storage Temperature | T _{ST} | -30 | +80 | °C | (1) |
| Operating Ambient Temperature | T _{OP} | -20 | +70 | °C | (1) |

Note (1) Temperature and relative humidity range are shown in the figure below.

(a) 90%RH Max. (Ta ≤ 40°C).

(b) Wet-bulb temperature should be 39°C Max. (Ta > 40°C).

(c) No condensation.

7.2 Electrical Absolute Ratings

7.2.1 TFT-LCD Module

(Ta=25±2°C, GND=VSS=0V)

| Item | Symbol | Value | | Unit | Note |
|------------------------------|--------|-------|------|------|------|
| | | Min. | Max. | | |
| Digital Power Supply Voltage | VCC | -0.3 | 4.3 | V | - |

7.2.2 Backlight Unit

(Ta=25±2°C)

| Item | Symbol | Value | | Unit | Note |
|--------------|--------|-------|------|------|------|
| | | Min. | Max. | | |
| Lamp current | IL | - | 7.0 | mA | (1) |

Note (1) Permanent damage to the device may occur if maximum values are exceeded or reverse voltage is loaded.

| | | | | |
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Electrical Characteristics TFT-LCD Module

(Ta=25±2°C)

| Item | Symbol | Value | | | Unit | Note |
|------------------------------|--------|--------|--------|--------|------|------|
| | | Min. | Typ. | Max. | | |
| Power Supply Voltage | VCC | 3.0 | 3.3 | 3.6 | V | - |
| Input High Threshold Voltage | VIH | 0.7VCC | - | VCC | V | - |
| Input Low Threshold Voltage | VIL | 0 | - | 0.3VCC | V | - |
| Power Consumption | PL | | (0.24) | | W | (1) |
| Frame Frequency | Fv | - | 60 | - | Hz | - |
| Dot Clock | DCLK | - | 6.4 | 7 | MHz | - |

Note (1) The specified power consumption is under the conditions at VCC=3.3V, Fv=60Hz, whereas a power dissipation check pattern below is displayed.

Black Pattern / 0 Gray



Active Area

Backlight Unit

(Ta=25±2°C)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Note |
|-------------------------|--------|-------|-------|------|-------|----------|
| Lamp current | IL | 5.5 | 6.0 | 6.5 | mArms | |
| Lamp voltage | VL | 745 | 825 | 905 | Vrms | IL=6.0mA |
| Lamp frequency | PL | 20 | 50 | 80 | KHz | IL=6.0mA |
| Kick-off voltage(25°C) | VS | -- | -- | 1235 | Vrms | IL=6.0mA |
| Kick-off voltage(0°C) | VS | -- | -- | 1650 | Vrms | IL=6.0mA |
| Kick-off voltage(-20°C) | VS | -- | -- | 2060 | Vrms | IL=6.0mA |
| Lamp Life Time(25°C) | | 40000 | 50000 | -- | hr | (1) |

Note (1) : Lamp life time is defined as under 25±2°C , when the average brightness decrease to 50% of original brightness

| | | | | |
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8.2 Backlight Unit

(Ta=25±2°C)

| Pin NO | Pin Name | Description | Note |
|--------|-------------------|----------------------------------|------|
| 1 | V _{LOW} | Input terminal(Low voltage side) | (1) |
| - | NC | This is electrically opened | |
| 2 | V _{HIGH} | Input terminal(Hi voltage side) | |

