**AUO**

| Doc. Version | 0.1 |
|---|---|
| Total Page | 18 |
| Date | 2008/11/27 |

# Product Specification

# 4.3" COLOR TFT-LCD MODULE

## MODEL NAME: A043FW02 V3

< □ >Preliminary Specification

<　　>Final Specification

# Record of Revision

| Version | Revise Date | Page | Content |
|---------|-------------|------|---------|
| 0.0 | 2008/09/01 | | First draft. |
| 0.1 | 2008/11/27 | 9 | Update Electrical Characteristics |
| | | 11 | Update Power on/off sequence |
| | | 12 | Update Timing Condition |

# Contents:

## A. General Description

A043FW02 V3 is an amorphous transmissive type Thin Film Transistor Liquid crystal Display (TFT-LCD). This model is composed of a TFT-LCD, a driver and FPC .

## B. Features

- WQVGA resolution in RGB stripe dot arrangement
- DC/DC integrated
- Interfaces: parallel RGB 24-bit
- Wide viewing angle
- Green design

## C. Physical Specifications

| NO. | Item | Unit | Specification | Remark |
|-----|------|------|---------------|--------|
| 1 | Display Resolution | dot | 480 RGB (H)×272(V) | |
| 2 | Active Area | mm | 95.04(H)×53.856(V) | |
| 3 | Screen Size | inch | 4.3(Diagonal) | |
| 4 | Dot Pitch | mm | 0.066(H)×0.198(V) | |
| 5 | Color Configuration | -- | R. G. B. Stripe | Note 1 |
| 6 | Color Depth | -- | 16.7M Colors | |
| 7 | Overall Dimension | mm | 102.5(H) × 63.3(V) × 1.435(T) | Note 2 |
| 8 | Weight | g | 18 | |
| 9 | Display Mode | -- | Normally White | |
| 10 | Gray Level Inversion Direction | | 6 O'clock | |

Note 1: Below figure shows dot stripe arrangement.
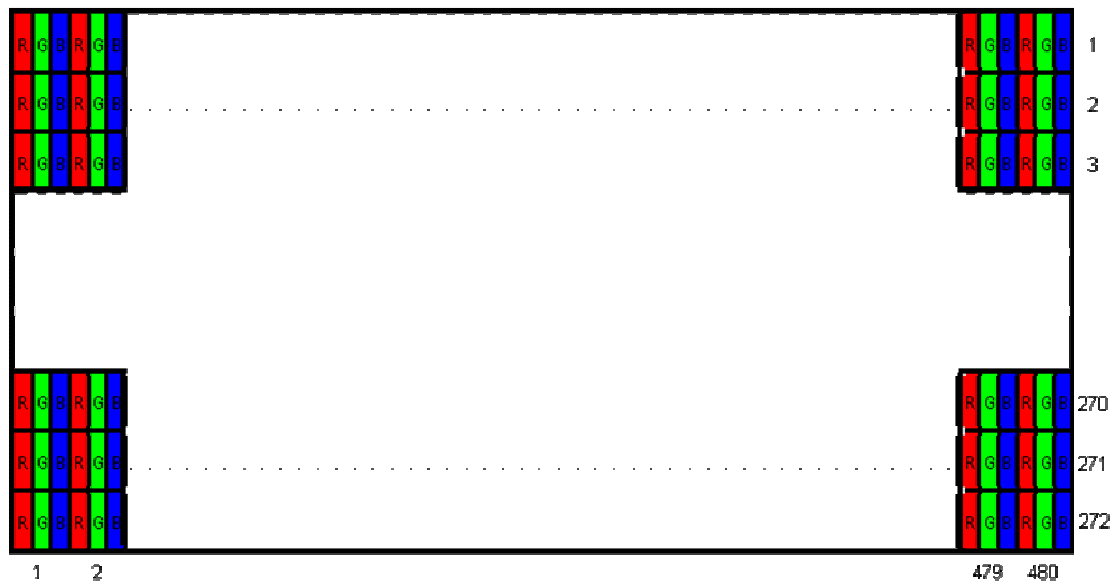


Note 2: Not including FPC. Refer to the drawing next page for further information.

