Display Elektronik GmbH

# DATA SHEET

## MIP Display

# DE MIP176176A-W

(1.28“ Memory in Pixel, mono)

**Product Specification** **Ver.: 2**

**28.05.2026**

Revise Records

| Rev. | Date | Contents | Written | Approved |
|---|---|---|---|---|
| 0 | 28.11.2023 | Preliminary Specification | A | A |
| 1 | 02.02.2024 | Update Power Consumption | A | A |
| 2 | 28.05.2026 | Modify Display Resolution<br>Change “test” to “Reliability Condition” | A | MH |
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Special Notes

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|---|---|
| Note1. | |
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# Contents

## 1 General Description and Features

The specifications are applied to LTPS (Memory in Pixel type) display DE MIP176176A-W

### 1.1 Features

- Reflective type
- ROHS Compliance

### 1.2 LCD Module

| Item | Specification | Unit |
|---|---|---|
| Screen Size | 1.28 | Inch |
| Display Resolution | 176 x 176 | Dot |
| Pixlel Pitch | 0.1308 x 0.1308 | mm |
| Active Area | 23.208 x 23.208 | mm |
| Outline Dimension | 25.62 x 27.72 x 0.745 mm | mm |
| Display Mode | MPI, Normally White (Reflective type) | -- |
| Pixel Arrangement | Square | -- |
| Surface Treatment | Anti-Glare (AG) | -- |

## 2 Mechanical Information

| Item | | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Module Size | Horizontal (H) | -- | 25.62 | -- | mm | -- |
| | Vertical (V) | -- | 27.72 | -- | mm | (1) |
| | Thickness (T) | -- | 0.745 | -- | mm | (1) |
| Weight | | -- | 1.1 | -- | g | -- |

Note (1) Not include FPC.
Refer to the Dimensional Outlines for further information.

# 3 Electrical Specifications

## 3.1 Absolute Max. Ratings

### 3.1.1 Absolute Ratings of Environment

If the operating condition exceeds the following absolute maximum ratings, the TFT LCD module may be damaged permanently.

(Ta=25±2°C, $V_{SS}$=GND=0)

| Item | Symbol | Min. | Max. | Unit | Note |
|---|---|---|---|---|---|
| Storage Temperature | $T_{STG}$ | -30 | 80 | °C | (1) |
| Operating Temperature | $T_{OPR}$ | -20 | 70 | °C | (1,2) |

Note (1) Ta≦40°C: 85%RH Max.

Ta> 40°C: Absolute humidity needs to be equal or less than the numeric value at the condition of Ta=40°C, 85%RH.

Note (2) Only operation is guarantied at operating temperature. Contrast, response time, another display quality are evaluated at +25°C.

## 3.2 Electrical Absolute Rating

### 3.2.1 TFT-LCD Module

(Ta=25±2°C, $V_{SS}$=GND=0)

| Item | Symbol | Value | | Unit | Condition |
|---|---|---|---|---|---|
| | | Min. | Max. | | |
| Power Supply Voltage | $V_{DD}$ | -0.3 | 3.6 | V | - |

