



PROPRIETARY NOTE

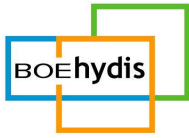
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TITLE: HT15X15-D01 Product Specification

Rev. 0

BOE-HYDIS TECHNOLOGY CO., LTD.

| SPEC. NUMBER | PRODUCT GROUP | REV. | ISSUE DATE | PAGE |
|---------------------|----------------------|-------------|-------------------|-------------|
| S864-1145 | TFT-LCD PRODUCT | 0 | 2003.06.09 | 1 OF 22 |



PRODUCT GROUP

REV.

ISSUE DATE

TFT-LCD PRODUCT

O

2003.06.09

REVISION HISTORY

| REV. | ECN NO. | DESCRIPTION OF CHANGES | DATE | PREPARED |
|----------------------------------|---------|---|----------|------------------------|
| 0 | | Initial Release | 03.06.09 | I.H.Park |
| SPEC. NUMBER S864-1145 | | SPEC. TITLE HT15X15-D01 Product Specification | | PAGE 2 OF 22 |



PRODUCT GROUP

REV.

ISSUE DATE

TFT-LCD PRODUCT

O

2003.06.09

Contents

| No. | Item | Page |
|------|---|------|
| 1.0 | General Description | 4 |
| 2.0 | Absolute Maximum Ratings | 5 |
| 3.0 | Electrical Specifications | 6 |
| 4.0 | Optical Specifications | 7 |
| 5.0 | Interface Connection | 9 |
| 6.0 | Signal Timing Specifications | 11 |
| 7.0 | Signal Timing Waveforms of interface signal (DE mode) | 13 |
| 8.0 | Input Signals, Display Colors & Gray Scale of Colors | 14 |
| 9.0 | Power Sequence | 15 |
| 10.0 | Mechanical Characteristics | 16 |
| 11.0 | Reliability Test | 17 |
| 12.0 | Handling & Cautions | 18 |
| 13.0 | Appendix | 19 |

SPEC. NUMBER

SPEC. TITLE

PAGE

S864-1145

HT15X15-D01 Product Specification

3 OF 22



PRODUCT GROUP

REV.

ISSUE DATE

TFT-LCD PRODUCT

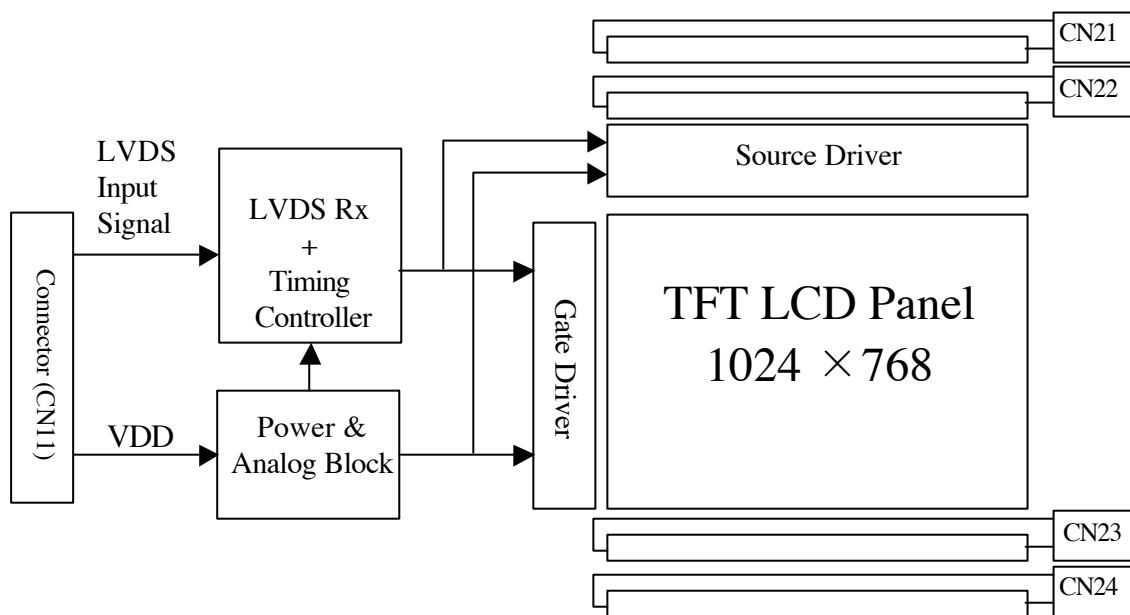
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2003.06.09

1.0 GENERAL DESCRIPTION

1.1 Introduction

HT15X15-D01 is a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This module has a 15.0 inch diagonally measured active area with XGA resolutions (1024 horizontal by 768 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16,194,277 colors. The TFT-LCD panel used for this module is a low reflection and higher color type.



1.2 Features

- LVDS Interface with 1pixel / clock
- High-speed response
- 8-bit color depth, Display 16,194,277 colors
- Incorporated edge type back-light (Four lamps)
- High luminance and contrast ratio, low reflection and wide viewing angle
- DE (Data Enable) mode only

1.3 Applications

- LCD TV & AV System
- Display Terminals & Monitors

SPEC. NUMBER

SPEC. TITLE

PAGE

S864-1145

HT15X15-D01 Product Specification

4 OF 22



PRODUCT GROUP

REV.

ISSUE DATE

TFT-LCD PRODUCT

O

2003.06.09

1.4 General Specifications

| Parameter | Specification | Unit | Remarks |
|---------------------|---|--------|---------|
| Active area | 304.128 (H) × 228.096(V) | mm | |
| Number of pixels | 1024(H) × 768(V) | pixels | |
| Pixel pitch | 0.297(H) × 0.297(V) | mm | |
| Pixel arrangement | RGB Vertical stripe | | |
| Display colors | 16,194,277 | colors | |
| Display mode | Normally white | | |
| Dimensional outline | 331.6(H) × 254.7(V) × 12.7(D) typ. | mm | |
| Weight | 1,290 max. | gram | |
| Back-light | Top/Bottom edge side 4-CCFL type | | Note 1 |
| Surface treatment | Haze 25, Anti-glare & hard-coating (3H) | | |

Note: 1. CCFL (Cold Cathode Fluorescent Lamp)

2.0 ABSOLUTE MAXIMUM RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit.

[VSS = GND = 0V]

| Parameter | Symbol | Min | Max | Unit | Remarks |
|-------------------------------------|-----------------|---------|----------------------|------|-----------|
| Power Input Voltage | V _{DD} | VSS-0.3 | 4.0 | V | Ta = 25°C |
| Logic Input Voltage | V _{IN} | VSS-0.3 | V _{DD} +0.3 | V | |
| Back-light Lamp Current | I _{BL} | 3 | 7 | mA | |
| Back-light lamp Frequency | F _L | 40 | 80 | KHz | |
| Operating Temperature (Humidity) | T _{OP} | 0 | +50 | °C | ≤ 40 °C |
| | RH | | 80 | % | |
| Storage Temperature (Humidity) | T _{ST} | -20 | +60 | °C | ≤ 40 °C |
| | RH | | 90 | % | |

SPEC. NUMBER

SPEC. TITLE

PAGE

S864-1145

HT15X15-D01 Product Specification

5 OF 22



PRODUCT GROUP

REV.

