晶采光電科技股份有限公司
**AMPIRE CO., LTD.**

# SPECIFICATIONS   FOR
# LCD   MODULE

| CUSTOMER | |
|---|---|
| **CUSTOMER PART NO.** | |
| **AMPIRE PART NO.** | **AM-1280800WZTZQW-T51H** |
| **APPROVED   BY** | |
| **DATE** | |

☐ **Preliminary Specification**
☐ **Approved Specification**

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This specification is subject to change without notice

# RECORD OF REVISION

| Revision Date | Page | Contents | Editor |
|---|---|---|---|
| 2022/03/21 | -- | New Release | Mark |
|  |  |  |  |

# 1.0 General Descriptions

## 1.1 Introduction

The LCM is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. It is composed of a TFT LCD panel, a backlight system, column driver and row driver circuit. This TFT LCD has a 10.1-inch diagonally measured active display area with WXGA resolution (1280 horizontal by 800 vertical pixels array).

## 1.2 Features

‧10.1" TFT LCD Panel

‧LED Backlight System

‧Supported WXGA 1280x800 pixels resolution

‧Compatible with RoHS Standard

‧Touch Panel:

■ Controller: ILI2511

■ Interface: I2C

■ Cover Glass: T=1.1mm

## 1.3 Product Summary

| Items | Specifications | Unit |
|---|---|---|
| Screen Diagonal | 10.1 | Inch |
| Active Area | 216.96(H) x 135.6(V) | mm |
| Pixel Format | 1280(RGB) x800 | - |
| Pixel Pitch | 0.1695(H)×0.1695 (V) | mm |
| Pixel Arrangement | R.G.B. Vertical Stripe | - |
| Display Mode | Normally Black | - |
| White Luminance | 295(Typ) | cd /m2 |
| Contrast Ratio | 800 : 1 (Typ) | - |
| Response Time | 25 | msec |
| Input Voltage | 3.3 | V |
| Weight | 160 (Max) | g |
| Electrical Interface (Logic) | LVDS | - |
| Support Color | 16.7M | - |
| Surface Treatment | Glare, Hard-Coating (3H) | - |

## 1.4 Functional Block Diagram

Shows the functional block diagram of the LCD module.

**Figure 1 Block Diagram**
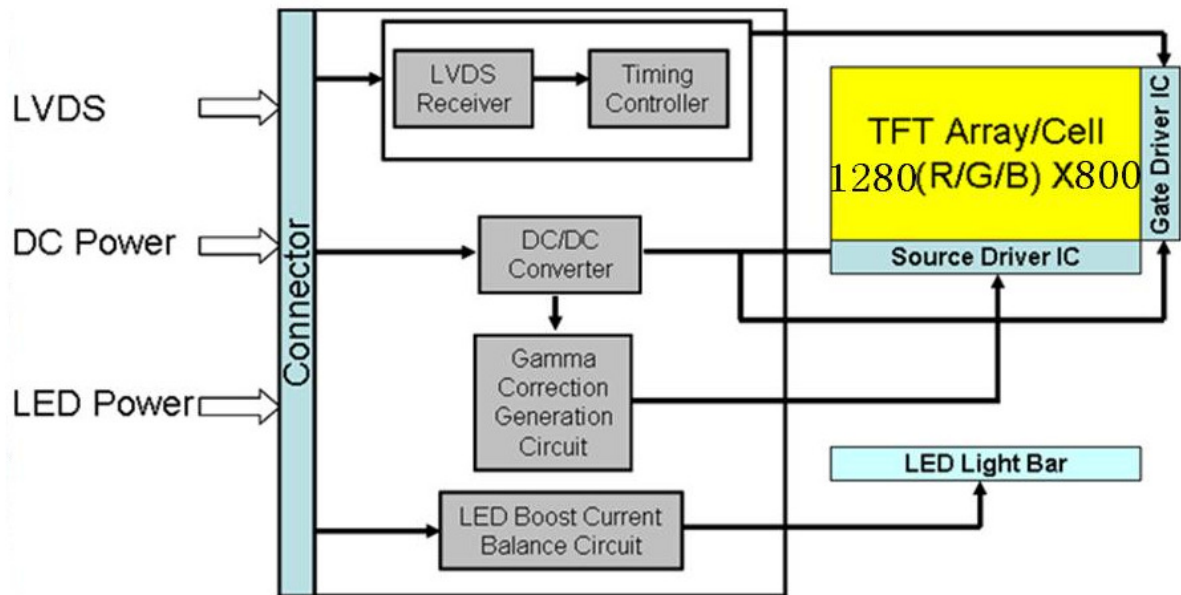
## 2.0 Absolute Maximum Ratings

**Table 1 Electrical Absolute Ratings**

| Item | Symbol | Min | Max | Unit | Conditons |
|---|---|---|---|---|---|
| Logic Supply Voltage | VDD | -0.3 | 4.0 | V | TA=25℃ |
| Supply VLED Voltage | VLED | -0.3 | 24 | V | TA=25℃ |

**Table 2 Reliability Absolute Ratings**

| Item | Symbol | Min | Max | Unit | Conditons |
|---|---|---|---|---|---|
| Operating Temperature | TOP | -20 | 70 | ℃ | Note |
| Operating Humidity | HOP | -- | 90 | %RH | Note |
| Storage Temperature | TST | -30 | 80 | ℃ | Note |
| Storage Humidity | HST | -- | 90 | %RH | Note |

Note: (1) Maximum Wet-Bulb temperature should be 39 degree C and no condensation.

(2) When you apply the LCD module for OA system. Please make sure to keep the temperature of