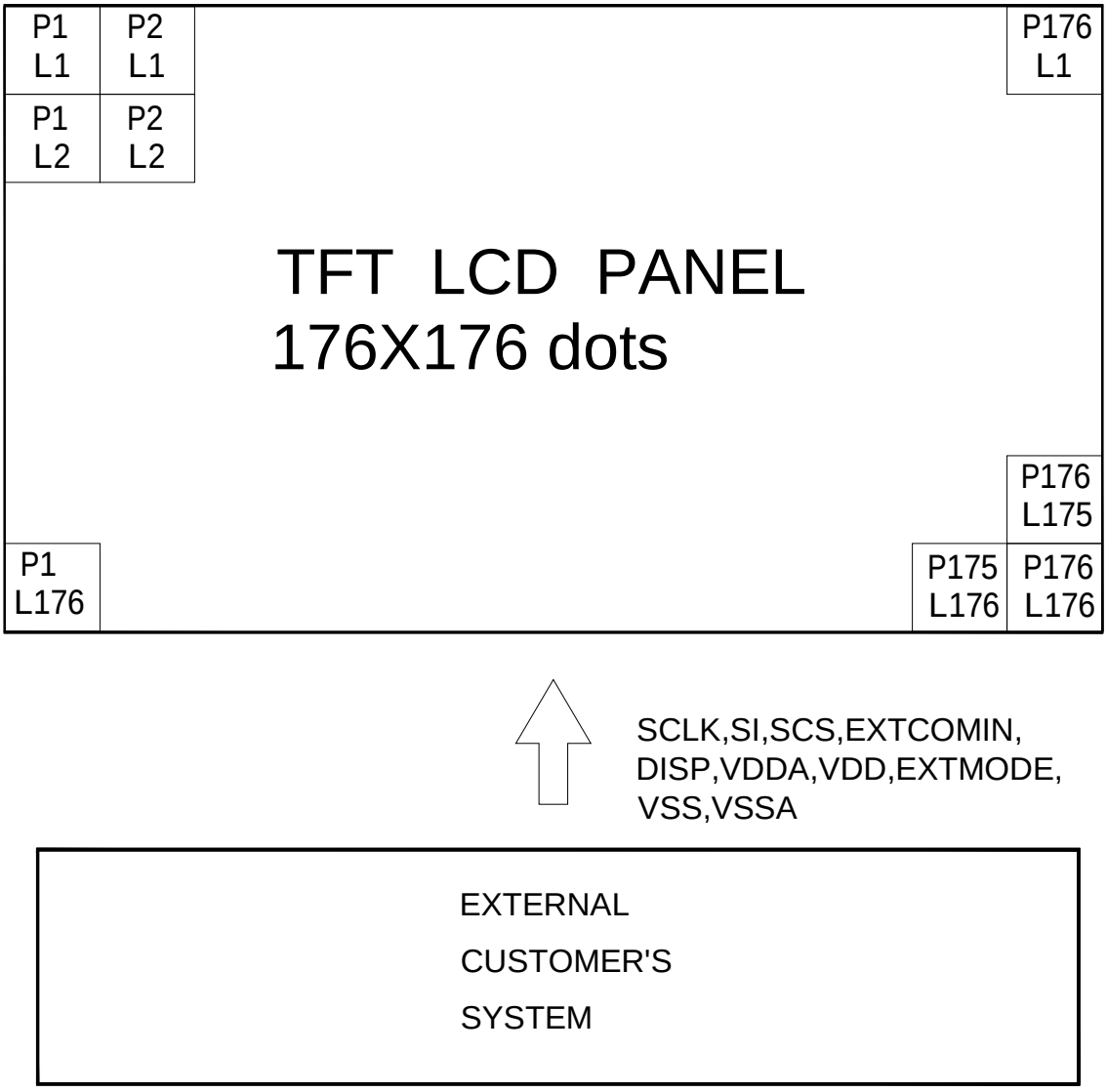
# 4 Electrical Characteristics

## 4.1 TFT-LCD Module

(Ta=25±2°C, $V_{DD}$ =3.3V)

| Item | | Symbol | Value | | | Unit | Condition |
|---|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | | |
| Power Supply Voltage | | $V_{DD}$ | 2.7 | 3.0 | 3.3 | V | - |
| Input Voltage for Logic | H Level | VIH | $V_{DD-0.1}$ | $V_{DD}$ | $V_{DD}$ | V | - |
| | L Level | VIL | VSS | VSS | VSS+0.1 | V | - |
| No Update Mode | Black display | -- | -- | 25 | 85 | μW | - |
| date Update Mode | Vertical stripe display | -- | -- | 30 | 90 | μW | - |

## 5 Block Diagram



## 6 Input Terminal Pin Assignment

### 6.1 Pin Assignment

| Pin No. | Symbol | I/O | Function | Remark |
|---|---|---|---|---|
| 1 | SCLK | P | Serial Clock Signal | - |
| 2 | SI | P | Serial Data Input Signal | - |
| 3 | SCS | P | Chip Select Signal | - |
| 4 | EXTCOMIN | P | COM Inversion Polarity Input | Note1 |
| 5 | DISP | I | Display ON/OFF Switching Signal | Note2 |
| 6 | VDDA | I | Power Supply for Analog | - |
| 7 | VDD | I | Power Supply for Logic | - |
| 8 | EXTMODE | I | COM Inversion Mode Select Terminal | Note1 |
| 9 | VSS | I | Logic Ground | - |
| 10 | VSSA | I | Analog Ground | - |

Note1:

When EXTMODE is “Hi”, EXTCOMIN signal is enable.

When EXTMODE is “Lo” ,serial input flag is enable.

“Hi”mode ； connect the EXTMODE to VDD,

“Lo” mode ； connect the EXTMODE and EXTCOMIN to VSS.

Note2:

The display ON/OFF signal is only for display.

Data in the memory will be saved at the time of ON/OFF.

When it’s “Hi”, data in the memory will display, when it’s “Lo”, white color will diaplay and data in the memory will be saved.

## 7 Optical Characteristics

The following items are measured under stable conditions. The optical characteristics should be measured in a dark room
Measuring equipment: BM-7A

(Ta=25±2°C , VDD =3.3V, $I_f$=40mA)

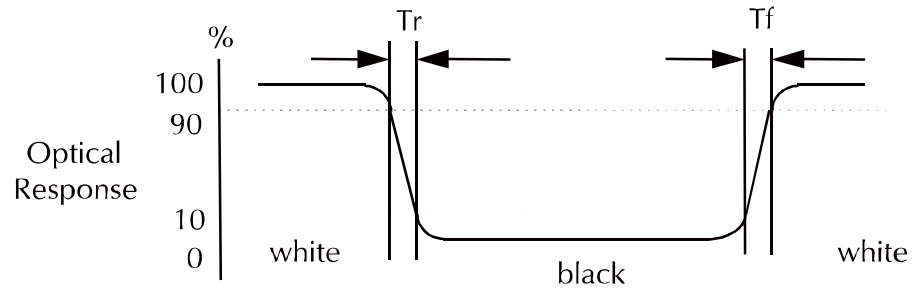
| Item | | Symbol | Condition | Min | Type | Max | Unit | Note |
|---|---|---|---|---|---|---|---|---|
| Response Time | | $T_R$ | θ=0° | -- | 10 | (20) | ms | -- |
| | | $T_F$ | | -- | 20 | (40) | ms | |
| Contrast Ratio | | CR | At optimized Viewing Angle | 13 | 18 | -- | -- | -- |
| Transmissivity Ratio | | T | -- | - | (0.3) | - | | % |
| Color Chromaticity | White | Wx | θ=0° normal Viewing Angle | 0.26 | 0.31 | 0.36 | -- | -- |
| | | Wy | | 0.28 | 0.33 | 0.38 | -- | |
| Viewing Angle (6H) | Hor. | $\theta_R$ | CR≥10 | 40 | 60 | | Degree | -- |
| | | $\theta_L$ | | 40 | 60 | | | |
| | Ver. | $\theta_U$ | | 40 | 60 | | | |
| | | $\theta_D$ | | 40 | 60 | | | |

a. Test equipment setup

After stabilizing and leaving the panel alone shall be warmed up for the stable operation of LCM, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-5A/BM-7(fast) with a viewing angle of 2° at a distance of 50cm and normal direction.

b. Definition of response time: Tr and Tf

The response time is defined as the following figure and shall be measured by switching the input signal for “black” and “white”.