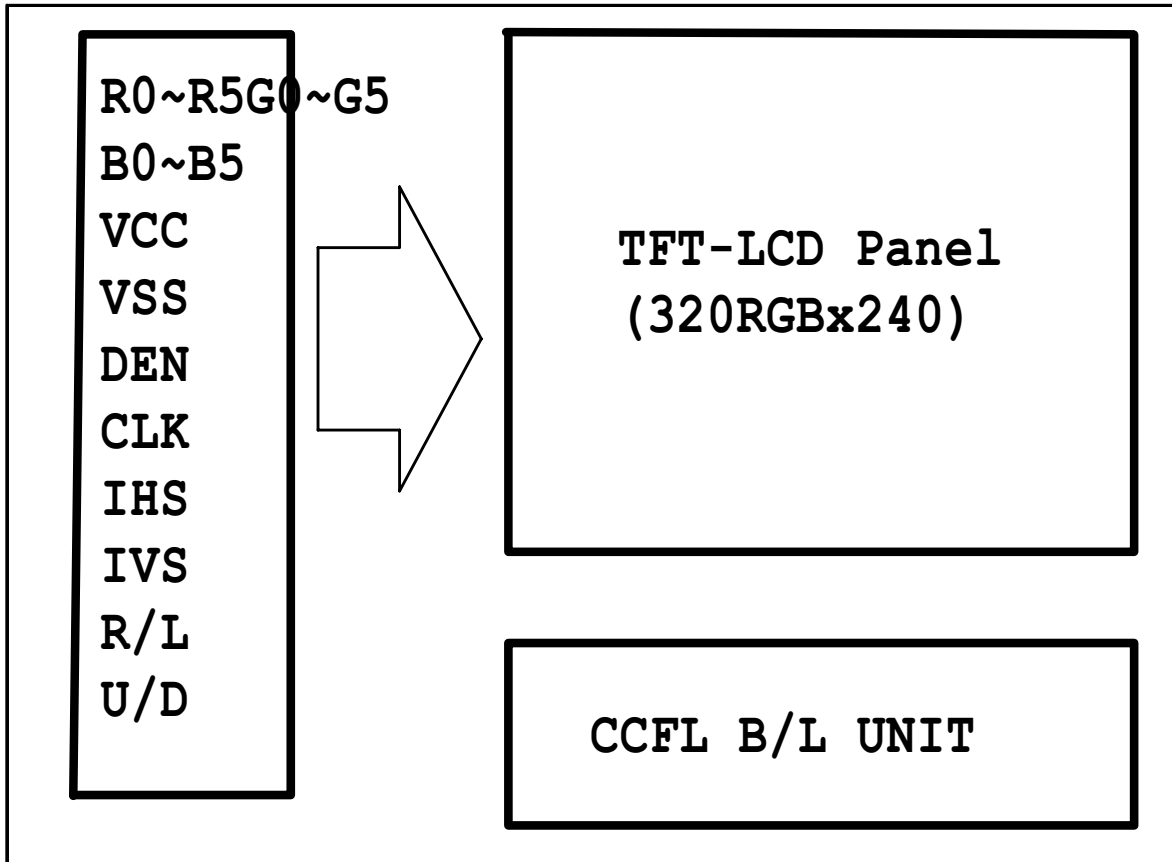
Note (1)? Low voltage side of backlight inverter connects with ground of inverter circuits.

(Ta=25±2°C)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Note |
|-------------------------|--------|-------|------|------|-------|----------|
| Lamp current | IL | 5.5 | 6.0 | 6.5 | mArms | |
| Lamp voltage | VL | 745 | 825 | 905 | Vrms | IL=6.0mA |
| Lamp frequency | PL | 20 | 50 | 80 | KHz | IL=6.0mA |
| Kick-off voltage(25?) | VS | - | | 1235 | Vrms | IL=6.0mA |
| Kick-off voltage(-20?) | VS | -- | | 2060 | Vrms | IL=6.0mA |
| Lamp Life Time | FL | 20000 | -- | -- | hr | IL=6.0mA |

9. Block Diagram

9.1 TFT-LCD Module with Backlight Unit



Input / Output Terminals Pin Assignment TFT-LCD Module

Connector: CVILUX CF25331D0R0-05

| Pin No. | Symbol | I/O | Description |
|---------|--------|-----|--|
| 1 | VSS | I | Ground |
| 2 | CLK | I | Clock signal |
| 3 | IHS | I | Horizontal synchronous signal |
| 4 | IVS | I | Vertical synchronous signal |
| 5 | VSS | I | Ground |
| 6 | R0 | I | RED data (LSB) |
| 7 | R1 | I | RED data |
| 8 | R2 | I | RED data |
| 9 | R3 | I | RED data |
| 10 | R4 | I | RED data |
| 11 | R5 | I | RED data(MSB) |
| 12 | VSS | I | Ground |
| 13 | G0 | I | GREEN data(LSB) |
| 14 | G1 | I | GREEN data |
| 15 | G2 | I | GREEN data |
| 16 | G3 | I | GREEN data |
| 17 | G4 | I | GREEN data |
| 18 | G5 | I | GREEN data(MSB) |
| 19 | VSS | I | Ground |
| 20 | B0 | I | Blue data(LSB) |
| 21 | B1 | I | Blue data |
| 22 | B2 | I | Blue data |
| 23 | B3 | I | Blue data |
| 24 | B4 | I | Blue data |
| 25 | B5 | I | Blue data(MSB) |
| 26 | VSS | I | Ground |
| 27 | DEN | I | Input data enable control |
| 28 | VCC | I | +3.3V power supply |
| 29 | VCC | I | +3.3V power supply |
| 30 | R/L | I | Right-and-Left scan setting. (“H” : Normally , “L” : Right-and-Left reversal) |