LCD module is less than 70℃
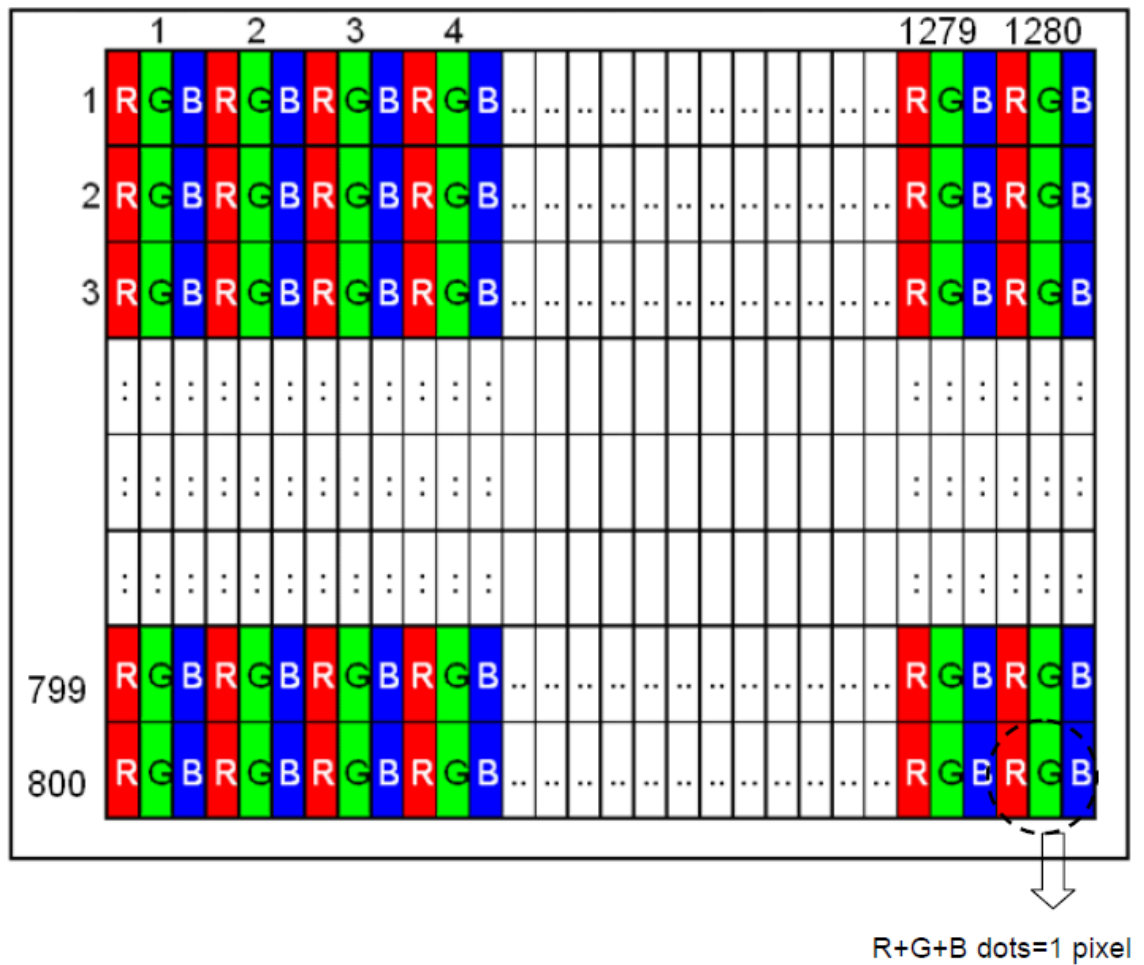
(3) Storage /Operating temperature
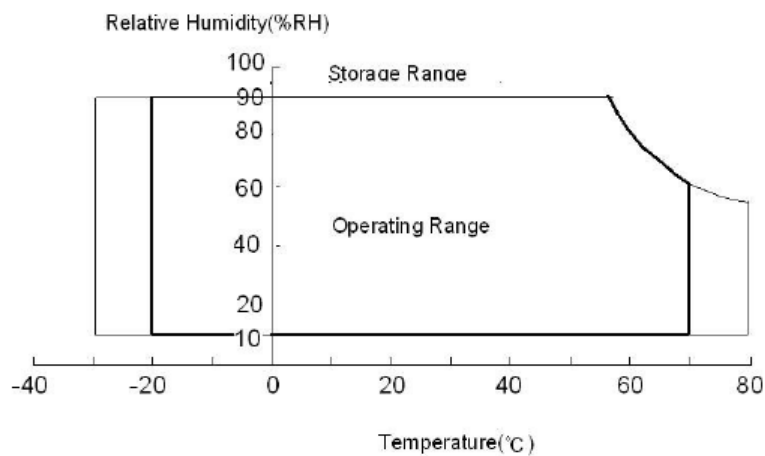
## 3.0 Pixel Format Image

Figure 2 shows the relationship of the input signals and LCD pixel format image.

### Figure 2 Pixel Format



R+G+B dots=1 pixel

## 4.0 Optical Characteristics

The optical characteristics are measured under stable conditions as following notes

**Table 2 Optical Characteristics**

| Item | Conditions | | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|---|
| Viewing Angle（CR>10） | Horizontal | $\theta_L$ | (75) | (85) | - | degree | (1),(2),(3) |
| | | $\theta_R$ | (75) | (85) | - | | |
| | Vertical | $\theta_T$ | (75) | (85) | - | | |
| | | $\theta_B$ | (75) | (85) | - | | |
| Contrast Ratio | Center | | (600) | (800 ) | - | - | (1),(2),(4) |
| Response Time | Rising | | - | - | - | ms | (1),(2),(5) |
| | Falling | | - | - | - | ms | |
| | Rising + Falling | | - | 25 | - | ms | |
| Color Chromaticity (CIE1931) | NTSC | | - | 45 | - | % | (1),(2) |
| | Red | x | Typ. -0.03 | 0.561 | Typ. +0.03 | - | (1),(2) |
| | Red | y | | 0.334 | | - | |
| | Green | x | | 0.341 | | - | |
| | Green | y | | 0.568 | | - | |
| | Blue | x | | 0.161 | | - | |
| | Blue | y | | 0.129 | | - | |
| | White | x | - | 0.313 | - | - | |
| | White | y | - | 0.329 | - | - | |
| White Luminance | Center | | 255 | 295 | - | cd/m^2 | (1),(2),(6) |
| Luminance Uniformity | 9Points | | 70 | 75 | - | % | (1),(2),(6) |

## Note(1)  Measurement Setup:

The LCD module should be stabilized at given temperature(25℃) for 15 minutes to Avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 15 minutes in a windless room.

Fig
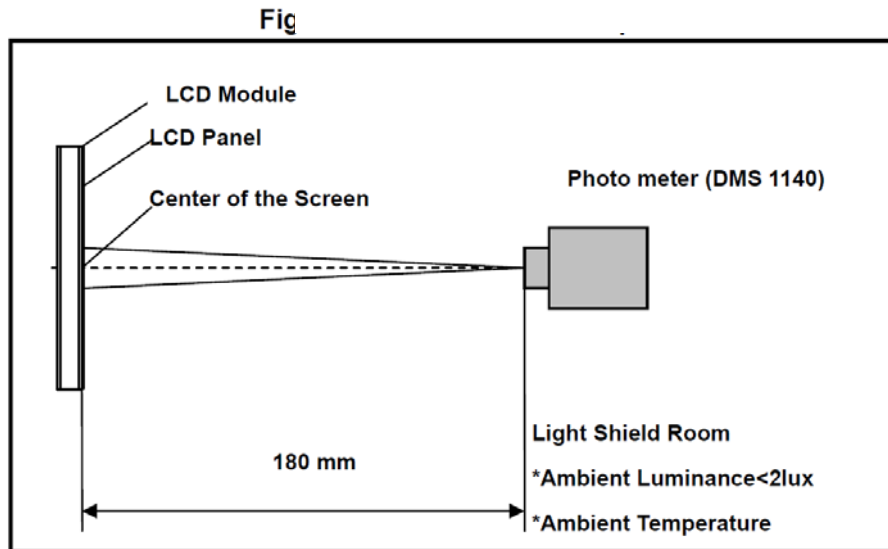


## Note(2)  The LED input parameter setting as:PWM: duty 100 %

## Note(3)  Definition of viewing angle:
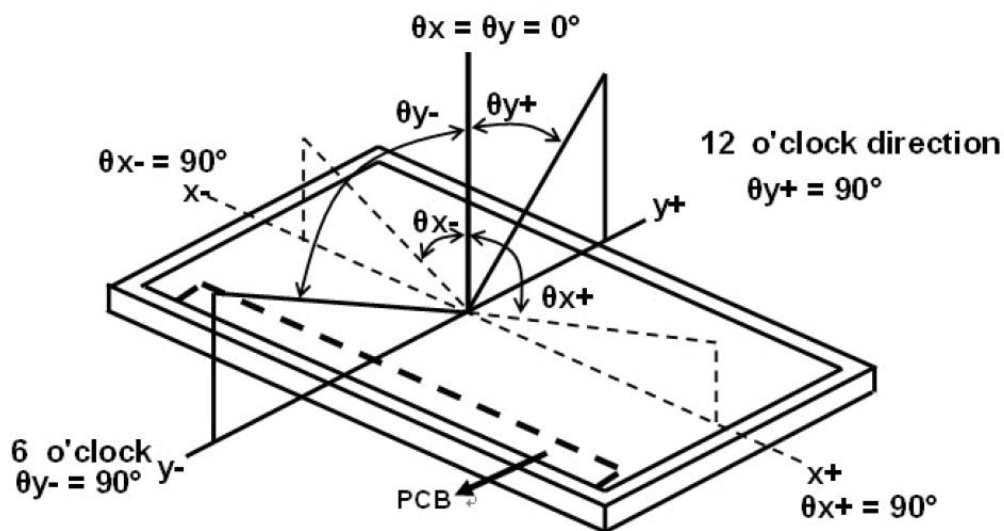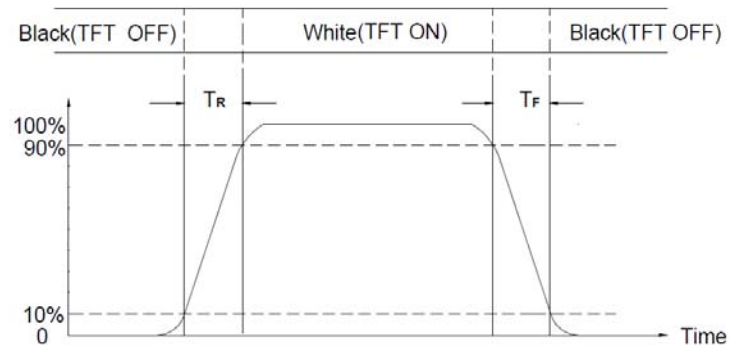