# D. Outline Dimension (Tentative)

NOTES:
1. Gerneral tolerance ±0.3 .
2. The bending radius of FPC should be larger than 0.6 .
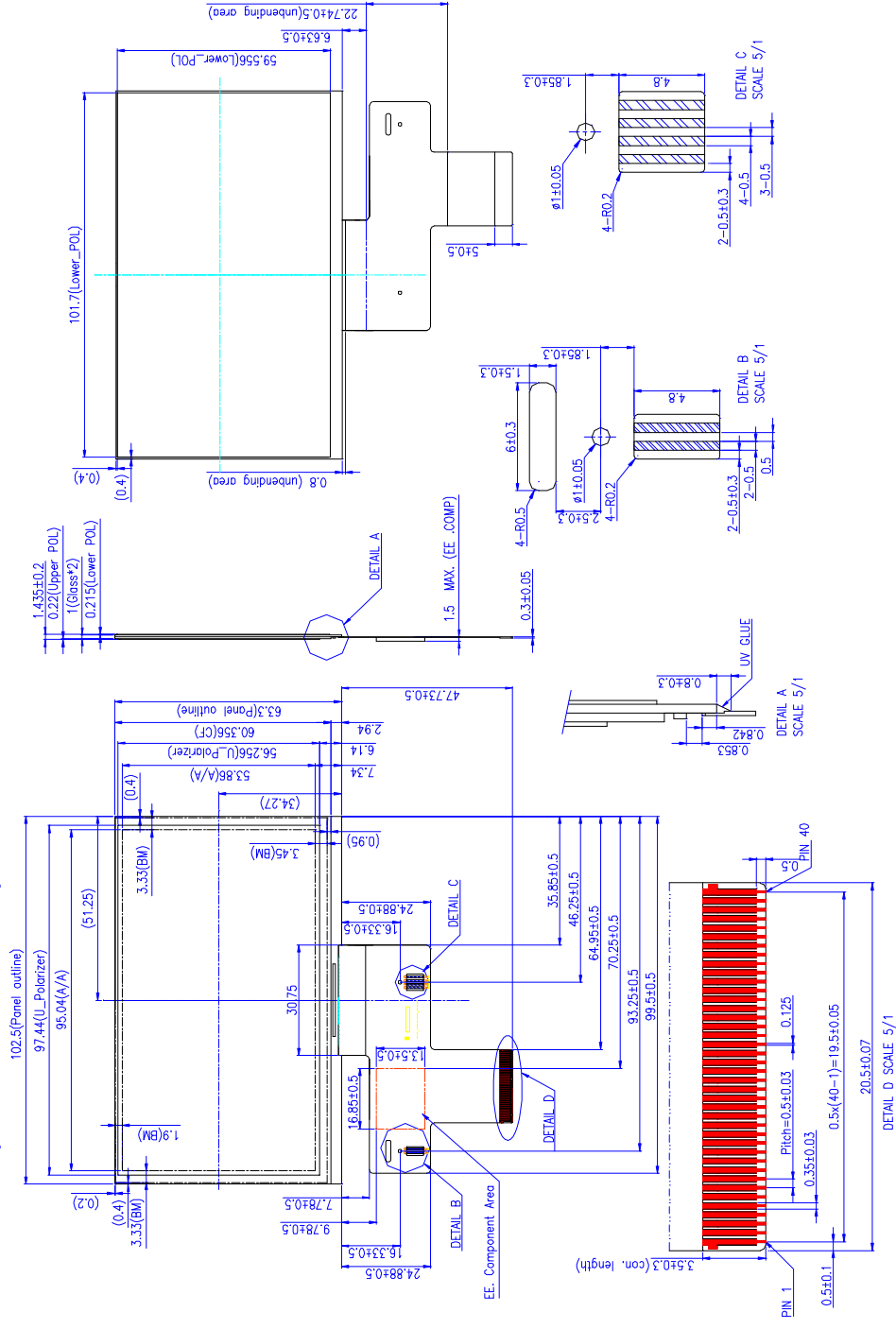
DETAIL A
SCALE 5/1

DETAIL B
SCALE 5/1

DETAIL C
SCALE 5/1

DETAIL D SCALE 5/1

## E. Electrical Specifications

### 1. Pin Assignment

| No. | Pin Name | I/O | Description | Remarks |
|-----|----------|-----|-------------|---------|
| 1 | VLED- | PI | LED backlight cathode | |
| 2 | VLED+ | PI | LED backlight anode | |
| 3 | GND | G | Ground | |
| 4 | VDD | P | Power Supply | |
| 5 | R0 | I | Red Data (LSB) | |
| 6 | R1 | I | Red Data | |
| 7 | R2 | I | Red Data | |
| 8 | R3 | I | Red Data | |
| 9 | R4 | I | Red Data | |
| 10 | R5 | I | Red Data | |
| 11 | R6 | I | Red Data | |
| 12 | R7 | I | Red Data (MSB) | |
| 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 | |
| 19 | G6 | I | Green Data | |
| 20 | G7 | I | Green Data (MSB) | |
| 21 | B0 | I | Blue Data (LSB) | |
| 22 | B1 | I | Blue Data | |
| 23 | B2 | I | Blue Data | |
| 24 | B3 | I | Blue Data | |
| 25 | B4 | I | Blue Data | |
| 26 | B5 | I | Blue Data | |
| 27 | B6 | I | Blue Data | |
| 28 | B7 | I | Blue Data (MSB) | |
| 29 | GND | G | Ground | |
| 30 | DCLK | I | Pixel Clock | |
| 31 | DISP | I | Display On/Off Signal | |
| 32 | HSYNC | I | Horizontal Synchronizing Signal | |
| 33 | VSYNC | I | Vertical Synchronizing Signal | |

| 34 | DE | I | Data Enable | |
|----|------|---|-------------------------|---|
| 35 | NC | | Not Connected | |
| 36 | GND | G | Ground | |
| 37 | NC | - | Reserved for Touch Panel | |
| 38 | NC | - | Reserved for Touch Panel | |
| 39 | NC | - | Reserved for Touch Panel | |
| 40 | NC | - | Reserved for Touch Panel | |

