SAMSUNG ELECTRONICS

Approval

TO : CUSTOMER

DATE : May. 4, 2007

*SAMSUNG TFT-LCD*

# MODEL NO. :LMS480HF02

Customer Approval

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*Any Modification of Spec is not allowed without SEC's permission.*

Approved by : *Se Chun, Oh*

**LCD DIVISION**

**Samsung Electronics Co . , LTD.**

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Approval

# Revision History

| Date | Rev. No. | Page | Summary |
|---|---|---|---|
| May.04.2006 | 000 | | Rev.000 was first issues. |

Approval

# Contents

## General Description

*** Description**

LMS480HF02 is a TMR(Transmissive with Micro Reflective) type color active matrix TFT (Thin Film Transistor) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching devices. This model is composed of a TFT-LCD module, a driver circuit and a back-light unit.

The resolution of a 4.8" contains 480x272(RGB) dots and can display up to 16.7M colors.

*** Features**

- triple-gate & Dual ASG
- Transmissive with Micro Reflective type and back-light with eight LEDs are available.
- TN(Twisted Nematic) mode.
- Column inversion mode.
- 24bit RGB Interface
- DE(Data Enable) & SYNC mode - DE, Vsync, Hsync, DOTCLK

*** Applications**

- Display terminals for PMP(Portable Multimedia Player) , Portable CNS(P-CNS) , MP3 application products.
- Display terminals for AV application products.

*** General information**

| Items | Specification | Unit | Note |
|---|---|---|---|
| Display area | 105.84 X 59.98 (4.8" diagonal) | mm | - |
| Driver element | a-Si TFT active matrix | - | - |
| Display colors | 16,777,212 | colors | - |
| Number of dots | 480(H) x 272 x RGB(V) | dot | - |
| Pixel arrangement | RGB stripe | - | - |
| Pixel pitch | 0.2205 x 0.2205 | mm | - |
| Display mode | Normally White | - | - |
| Viewing direction | 6 | o'clock | - |

*** Mechanical information**

| Item | | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Module size | Horizontal(H) | 114.04 | 114.24 | 114.44 | mm | - |
| | Vertical(V) | 72.68 | 72.88 | 73.08 | mm | (1) |
| | Depth(D) | 4.18 | 4.2 | 4.22 | mm | (1) |
| Weight | | - | 60.0 | 65.0 | g | (2) |

Note (1) Not include FPC.
Refer to the Outline Dimension in the "8. Outline Dimension" for further information.
(2) Module and Back-light unit are included.

# 1. Absolute Maximum Ratings

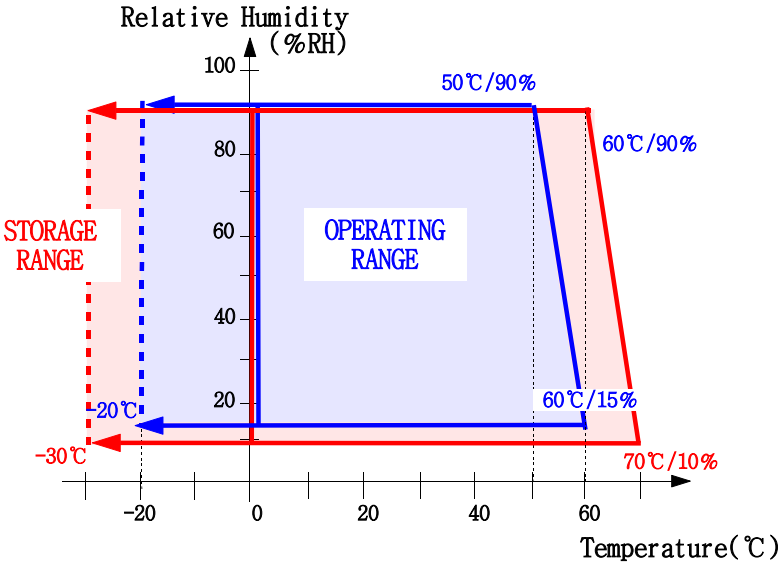
## 1.1 Absolute Ratings Of Environment

| ITEM | MIN | MAX | REMARK |
|---|---|---|---|
| Storage Temperature | -30℃ | 70℃ | Note(1) |
| Operating Temperature | -20℃ | 60℃ | Note(2)(3) |

Note(1) 90%RH maximum humidity, 60℃ maximum wet-bulb temperature

(2) When operated at a temperature lower than 0℃,
the LCD worked slowly and the screen appeared low-contrast images due to the characteristics of LC(Liquid Crystal).

(3) If any fixed pattern is displayed on LCD for minutes,
image-sticking phenomenon may occur.




Temperature & Humidity Graph at Absolute Environment

## 1.2 Electrical Absolute Ratings

(1) TFT-LCD Module

(Ta = 25 ± 2°C, VSS=GND=0)

| Item | Symbol | Min. | Max. | Unit | Note |
|---|---|---|---|---|---|
| Input voltage | VDD | -0.3 | 4.6 | V | - |

(2) Back-Light Unit

(Ta = 25 ± 2°C)

| Item | Symbol | Min. | Max. | Unit. | Note |
|---|---|---|---|---|---|
| Current | $I_B$ | - | 25 | mA | (1) |

Note (1) Permanent damage to the device may occur if maximum values are exceeded or reverse voltage is loaded.
Functional operation should be restricted to the conditions described under normal operating conditions.

## 2. Optical Characteristics

The following items are measured under stable conditions. The optical characteristics should be measured in a dark room or equivalent state with the methods shown in Note (1).
Measuring equipment: SR3, BM-7, EZ-Contrast

(Ta=25 ± 2°C , VDD=2.5V or 3.3V , fv=60Hz , fDCLK=9.2MHz , IL=20mA)

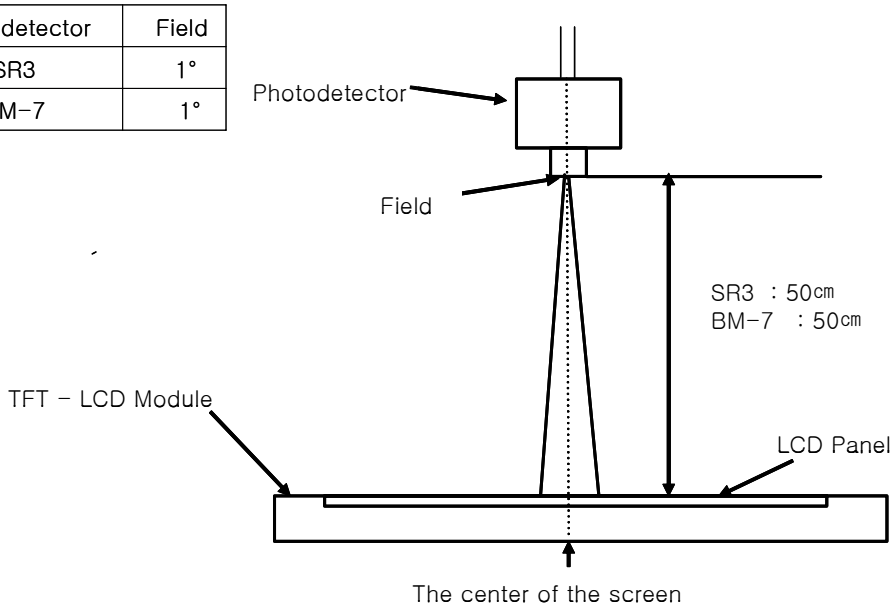
| Item | | Symbol | Condition | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|---|---|
| Contrast ratio (Center point) | | C/R | NOTE (1) | 200 | 400 | - | - | (2) SR3 |
| Luminance of white (Center point) | | $Y_L$ | | 300 | 400 | - | cd/㎡ | (3) SR3 |
| Response time | Rising | $T_R$ | Θ = 0 Φ = 0 Normal Viewing Angle B/L On | - | 5 | 15 | msec | (4) BM-7 |
| | Falling | $T_F$ | | - | 25 | 30 | | |
| Color chromaticity (CIE 1931) | White | Wx | | 0.277 | 0.327 | 0.377 | - | (5) SR3 |
| | | Wy | | 0.308 | 0.358 | 0.408 | | |
| | Red | Rx | | 0.553 | 0.603 | 0.653 | | |
| | | Ry | | 0.316 | 0.366 | 0.416 | | |
| | Green | Gx | | 0.296 | 0.346 | 0.396 | | |
| | | Gy | | 0.508 | 0.558 | 0.608 | | |
| | Blue | Bx | | 0.094 | 0.149 | 0.199 | | |
| | | By | | 0.084 | 0.134 | 0.184 | | |
| Viewing angle | Hor. | $\Theta_L$ | C/R ≥ 10 B/L On | 60 | 65 | - | Degrees | (6) Ez-Contrast |
| | | $\Theta_R$ | | 60 | 65 | - | | |
| | Ver. | $\Phi_H$ | | 45 | 50 | - | | |
| | | $\Phi_L$ | | 50 | 55 | - | | |