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| Pin No. | Symbol | I/O | Description |
|---------|--------|-----|---|
| 31 | U/D | I | Up/down scan setting. ("H": normal scan. "L": Up-and-Down reversal.) |
| 32 | NC | I | No connection |
| 33 | VSS | I | Ground |

10.2 Color Data Input Assignment

The brightness of each primary color (red, green and blue) is based on the 6 bit gray scale data input for the color. The higher the binary input, the brighter the color. The table provides the assignment of color versus data input.

| Color | | Data Signal | | | | | | | | | | | | | | | | | |
|---------------------|-----------------|-------------|-----|-----|-----|-----|-----|-------|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|
| | | Red | | | | | | Green | | | | | | Blue | | | | | |
| | | D05 | D04 | D03 | D02 | D01 | D00 | D15 | D14 | D13 | D12 | D11 | D10 | D25 | D24 | D23 | D22 | D21 | D20 |
| Basic Colors | Black | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Blue | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Cyan | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Magenta | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Yellow | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | White | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Gray Scale Of RED | Red(0) / Dark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red(1) | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red(2) | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | Red(61) | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red(62) | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Red(63) | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gray Scale Of Green | Green(0) / Dark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green(1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green(2) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | Green(61) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green(62) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Green(63) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gray Scale Of Blue | Blue(0)/Dark | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Blue(1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | Blue(2) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| | Blue(61) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 |
| | Blue(62) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| | Blue(63) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |

| | | | | |
|--|-------|-------|-----------|-------------------|
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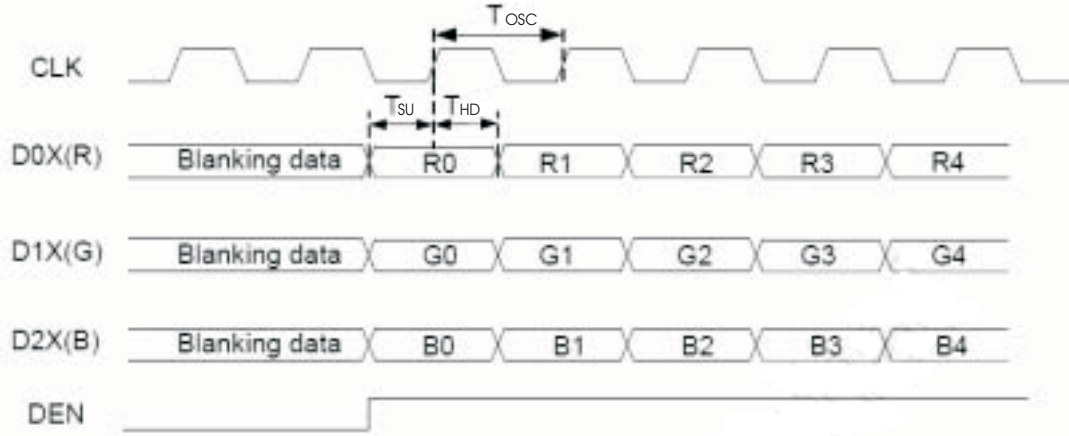
Interface Timing
Input Signal Characteristics
Digital Parallel RGB Interface (960×240 resolution)