I: Digital signal input, O: Digital signal output, G: GND, PI: Power input, C: Capacitor

## 2. Absolute Maximum Ratings

| Items | Symbol | Values | | Unit | Condition |
|---|---|---|---|---|---|
| | | Min. | Max. | | |
| Power Supply Voltage | VDD | -0.3 | 4.5 | V | |
| Operation Temperature | $T_{op}$ | -20 | 70 | ˚C | |
| Storage Temperature | $T_{st}$ | -30 | 80 | ˚C | |

Note 1. If the operating condition exceeds the absolute maximum ratings, the TFT-LCD module may be damaged permanently. Also, if the module operated with the absolute maximum ratings for a long time, its reliability may drop.
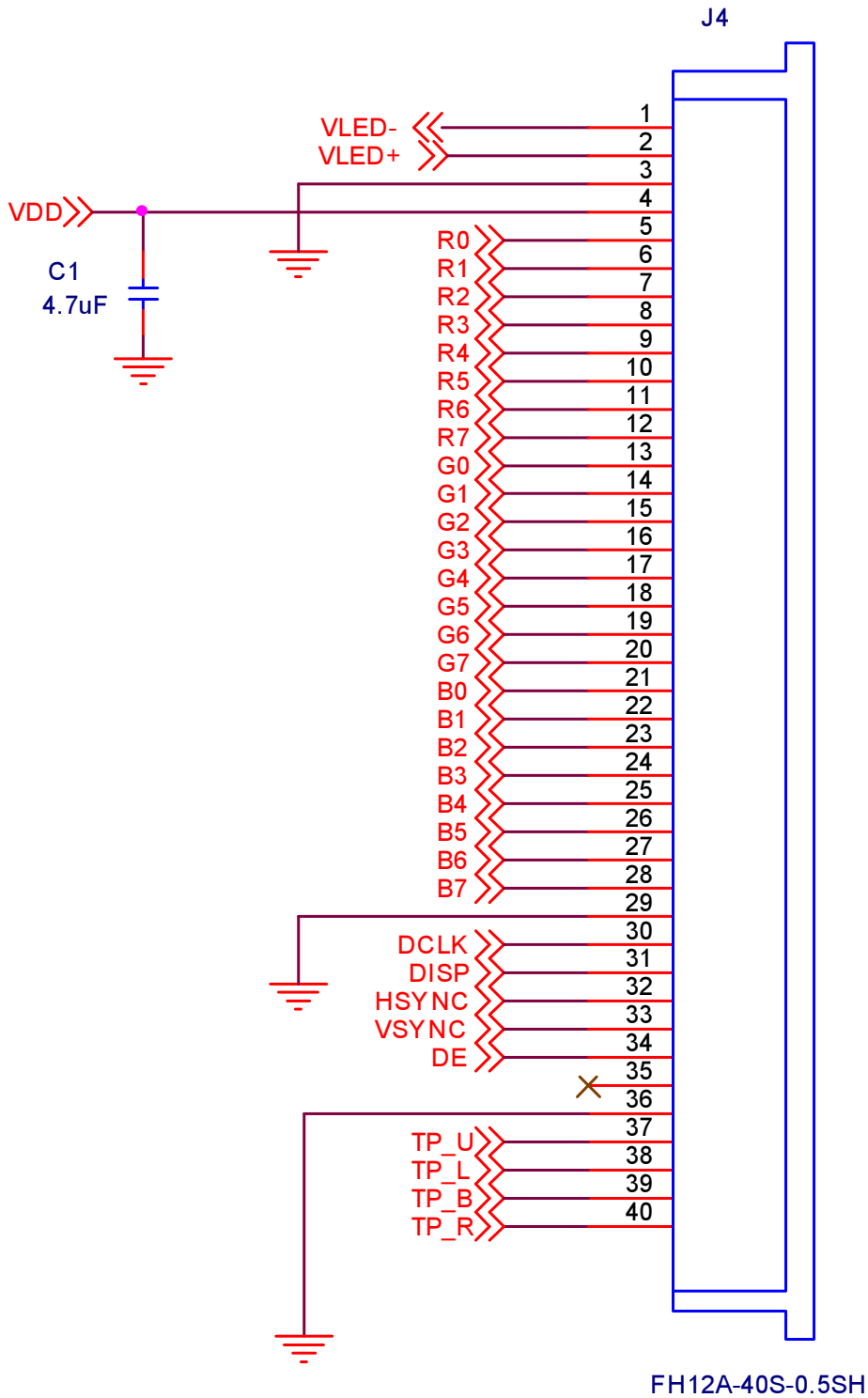
## 3. Electrical Characteristics

The following items are measured under stable condition and suggested application circuit.