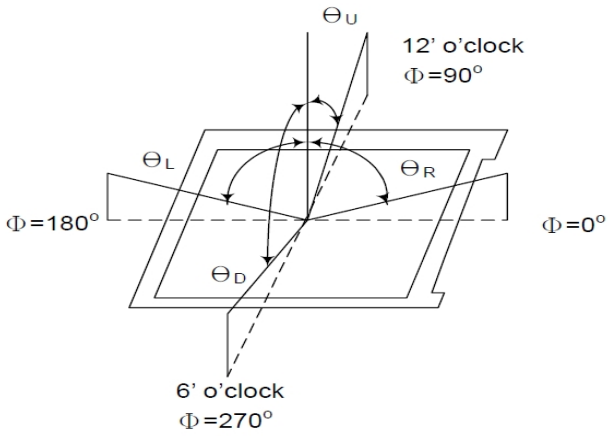



c. Definition of contrast ratio:

$$\text{Contrast Ratio (CR)} = \frac{\text{Brightness measured when LCD is at “white state”}}{\text{Brightness measured when LCD is at “black state”}}$$

d. Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

e. View Angle



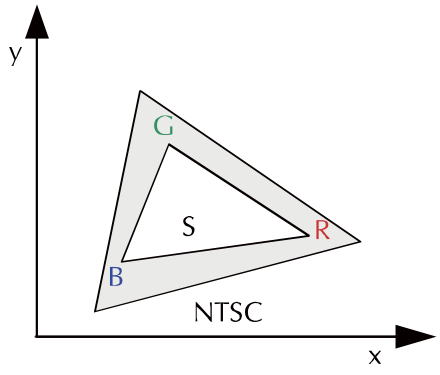

f. Definition of Luminance of White: Luminance of white at the center points

| | |
|---|---|
| Light Source of Back-Light Unit | LED Type |

g. Definition of White Uniformity

$$\text{White Uniformity} = \frac{\text{Min. luminance of white among 9-points}}{\text{Max. luminance of white among 9-points}} \quad X \quad 100\%$$

h. The definition of Color Gamut -Color Chromaticity CIE 1931
Color coordinate of white & red, green, blue at center point.
Color Gamut : NTSC(%) = ( RGB Triangle Area / NTSC Triangle Area ) x 100