ISSUE DATE

TFT-LCD PRODUCT

O

2003.06.09

3.0 ELECTRICAL SPECIFICATIONS

[Ta = 25 ± 2°C]

| Parameter | | Min | Typ | Max | Unit | Remarks |
|---|-----------------|--------------------|------|------|-------------------|------------------------------------|
| Power Supply Voltage | V _{DD} | 3.0 | 3.3 | 3.6 | V | |
| Power Supply Current | I _{DD} | - | 500 | 730 | mA | Note 1 |
| Permissible Input Ripple Voltage | V _{RF} | - | - | 100 | mV | V _{DD} = 3.3V |
| High Level Differential Input Threshold Voltage | V _{IH} | - | - | +100 | mV | V _{cm} = 1.2V typ. |
| Low Level Differential Input Threshold Voltage | V _{IL} | -100 | - | - | mV | |
| Back-light Lamp Voltage | V _{BL} | - | 540 | - | V _{rms} | |
| Back-light Lamp Current | I _{BL} | 3.0 | 6.0 | 7.0 | mA _{rms} | |
| Back-light Lamp Frequency | F _L | 40 | - | 80 | KHz | Note 2 |
| Lamp Start Voltage | | | | 950 | V _{rms} | 25°C , Note 3 |
| | | | | 1250 | V _{rms} | 0°C , Note 3 |
| Lamp Life | | 35,000 | | | hrs | I _{BL} = 3.0~7.0mA |
| Power Consumption | | P _D | 1.6 | | W | |
| | | P _{BL} | 13.0 | | W | I _{BL} = 6.0mA, Note 4 |
| | | P _{total} | 14.6 | | W | |

Notes:

- The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for VDD = 3.3V, Frame rate = 75Hz
and Clock frequency = 78.75MHz.
Test Pattern of power supply current
a) Typ : Vertical color bar pattern
b) Max : Gray 28 @ Vertical 2 Skip line pattern
- The lamp frequency should be selected as different as possible from the horizontal synchronous frequency and its harmonics to avoid interference, which may cause line flow on the display
- The voltage above this value should be applied to the lamps for more than 1 second to startup. Otherwise the lamps may not be turned on.
- Calculated value for reference (V_{BL} × I_{BL}) × 4 excluding inverter loss.

| SPEC. NUMBER | SPEC. TITLE | PAGE |
|--------------|-----------------------------------|---------|
| S864-1145 | HT15X15-D01 Product Specification | 6 OF 22 |



PRODUCT GROUP

REV.

ISSUE DATE

TFT-LCD PRODUCT

O

2003.06.09

4.0 OPTICAL SPECIFICATIONS

The measurement shall be executed after 30 minutes warm-up period.

Measuring equipment: TOPCON-BM5.

[VDD=3.3V, Frame rate=60Hz, Clock=65MHz, I_{BL} = 6.0mA, T_a = 25 ± 2°C]

| Parameter | | Symbol | Condition | Min | Typ | Max | Unit | Remark | |
|----------------------------|---------------------------------|--------------------|-----------|--|-------|-------|------|-------------------|--------|
| Viewing Angle | Horizontal | θ_3 | CR > 5 | 70 | 80 | - | Deg | Note 1 | |
| | | θ_9 | | 70 | 80 | - | Deg | | |
| | Vertical | θ_{12} | | 40 | 50 | | Deg | | |
| | | θ_6 | | 70 | 80 | | Deg | | |
| | Horizontal | θ_3 | CR > 10 | 60 | 65 | | Deg | | |
| | | | | θ_9 | 60 | 65 | | | Deg |
| | | Vertical | | θ_{12} | 35 | 45 | - | | Deg |
| | | | | θ_6 | 50 | 65 | - | | Deg |
| Luminance contrast ratio | | CR | | | - | 500 | - | | Note 2 |
| Luminance of white | | Y _L | | | 350 | 400 | - | cd/m ² | Note 3 |
| White luminance uniformity | | ΔY | | | - | | 1.33 | | Note 4 |
| Color Cord. | White | x _w | | $\theta = 0^\circ$ (Center) Normal Viewing Angle | - | 0.265 | - | | Note 5 |
| | | y _w | - | | 0.293 | - | | | |
| | Red | x _R | - | | 0.629 | - | | | |
| | | y _R | - | | 0.340 | - | | | |
| | Green | x _G | - | | 0.255 | - | | | |
| | | y _G | - | | 0.601 | - | | | |
| | Blue | x _B | - | | 0.141 | - | | | |
| | | y _B | - | | 0.071 | - | | | |
| Color Reproduction | | | | 70 | | | % | | |
| Response time | T _{total} (Tr + Td) | T _{total} | | - | 25 | - | msec | Note 6 | |
| Cross talk | | CT | | - | - | 2.0 | % | Note 7 | |

SPEC. NUMBER

SPEC. TITLE

PAGE

S864-1145

HT15X15-D01 Product Specification

7 OF 22



PRODUCT GROUP

REV.

ISSUE DATE

TFT-LCD PRODUCT

O

2003.06.09

Note:

1. Viewing angle is the angle at which the contrast ratio is greater than 5 or 10. The viewing are determined for the horizontal or 3, 9 o' clock direction and the vertical or 6, 12 o' clock direction with respect to the optical axis which is normal to the LCD surface (see FIGURE 1 shown in Appendix).
2. Contrast measurements shall be made at viewing angle of $\theta = 0^\circ$ and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state. (See FIGURE 1 shown in Appendix) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. Luminance of white is defined as a center point(#1) on LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.
4. The White luminance uniformity on LCD surface is then expressed as : $\Delta Y = \text{Maximum Luminance of 9 points} / \text{Minimum Luminance of 9 points}$ (see FIGURE 2 shown in Appendix).
5. The color chromaticity coordinates specified in Table 4 shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.
6. The electro-optical response time measurements shall be made as FIGURE 3 shown in Appendix by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Td, and 90% to 10% is Tr.
7. Cross-Talk of one area of the LCD surface by another shall be measured by comparing the luminance (Y_A) of a 25mm diameter area, with all display pixels set to a gray level, to the luminance (Y_B) of that same area when any adjacent area is driven dark. (See FIGURE 4 shown in Appendix).