## Note(4)  Definition of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression

Contrast Ratio (CR) = L255 / L0

L63: Luminance of gray level 255, L0: Luminance of gray level 0

Note(5)  Definition of Response Time (TR, TF)



Note(6)  Definition of brightness luminance
Active area is divided into 9 measuring areas (Refer to bellow figure).
Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (Yu)} = \frac{\text{Bmin}}{\text{Bmax}}$$

L ----- Active area length        W ----- Active area width
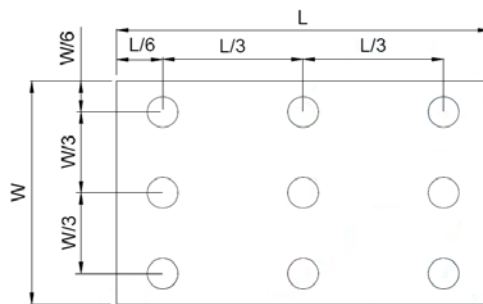


Bmax: The measured maximum luminance of all measurement position.
Bmin: The measured minimum luminance of all measurement position.

## 5.0 Backlight Characteristics

5.1 Parameter Guideline Of LED Backlight

**Table 3 Parameter Guideline for LED Backlight**

| Symbol | Parameter | | Min. | Typ. | Max. | Units | Condition |
|---|---|---|---|---|---|---|---|
| VLED | LED Input | | (6) | (12) | (21) | [V] | Ta=25℃ Note B |
| PLED | LED Power Consumption | | - | - | (2.5) | W | Ta=25℃ Note B |
| VLED_PWM | PWM Signal Voltage | High | 3.0 | -- | 3.6 | V | Ta=25℃ |
| | | Low | 0 | -- | 0.4 | V | |
| $F_{PWM}$ | PWM dimming Frequency | | 100 | - | 200 | Hz | $D_{DIM}≥0.1\%$ |
| | | | 200 | - | 500 | | $D_{DIM}≥0.25\%$ |
| | | | 500 | - | 1000 | | $D_{DIM}≥0.5\%$ |
| | | | 1000 | - | 2000 | | $D_{DIM}≥1\%$ |
| | | | 2000 | - | 5000 | | $D_{DIM}≥2.5\%$ |
| | | | 5000 | - | 10000 | | $D_{DIM}≥5\%$ |
| | | | 10000 | - | 20000 | | $D_{DIM}≥10\%$ |
| | | | 20000 | - | 30000 | | $D_{DIM}≥15\%$ |
| VLED_EN | LED Enable Voltage | High | 3.0 | -- | 3.6 | V | - |
| | | Low | 0 | -- | 0.4 | V | |
| LT | LED Life Time | | 20,000 | 25,000 | - | Hours | Ta=25℃ Note A |

Note A: The LED life time define as the estimated time to
　　　　50% degradation of initial luminous.

Note B: A higher LED power supply voltage will result in better power efficiency.
　　　　Keep the VLED between 12V and 12.6V is strongly recommended.

**Figure 7 LED Rush Current Measure Condition**



VLED rising time
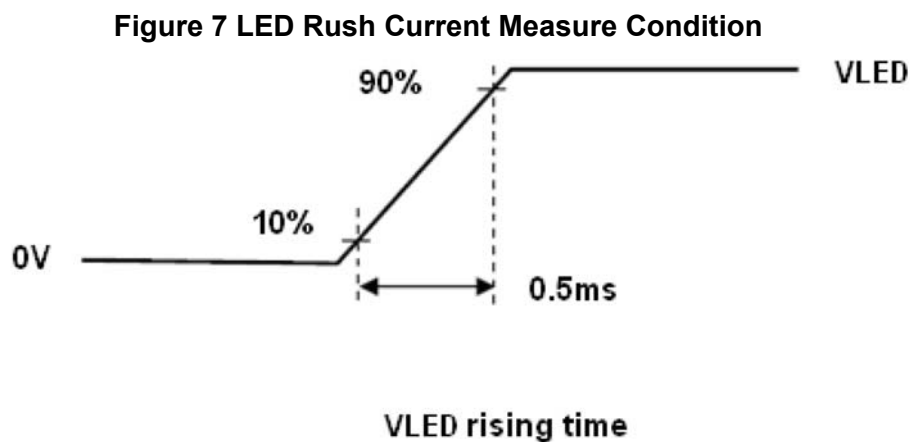
## 6.0 Electrical Characteristics

### 6.1 TFT LCD Module Interface Connector

#### Table 4 Connector Name / Designation

| Item | Description |
|---|---|
| Manufacturer / Part Number | Starconn / 300E40-0010RA-G3 |
| Mating Model Number | TBD or compatible |

#### Table 5 Signal Pin Assignment

| Pin # | Singnal Name | Description | Remarks |
|---|---|---|---|
| 1 | NC | Not Connect | - |
| 2 | VDD | Power Supply, 3.3V (typical) | - |
| 3 | VDD | Power Supply, 3.3V (typical) | |
| 4 | VDD_EDID | Power Supply for EDID I2C Flash IC | |
| 5 | SCL_EDID | I2C Serial Clock for EDID I2C Flash IC | |
| 6 | SDA_EDID | I2C Serial Data for EDID I2C Flash IC | |
| 7 | NC | Not Connect | |
| 8 | LV0N | -LVDS differential data input | |
| 9 | LV0P | +LVDS differential data input | |
| 10 | GND | Ground | |
| 11 | LV1N | -LVDS differential data input | |
| 12 | LV1P | +LVDS differential data input | |
| 13 | GND | Ground | |
| 14 | LV2N | -LVDS differential data input | |
| 15 | LV2P | +LVDS differential data input | |
| 16 | GND | Ground | |
| 17 | LVCLKN | -LVDS differential data input | |
| 18 | LVCLKP | +LVDS differential data input | |
| 19 | GND | Ground | |
| 20 | LV3N | -LVDS differential data input | |
| 21 | LV3P | +LVDS differential data input | |
| 22 | GND | Ground | |
| 23 | LED_GND | Ground for LED Driving | |
| 24 | LED_GND | Ground for LED Driving | |
| 25 | LED_GND | Ground for LED Driving | |
| 26 | NC | Not Connect | |
| 27 | LED_PWM | PWM Input signal for LED driver | |
| 28 | LED_EN | LED Enable Pin | |
| 29 | NC | Not Connect | |
| 30 | NC | Not Connect | |
| 31 | LED_VCC | Power Supply for LED Driver | |
| 32 | LED_VCC | Power Supply for LED Driver | |
| 33 | LED_VCC | Power Supply for LED Driver | |
| 34 | NC | Not Connect | |
| 35 | BIST | BIST pin. (Keep NC or HIGH if not use.) | NC |
| 36 | CSB | Serial communication enables. (For test only) | NC |
| 37 | SCL | Serial communication clock input (For test only) | NC |
| 38 | SDA | Serial communication data input. (For test only) | NC |
| 39 | SCL_I2C | Serial communication clock input. (For test only) | NC |
| 40 | SDA_I2C | Serial communication data input. (For test only) | NC |

Note: All input signals shall be low or Hi-resistance state when VDD is off.