Note (1) Test Equipment Setup

After stabilizing and leaving the panel alone at a given temperature for 10 min , the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. 10 min after lighting the back-light. This should be measured in the center of screen.
Environment condition : Ta = 25 ± 2 °C

Back-Light On condition

| Photodetector | Field |
|---|---|
| SR3 | 1° |
| BM-7 | 1° |

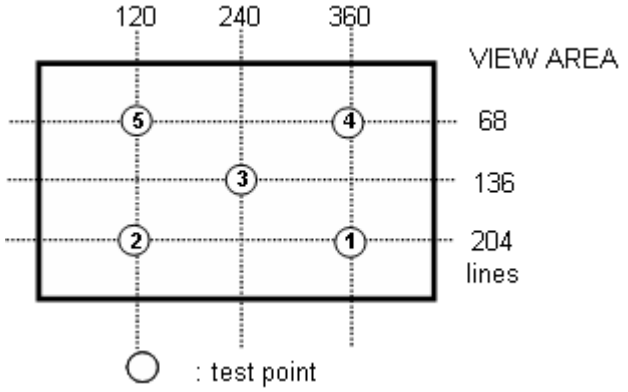



Note (2) Definition of Contrast Ratio (C/R) : Ratio of gray max (Gmax) & gray min (Gmin) at the center point

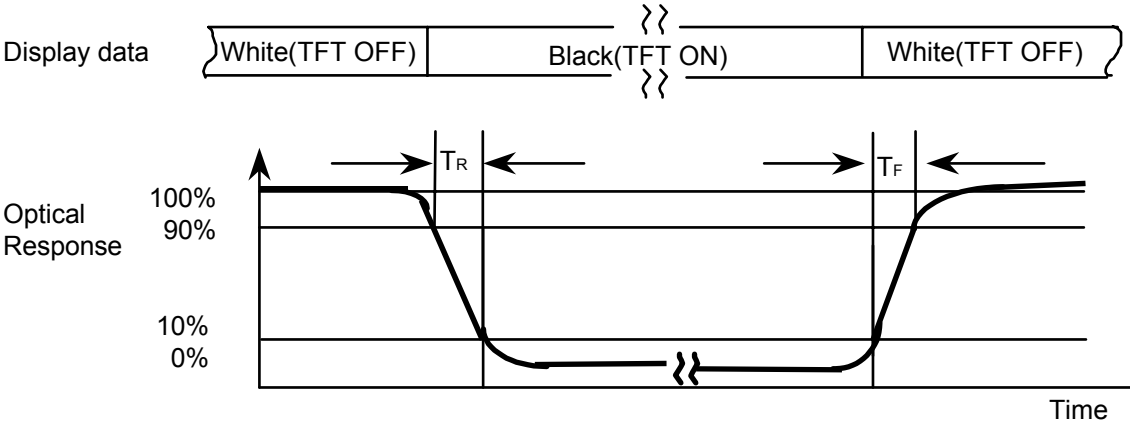
$$CR = \frac{G\max}{G\min}$$

* Gmax : Luminance with all pixels white
* Gmin : Luminance with all pixels black

Note (3) Definition of Luminance of White : Luminance of white at the center point (@③)



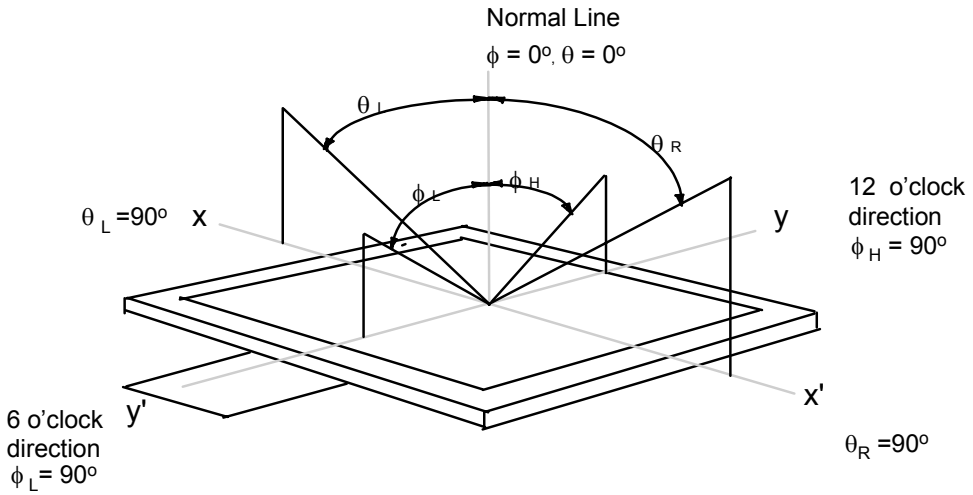
Note (4) Definition of Response time : Sum of Tr ,Tf




Note (5) Definition of Color Chromaticity (CIE 1931)

Color coordinate of white & red, green, blue at center point.