SPEC. NUMBER

SPEC. TITLE

PAGE

S864-1145

HT15X15-D01 Product Specification

8 OF 22

**PRODUCT GROUP****REV.****ISSUE DATE**

TFT-LCD PRODUCT

O

2003.06.09

5.0 INTERFACE CONNECTION

5.1 Electrical Interface

CN1 Interface connector : DF14H-20P-1.25H (HIROSE) or equivalent

User side connector : DF14-20S-1.25C (HIROSE) or equivalent

| Pin No | Symbol | Function | Remark |
|--------|---------|--------------------------------|-------------|
| 1 | VDD1 | Power Supply: +3.3V | |
| 2 | VDD2 | Power Supply: +3.3V | |
| 3 | VSS | Ground | |
| 4 | VSS | Ground | |
| 5 | RIN0- | LVDS Negative data signal (-) | Tx pin # 48 |
| 6 | RIN0+ | LVDS Positive data signal (+) | Tx pin # 47 |
| 7 | VSS | Ground | |
| 8 | RIN1- | LVDS Negative data signal (-) | Tx pin # 46 |
| 9 | RIN1+ | LVDS Positive data signal (+) | Tx pin # 45 |
| 10 | VSS | Ground | |
| 11 | RIN2- | LVDS Negative data signal (-) | Tx pin # 42 |
| 12 | RIN2+ | LVDS Positive data signal (+) | Tx pin # 41 |
| 13 | VSS | Ground | |
| 14 | RCLKIN- | LVDS Negative clock signal (-) | Tx pin # 40 |
| 15 | RCLKIN+ | LVDS Positive clock signal (+) | Tx pin # 39 |
| 16 | VSS | Ground | |
| 17 | RIN3- | LVDS Negative data signal (-) | Tx pin # 38 |
| 18 | RIN3+ | LVDS Positive data signal (+) | Tx pin # 37 |
| 19 | VSS | Ground | |
| 20 | NC | Reserved | |

SPEC. NUMBER

S864-1145

SPEC. TITLE

HT15X15-D01 Product Specification

PAGE

9 OF 22



PRODUCT GROUP

REV.

ISSUE DATE

TFT-LCD PRODUCT

O

2003.06.09

5.2 LVDS Interface

LVDS Transmitter: THC63LVDM83A or equivalent.

| Input signal | Transmitter | | Interface | | DF14H-20P-1.25H | Remark |
|--------------|-------------|----------|--------------------|------------------|-----------------|--------|
| | Pin No | Pin No | System (Tx) | TFT-LCD (Rx) | Pin No. | |
| R0 | 51 | 48 47 | OUT0- OUT0+ | IN0- IN0+ | 5 6 | |
| R1 | 52 | | | | | |
| R2 | 54 | | | | | |
| R3 | 55 | | | | | |
| R4 | 56 | | | | | |
| R5 | 3 | | | | | |
| G0 | 4 | 46 45 | OUT1- OUT1+ | IN1- IN1+ | 8 9 | |
| G1 | 6 | | | | | |
| G2 | 7 | | | | | |
| G3 | 11 | | | | | |
| G4 | 12 | | | | | |
| G5 | 14 | | | | | |
| B0 | 15 | 42 41 | OUT2- OUT2+ | IN2- IN2+ | 11 12 | |
| B1 | 19 | | | | | |
| B2 | 20 | | | | | |
| B3 | 22 | | | | | |
| B4 | 23 | | | | | |
| B5 | 24 | | | | | |
| HSYNC | 27 | 40 39 | CLKOUT- CLKOUT+ | CLKIN- CLKIN+ | 14 15 | |
| VSYNC | 28 | | | | | |
| DE | 30 | | | | | |
| MCLK | 31 | | | | | |
| R6 | 50 | | | | | |
| R7 | 2 | | | | | |
| G6 | 8 | 38 37 | OUT3+ OUT3- | IN3- IN3+ | 17 18 | |
| G7 | 10 | | | | | |
| B6 | 16 | | | | | |
| B7 | 18 | | | | | |
| RSVD | 25 | | | | | |

SPEC. NUMBER

SPEC. TITLE

PAGE

S864-1145

HT15X15-D01 Product Specification

10 OF 22



PRODUCT GROUP

REV.

ISSUE DATE

TFT-LCD PRODUCT

O

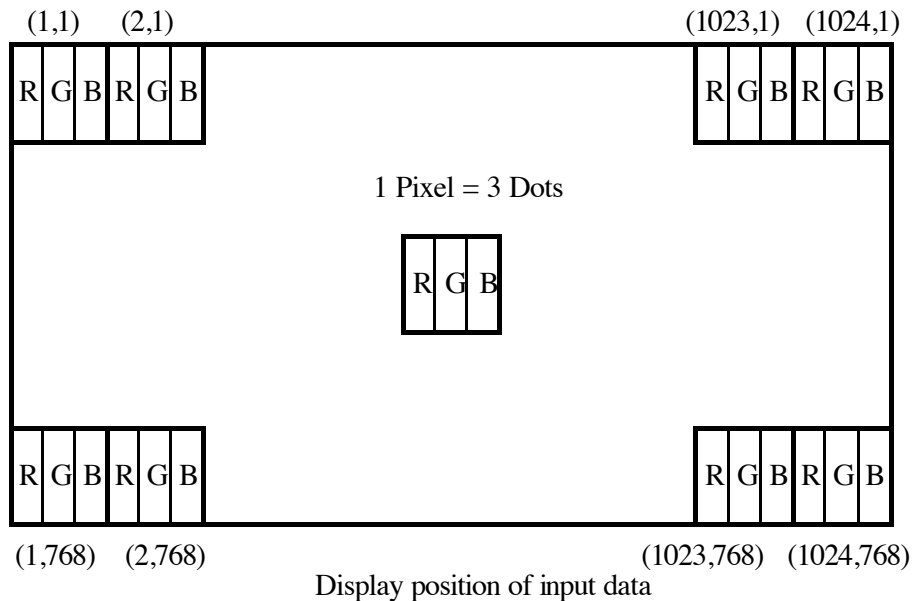
2003.06.09

5.3 Back-light Interface

CN21, 22, 23, 24 Connector : BHSR-02VS-1 (JST) or equivalent
 User side connector : SM02B-BHSS-1 (JST) or equivalent

| Pin No | INPUT | Color | Function |
|--------|-------|---------------|--------------|
| 1 | HOT | Pink & Cyan | High voltage |
| 2 | COLD | White & Black | Ground |

5.4 Data Input Format



6.0 SIGNAL TIMING SPECIFICATIONS

6.1 The HT15X15-D01 is operated by the only DE (Data enable) mode (LVDS Transmitter Input)

| Item | Symbols | Min | Typ | Max | Unit | |
|---------------------------|------------|------|------|------|--------|-----|
| Clock | Frequency | 1/Tc | - | 65 | 80 | MHz |
| | High Time | Tch | 4.5 | - | - | ns |
| | Low Time | Tcl | 4.5 | - | - | ns |
| Data | Setup Time | Tds | 2.7 | - | - | ns |
| | Hold Time | Tdh | 0 | - | - | ns |
| Data Enable Setup Time | Tes | 2.7 | - | - | ns | |
| Frame Period | Tv | 772 | 806 | 1022 | lines | |
| Vertical Display Period | Tvd | 768 | 768 | 768 | lines | |
| One Line Scanning Period | Th | 1100 | 1344 | 2046 | clocks | |
| Horizontal Display Period | Thd | 1024 | 1024 | 1024 | clocks | |

SPEC. NUMBER

SPEC. TITLE

PAGE

S864-1145

HT15X15-D01 Product Specification

11 OF 22



PRODUCT GROUP

REV.