## 6.2 LVDS Receiver

### 6.2.1 Signal Electrical Characteristics For LVDS Receiver

**Table 7 LVDS Receiver Electrical Characteristics**

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|-----------|--------|------|------|------|------|-----------|
| Differential Input High | Vth | - | - | +100 | mV | $V_{CM}$=+1.2V |
| Differential Input Low | Vtl | -100 | - | - | mV | $V_{CM}$=+1.2V |
| Magnitude Differential Input | $|V_{ID}|$ | 200 | - | 400 | mV | - |
| Common Mode Voltage | $V_{CM}$ | 0.3+(VID/2) | - | VDD-1.2-(VID/2) | V | - |
| Common Mode Voltage | $\Delta V_{CM}$ | - | - | 50 | mV | $V_{CM}$=+1.2V |

Note (1) Input signals shall be low or Hi-Z state when VDD is off.

(2) All electrical characteristics for LVDS signal are defined and shall be measured at the interface connector of LCD.
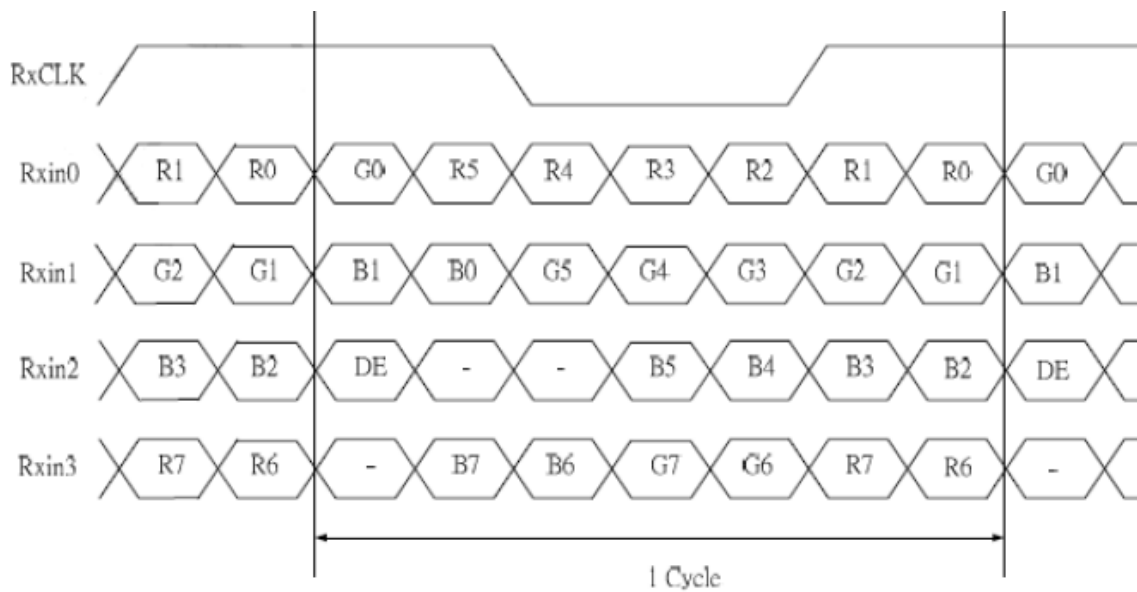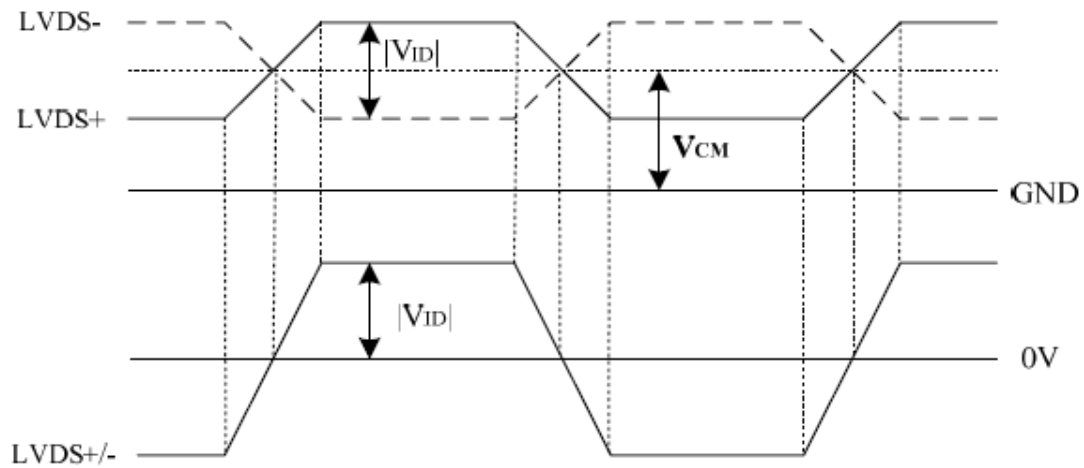
## 7.0 Interface Timings

### 7.1 Timing Characteristics

#### Interface Timings

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| LVDS Clock Frequency | Fclk | (70.0) | (72.4) | (76.6) | MHz |
| H Total Time | HT | (1,410) | (1,440) | (1,470) | Clocks |
| H Active Time | HA | | 1,280 | | Clocks |
| V Total Time | VT | (828) | (838) | (868) | Lines |
| V Active Time | VA | | 800 | | Lines |
| Frame Rate | FV | - | (60) | - | Hz |

Note1： HT * VT *Frame Frequency≤(76.6) MHz

Note2: All reliabilities are specified for timing specification based on refresh rate of 60Hz.

### 7.2 Timing Diagram of Interface Signal (DE mode)

#### Figure 8 Timing Characteristics



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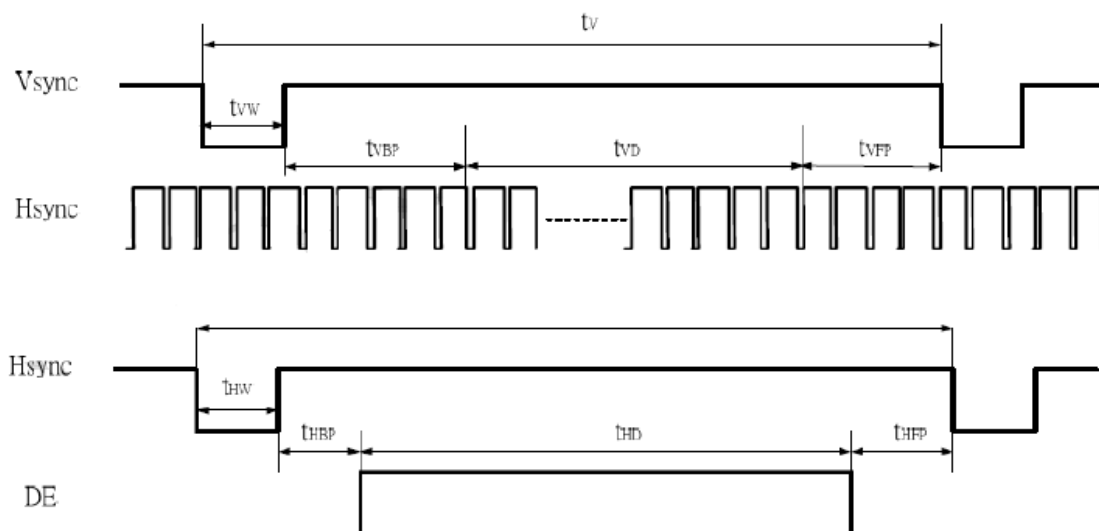
## 8.0 Power Consumption

Input power specifications are as follows.