## 8 Gate Line Address Setting

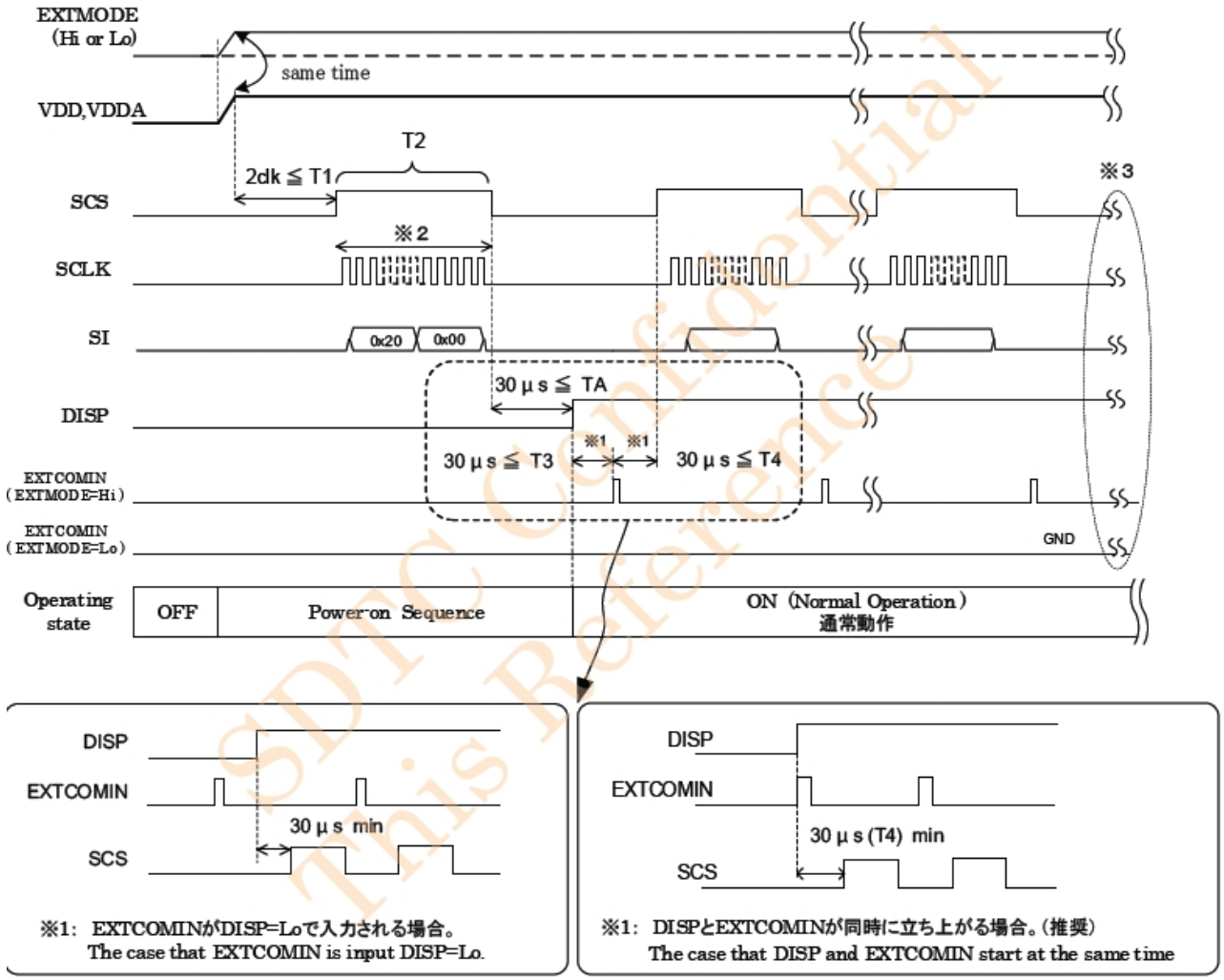
| GL | AG0 | AG1 | AG2 | AG3 | AG4 | AG5 | AG6 | AG7 |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 5 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 7 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 9 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 10 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| 11 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| 13 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| 14 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| 15 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 17 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 18 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| 19 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| 20 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| 21 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| 22 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| 23 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| 24 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| 25 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| 26 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 |
| 27 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 |
| 28 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 |
| 29 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 |
| 30 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 |
| 31 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 |
| 32 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 33 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 34 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| 35 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| 36 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| 37 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| 38 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |
| 39 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |
| 40 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |
| 41 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |
| 42 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 |
| 43 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 |
| 44 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 |
| 45 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 |
| 46 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 |
| 47 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 |
| 48 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| 49 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| 50 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| 51 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| 52 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 |
| 53 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 |
| 54 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 |
| 55 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 |
| 56 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 |
| 57 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 |
| 58 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 |
| 59 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 |
| 60 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 |
| 61 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 |
| 62 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 |
| 63 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 |
| 64 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 65 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 66 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| 67 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| 68 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 69 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| 70 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| 71 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| 72 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| 73 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| 74 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |
| 75 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 |
| 76 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 |
| 77 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 |
| 78 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 |
| 79 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 |
| 80 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| 81 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| 82 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| 83 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| 84 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| 85 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| 86 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 |
| 87 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 |
| 88 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 |
| 89 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 |
| 90 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 |
| 91 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 |
| 92 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 |
| 93 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 |
| 94 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |
| 95 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |
| 96 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| 97 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| 98 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 |
| 99 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 |
| 100 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| 101 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| 102 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 |
| 103 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 |
| 104 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 |
| 105 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 |
| 106 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 |
| 107 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 |
| 108 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| 109 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| 110 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 |
| 111 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 |
| 112 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| 113 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| 114 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 |
| 115 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 |
| 116 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 |
| 117 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 |
| 118 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 |
| 119 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 |
| 120 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 |
| 121 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 |
| 122 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 |
| 123 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 |
| 124 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 125 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 126 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 127 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 128 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 129 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 130 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 131 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 132 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| 133 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| 134 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| 135 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| 136 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| 137 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| 138 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 |
| 139 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 |
| 140 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 |
| 141 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 |
| 142 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 |
| 143 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 |
| 144 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| 145 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| 146 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| 147 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| 148 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 |
| 149 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 |
| 150 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 |
| 151 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 |
| 152 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 153 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| 154 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 |
| 155 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 |
| 156 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 |
| 157 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 |
| 158 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 |
| 159 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 |
| 160 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| 161 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| 162 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |
| 163 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |
| 164 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 |
| 165 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 |
| 166 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 |
| 167 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 |
| 168 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 |
| 169 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 |
| 170 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 171 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 172 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 |
| 173 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 |
| 174 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 |
| 175 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 |
| 176 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |

GL: Gate address line

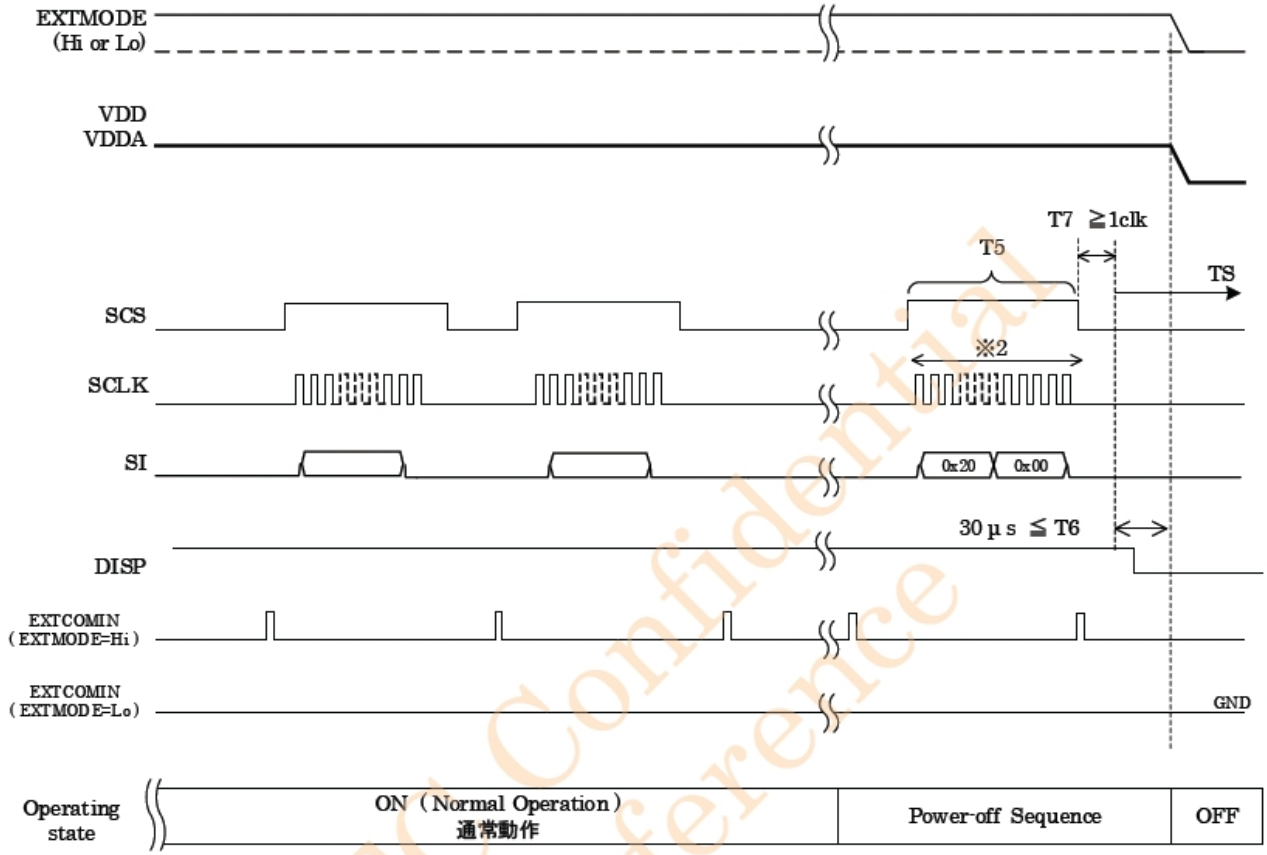
### 8.1 AC Characteristics

Power Supply Sequence

Power On



Power Off




TS : Off control

全ての制御信号を“Lo”にした後、T6の時間を経過後に電源をOFFしてください。

Please turn off a power supply after making all the control signals into “Low Level”, and passing the time of T6.

### 8.2 Input Signal Characteristics

Input Signal Timing Parameters

VDDA=＋3.0V、VDD=＋3.0V GND=0V、Ta=25℃

| Item | Symbol | Min | Typ | Max | Unit | Remark |
|---|---|---|---|---|---|---|
| COM反転<br>COM Inversion | fV | 57 | 60 | 90 | Hz | When EXTMODE=Lo<br>Figure 6-3-1,Figuer 6-6-5<br>【Note 6-3-1】,【Note 6-3-5】 |
| COM周波数<br>COM frequency | fCOM | 28.5 | － | 45 | Hz | 【Note 6-3-5】 |
| フレーム周波数<br>Frame frequency | fSCS | 28.5 | － | 32.5 | Hz | When EXTMODE=Lo<br>【Note 6-3-2】<br>【Note 6-3-4】,【Note 6-3-5】 |
| | | － | － | 32.5 | Hz | When EXTMODE=Hi<br>【Note 6-3-3】<br>【Note 6-3-4】,【Note 6-3-5】 |

[Note 6-3-1] COM制御をシリアルデータにて行う場合。
COM driving by the serial command.

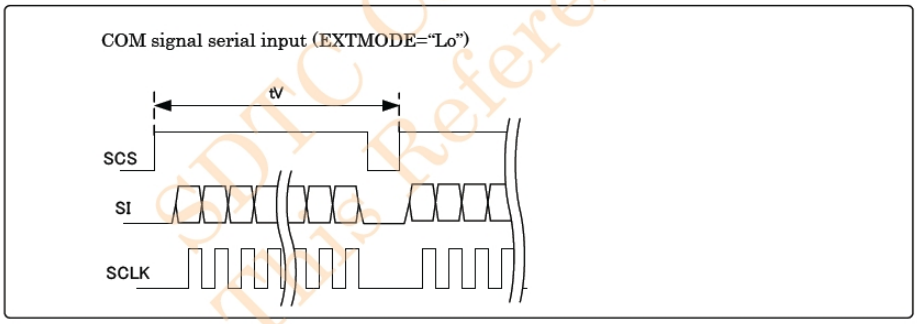



Figure 6-3-1 COM Signal Timing

[Note 6-3-2]
In case of whole lines update with COM driving by the serial command.

[Note 6-3-3]
In case of whole lines update with COM driving by the EXTCOMIN signal.

[Note 6-3-4]
Please use a frame frequency in the range where there are no problems with the display quality.

[Note 6-3-5]
LC inversion：
LC material is needed alternative polarity driving as changing timing which should be constant period.