ISSUE DATE

TFT-LCD PRODUCT

O

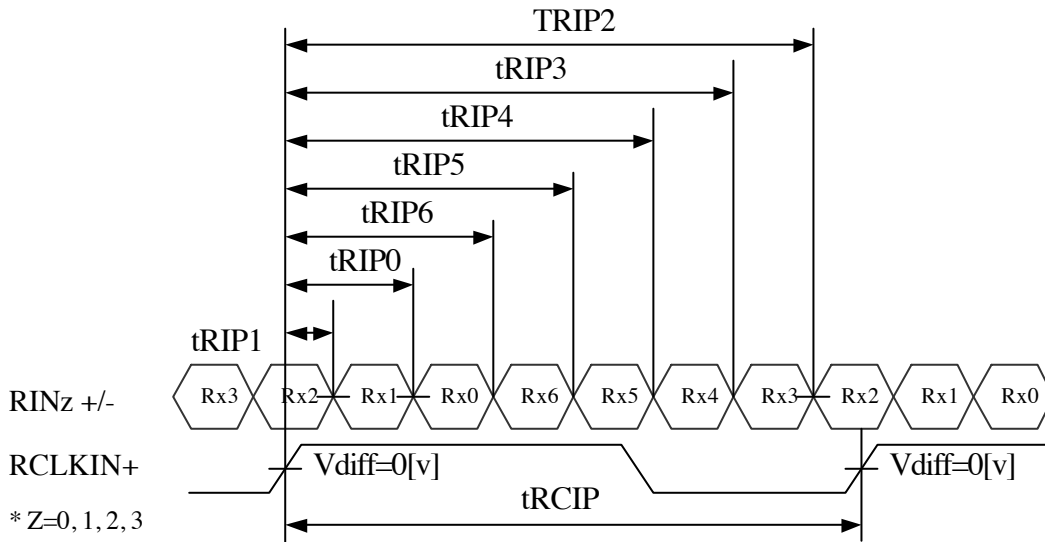
2003.06.09

6.2 LVDS Rx interface timing parameter

The specification of the LVDS Rx interface timing parameter

<LVDS Rx Interface Timing Specification>

| Item | Symbol | Min | Typ | Max | Unit | Remark |
|--------------|--------|---------------|-----------|---------------|------|--------|
| CLKIN Period | tRCIP | 12.5 | 15.38 | - | nsec | |
| Input Data 0 | tRIP1 | -0.4 | 0.0 | +0.4 | nsec | |
| Input Data 1 | tRIP0 | 1*tRCIP/7-0.4 | 1*tRCIP/7 | 1*tRCIP/7+0.4 | nsec | |
| Input Data 2 | tRIP6 | 2*tRCIP/7-0.4 | 2*tRCIP/7 | 2*tRCIP/7+0.4 | nsec | |
| Input Data 3 | tRIP5 | 3*tRCIP/7-0.4 | 3*tRCIP/7 | 3*tRCIP/7+0.4 | nsec | |
| Input Data 4 | tRIP4 | 4*tRCIP/7-0.4 | 4*tRCIP/7 | 4*tRCIP/7+0.4 | nsec | |
| Input Data 5 | tRIP3 | 5*tRCIP/7-0.4 | 5*tRCIP/7 | 5*tRCIP/7+0.4 | nsec | |
| Input Data 6 | tRIP2 | 6*tRCIP/7-0.4 | 6*tRCIP/7 | 6*tRCIP/7+0.4 | nsec | |



* $V_{diff} = (RIN_{z+}) - (RIN_{z-}), (RCLKIN_{+}) - (RCLKIN_{-})$

SPEC. NUMBER
S864-1145

SPEC. TITLE
HT15X15-D01 Product Specification

PAGE
12 OF 22



PRODUCT GROUP

REV.