Note (6) Definition of Viewing Angle : Viewing angle range (CR≧10 )



## 3. Electrical Characteristics

### 3.1 TFT-LCD Module

Ta = 25 ± 2°C

| ITEM | | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|---|
| Logic supply voltage | | VDD | 2.25 | 2.5 | 2.9 | V | (1) |
| | | | 2.9 | 3.3 | 3.5 | V | (2) |
| Vsync Frequency | | fv | - | 60 | 70 | Hz | |
| Hsync Frequency | | $f_H$ | - | 17.26 | - | kHz | |
| Main Frequency | | $f_{DCLK}$ | - | 9.2 | 15.0 | MHZ | |
| Power Dissipation | White | - | - | 80 | 85 | mW | (3),(4) |
| | Black | | - | 85 | 90 | mW | |

Note (1). PWRSEL = Low

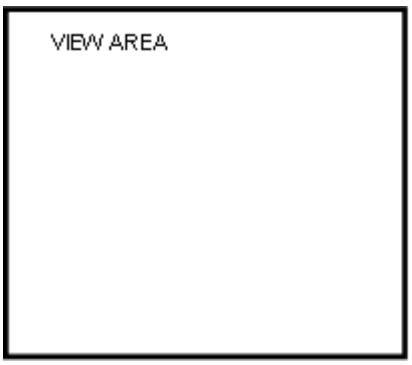
Note (2). PWRSEL = High

※ Refer to the "6. Input Terminal Pin Assignment"

Note (3). $f_V$=60Hz, $f_{DCLK}$=9.2MHZ, VDD=2.5V or 3.3V

Note (4). Power Dissipation check pattern

a) White Pattern




b) Black Pattern

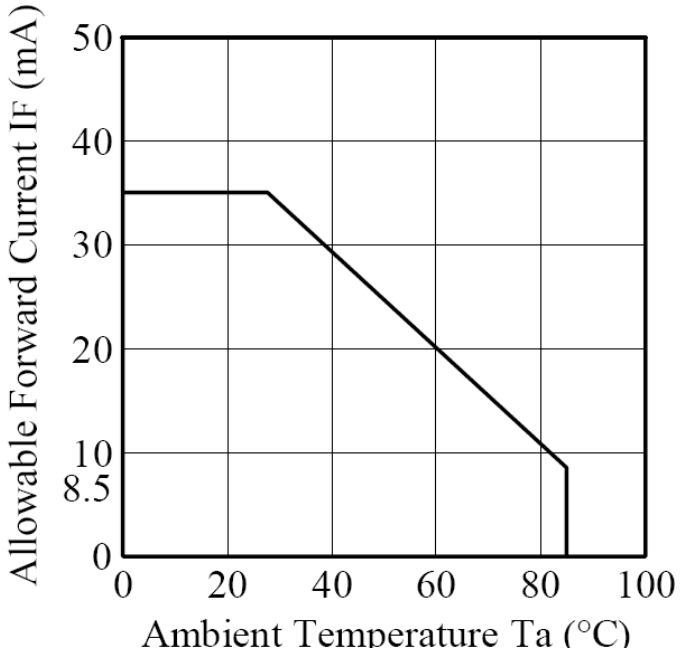
### 3.2 Back-Light unit

The back-light system is an edge-lighting type with eleven white LED(Light Emitting Diode)s.

(Ta=25 ± 2°C)

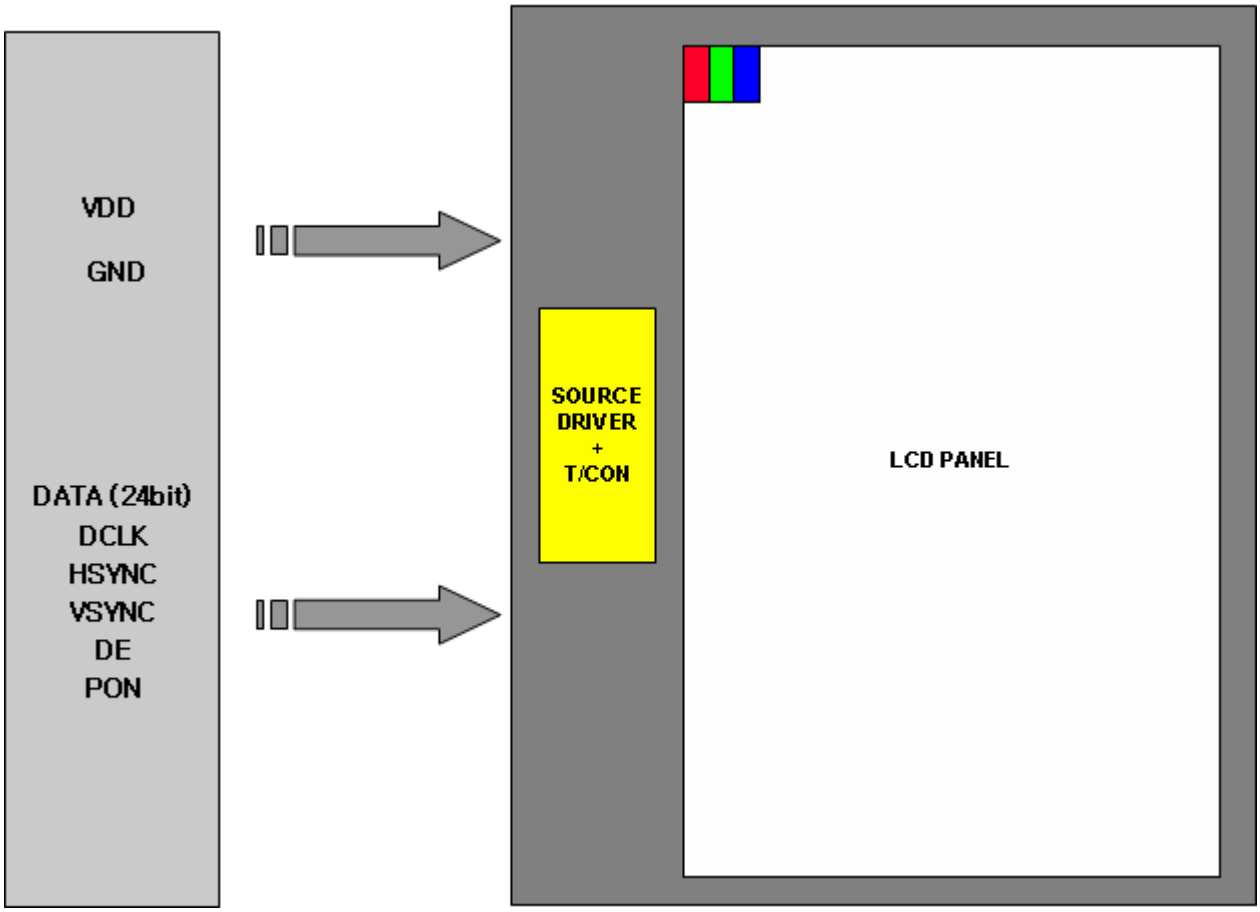
| Item | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| LEDs Current | $I_B$ | - | 18 | 20 | mA | (1) |
| Power Consumption | $P_{BL}$ | - | 655 | 730 | mW | |

Note (1) eleven LEDs parallel type.