### TFT- LCD Pane

| Parameter | Symbol | Min | Typ | Max | Unit | Notes |
|---|---|---|---|---|---|---|
| Power Supply Voltage | $V_{DD}$ | 3 | 3.3 | 3.6 | V | PWR_SEL=H |
| | $V_{DD}$ | 2.25 | 2.5 | 3 | V | PWR_SEL=L |
| Input Signal Voltage | $V_{ih}$ | 0.8* VDD | -- | VDD | V | |
| | $V_{il}$ | GND | -- | 0.2* VDD | V | |
| Frame Frequency | $f_{Frame}$ | -- | 60 | 70 | Hz | |
| Dot Data Clock | DCLK | 5 | 9.2 | 12 | MHz | |

Note 1. Panel surface temperature should be kept less than content of section E.2. "Absolute maximum ratings"
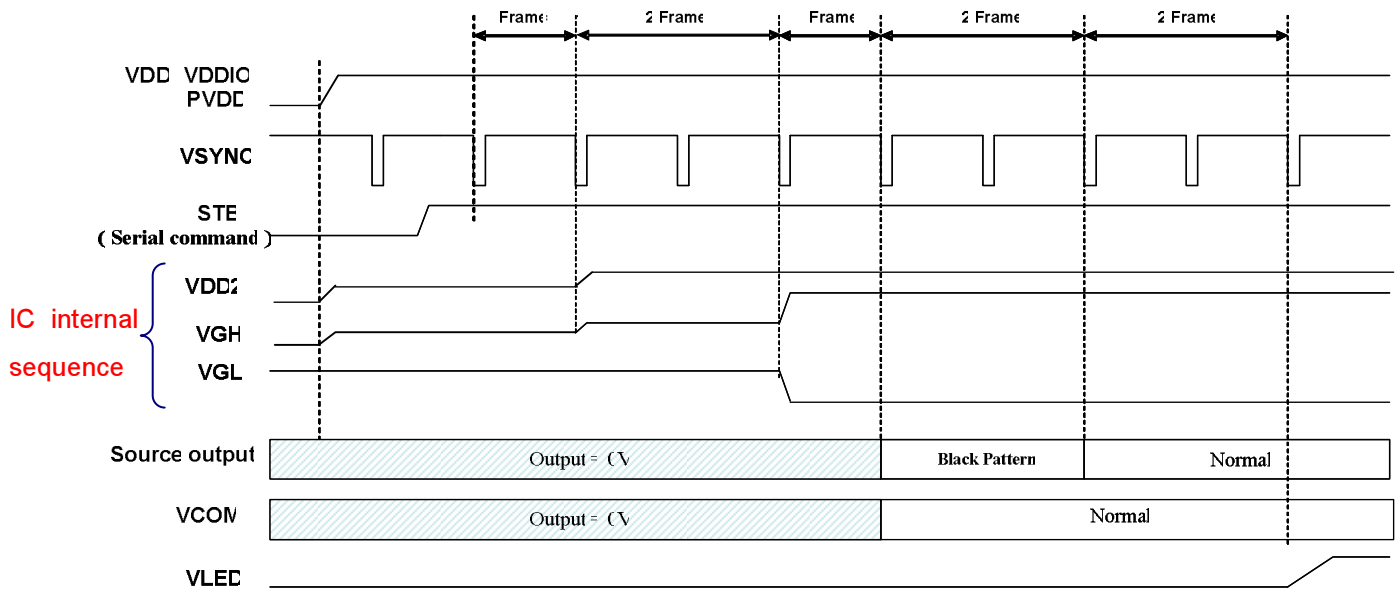
## 4. Suggested Application Circuit

J4

| | |
|---|---|
| VLED- | 1 |
| VLED+ | 2 |
| | 3 |
| VDD | 4 |
| | 5 |
| R0 | 6 |
| R1 | 7 |
| R2 | 8 |
| R3 | 9 |
| R4 | 10 |
| R5 | 11 |
| R6 | 12 |
| R7 | 13 |
| G0 | 14 |
| G1 | 15 |
| G2 | 16 |
| G3 | 17 |
| G4 | 18 |
| G5 | 19 |
| G6 | 20 |
| G7 | 21 |
| B0 | 22 |
| B1 | 23 |
| B2 | 24 |
| B3 | 25 |
| B4 | 26 |
| B5 | 27 |
| B6 | 28 |
| B7 | 29 |
| | 30 |
| DCLK | 31 |
| DISP | 32 |
| HSYNC | 33 |
| VSYNC | 34 |
| DE | 35 |
| | 36 |
| | 37 |
| TP_U | 38 |
| TP_L | 39 |
| TP_B | 40 |
| TP_R | |