ISSUE DATE

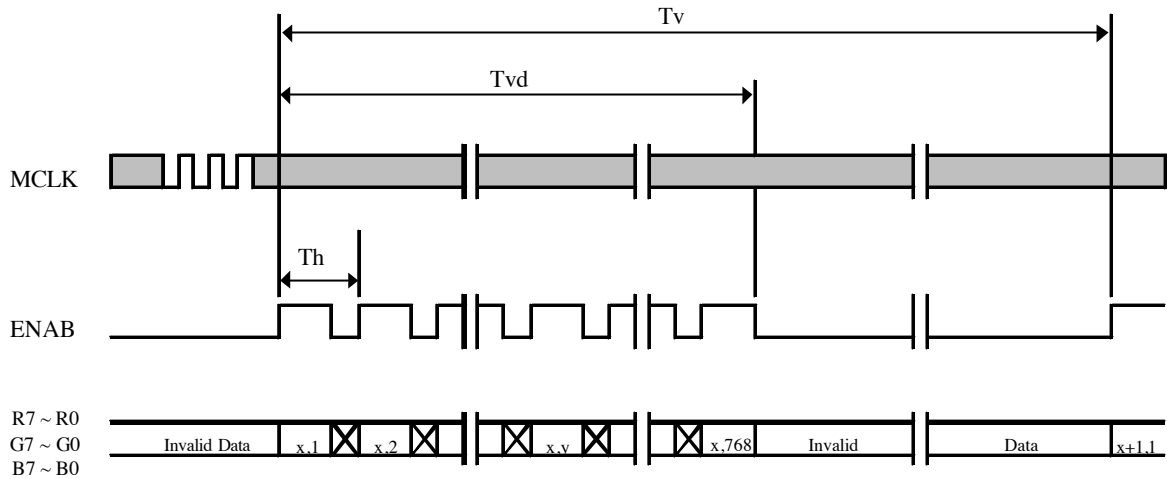
TFT-LCD PRODUCT

O

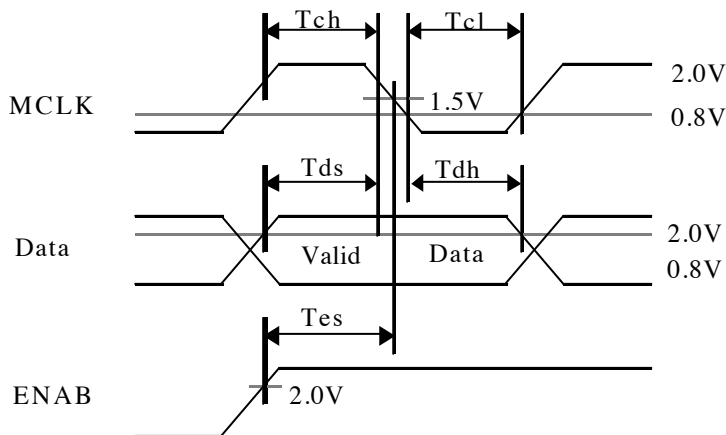
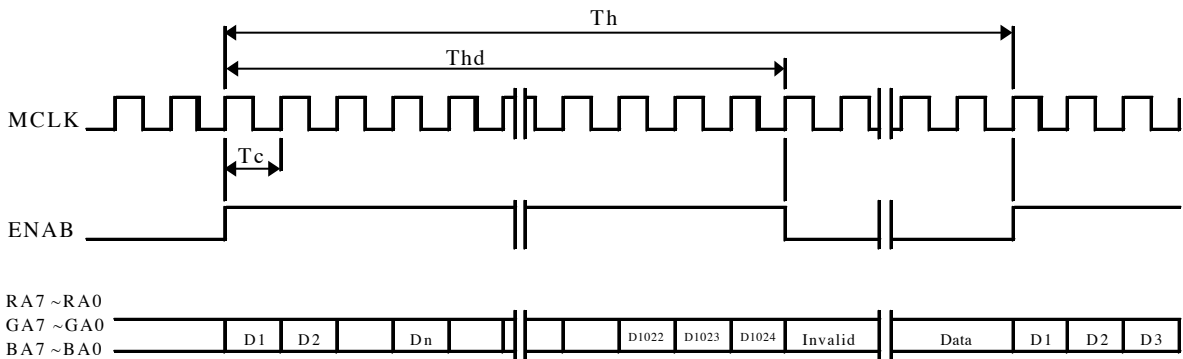
2003.06.09

7.0 SIGNAL TIMING WAVEFORMS OF INTERFACE SIGNAL (DE MODE)

7.1 Vertical Timing Waveforms



7.2 Horizontal Timing Waveforms



SPEC. NUMBER
S864-1145

SPEC. TITLE
HT15X15-D01 Product Specification

PAGE
13 OF 22



PRODUCT GROUP

REV.

ISSUE DATE

TFT-LCD PRODUCT

O

2003.06.09

8.0 INPUT SIGNALS, BASIC DISPLAY COLORS & GRAY SCALE OF COLORS

| Colors & Gray Scale | | Red data | | | | | | | | Green data | | | | | | | | Blue data | | | | | | | |
|-----------------------------|------------|----------|----|----|----|----|----|----|----|------------|----|----|----|----|----|----|----|-----------|----|----|----|----|----|----|----|
| | | R7 | R6 | R5 | R4 | R3 | R2 | R1 | R0 | G7 | G6 | G5 | G4 | G3 | G2 | G1 | G0 | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 |
| Basic Colors | Black | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Blue | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Green | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Cyan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Red | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Magenta | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 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 | 1 | 1 | 1 | 1 | 0 | 0 | 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 | 1 | 1 | 1 | 1 | 1 | 1 |
| Gray Scale Of Red | Black | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | △ | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Darker △ | ↓ | | | | | | | | ↓ | | | | | | | | | | | | | | | |
| | ▽ | ↓ | | | | | | | | ↓ | | | | | | | | | | | | | | | |
| | Brighter △ | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ▽ | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Red | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Gray Scale Of Green | Black | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | △ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | Darker △ | ↓ | | | | | | | | ↓ | | | | | | | | | | | | | | | |
| | ▽ | ↓ | | | | | | | | ↓ | | | | | | | | | | | | | | | |
| | Brighter △ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | ▽ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Green | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Gray Scale Of Blue | Black | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | △ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| | Darker △ | ↓ | | | | | | | | ↓ | | | | | | | | | | | | | | | |
| | ▽ | ↓ | | | | | | | | ↓ | | | | | | | | | | | | | | | |
| | Brighter △ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 |
| | ▽ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| Blue | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| Gray Scale Of White & Black | Black | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | △ | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | |
| | Darker △ | ↓ | | | | | | | | ↓ | | | | | | | | | | | | | | | |
| | ▽ | ↓ | | | | | | | | ↓ | | | | | | | | | | | | | | | |
| | Brighter △ | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 |
| | ▽ | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| White | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |

SPEC. NUMBER
S864-1145

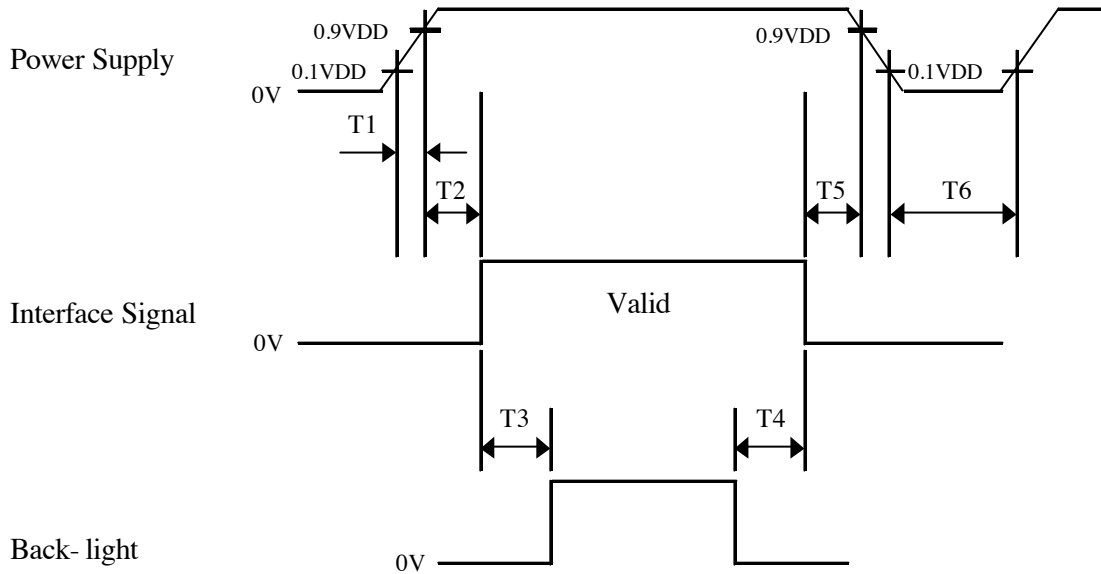
SPEC. TITLE
HT15X15-D01 Product Specification

PAGE
14 OF 22



9.0 POWER SEQUENCE

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence should be as shown in below



- $0 < T1 \leq 10 \text{ ms}$
- $0 < T2 \leq 50 \text{ ms}$
- $100 \text{ ms} \leq T3, T4$
- $0 < T5 \leq 50 \text{ ms}$
- $1 \text{ sec} < T6$

Notes:

1. When the power supply VDD is 0V, Keep the level of input signals on the low or keep high impedance.
2. Do not keep the interface signal high impedance when power is on.
3. Back Light must be turn on after power for logic and interface signal are valid.