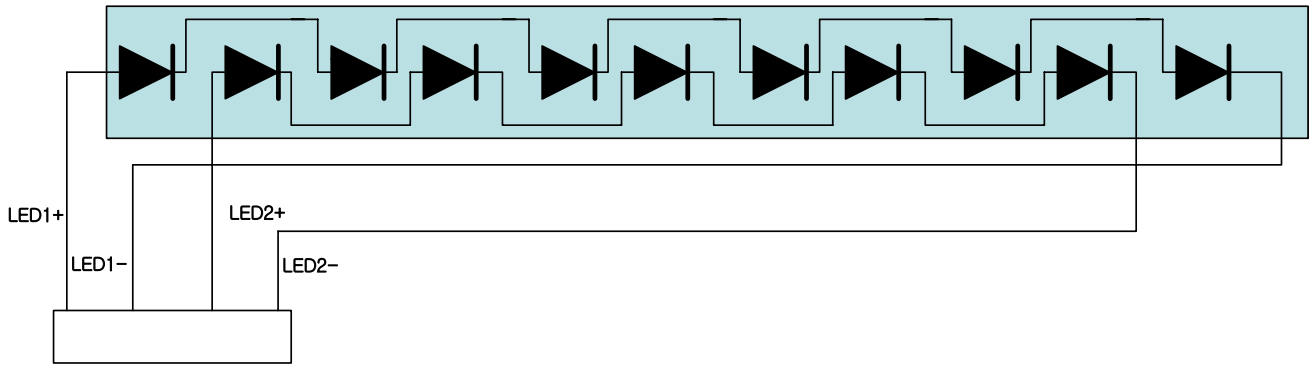


# 4. Block Diagram

## 4.1 TFT-LCD Module (Interface System Structure) with Back Light Unit



## 4.2 Back-light Unit



## 5. Input Terminal Pin Assignment

### 5.1 Input Signal & Power (Connector type : 45Pin, 0.5mm pitch, Top contact)

| Pin No. | Symbol | Description | Remark | Pin No. | Symbol | Description | Remark |
|---|---|---|---|---|---|---|---|
| 1 | VSS | Ground | | 24 | B3 | Blue data | |
| 2 | VSS | Ground | | 25 | B4 | Blue data | |
| 3 | VDD | Power Supply | 2.5V or 3.3V | 26 | B5 | Blue data | |
| 4 | VDD | Power Supply | 2.5V or 3.3V | 27 | B6 | Blue data | |
| 5 | R0 | Red data (LSB) | | 28 | B7 | Blue data (MSB) | |
| 6 | R1 | Red data | | 29 | VSS | Ground | |
| 7 | R2 | Red data | | 30 | PCLK | dot clock | |
| 8 | R3 | Red data | | 31 | PON | Disply on/off | |
| 9 | R4 | Red data | | 32 | HSYNC | Horizontal Sync | |
| 10 | R5 | Red data | | 33 | YSYNC | Vertical Sync | |
| 11 | R6 | Red data | | 34 | DE | Data Enable | |
| 12 | R7 | Red data (MSB) | | 35 | PWRSEL | VDD Power select | Low:2.5V<br>High:3.3V |
| 13 | G0 | Green data (LSB) | | 36 | VSS | Ground | |
| 14 | G1 | Green data | | 37 | Y2 | | |
| 15 | G2 | Green data | | 38 | X2 | | |
| 16 | G3 | Green data | | 39 | Y1 | | |
| 17 | G4 | Green data | | 40 | X1 | | |
| 18 | G5 | Green data | | 41 | VSS | Ground | |
| 19 | G6 | Green data | | 42 | LED1- | Ground(Cathode) | 6 LEDs- |
| 20 | G7 | Green data (MSB) | | 43 | LED1+ | LED Input Teminal(Anode) | 6 LEDs+ |
| 21 | B0 | Blue data (LSB) | | 44 | LED2- | Ground(Cathode) | 5 LEDs- |
| 22 | B1 | Blue data | | 45 | LED2+ | LED Input Teminal(Anode) | 5 LEDs+ |
| 23 | B2 | Blue data | | | | | |

## 5.2 Input Signal,Basic Display Colors and Gray Scale of Each Colors

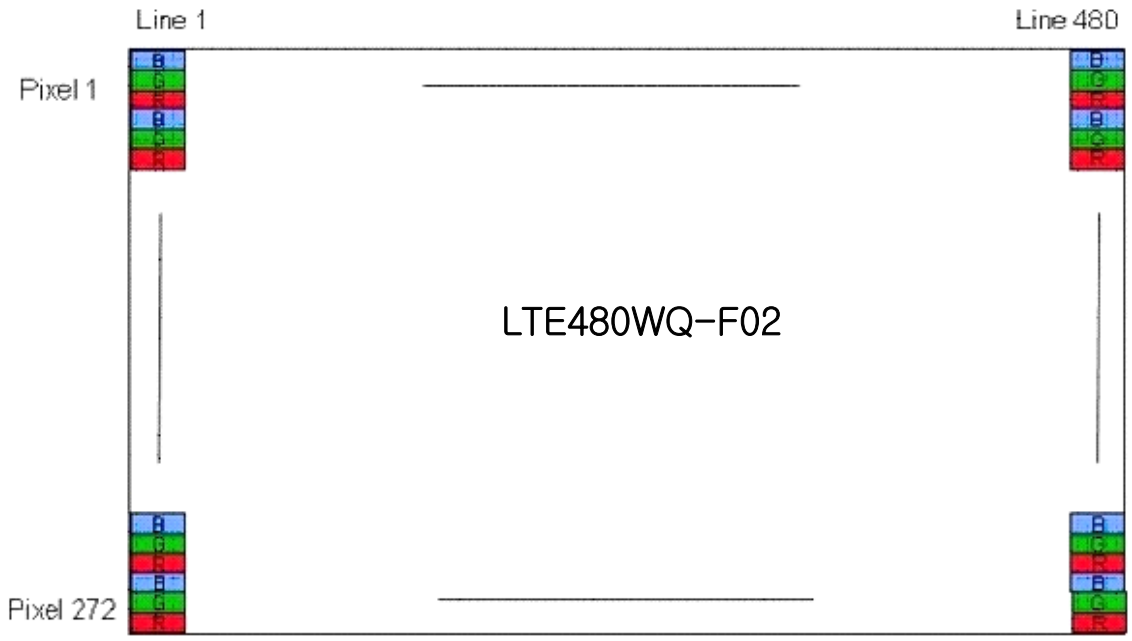
| COLOR | DISPLAY | DATA SIGNAL | | | | | | | | | | | | | | | | | | | | | | | | GRAY SCALE LEVEL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | RED | | | | | | | | GREEN | | | | | | | | BLUE | | | | | | | | |
| | | R0 | R1 | R2 | R3 | R4 | R5 | R6 | R7 | G0 | G1 | G2 | G3 | G4 | G5 | G6 | G7 | B0 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | |
| BASIC COLOR | 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 | 1 | 1 | 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 | R0 |
| | DARK ↑ | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | R1 |
| | | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | R2 |
| | | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | R3~R252 |
| | ↓ LIGHT | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | |
| | | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | R253 |
| | | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | R254 |
| | 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 | R255 |
| 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 | G0 |
| | DARK ↑ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | G1 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | G2 |
| | | : | | | : | : | : | : | : | : | | | : | : | : | : | : | : | | | : | : | : | : | : | G3~G252 |
| | ↓ LIGHT | : | | | : | : | : | : | : | : | | | : | : | : | : | : | : | | | : | : | : | : | : | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | G253 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | G254 |
| | 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 | G255 |
| 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 | B0 |
| | DARK ↑ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | B1 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | B2 |
| | | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | B3~B252 |
| | ↓ LIGHT | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | : | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | B253 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | B254 |
| | 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 | B255 |

Note) Definition of Gray :

Rn : Red Gray, Gn : Green Gray, Bn : Blue Gray (n = Gray level)