VDDA=+3.0V、VDD=+3.0V、GND=0V、Ta=25℃

| | Item | Symbol | Min | Typ | Max | Unit | Remark |
|---|---|---|---|---|---|---|---|
| SCS | Rise time | trSCS | – | – | 50 | ns | |
| | Fall Time | tfSCS | – | – | 50 | ns | |
| | High duration | twhSCS | 198 | – | – | us | Data update mode [Note 6-3-6] |
| | | | 22.54 | – | – | us | Hold mode [Note 6-3-6] |
| | Low duration | twlSCS | 6 | – | – | us | |
| | Set up time | tsSCS | 6 | – | – | us | |
| | Hold time | thSCS | 2 | – | – | us | |
| SI | Rise time | trSI | – | – | 50 | ns | |
| | Fall time | tfSI | – | – | 50 | ns | |
| | Set up time | tsSI | 250 | – | – | ns | |
| | Hold time | thSI | 350 | – | – | ns | |
| SCLK | Clock frequency | fSCLK | – | 1 | 1.1 | MHz | |
| | Rise time | trSCLK | – | – | 50 | ns | |
| | Fall time | tfSCLK | – | – | 50 | ns | |
| | High duration | twhSCLK | 454.55 | 500 | – | ns | |
| | Low duration | twlSCLK | 454.55 | 500 | – | ns | |
| EXTCOMIN | Frequency | fEXTCOMIN | 57 | 60 | 90 | Hz | 【Note 6-3-5】 |
| | Rise time | trEXTCOMIN | – | – | 50 | ns | |
| | Fall time | tfEXTCOMIN | – | – | 50 | ns | |
| | High duration | twhEXTCOMIN | 2 | – | – | us | |
| DISP | Rise time | trDISP | – | – | 50 | ns | |
| | Fall time | tfDISP | – | – | 50 | ns | |



【Note 6-3-6】

Please keep SCS in the state of L when you maintain current display after writing of the display data.