C1
4.7uF

FH12A-40S-0.5SH
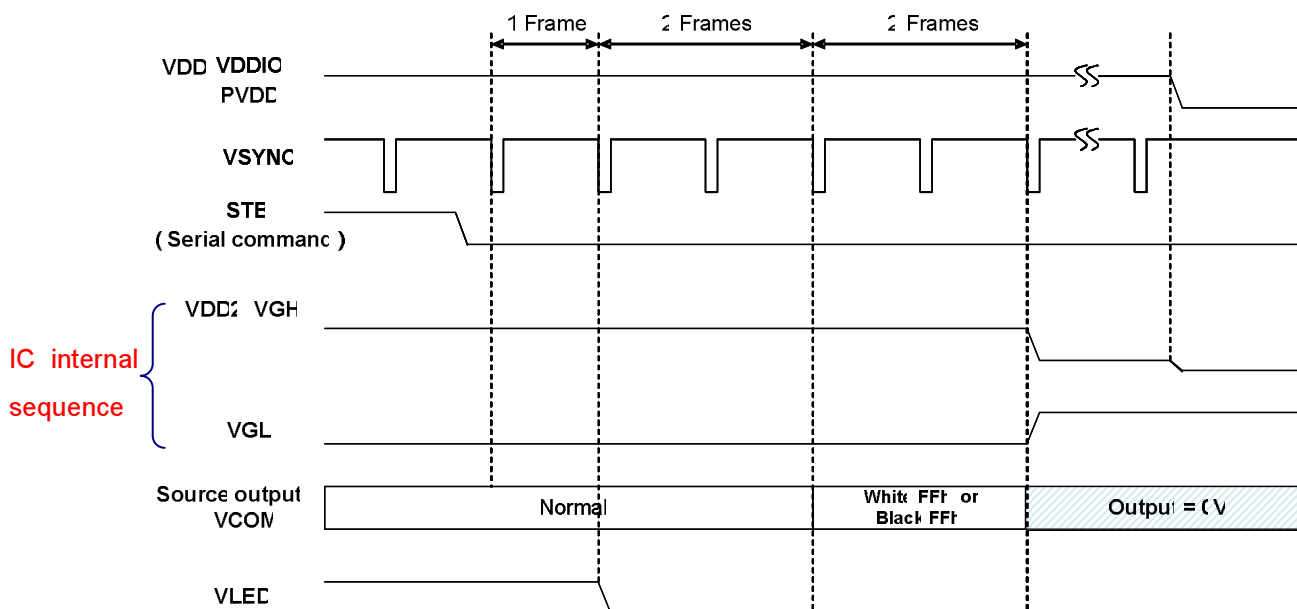
## 5. AC Timing

### a. Power on/off sequence

#### Power On (Display ON; Standby Disabling)



Notes: The driver IC default is on standby mode. It can be changed to normal operation by using DISP hard pin.

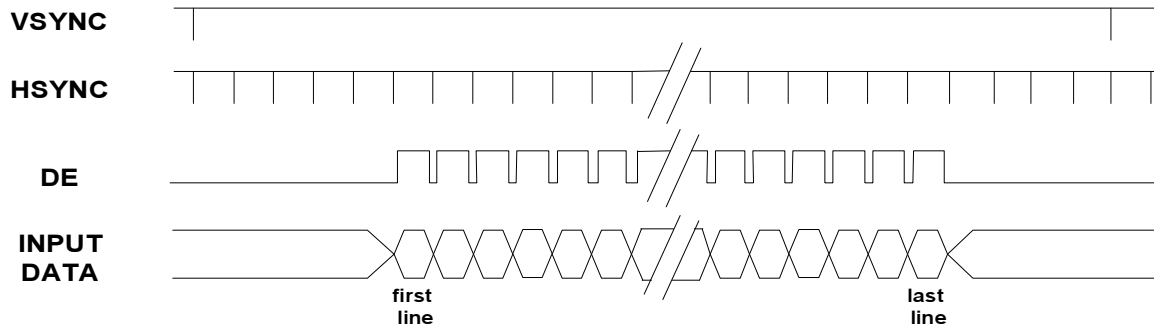#### Power-Off (Display Off; Standby Enabling)