Input Signal : 0 = Low level voltage, 1 = High level voltage

## 5.3 PIXEL FORMAT



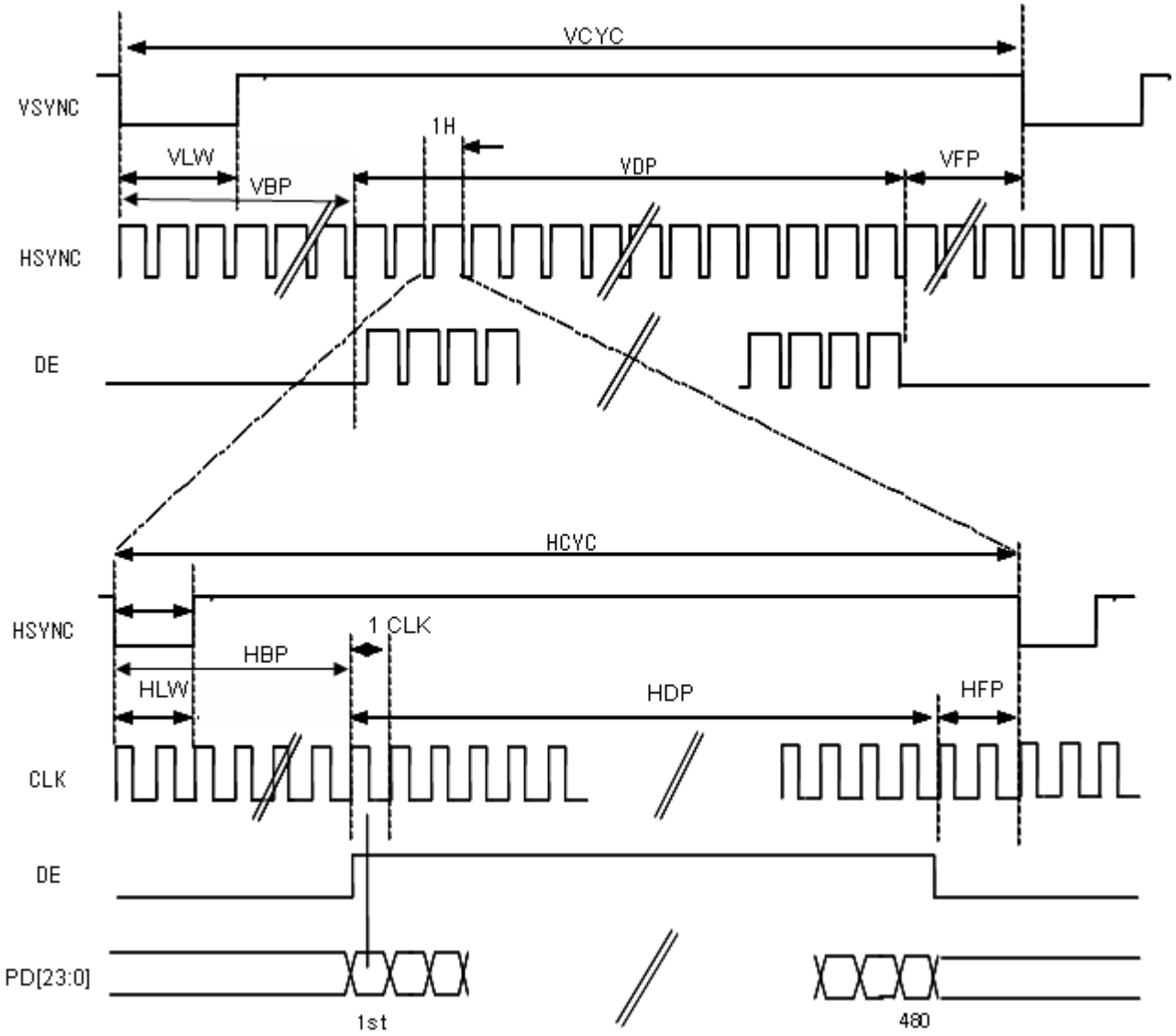
## 6. INTERFACE TIMING

### 6.1. Vertical timing

| Signal | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Frame Frequency | fFRM | - | 60 | 70 | Hz | |
| VSYNC(Frame) Period | VCYC | 239 | 288 | 335 | H | |
| VSYNC Low width | VLW | 1 | 10 | - | H | |
| Vertical Display Period | VDP | | 272 | - | H | |
| Vertical Back porch | VBP | - | 12 | - | H | |
| Vertical Front porch | VFP | 2 | 4 | - | H | |

### 6.2. Horizontal timing

| Signal | Symbol | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| HSYNC(1H) Period | HCYC | 490 | 533 | 605 | DOTCLK | |
| HSYNC Low width | HLW | 4 | 41 | - | DOTCLK | |
| Horizontal Display Period | HDP | - | 480 | - | DOTCLK | |
| Horizontal Back porch | HBP | 8 | 45 | - | DOTCLK | |
| Horizontal Front porch | HFP | 2 | 8 | - | DOTCLK | |
| DOTCLK Frequence | $f_{DOTCLK}$ | - | 9.2 | 15 | MHz | @fFRM=60Hz |