Signal Timing

※SCS,SI,SCLK,DISP,EXTCOMIN: 3V input voltage

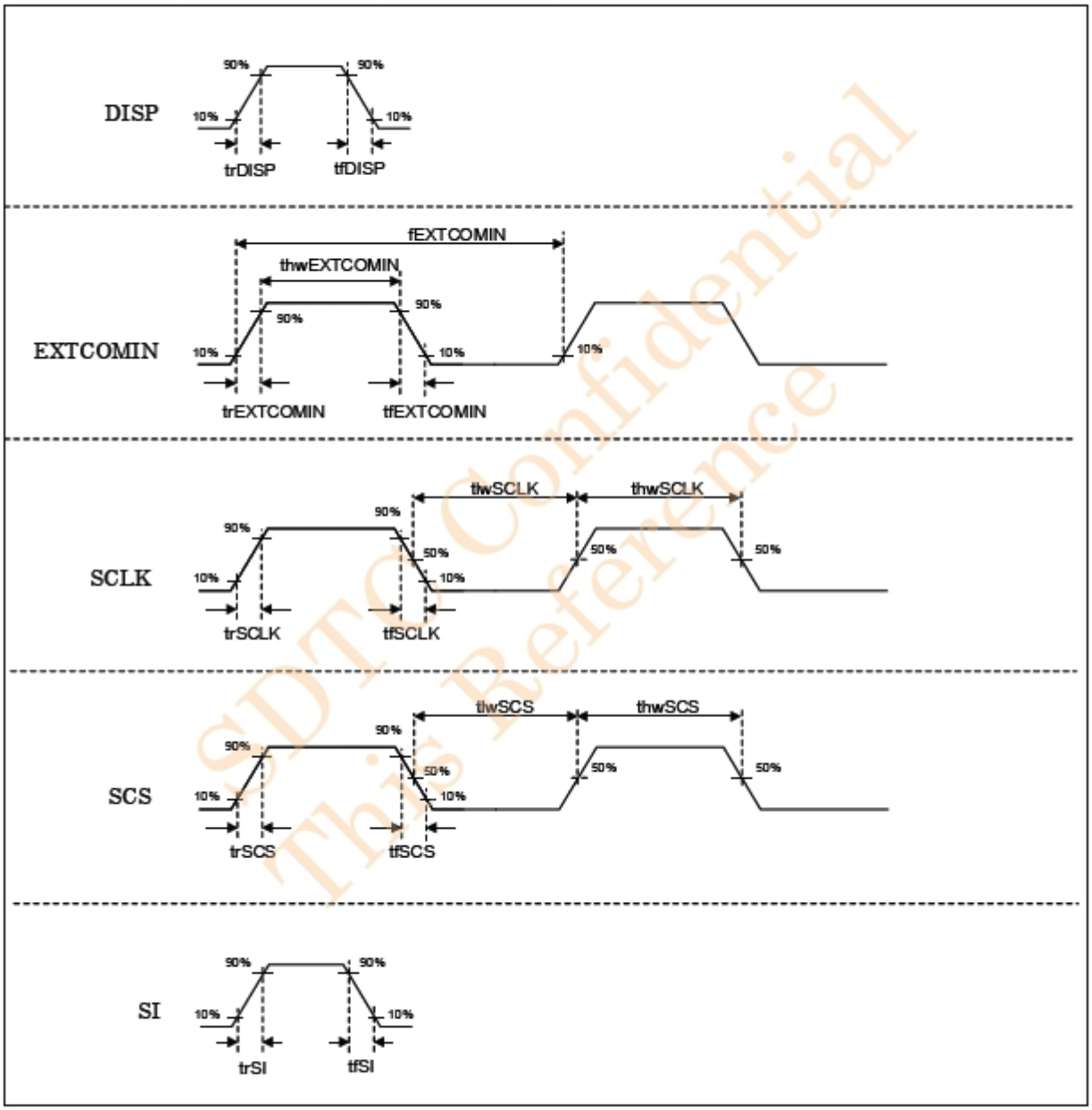



Figure 6-4-1 Signal Timing

※SCS,SI,SCLK,DISP,EXTCOMIN: 3V input voltage

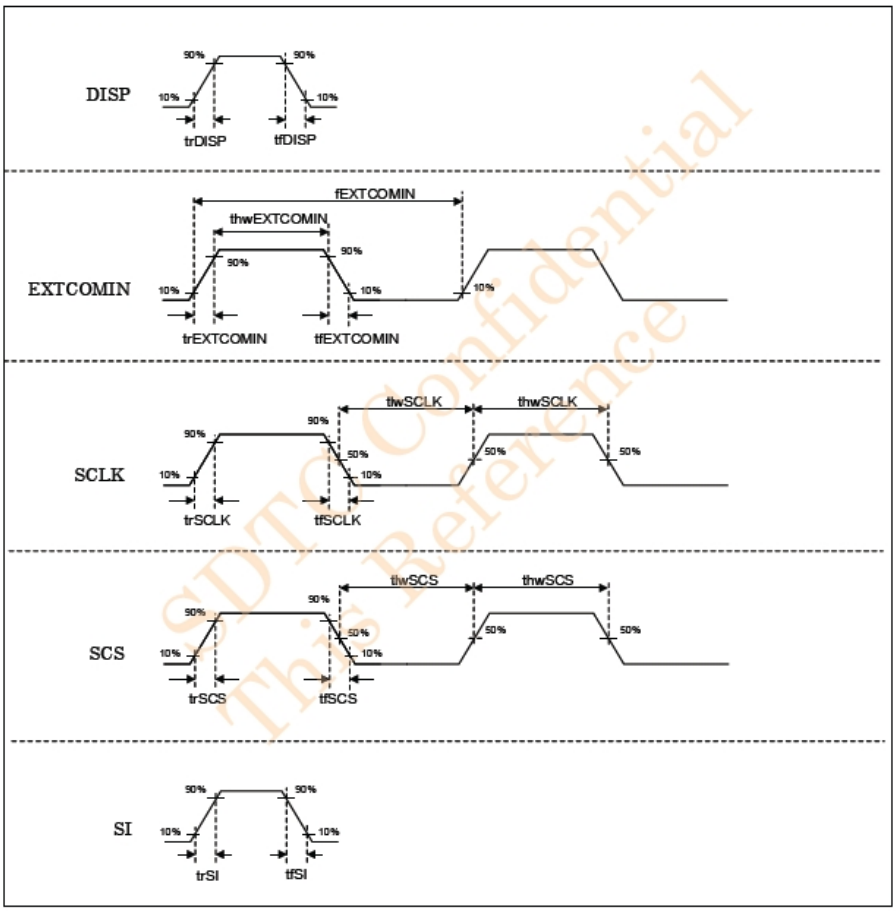
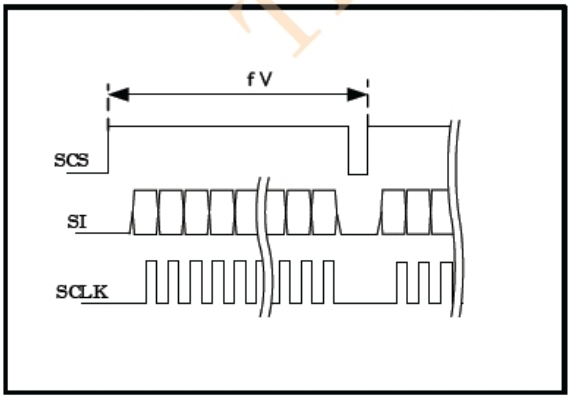



Figure 6-4-1 Signal Timing




COM signal serial input (EXTMODE="Lo")

Figure 6-4-4 Signal Timing-4

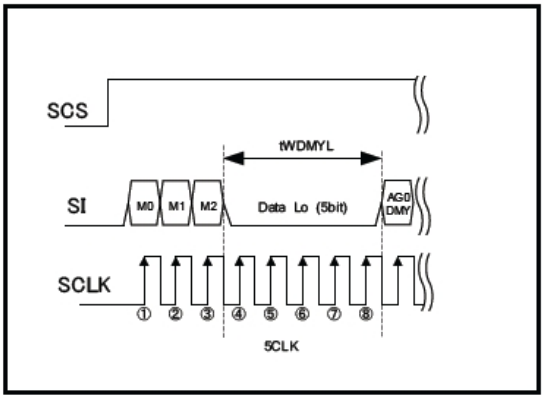



Figure 6-4-5 Signal Timing-5

## 9 Reliability Condition

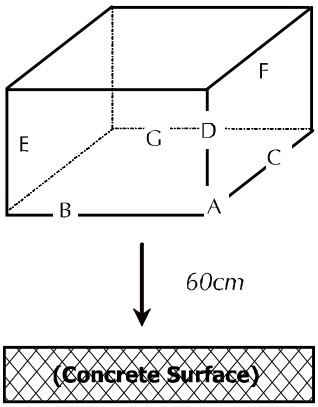
No change on display and in operation under the following test condition.

Condition: Unless otherwise specified, tests will be conducted under the following condition.

Temperature: 20°C±5°C.

Humidity: 65% ± 5%RH.