**Table 8 Power Consumption**

| Item | | Symbol | Min | Typ | Max | Unit | Note |
|---|---|---|---|---|---|---|---|
| LCD Drive Voltage | | V$_{DD}$ | 3.0 | 3.3 | 3.6 | V | (3) |
| VDD Current | White Pattern | IDD | -- | 0.295 | -- | A | (2),(3) |
| VDD Power Consumption | White Pattern | PDD | -- | -- | 1.2 | W | (2),(3) |
| LED Power Consumption | | PLED | | | 2.5 | W | (2),(3) |
| Rush Current | | Irush | | | 1.5 | A | (1),(3),(4) |
| Allowable Logic/LCD Drive Ripple Voltage | | VDDrp | | | 300 | mV | (3) |

Note (1) Measure Condition

**Figure 9 VDD rising time**
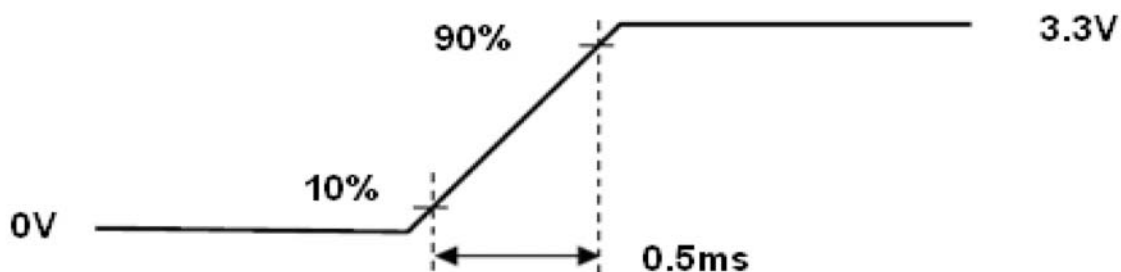


VDD rising time

Note (2) Frame Rate=60Hz, VDD=3.3V,DC Current.

Note (3) Operating temperature 25℃ , humidity 55%RH.

Note (4) The reference measurement circuit of rush current.

CONTROL

Switch

OUTPUT

Q1

VR1
10K D1.4mm
3
2
1

C1
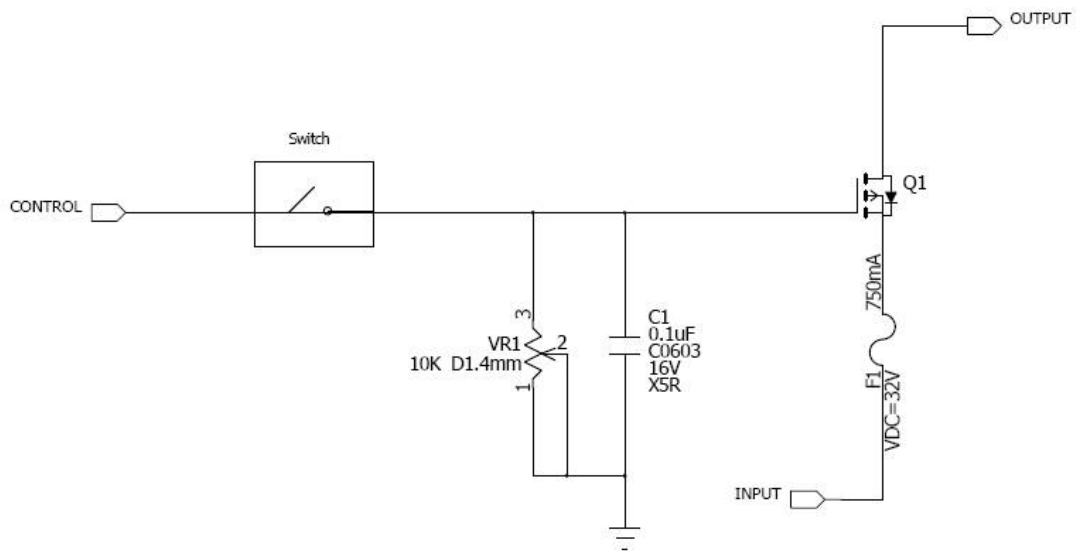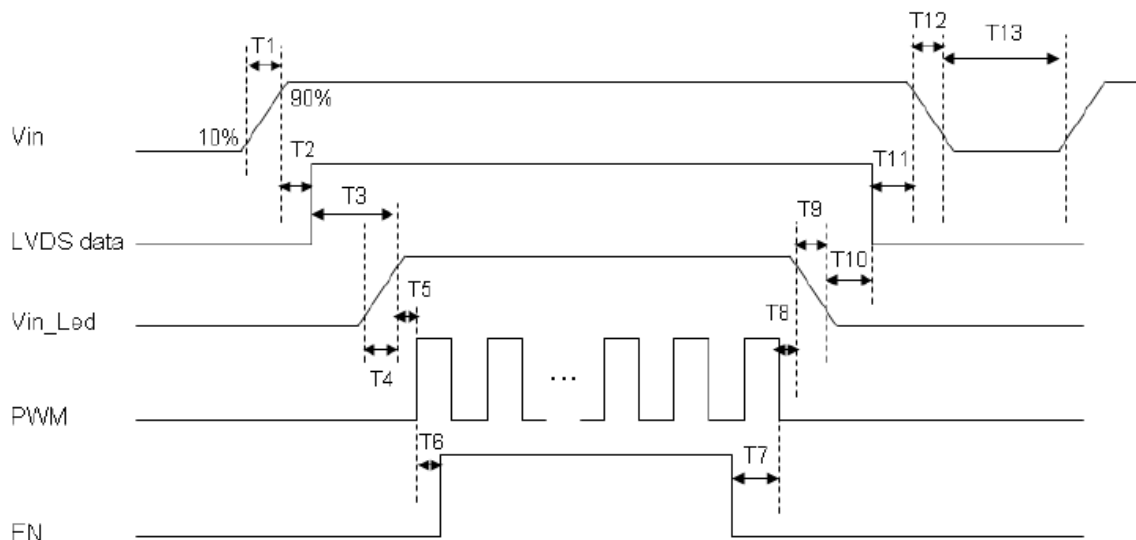0.1uF
C0603
16V
X5R

F1
750mA
VDC=32V

INPUT

## 8.1 Power ON/OFF Sequence

Power on/off sequence is as follows. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when VDD is off.

**Figure 11 Power Sequence**



**Table 9 Power Sequencing Requirements**

| Parameter | Symbol | Unit | Min | Typ. | Max |
|---|---|---|---|---|---|
| VIN Rise Time | T1 | ms | 0.5 | -- | 10 |
| VIN Good to Signal Valid | T2 | ms | 30 | -- | 90 |
| Signal Valid to Backlight On | T3 | ms | 200 | -- | -- |
| Backlight Power On Time | T4 | ms | 0.5 | -- | -- |
| Backlight VDD Good to System PWM On | T5 | ms | 10 | -- | -- |
| System PWM ON to Backlight Enable ON | T6 | ms | 10 | -- | -- |
| Backlight Enable Off to System PWM Off | T7 | ms | 0 | -- | -- |
| System PWM Off to B/L Power Disable | T8 | ms | 10 | -- | -- |
| Backlight Power Off Time | T9 | ms | -- | 10 | 30 |
| Backlight Off to Signal Disable | T10 | ms | 200 | -- | -- |
| Signal Disable to Power Down | T11 | ms | 0 | -- | 50 |
| VIN Fall Time | T12 | ms | -- | 10 | 30 |
| Power Off | T13 | ms | 500 | -- | -- |

## 9.0 Projected capacitive-type Touch panel specification
## 9.1 Basic Characteristic

| ITEM | SPECIFICATION |
|---|---|
| Type | Projective Capacitive Touch Panel |
| Activation | Max 10-fingers or Signal-finger |
| X/Y Position Reporting | Absolute Position |
| Touch Force | No contact pressure required |
| Calibration | No need for calibration |
| Report Rate | Approx 80 points/sec |
| Interface | I2C |
| Control IC | ILI2511 |

| Item | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Power Supply Voltage | VIN | 3.14 | 3.3 | 3.46 | V |
| Low Level Input Voltage | VIL | 0 | -- | 0.3*VIN | V |
| High Level Input Voltage | VIH | 0.6*VIN | -- | VIN | V |

## 9.2 Interface

| Pin No. | Symbol | Function |
|---|---|---|
| 1 | VIN | Power Supply for TP controller |
| 2 | SCL | I2C Data |
| 3 | SDA | I2C Clock |
| 4 | INT | Interrupt Request pin |
| 5 | RES | Rest pin to Master Chip |
| 6 | GND | GND |