| PARAMETER | | Symbol | Min. | Typ. | Max. | Unit |
|-----------------|------|-----------|------|-------|------|-----------|
| CLK period | | T_{OSC} | - | 156 | - | ns |
| Data setup time | | T_{SU} | 12 | - | - | ns |
| Data hold time | | T_{HD} | 12 | - | - | ns |
| IHS period | | T_H | - | 408 | - | T_{OSC} |
| IHS pulse width | | T_{HS} | 5 | 30 | - | T_{OSC} |
| IHS setup time | | T_{Cr} | 12 | - | - | ns |
| IHS hold time | | T_{Cr} | 12 | - | - | ns |
| IVS pulse width | | T_{VS} | 1 | 3 | 5 | T_H |
| IVS setup time | | T_{Vr} | 12 | - | - | ns |
| IVS hold time | | T_{Vr} | 12 | - | - | μ s |
| IVS-DEN time | NTSC | T_{VSE} | - | 18 | - | T_H |
| | PAL | T_{VSE} | - | 26 | - | T_H |
| IHS-DEN time | | T_{HE} | 36 | 68 | 88 | T_{OSC} |
| DEN pulse width | | T_{EP} | - | 320 | - | T_{OSC} |
| DEN-STH time | | T_{DES} | - | 1 | - | T_{OSC} |
| IVS period | NTSC | - | - | 262.5 | - | T_H |
| | PAL | - | - | 312.5 | - | T_H |

Note: When SYNC mode is used, 1st data start from 68th CLK after IHS falling.

11.2 Waveform

11.2.1 Clock and Data Waveform



11.2.2 Clock and Sync waveforms

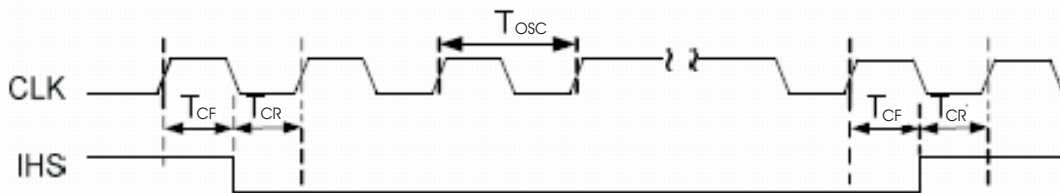
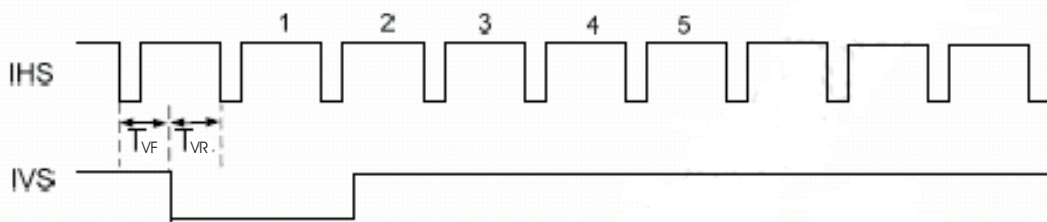
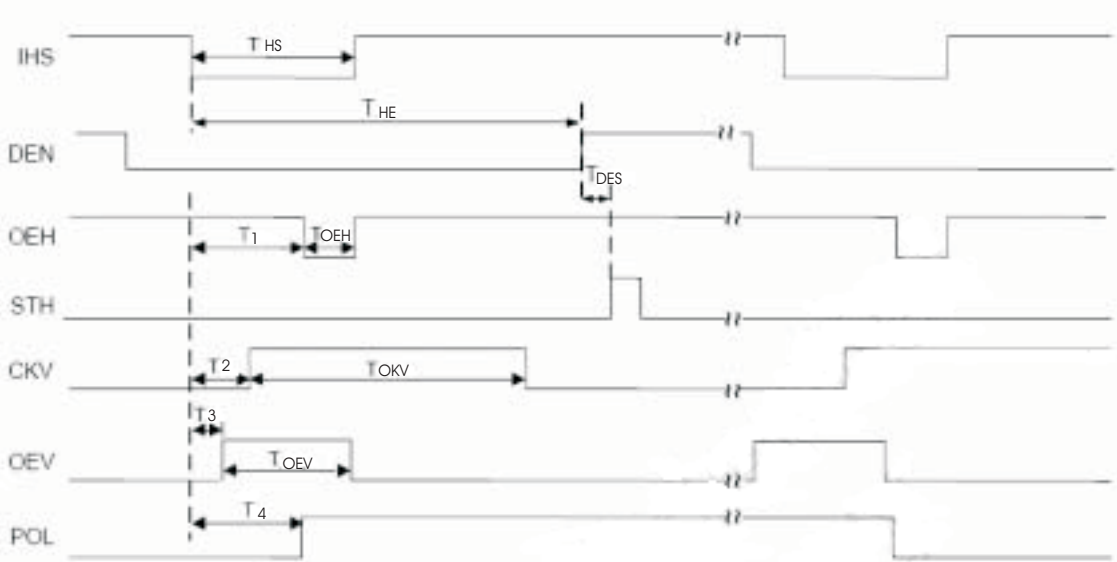