PRODUCT GROUP

REV.

ISSUE DATE

TFT-LCD PRODUCT

O

2003.06.09

10.0 MECHANICAL CHARACTERISTICS

10.1 Dimensional Requirements

FIGURE 6 shown in appendix shows mechanical outlines for the model.

| Parameter | Specification | Unit |
|---------------------|--------------------------|--------|
| Dimensional outline | | |
| Horizontal | 331.6±0.5 | mm |
| Vertical | 254.7±0.5 | |
| Thickness | 12.7±0.3 | |
| Weight | 1,290 max. | gram |
| Active area | 304.128 (H) × 228.096(V) | mm |
| Pixel pitch | 0.297(H) × 0.297(V) | mm |
| Number of pixels | 1024(H) × 768(V) | pixels |

10.2 Mounting

See FIGURE 5 shown in appendix

10.3 Anti-Glare and Polarizer Hardness.

The surface of the LCD has an anti-glare coating to minimize reflection and a coating to reduce scratching.

10.4 Light Leakage

There shall not be visible light from the back-lighting system around the edges of the screen as seen from a distance 50 cm from the screen with an overhead light level of 400lux. The manufacture shall furnish limit samples of the panel showing the light leakage acceptable.

SPEC. NUMBER

SPEC. TITLE

PAGE

S864-1145

HT15X15-D01 Product Specification

16 OF 22



PRODUCT GROUP

REV.

ISSUE DATE

TFT-LCD PRODUCT

O

2003.06.09

11.0 RELIABILITY TEST

| No | Test Items | Conditions |
|----|---|---|
| 1 | High temperature storage test | Ta = 60 °C, 240 hrs |
| 2 | Low temperature storage test | Ta = -20 °C, 240 hrs |
| 3 | High temperature & high humidity operation test | Ta = 50 °C, 80 %RH, 240 hrs |
| 4 | High temperature operation test | Ta = 50 °C, 240 hrs |
| 5 | Low temperature operation test | Ta = 0 °C, 240 hrs |
| 6 | Thermal shock | Ta = -20 °C ↔ 60 °C (30 min), 100 cycle |
| 7 | Vibration test (non-operating) | Frequency : 10 ~ 300 Hz Gravity/AMP : 1.5G Period : X, Y, Z 30 min |
| 8 | Shock test (non-operating) | Gravity : 150G Pulse width : 6ms, half sine wave ±X, ±Y, ±Z Once for each direction |
| 9 | Electrostatic discharge test | Air : 150 pF, 330 Ω, 15KV Contact : 150 pF, 330 Ω, 8KV |

SPEC. NUMBER

SPEC. TITLE

PAGE

S864-1145

HT15X15-D01 Product Specification

17 OF 22



PRODUCT GROUP

REV.

ISSUE DATE

TFT-LCD PRODUCT

O

2003.06.09

12.0 HANDLING & CAUTIONS

12.1 Cautions when taking out the module

- Pick the pouch only, when taking out module from a shipping package.

12.2 Cautions for handling the module

- As the electrostatic discharges may break the LCD module, handle the LCD module with care. Peel a protection sheet off from the LCD panel surface as slowly as possible.
- As the LCD panel and backlight element are made from fragile glass material, impulse and pressure to the LCD module should be avoided.
- As the surface of the polarizer is very soft and easily scratched, use a soft dry cloth without chemicals for cleaning.
- Do not pull the interface connector in or out while the LCD module is operating.
- Put the module display side down on a flat horizontal plane.
- Handle connectors and cables with care.

12.3 Cautions for the operation

- When the module is operating, do not lose MCLK, DE signals. If any one of these signals were lost, the LCD panel would be damaged.
- Obey the supply voltage sequence. If wrong sequence were applied, the module would be damaged.

12.4 Cautions for the atmosphere

- Dewdrop atmosphere should be avoided.
- Do not store and/or operate the LCD module in a high temperature and/or humidity atmosphere. Storage in an electro-conductive polymer-packing pouch and under relatively low temperature atmosphere is recommended.

12.5 Cautions for the module characteristics

- Do not apply fixed pattern data signal to the LCD module at product aging.
- Applying fixed pattern for a long time may cause image sticking.

12.6 Other cautions

- Do not disassemble and/or re-assemble LCD module.
- Do not re-adjust variable resistor or switch etc.
- When returning the module for repair or etc, please pack the module not to be broken. We recommend using the original shipping packages.

SPEC. NUMBER

SPEC. TITLE

PAGE

S864-1145

HT15X15-D01 Product Specification

18 OF 22



PRODUCT GROUP

REV.