TP needs to work in environment with stable stray capacitance. In order to minimize the variation in stray capacitance, all conductive mechanical parts must not be floating. Intermittent floating any conductive part around the touch sensor may cause significant stray capacitance change and abnormal touch function. It is recommended to keep all conductive parts having same electrical potential as the GND of the touch controller module.
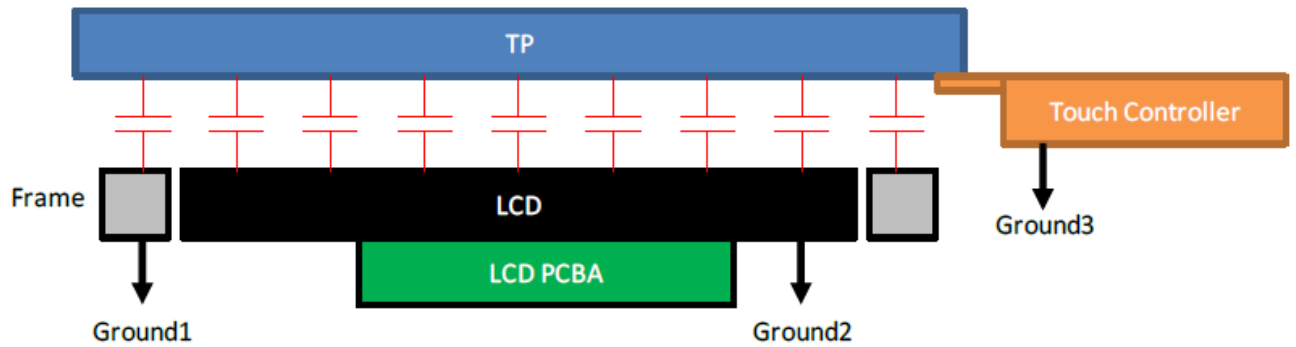


GND1, GND2 and GND3 should be connected together to have the same ground

## 7.3 Power- on Timing Chart (IIC interface)
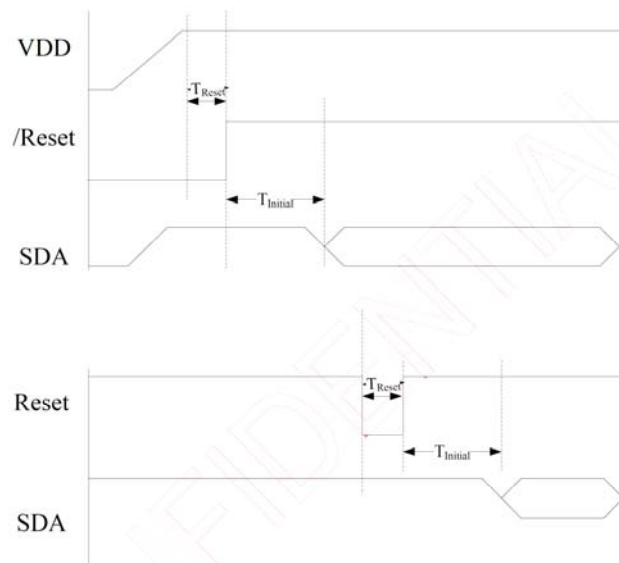


| Symbol | Parameter | MIN. | MAX. | Unit |
|--------|-----------|------|------|------|
| $T_{Initial}$ | After powering-on or resetting the device, the device needs $I_{nitial}$ time to configure the system. | - | 100 | ms |
| $T_{Reset}$ | /Reset pin low hold time | 50 | - | µs |

## 9.4 IIC AC Waveform
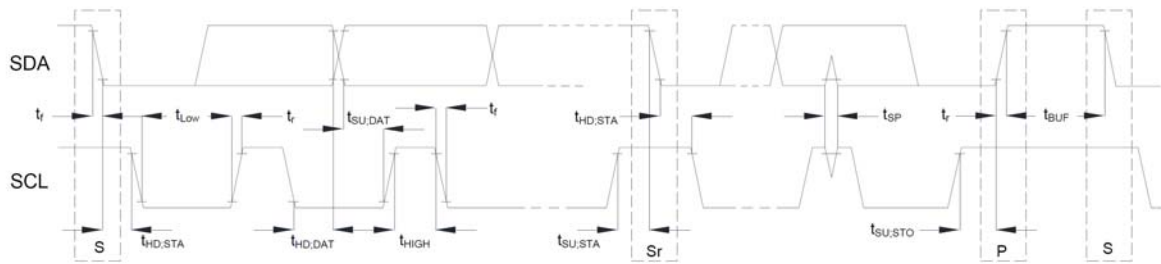


## 9.5   IIC Characteristics

| Symbol | Parameter | 100KHz | | | 400KHz | | |
|--------|-----------|--------|--------|--------|--------|--------|--------|
| | | Min | Max | Unit | Min | Max | Unit |
| $f_{SCL}$ | SCL clock frequency | 0 | 100 | kHz | 0 | 400 | KHz |
| $t_{HD;STA}$ | Hold time (repeated) START condition. After this period, the first clock pulse is generated | 4.0 | – | µs | 0.6 | – | µs |
| $t_{LOW}$ | LOW period of the SCL clock | 4.7 | – | µs | 1.3 | – | µs |
| $t_{HIGH}$ | HIGH period of the SCL clock | 4.0 | – | µs | 0.6 | – | µs |
| $t_{SU;STA}$ | Set-up time for a repeated START condition | 4.7 | – | µs | 0.6 | – | µs |
| $t_{HD;DAT}$ | Data hold time | 0 | 3.45 | µs | 0 | 0.9 | µs |
| $t_{SU;DAT}$ | Data set-up time | 250 | – | ns | 100 | – | ns |
| $t_r$ | Rise time of both SDA and SCL signals | – | 1000 | ns | – | 300 | ns |
| $t_f$ | Fall time of both SDA and SCL signals | – | 300 | ns | – | 300 | ns |
| $t_{SU;STO}$ | Set-up time for STOP condition | 4.0 | – | µs | 0.6 | – | µs |
| $t_{BUF}$ | Bus free time between a STOP and START condition | 4.7 | – | µs | 1.3 | – | µs |