Tests will be not conducted under functioning state.

| No. | Parameter | Condition | Notes |
|---|---|---|---|
| 1 | High Temperature Operating | +70°C±2°C, 240hrs (Operation state). | |
| 2 | Low Temperature Operating | -20°C±2°C, 240hrs (Operation state). | 1 |
| 3 | High Temperature Storage | +80°C±2°C, 240hrs. | 2 |
| 4 | Low Temperature Storage | -30°C±2°C, 240hrs. | 1,2 |
| 5 | High Temperature and High Humidity Operation Test | +60°C±2°C, 90%, 240hrs | 1,2 |
| 6 | Vibration Test | Total fixed amplitude: 1.5mm.<br>Vibration Frequency: 10~55Hz.<br>One cycle 60 seconds to 3 direction of X, Y, Z each 15 minutes. | 3 |
| 7 | Electro Static Discharge Test<br>(non-operating) | Panel Surface/Top Case: 150pF, 330 ohm<br>Air: ±12kV, Contact: ±6kV | |
| 8 | Drop Test | To be measured after dropping from 60cm high on the concrete surface in packing state.<br>  <br>*Dropping method corner dropping:*<br>*A corner: Once edge dropping.*<br>*B, C, D edge: Once face dropping.*<br>*E, F, G face: Once.* | |

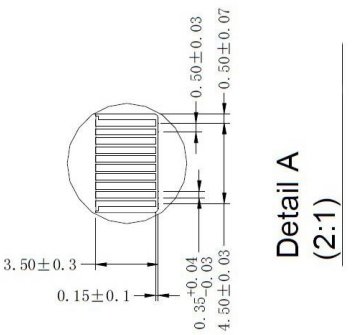
Notes: 1. No dew condensation to be observed.

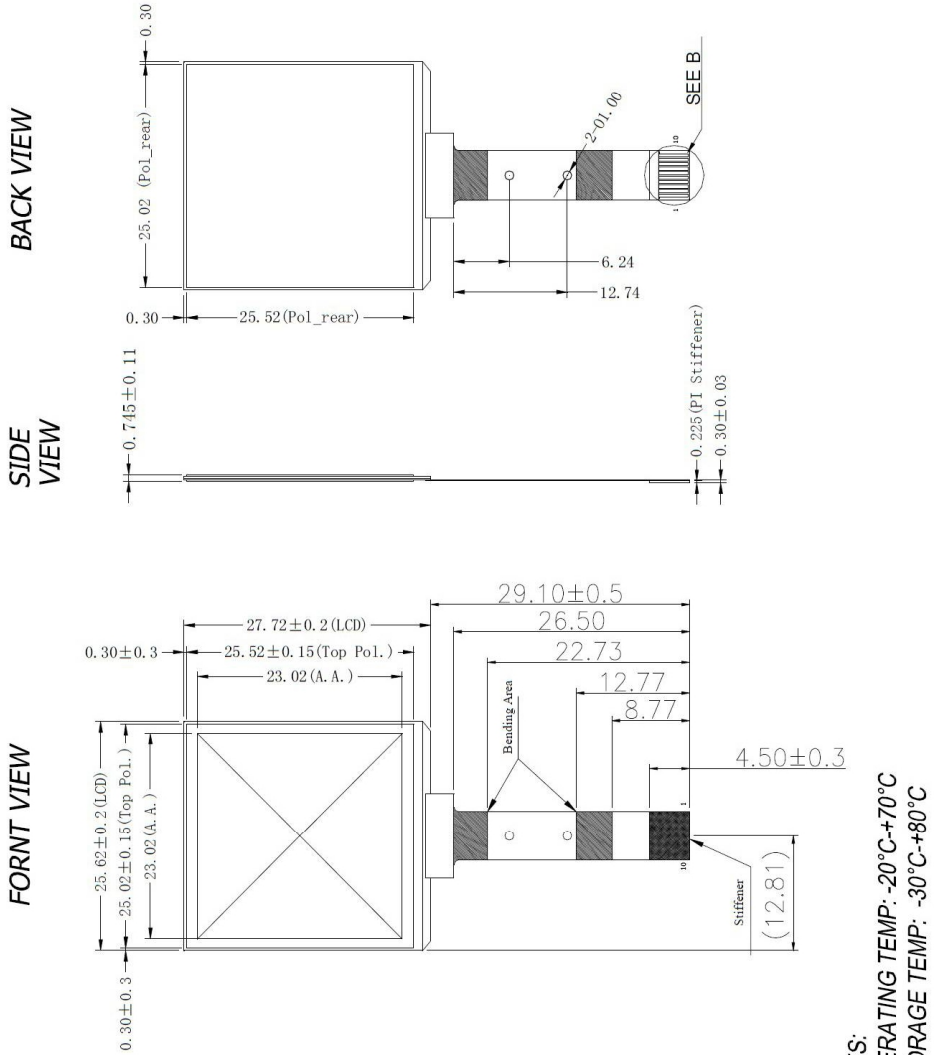
2. The function test shall be conducted after 4 hours storage at the normal temperature and humidity after removed from the test chamber.

3. Vibration test will be conducted to the product itself without putting I in a container.

## 10 Dimensional Outlines

| NO. | Pin Define |
|---|---|
| 1 | SCLK |
| 2 | SI |
| 3 | SCS |
| 4 | EXTCOMIN |
| 5 | DISP |
| 6 | VDDA |
| 7 | VDD |
| 8 | EXTMODE |
| 9 | VSS |
| 10 | VSSA |




NOTES:
1.OPERATING TEMP: -20°C-+70°C
2.STORAGE TEMP: -30°C-+80°C