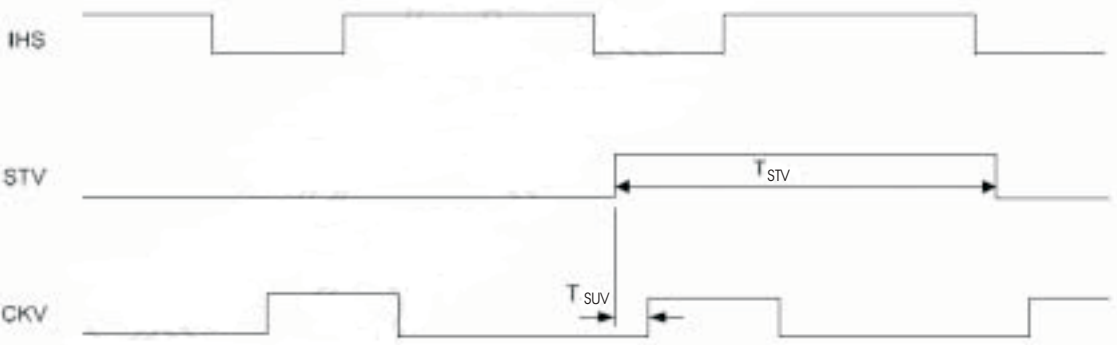
Figure 8. 6 CLK and IHS timing waveform



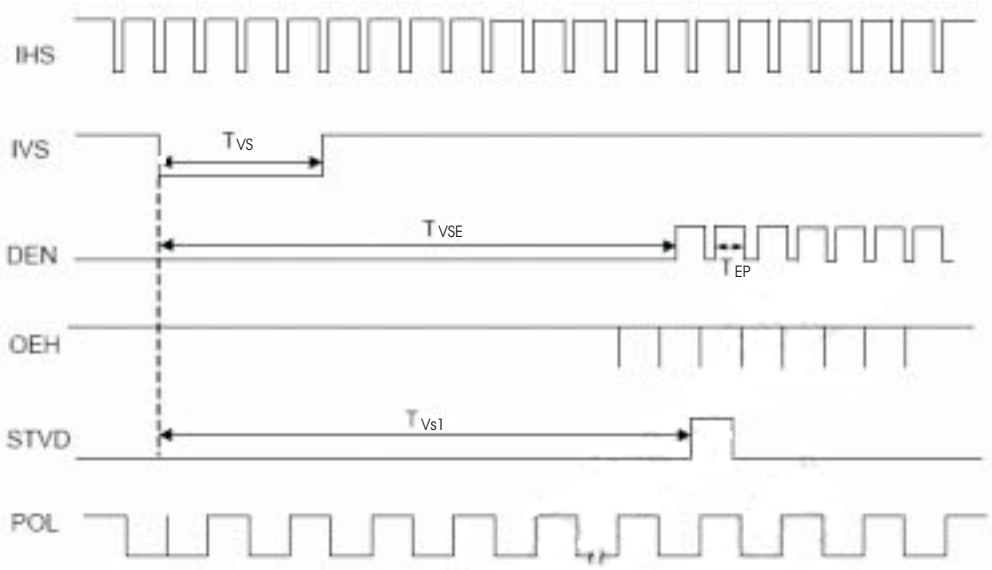
11.2.3 IHS and horizontal control timing waveforms



11.2.4 IHS and vertical shift clock timing waveforms



11.2.5 IHS and vertical control timing waveforms



| | | | | |
|--|-------|-------|------------------|----------------|
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12. Optical Characteristics