### b. Timing Condition

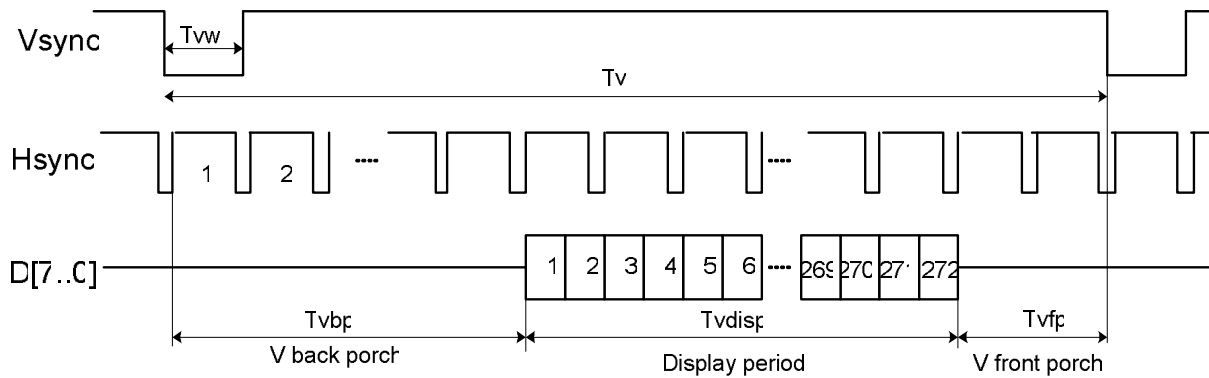| Parameter | | Symbol | Min. | Typ. | Max. | Unit. | Remark |
|---|---|---|---|---|---|---|---|
| DCLK | Frequency | 1/Tdclk | 5 | 9.2 | 12 | MHz | |
| | CLK pulse duty | Tcwh | 40 | -- | -- | ns | |
| | CLK pulse duty | Tcwl | 40 | -- | -- | ns | |
| Data | Setup Time | Tdsu | 12 | -- | -- | ns | |
| | Hold Time | Tdhd | 12 | -- | -- | ns | |
| DE | Setup Time | Tdesu | 12 | -- | -- | ns | |
| | Hold Time | Tdehd | 12 | -- | -- | ns | |
| Frame Frequency | Cycle | tv | | 16.7 | | ms | |
| 1 Frame Scanning Time | Cycle | tv | 275 | 288 | 335 | H | |
| | Display Period | tvdisp | | 272 | | H | |
| | Front porch | Tvfp | 1 | 4 | -- | H | |
| | Pulse width | Tvw | 1 | 10 | -- | H | |
| | Back porch | Tvbp | 2 | 12 | -- | H | |
| 1 Line Scanning Time | Cycle | Th | 490 | 531 | 605 | DCLK | |
| | Display Period | Thdisp | | 480 | | DCLK | |
| | Front porch | Thfp | 2 | 8 | -- | DCLK | |
| | Pulse width | Thw | 1 | 1 | -- | DCLK | |
| | Back porch | thbp | 8 | 43 | -- | DCLK | |

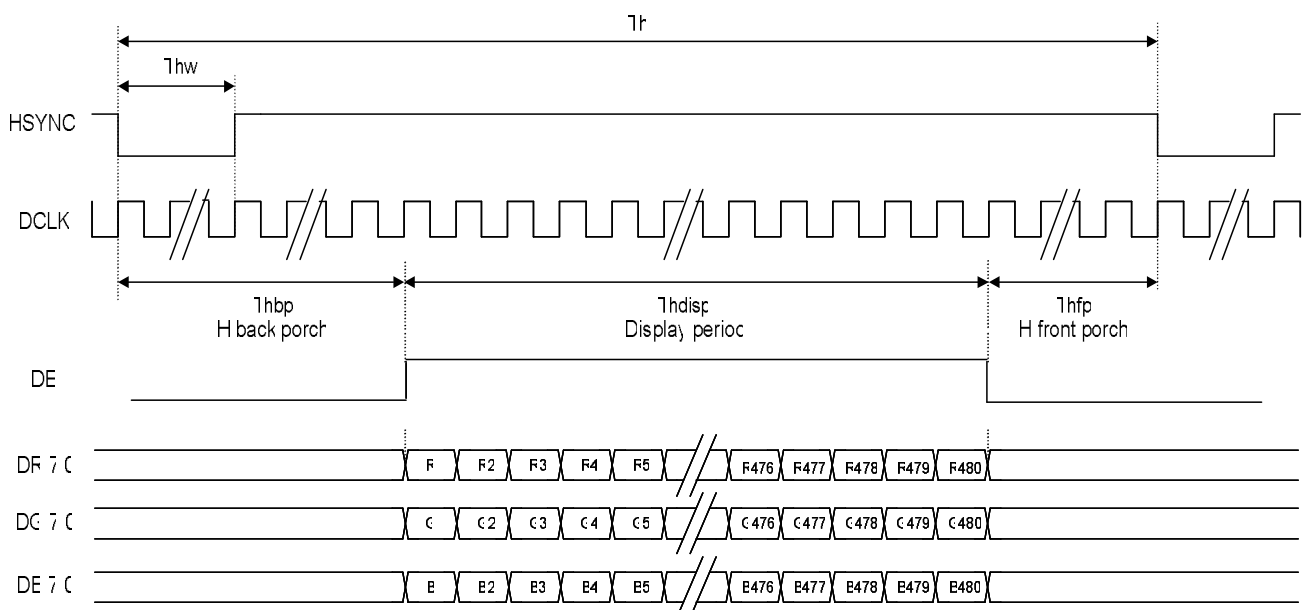Note 1: Sync mode just can be used on the typical timing setting.