## 9.6 Format Protocol
## Protocol V3.X Command List

| CMD Code | Name | Set /Get | Note | b7 | b6 | b5 | b4 | b3 | b2 | b1 | b0 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0x10 | Touch Information | Get | | 0: No touch | | | | | | | |
| | | | | 1: Last Report at ID 0 to ID 5 (include release status) | | | | | | | |
| | | | | 2: Last Report at ID 6 to ID 9 (include release status) | | | | | | | |
| | | | ID0 | 1: Touch Down, 0: Touch Off | 0 | X_High direction coordinate | | | | | |
| | | | | X_Low direction coordinate | | | | | | | |
| | | | | 0 | 0 | Y_High direction coordinate | | | | | |
| | | | | Y_Low direction coordinate | | | | | | | |
| | | | | Touch Pressure | | | | | | | |
| | | | ID1 | 1: Touch Down, 0: Touch Off | 0 | X_High direction coordinate | | | | | |
| | | | | X_Low direction coordinate | | | | | | | |
| | | | | 0 | 0 | Y_High direction coordinate | | | | | |
| | | | | Y_Low direction coordinate | | | | | | | |
| | | | | Touch Pressure | | | | | | | |
| | | | ID2 | 1: Touch Down, 0: Touch Off | 0 | X_High direction coordinate | | | | | |
| | | | | X_Low direction coordinate | | | | | | | |
| | | | | 0 | 0 | Y_High direction coordinate | | | | | |
| | | | | Y_Low direction coordinate | | | | | | | |
| | | | | Touch Pressure | | | | | | | |
| | | | ID3 | 1: Touch Down, 0: Touch Off | 0 | X_High direction coordinate | | | | | |
| | | | | X_Low direction coordinate | | | | | | | |
| | | | | 0 | 0 | Y_High direction coordinate | | | | | |
| | | | | Y_Low direction coordinate | | | | | | | |
| | | | | Touch Pressure | | | | | | | |
| | | | ID4 | 1: Touch Down, 0: Touch Off | 0 | X_High direction coordinate | | | | | |
| | | | | X_Low direction coordinate | | | | | | | |
| | | | | 0 | 0 | Y_High direction coordinate | | | | | |
| | | | | Y_Low direction coordinate | | | | | | | |
| | | | | Touch Pressure | | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | ID5 | 1: Touch Down, 0: Touch Off | 0 | X_High direction coordinate |
| | | | | X_Low direction coordinate | | |
| | | | | 0 | 0 | Y_High direction coordinate |
| | | | | Y_Low direction coordinate | | |
| | | | | Touch Pressure | | |
| 0x14 | Touch Information 2 | Get | ID6 | 1: Touch Down, 0: Touch Off | 0 | X_High direction coordinate |
| | | | | X_Low direction coordinate | | |
| | | | | 0 | 0 | Y_High direction coordinate |
| | | | | Y_Low direction coordinate | | |
| | | | | Touch Pressure | | |
| | | | ID7 | 1: Touch Down, 0: Touch Off | 0 | X_High direction coordinate |
| | | | | X_Low direction coordinate | | |
| | | | | 0 | 0 | Y_High direction coordinate |
| | | | | Y_Low direction coordinate | | |
| | | | | Touch Pressure | | |
| | | | ID8 | 1: Touch Down, 0: Touch Off | 0 | X_High direction coordinate |
| | | | | X_Low direction coordinate | | |
| | | | | 0 | 0 | Y_High direction coordinate |
| | | | | Y_Low direction coordinate | | |
| | | | | Touch Pressure | | |
| | | | ID9 | 1: Touch Down, 0: Touch Off | 0 | X_High direction coordinate |
| | | | | X_Low direction coordinate | | |
| | | | | 0 | 0 | Y_High direction coordinate |
| | | | | Y_Low direction coordinate | | |
| | | | | Touch Pressure | | |
| 0x20 | | | | The maximum X coordinate (bit 7:0) | | |
| | | | | The maximum X coordinate (bit 15:8) | | |
| | | | | The maximum Y coordinate (bit 7:0) | | |
| | | | | The maximum Y coordinate (bit 15:8) | | |
| | | | | The channel numbers of X direction | | |
| | | | | The channel numbers of Y direction | | |
| | | | | The maximum report points | | |

| | | | | The channel numbers of TouchKey / Scrolling Bar |
|---|---|---|---|---|
| | | | | For Touch Key Application |
| | | | | (Maximum supports 31 Touch Key) |
| | | | |    Byte 8 : The Touch Key number (<32) |
| | | | |    Byte 9: 0xFF |
| 0x30 | Enter Sleep Mode | Set | | -- |
| 0x40 | Firmware Version | Get | | Chip ID Code |
| | | | | Major firmware version |
| | | | | Minor firmware version |
| | | | | Release firmware version |
| | | | | For Customer Firmware Version |
| | | | | For Customer Firmware Version |
| | | | | For Customer Firmware Version |
| | | | | For Customer Firmware Version |
| 0x42 | | Get | | Major protocol version : 0x03 |
| | | | | Minor protocol version : XX |
| | | | | Release protocol version : XX |

## Protocol V3.X Data Format

| CMD Code | Name | Set / Get | Note | b7 | b6 | b5 | b4 | b3 | b2 | b1 | b0 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0x10 | Touch Information | Get | Packet Number | 0: No touch<br>1: Last Report at ID 0 to ID 5 (include release status)<br>2: Last Report at ID 6 to ID 9 (include release status) | | | | | | | |
| | | | ID0 | 1: Touch Down,<br>0: Touch Off | 0 | X_High direction coordinate | | | | | |
| | | | | X_Low direction coordinate | | | | | | | |
| | | | | 0 | 0 | Y_High direction coordinate | | | | | |
| | | | | Y_Low direction coordinate | | | | | | | |
| | | | | Touch Pressure | | | | | | | |
| | | | ID1 | 1: Touch Down,<br>0: Touch Off | 0 | X_High direction coordinate | | | | | |
| | | | | X_Low direction coordinate | | | | | | | |
| | | | | 0 | 0 | Y_High direction coordinate | | | | | |
| | | | | Y_Low direction coordinate | | | | | | | |
| | | | | Touch Pressure | | | | | | | |
| | | | ID2 | 1: Touch Down,<br>0: Touch Off | 0 | X_High direction coordinate | | | | | |
| | | | | X_Low direction coordinate | | | | | | | |
| | | | | 0 | 0 | Y_High direction coordinate | | | | | |
| | | | | Y_Low direction coordinate | | | | | | | |
| | | | | Touch Pressure | | | | | | | |
| | | | ID3 | 1: Touch Down,<br>0: Touch Off | 0 | X_High direction coordinate | | | | | |
| | | | | X_Low direction coordinate | | | | | | | |
| | | | | 0 | 0 | Y_High direction coordinate | | | | | |
| | | | | Y_Low direction coordinate | | | | | | | |
| | | | | Touch Pressure | | | | | | | |
| | | | ID4 | 1: Touch Down,<br>0: Touch Off | 0 | X_High direction coordinate | | | | | |

| | | | X_Low direction coordinate | | |
|---|---|---|---|---|---|
| | | | 0 | 0 | Y_High direction coordinate |
| | | | Y_Low direction coordinate | | |
| | | | Touch Pressure | | |
| | ID5 | 1: Touch Down, 0: Touch Off | 0 | | X_High direction coordinate |
| | | X_Low direction coordinate | | | |
| | | 0 | 0 | Y_High direction coordinate | |
| | | Y_Low direction coordinate | | | |
| | | Touch Pressure | | | |

## 9.7 Interrupt Pin (INT) Control

When a finger touches on the sensor surface, the INT pin will be pull low. TP controller supports two different type control method.

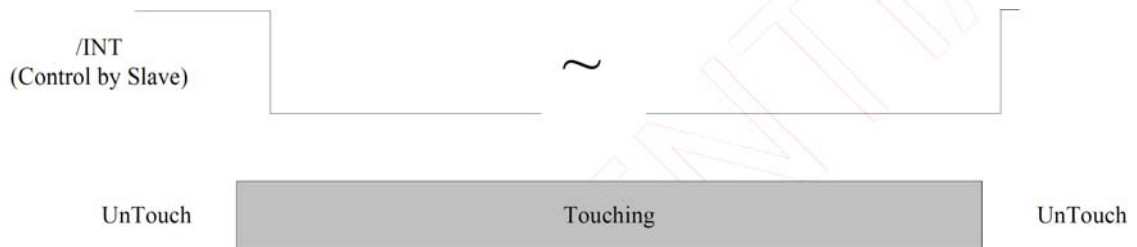Method 1(Polling): The $\overline{INT}$ will continue to be low until the finger leaves the sensor surface.