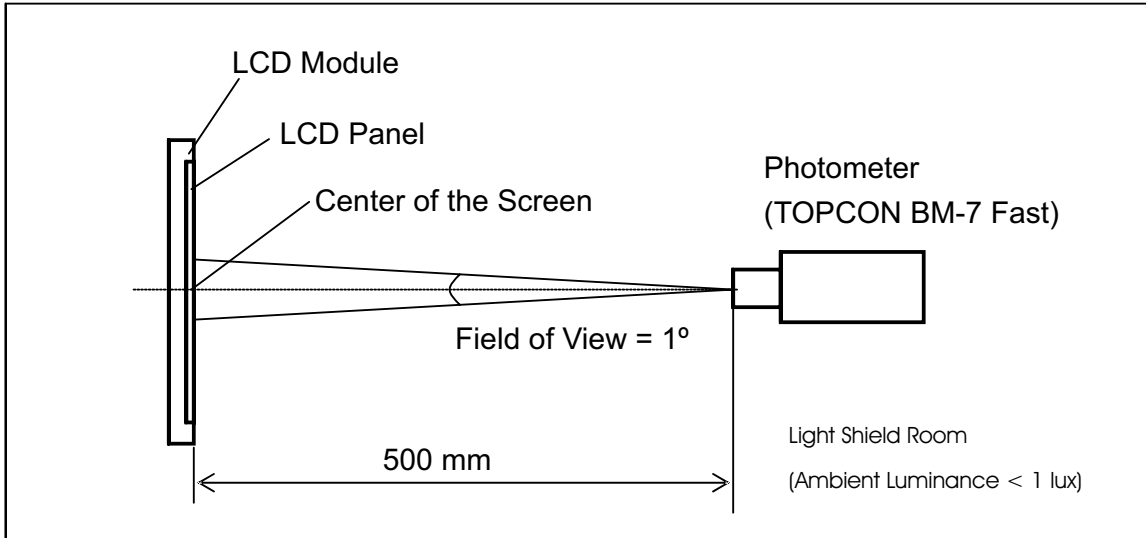
The optical characteristics should be measured in a dark environment (? 1 lux) or equivalent state with the methods shown in Note (4).

| Item | | Symbol | Conditions | Min. | Typ. | Max. | Unit | Note |
|-----------------------|------------|---------------|--|---------|---------|------|-------------------|---------|
| Contrast Ratio | | CR | $\theta_x=0^\circ \quad \theta_y=0^\circ$ Viewing Normal Angle | 300 | (450) | - | - | (2) |
| Response Time | | T_R | | - | 15 | - | ms | (3) |
| | | T_F | | - | 35 | - | ms | |
| Luminance(Center) | | Y | | 800 | (850) | - | cd/m ² | (4) |
| Brightness uniformity | | BUNI | | 80 | (85) | - | % | (5) |
| Color Chromaticity | Red | Rx | | - | (0.640) | - | - | (1),(4) |
| | | Ry | | - | (0.344) | - | - | |
| | Green | Gx | | - | (0.291) | - | - | |
| | | Gy | | - | (0.610) | - | - | |
| | Blue | Bx | | - | (0.142) | - | - | |
| | | By | - | (0.120) | - | - | | |
| | White | Wx | - | (0.346) | - | - | | |
| | | Wy | - | (0.381) | - | - | | |
| Viewing Angle | Horizontal | θ_{x+} | CR?10 | 55 | (60) | - | deg. | |
| | | θ_{x-} | | 55 | (60) | - | | |
| | Vertical | θ_{y+} | | 45 | (50) | - | | |
| | | θ_{y-} | | 35 | (40) | - | | |