VCYC
VSYNC
1H
VLW
VBP
VDP
VFP
HSYNC
DE
HCYC
HSYNC
1 CLK
HBP
HLW
HDP
HFP
CLK
DE
PD[23:0]
1st
480

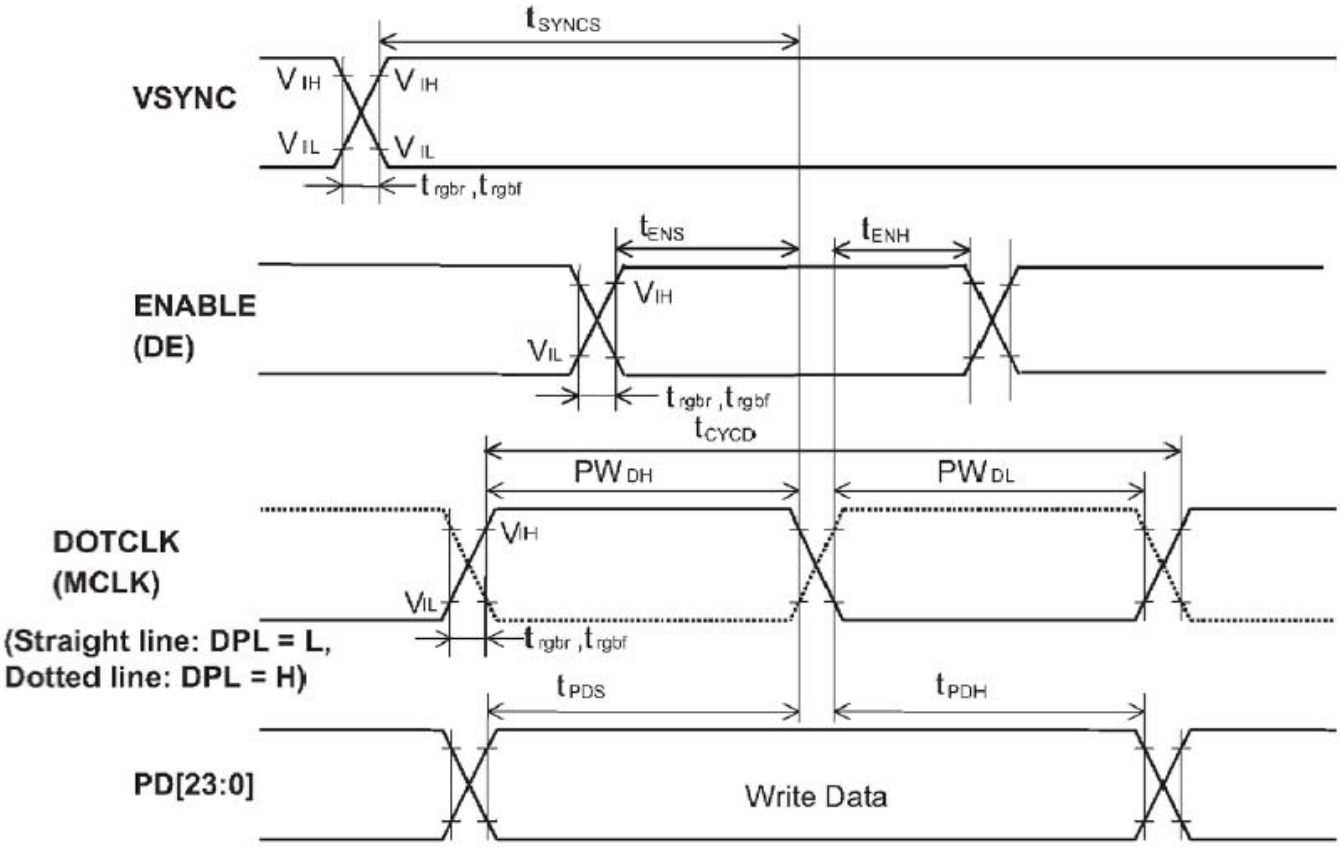
### 6.3. AC characteristics

※ Operating at VDD=2.25~2.9V , Ta = -40℃~+85℃

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| VSYNC,HSYNC setup time | $t_{SYNCS}$ | 10 | - | - | ns |
| ENABLE (DE) setup time | $t_{ENS}$ | 10 | - | - | |
| ENABLE (DE) hold time | $t_{ENH}$ | 10 | - | - | |
| DOTCLK "Low" level pulse width | $P_{WDL}$ | 25 | - | - | |
| DOTCLK "High" level pulse width | $P_{WDH}$ | 25 | - | - | |
| DOTCLK cycle time | $t_{CYCD}$ | 66.7 | - | - | |
| Data setup time | $t_{PDS}$ | 10 | - | - | |
| Data hold time | $t_{PDH}$ | 10 | - | - | |
| DOTCLK,VSYNC,HSYNC clock rise/fall time | $t_{rgbr}$ $t_{rgbf}$ | - | - | 5 | |

※ Operating at VDD=2.9~3.5V , Ta = -40℃~+85℃

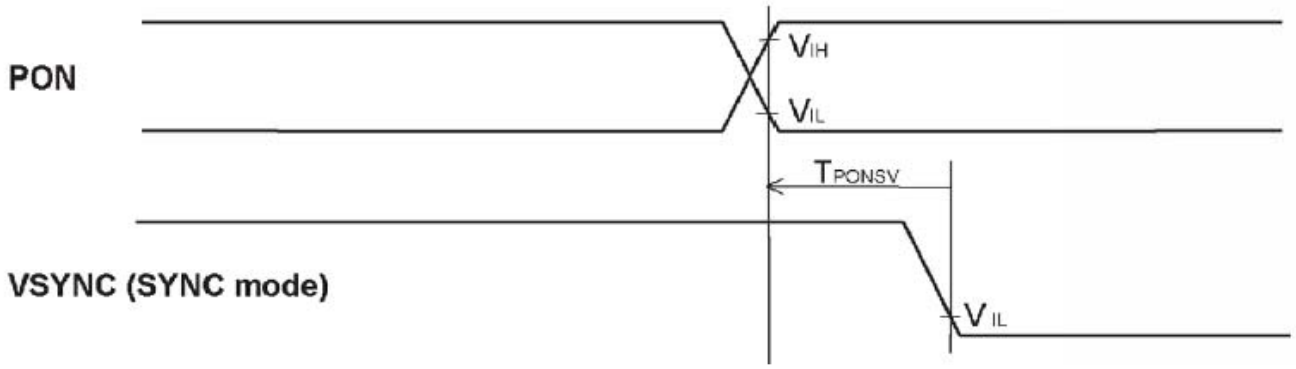
| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| VSYNC,HSYNC setup time | $t_{SYNCS}$ | 10 | - | - | ns |
| ENABLE (DE) setup time | $t_{ENS}$ | 10 | - | - | |
| ENABLE (DE) hold time | $t_{ENH}$ | 10 | - | - | |
| DOTCLK "Low" level pulse width | $P_{WDL}$ | 25 | - | - | |
| DOTCLK "High" level pulse width | $P_{WDH}$ | 25 | - | - | |
| DOTCLK cycle time | $t_{CYCD}$ | 66.7 | - | - | |
| Data setup time | $t_{PDS}$ | 10 | - | - | |
| Data hold time | $t_{PDH}$ | 10 | - | - | |
| DOTCLK,VSYNC,HSYNC clock rise/fall time | $t_{rgbr}$ $t_{rgbf}$ | - | - | 5 | |


tSYNCS
VSYNC
VIH
VIL
VIH
VIL
trgbr , trgbf
tENS
tENH
ENABLE
(DE)
VIH
VIL
trgbr , trgbf
tCYCD
PWDH
PWDL
DOTCLK
(MCLK)
VIH
VIL
trgbr , trgbf
(Straight line: DPL = L,
Dotted line: DPL = H)
tPDS
tPDH
PD[23:0]
Write Data

6.4. PON timing characteristics.

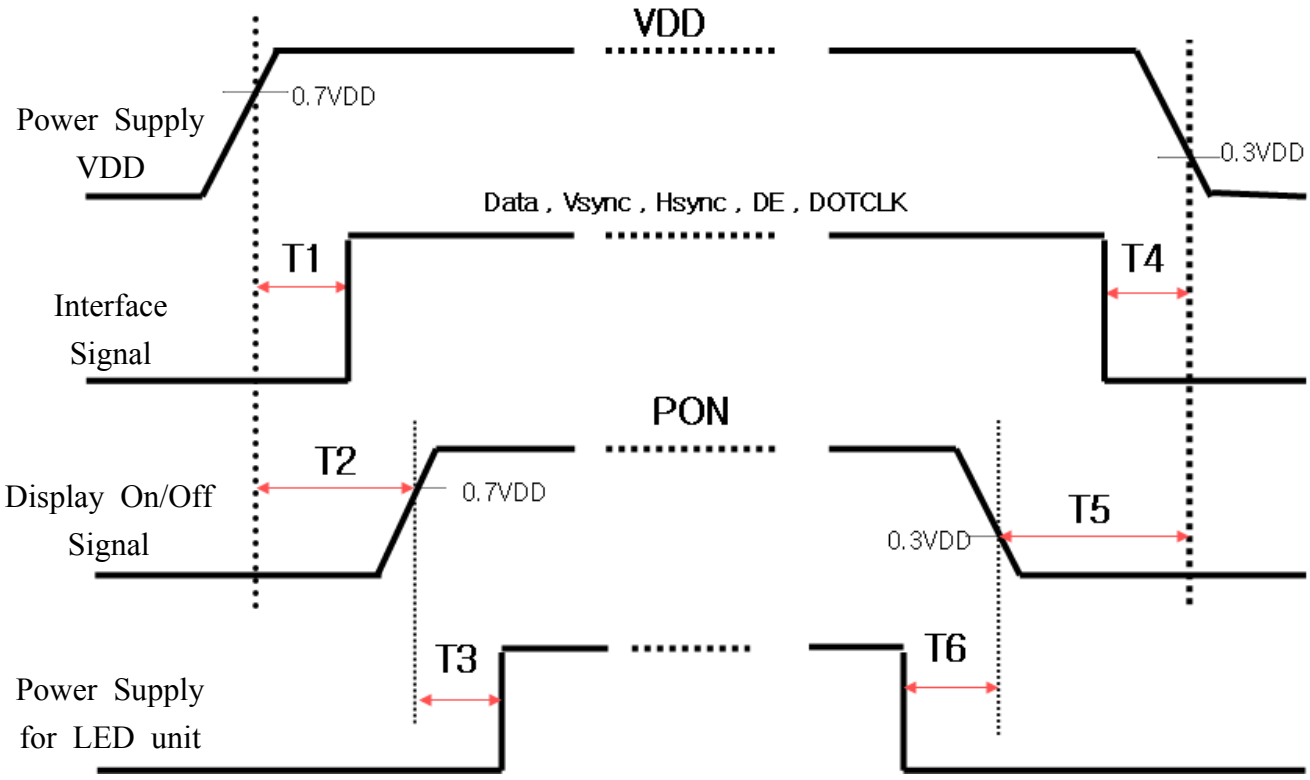
※ Operating at VDD=2.25~3.5V , Ta = -40℃~+85℃