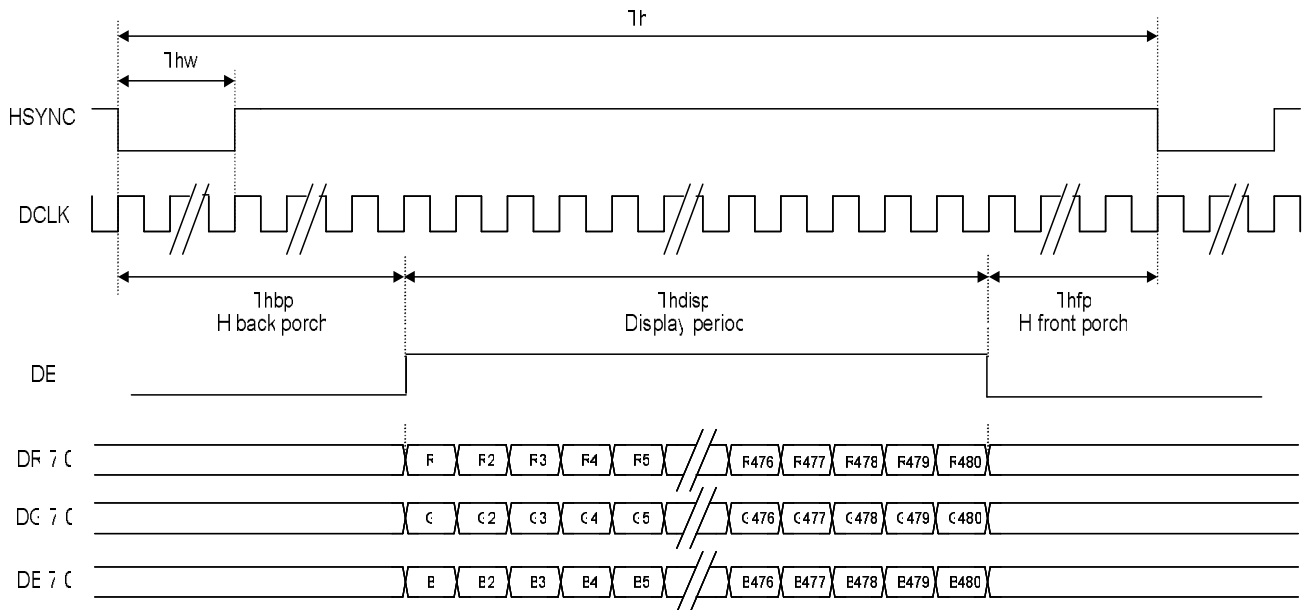### c. Timing Diagram

#### Vertical Timing of Input (Sync-DE mode)

VSYNC

HSYNC

DE

INPUT DATA

first line          last line

#### Vertical Timing of Input (Sync mode)

Vsync

Tvw

Tv

Hsync

1    2    ....          ....

D[7..0]

1  2  3  4  5  6  ....  269 270 271 272

Tvbp          Tvdisp          Tvfp

V back porch          Display period          V front porch

#### Horizontal Timing of Input (Sync mode)

Th

Thw

HSYNC

DCLK

Thbp          Thdisp          Thfp
H back porch          Display period          H front porch

DE

DR 7 0          R  R2  R3  R4  R5  ....  R476 R477 R478 R479 R480

DG 7 0          G  G2  G3  G4  G5  ....  G476 G477 G478 G479 G480

DB 7 0          B  B2  B3  B4  B5  ....  B476 B477 B478 B479 B480

## Horizontal Timing of Input (Sync-DE mode)



## Clock and data input timing diagram
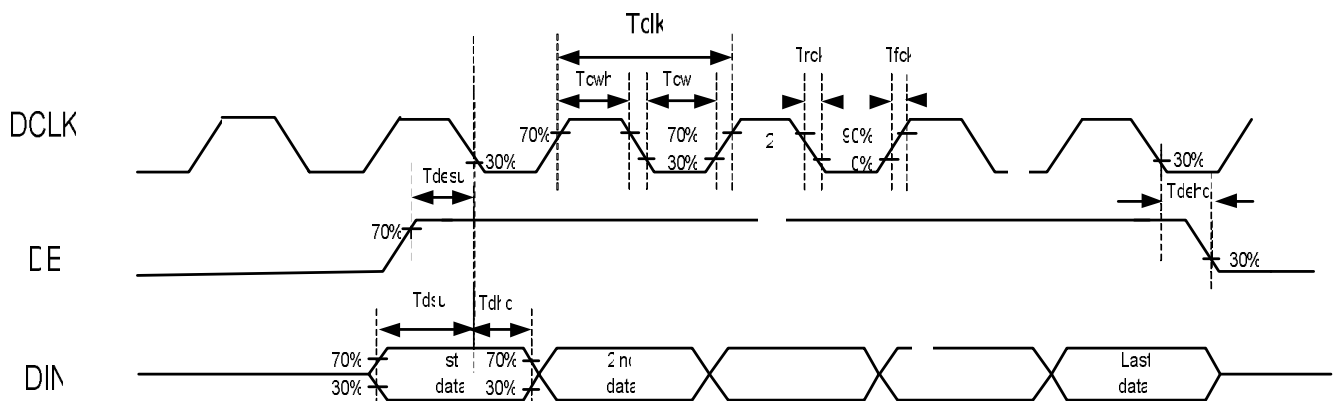
## F. Optical specifications (Note 1, 2)

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|---|
| Response Time | | | | | | | |
| Rise | Tr | $\theta = 0°$ | - | 15 | | ms | Note 3 |
| Fall | Tf | | - | 20 | | ms | |
| Contrast ratio | CR | At optimized viewing angle | 200 | 300 | - | | Note 5, 6 |
| Viewing Angle | | | | | | | |
| Top | | | | 50 | - | | |
| Bottom | | CR$\geqq$10 | | 60 | - | deg. | Note 7, 8 |
| Left | | | | 70 | - | | |
| Right | | | | 70 | - | | |
| White Chromaticity | X | $\theta = 0°$ | 0.27 | 0.32 | 0.37 | | |
| | y | $\theta = 0°$ | 0.29 | 0.34 | 0.39 | | |