| | | | | |
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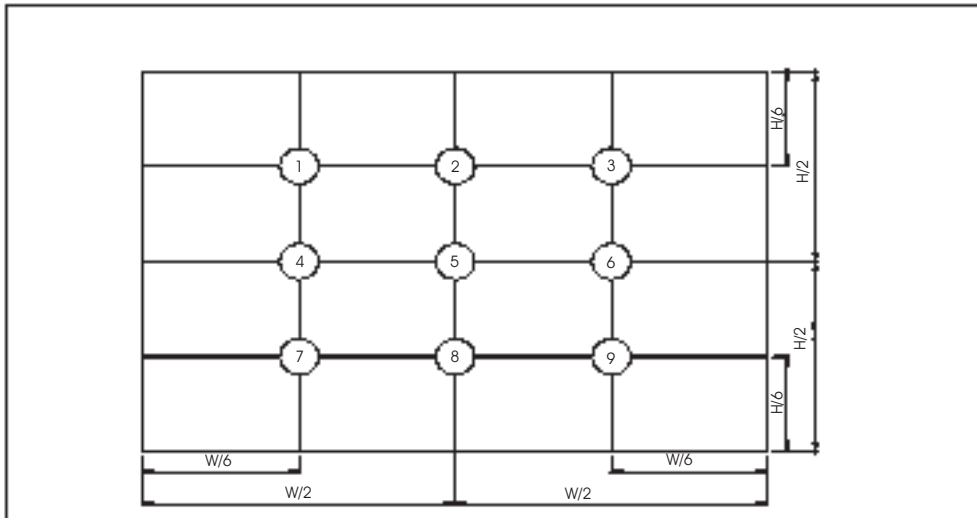
Note (4) Measurement Set-Up:

The LCD module should be stabilized at a given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a windless room.

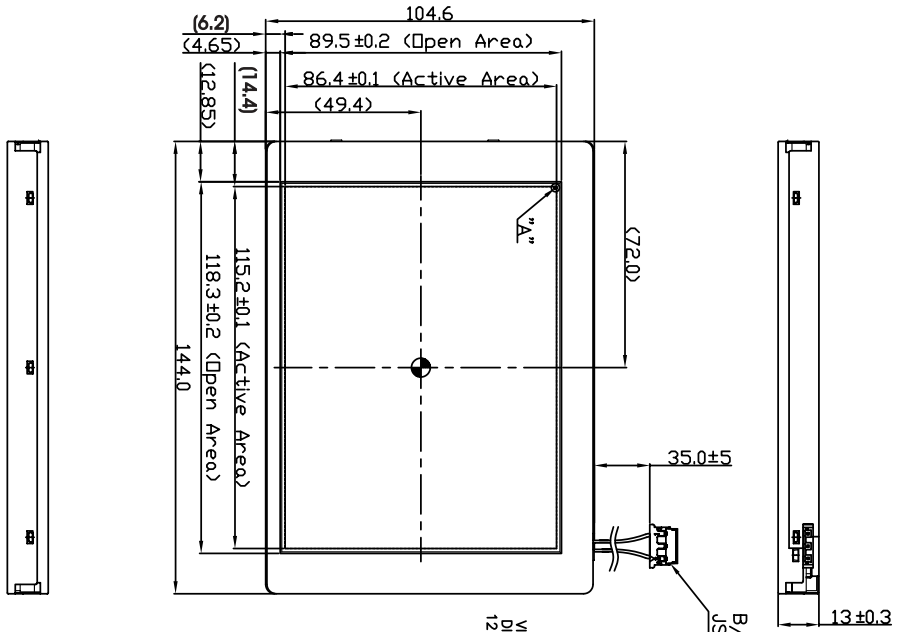


Note (5) Definition of brightness uniformity

Brightness uniformity $\frac{\text{Min Luminance of 9 points}}{\text{Max Luminance of 9 points}}$

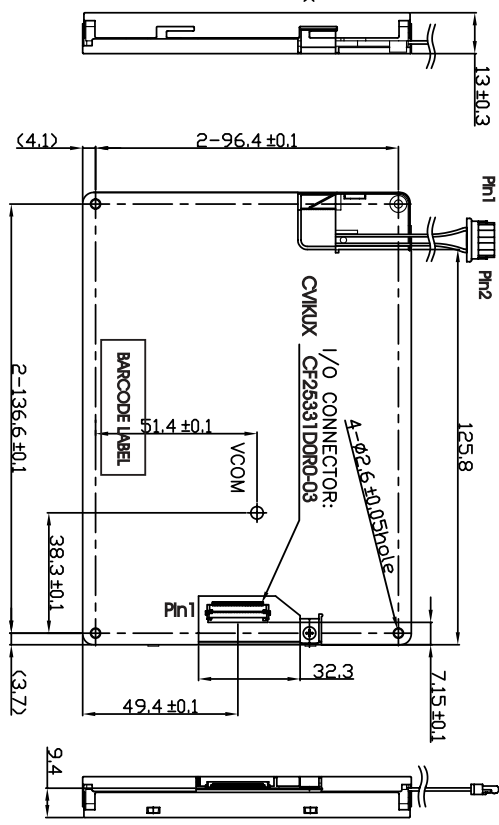
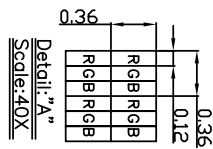


| | | | | |
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VIEWS
DIRECTION
12 O'CLOCK