| Item | Symbol | Min. | Typ. | Max. | unit |
|---|---|---|---|---|---|
| PON setup (SYNC mode) | $t_{PONSV}$ | 10 | - | - | DOTCLK |



## 7. Power On/Off Sequence

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



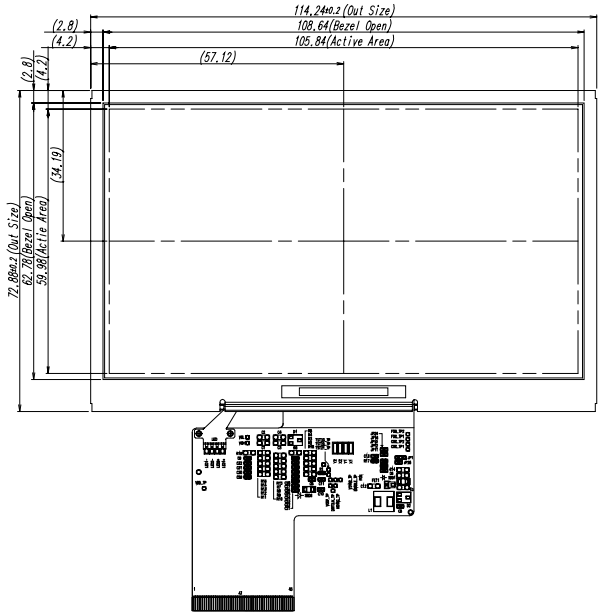

| Symbol | Specification | Note |
|---|---|---|
| T1 | 0 ms < T1 < T2 | |
| T2 | 5 ms < T2 | (1) |
| T3 | 10 frames < T3 | |
| T4 | 10 ms < T4 < T5 | |
| T5 | (5 frames + T4) < T5 | (1) |
| T6 | 10 frames < T6 | |

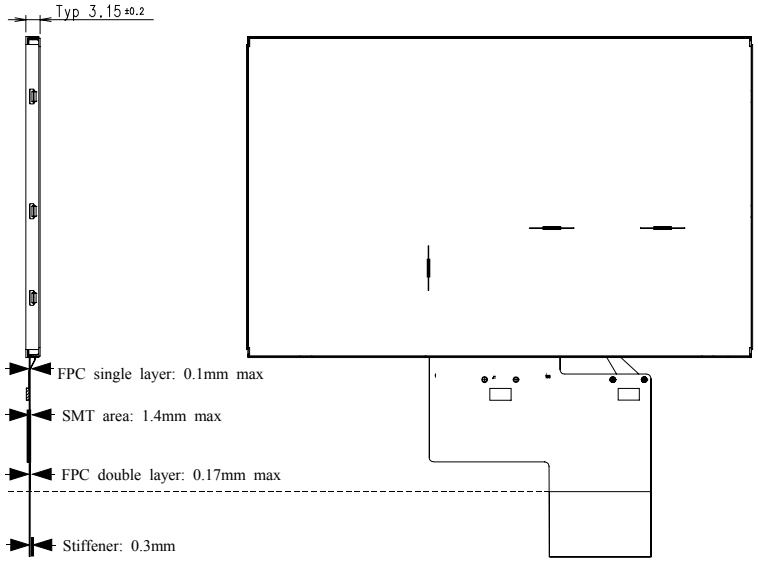
Note(1) Refer to "6-4. PON timing characteristics."

Preliminary

## 8. Outline Dimension

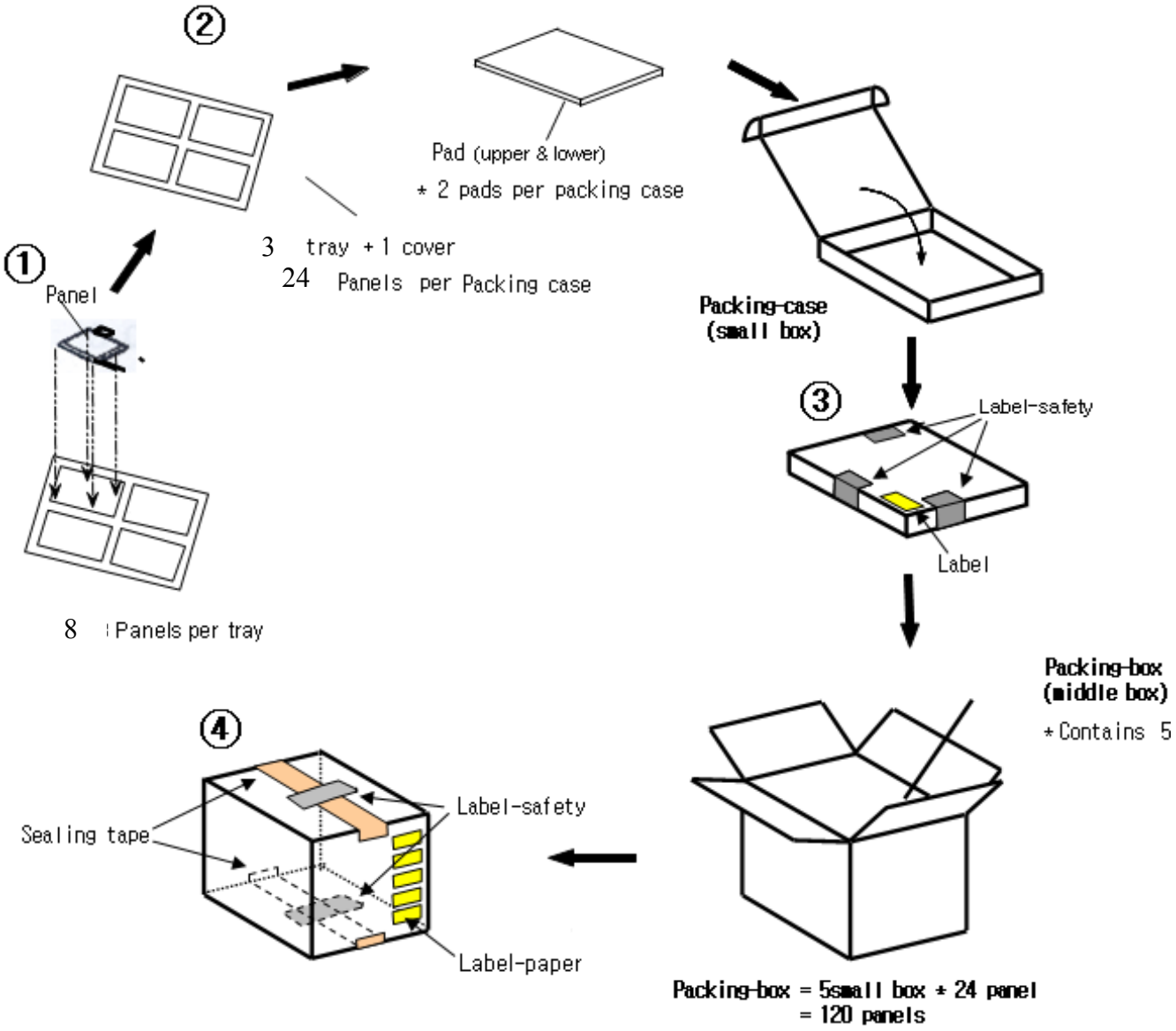
| NO | PART NAME | CODE NO | SPECIFICATION | Q'TY | SPEC NO | REMARK |
|---|---|---|---|---|---|---|
| | | | | | | |