Note 1: Measurement should be performed in the dark room, optical ambient temperature =25°C, and backlight current $I_L$=20 mA

Note 2: To be measured on the center area of panel with a field angle of 1°by Topcon luminance meter BM-7, after 10 minutes operation.

Note 3: Definition of response time:

The output signals of photo detector are measured when the input signals are changed from "black" to "white"(falling time) and from "white" to "black"(rising time), respectively.
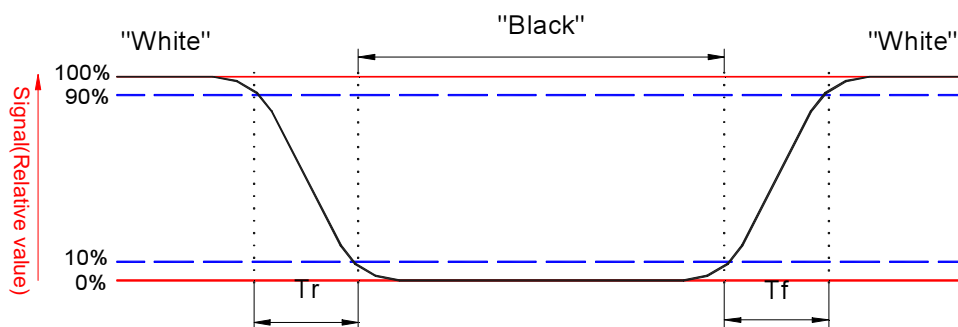


Note 4. From liquid crystal characteristics, response time will become slower and the color of panel will become darker when ambient temperature is below 25℃.

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

$$Contrast\ ratio = \frac{Photo\ detector\ output\ when\ LCD\ is\ at\ "White"\ state}{Photo\ detector\ output\ when\ LCD\ is\ at\ "Black"\ state}$$

Note 6. Definition of viewing angle: refer to figure as below.
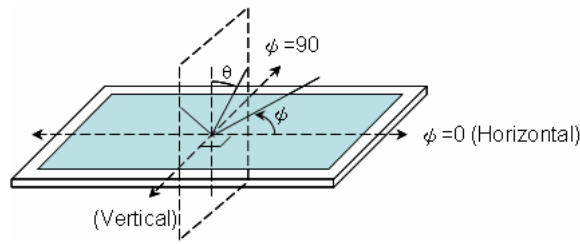
Note 7. The viewing angles are measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

Note 8. Brightness is measured at the center of the display perpendicular to the panel surface.

## G. Reliability Test Items

| No. | Test items | Conditions | | Remark |
|-----|-----------|-----------|------|--------|
| 1 | High Temperature Storage | Ta= 80°C | 240Hrs | |
| 2 | Low Temperature Storage | Ta= -30°C | 240Hrs | |
| 3 | High Temperature Operation | Ta= 70°C | 240Hrs | |
| 4 | Low Temperature Operation | Ta= -20°C | 240Hrs | |
| 5 | High Temperature & High Humidity | Ta= 60°C. 90% RH | 240Hrs | Operation |
| 6 | Heat Shock | -25°C ~70°C, 50 cycle,    2Hrs/cycle | | Non-operation |
| 7 | Vibration (With Carton) | Random vibration:<br>$0.015G^2$/Hz from 5~200Hz<br>–6dB/Octave from 200~500Hz | | IEC 68-34 |
| 8 | Drop (With Carton) | Height: 60cm<br>1 corner, 3 edges, 6 surfaces | | |

Note 1: Ta: Ambient temperature.

Note 2: In the standard condition, there is not display function NG issue occurred. All the cosmetic specification is judged before the reliability stress.

## H. Packing Form



CUSHION EPE
CUSHION EPE
CUSHION EPE
CUSHION EPE

CARTON

CUSHION EPE
CUSHION EPE

TAPE(60mm)

TAPE(60mm)
TAPE(60mm)
TAPE(60mm)

A/S BAG

OPEN

TAPE(60mm)

PET TRAY

TRAY TURN 180°
ONE STRATUM OF 6 PCS

Module

26 LAYER
26 LAYERS TO PUT 150 PCS

CARTON

MAX. CAPACITY:150 Panels
MAX. WEIGHT:  9.4±0.5 kg
MEAS.  520mm*340mm*250mm