ISSUE DATE

TFT-LCD PRODUCT

O

2003.06.09

13.0 APPENDIX

Figure 1. Measurement Set Up

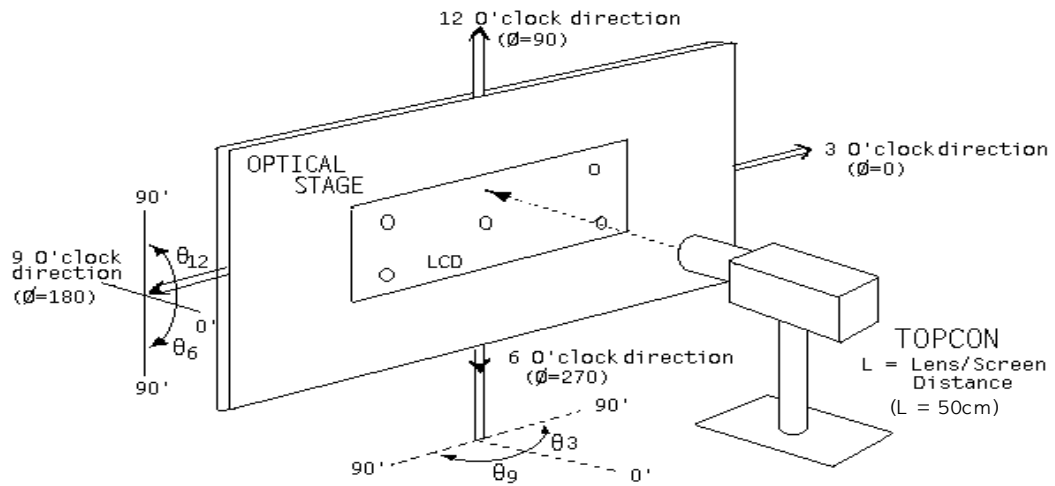
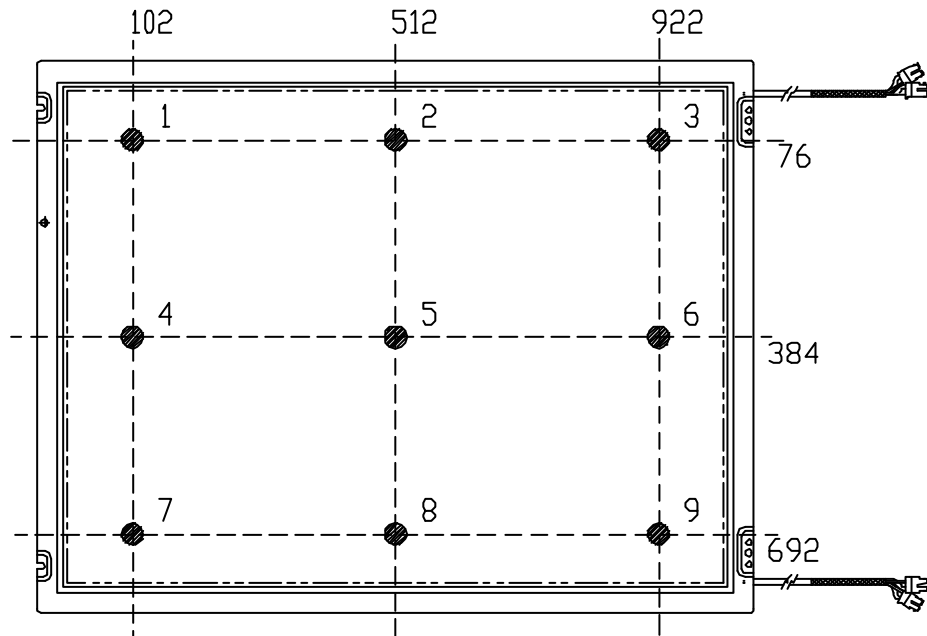


Figure 2. Average Luminance Measurement Locations & Uniformity Measurement Locations



SPEC. NUMBER

SPEC. TITLE

PAGE

S864-1145

HT15X15-D01 Product Specification

19 OF 22



PRODUCT GROUP

REV.

ISSUE DATE

TFT-LCD PRODUCT

O

2003.06.09

Figure 3. Response Time Testing

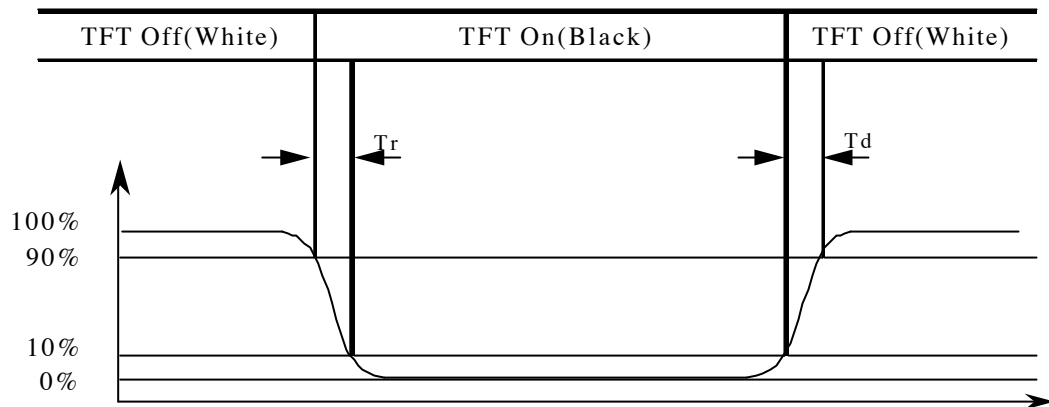
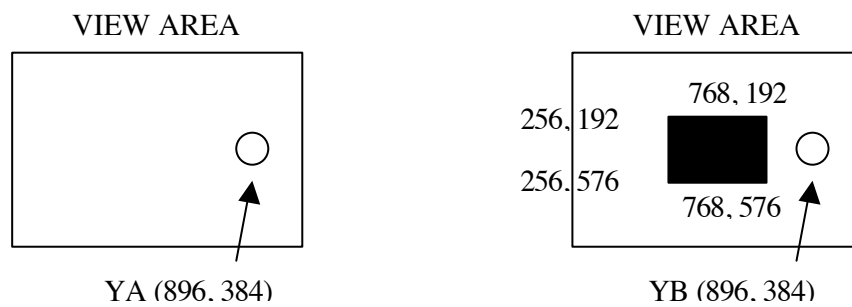


Figure 4. Cross Modulation Test Description



$$\text{Cross-Talk} = \left| \frac{Y_B - Y_A}{Y_A} \right| \times 100$$

Where:

Y_A = Initial luminance of measured area (cd/m^2)

Y_B = Subsequent luminance of measured area (cd/m^2)

The location measured will be exactly the same in both patterns.

SPEC. NUMBER

S864-1145

SPEC. TITLE

HT15X15-D01 Product Specification

PAGE

20 OF 22



PRODUCT GROUP

REV.