B/L CONNECTOR :
JST BHR-03VS-1



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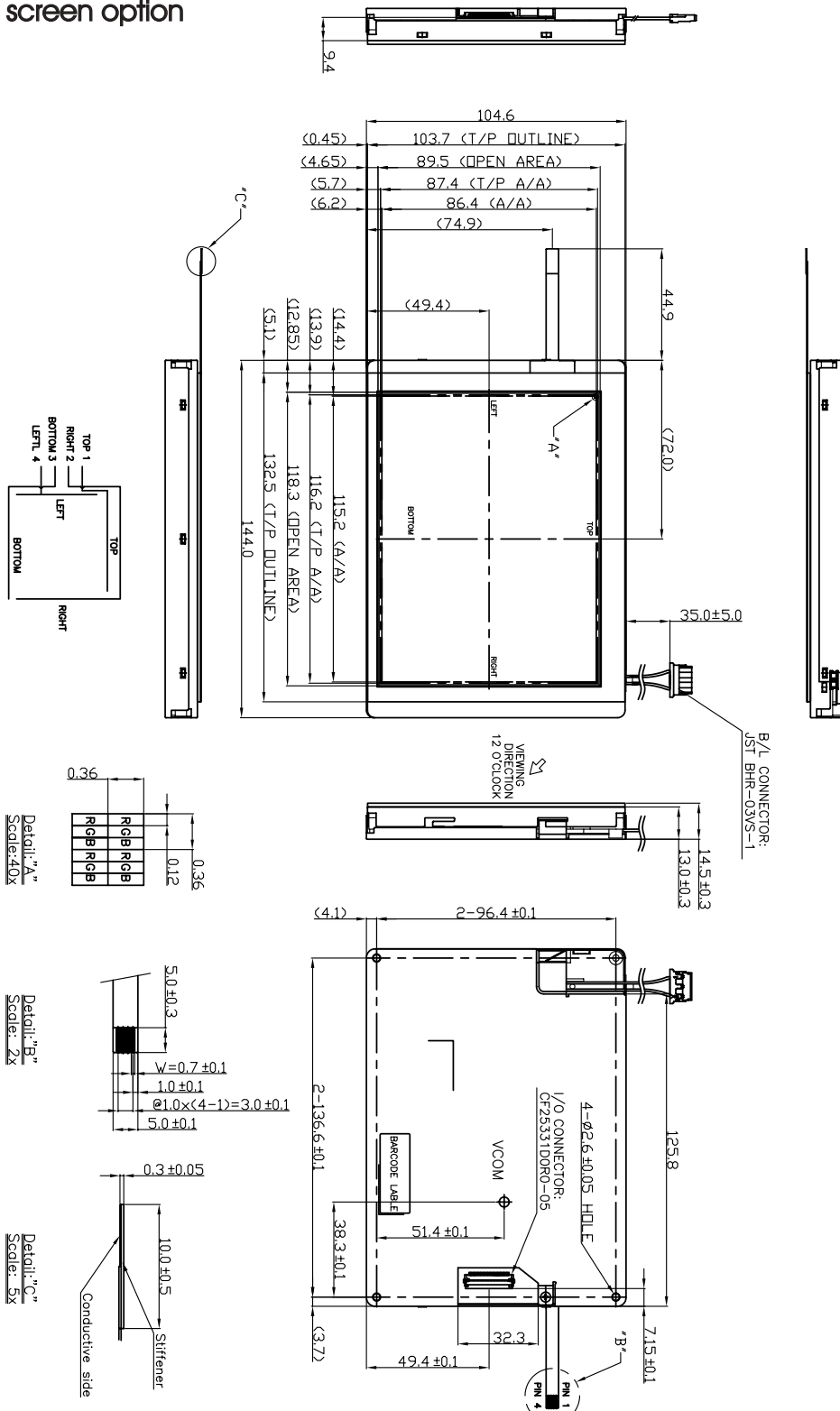
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Touch screen option



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