| REVISION | | GENERAL TOLERANCE | | | | REV | DATE | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | STEP | LEVEL 1 | LEVEL 2 | LEVEL 3 | UNIT | mm | DRA'N BY | DES'D BY | CHK'D BY | APP'D BY | MODEL NAME | LMS480HF02 |
| | | 0 < X ≤ 4 | ±0.05 | ±0.1 | ±0.2 | SCALE | 1/1 | W.H.KIM | | S.H.LEE | Y.B.CHU | PART/SHEET NAME | OUTLINE DIMENSION SHEET 1/1 |
| | | 4 < X ≤ 16 | ±0.08 | ±0.15 | ±0.3 | TOLERANCE LEVEL3 | | 07.05.04 | | 07.05.04 | 07.05.04 | | |
| | | 16 < X ≤ 64 | ±0.12 | ±0.25 | ±0.5 | SAMSUNG ELECTRONICS | | | | | SPEC. NO | CODE NO. | VER. 000 |
| | | 64 < X ≤ 256 | ±0.25 | ±0.4 | ±0.8 | | | | | | | | |

## 9. Packing




Note

(1) Total : Case: Approx. : 3 Kg
Box: Approx. : 15.5 Kg

(2) Size : Case: 490(W) x 342(D) x 58(H)
Box: 505(W) x 355(D) x 312(H)

(3) Place the panels in the tray facing the direction shown in the figure.

(4) Place 4 tray and cover(empty tray) and pads inside the packing-case.

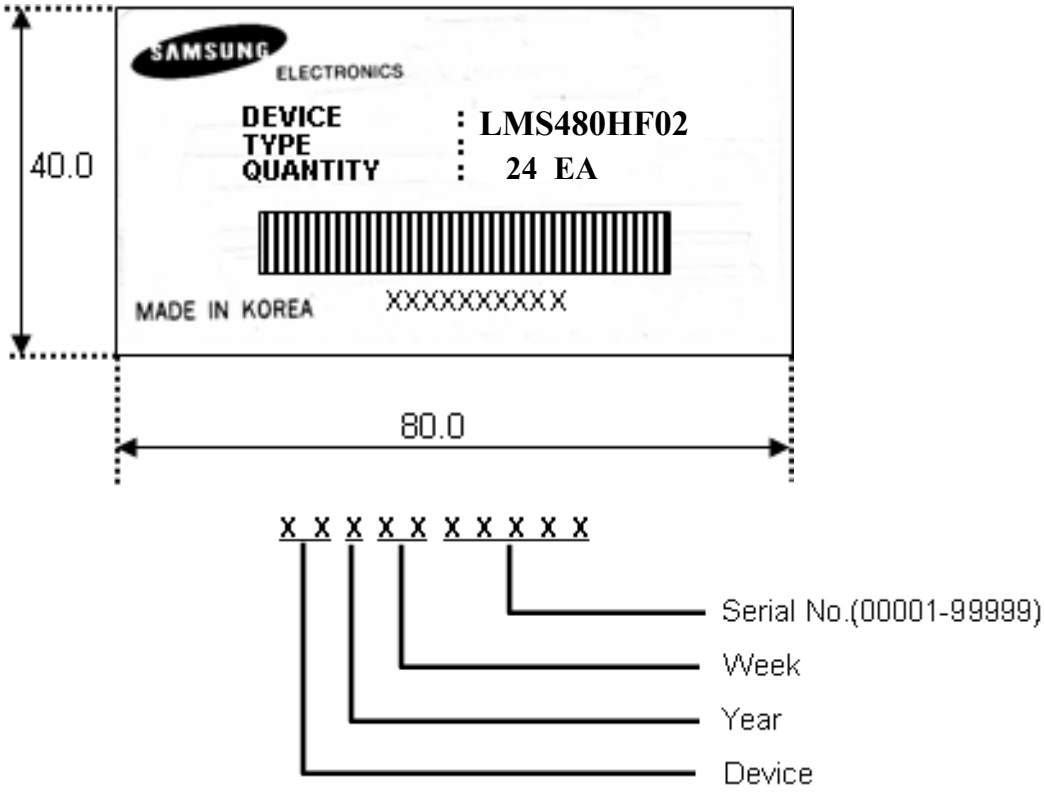
(5) Place 5 packing-case inside the packing-box. (Affix the label)

(6) Seal the packing-box. Affix the label-safety.

## 10. Marking & Others

A nameplate bearing followed by is affixed to a shipped product at the Specified location on each product.

(1) Packing case attach



# 11. General Precautions

## 11.1 Handling

(a) When the module is assembled, it should be attached to the system firmly. Be careful not to twist and bend the module.

(b) Refrain from strong mechanical shock and / or any force to the module. In addition to damage, this may cause improper operation or damage to the module and back-light unit.

(c) Note that polarizers are very fragile and could be easily damaged. Do not press or scratch the surface harder than a HB pencil lead.

(d) Wipe off water droplets or oil immediately. If you leave the droplets for a long time, Staining and discoloration may occur.

(e) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.

(f) The desirable cleaners are water, IPA(Isopropyl Alcohol) or Hexane. Do not use Ketone type materials(ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.

(g) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs or clothes, it must be washed away thoroughly with soap.

(h) Protect the module from static , it may cause damage to the Integrated Gate Circuit.

(i) Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.

(j) Do not disassemble the module.

(k) Do not adjust the variable resistor which is located on the back side.

(l) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.

(m) Pins of I/F connector shall not be touched directly with bare hands

**11.2 Storage**

(a) Do not leave the panel in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0 to 35°C and relative humidity of less than 70%.

(b) Do not store the TFT-LCD module in direct sunlight.

(c) The module shall be stored in a dark place. It is prohibited to apply sunlight or fluorescent light during the store.

**11.3 Operation**

(a) Do not connect, disconnect the module in the "Power On" condition.

(b) Power supply should always be turned on/off by the "Power on/off sequence"

(c) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimize the interference.

**11.4 Others**

(a) The Liquid crystal is deteriorated by ultraviolet, do not leave it in direct sunlight and strong ultraviolet ray for many hours.

(b) Avoid condensation of water. It may result in improper operation or disconnection of electrode.

(c) Do not exceed the absolute maximum rating value. ( the supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on) Otherwise the panel may be damaged.

(d) If the panel displays the same pattern continuously for a long period of time, it can be the situation when the image "Sticks" to the screen.

(e) This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.

(f) Avoid shortness between LED soldering pad.