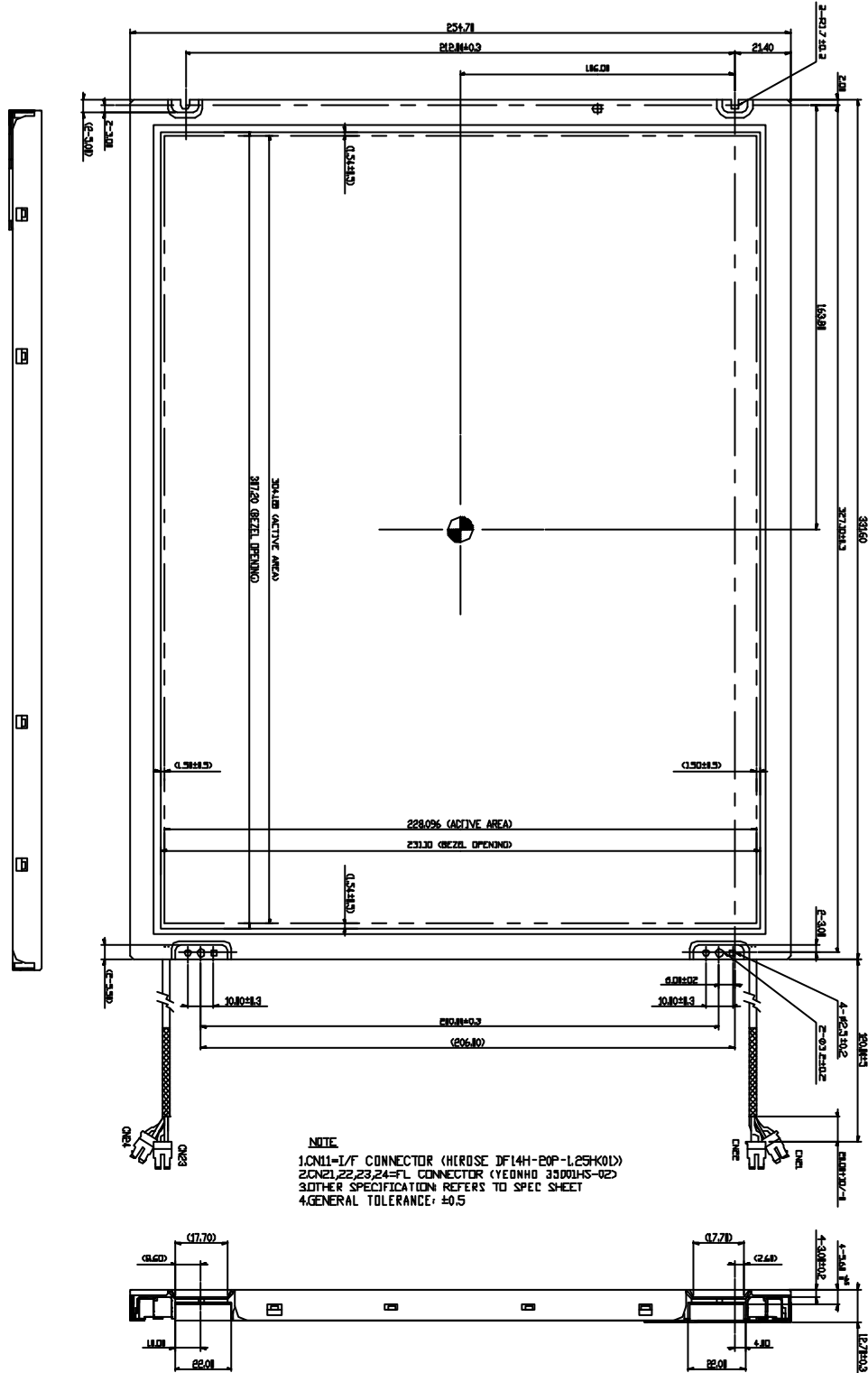
ISSUE DATE

TFT-LCD PRODUCT

O

2003.06.09

Figure 5. TFT-LCD Module Outline Dimensions (Front view)



SPEC. NUMBER
S864-1145

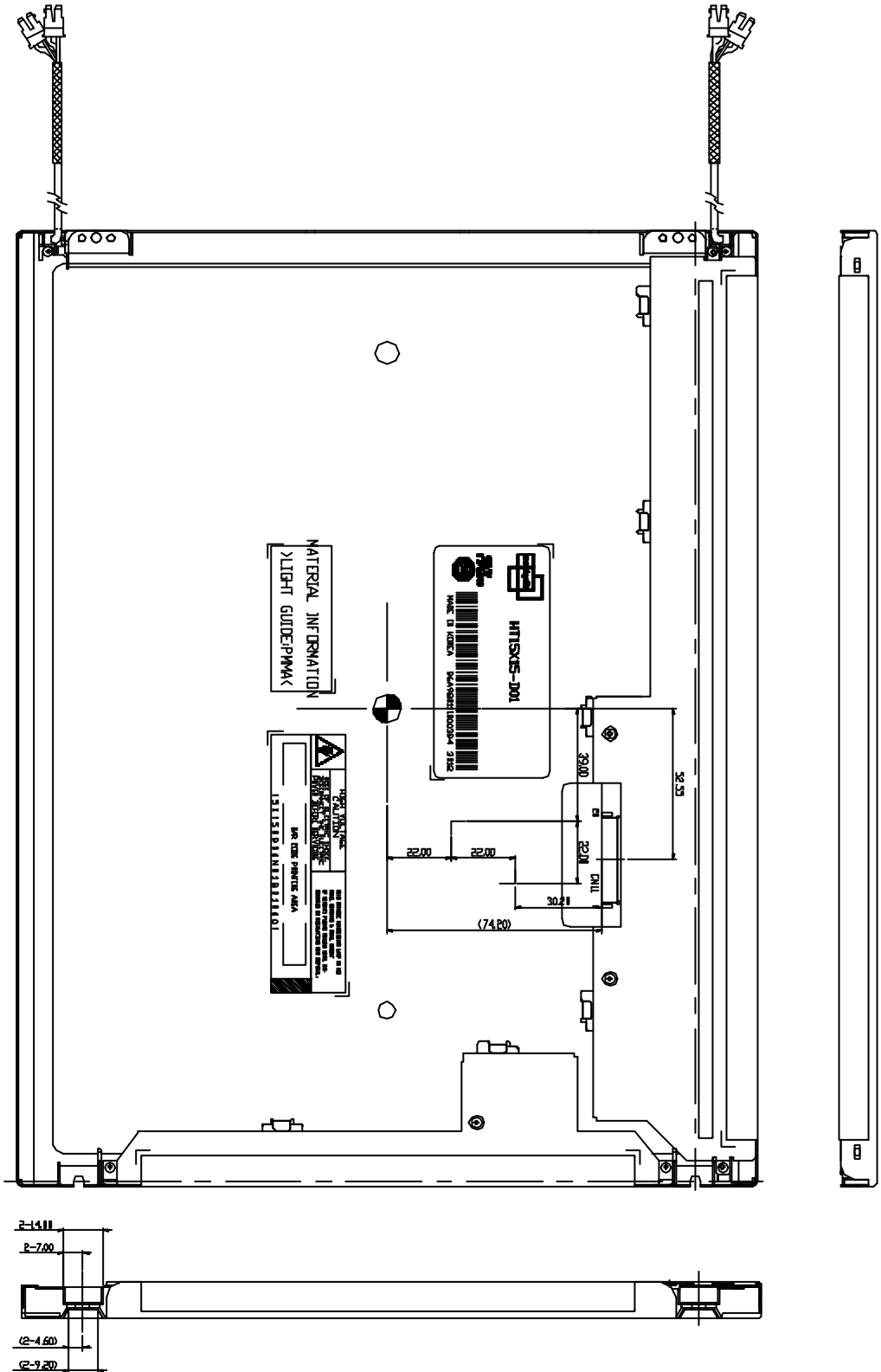
SPEC. TITLE
HT15X15-D01 Product Specification

PAGE
21 OF 22



| | | |
|----------------------|-------------|-------------------|
| PRODUCT GROUP | REV. | ISSUE DATE |
| TFT-LCD PRODUCT | O | 2003.06.09 |

Figure 6. TFT-LCD Module Outline Dimensions (Rear view)



| | | |
|---------------------|-----------------------------------|-------------|
| SPEC. NUMBER | SPEC. TITLE | PAGE |
| S864-1145 | HT15X15-D01 Product Specification | 22 OF 22 |