Fig 9: Method 1: $\overline{INT}$ Pin Control Diagram (Finger Touch)

Method 2(Interrupt): The $\overline{INT}$ will continue to be pull low until host read 0x10 command.
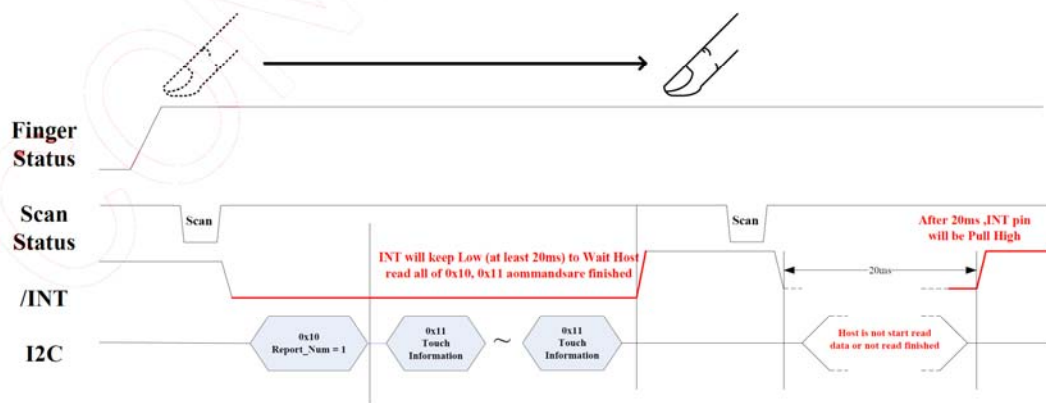


Fig 10: Method 2: $\overline{INT}$ Pin Control Diagram (Finger Touch)
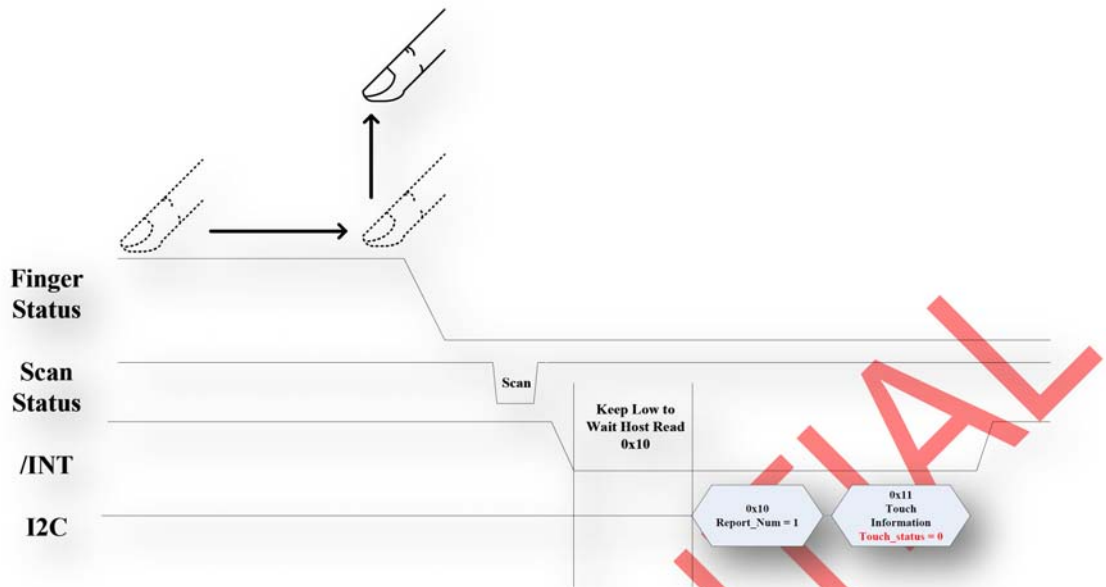
Fig 11:   Method 2: $\overline{\text{INT}}$   Pin Control Diagram (Finger Release)

Finger Status

Scan Status

Scan

/INT

Keep Low to Wait Host Read 0x10

I2C

0x10 Report_Num = 1

0x11 Touch Information Touch_status = 0

## 9.8 Device Address



MSB          LSB

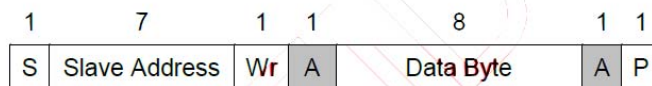| 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0/1 |
|---|---|---|---|---|---|---|-----|

Device Address    R/W

7-bit Device Address: 0x41

8-bit Device Read Address:0x83

8-bit Device Write Address:0x82

## 9.9 Data Transfer

Data is transferred over the IIC bus with 8-bit address and 8-bit data.



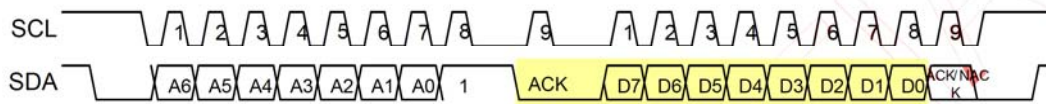| 1 | 7 | 1 | 1 | 8 | 1 | 1 |
|---|---|---|---|---|---|---|
| S | Slave Address | Wr | A | Data Byte | A | P |

| S | Start Condition |
|---|---|
| Sr | Repeated Start Condition |
| Rd | Read (bit value of 1) |
| Wr | Write (bit value of 0) |
| A/NA | Acknowledge (this bit position may be '0' for an ACK or '1' for a NACK) |
| P | Stop Condition |
| | Master-to-Slave |
| | Slave-to-Master |
| --- | Continue |

## I2C Write timing
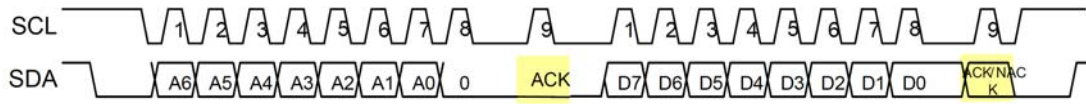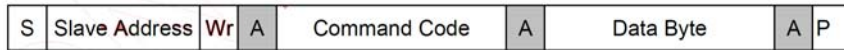


=> slave to master

## I2C Read timing



=> slave to master

## Byte Write



| S | Slave Address | Wr | A | Command Code | A | Data Byte | A | P |
|---|---|---|---|---|---|---|---|---|

F     Byte Write

## Byte Read

c

| S | Slave Address | Wr | A | Command Code | A | Sr | Slave Address | Rd | A | Data Byte | A | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
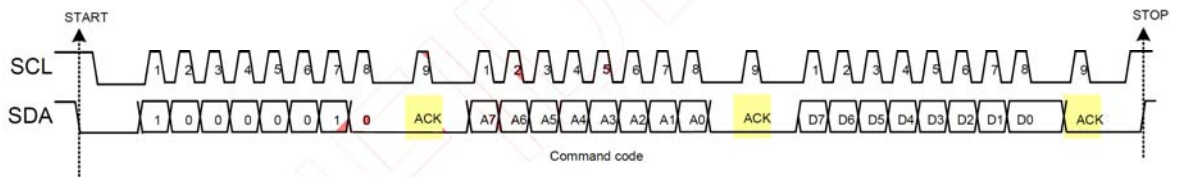
F     Byte Read

*Multi-Byte Write*



| S | Slave Address | Wr | A | Command Code | A | Data Byte 0 | A | Data Byte 1 | A |
|---|---|---|---|---|---|---|---|---|---|

| Data Byte 2 | A | ----- | A | Data Byte N | A | P |
|---|---|---|---|---|---|---|
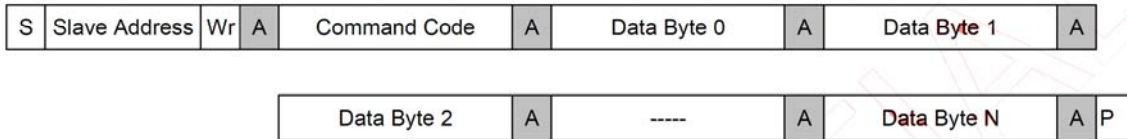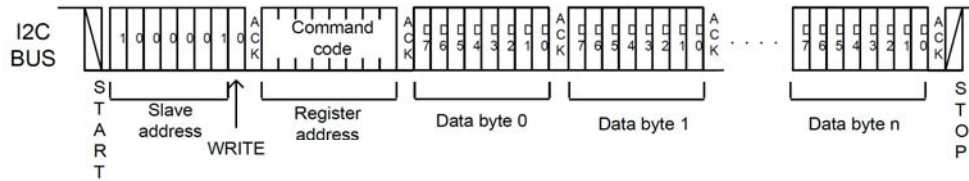
F    Multi-Byte Write

*Multi-Byte Read*



| S | Slave Address | Wr | A | Command Code | A | Sr | Slave Address | Rd | A | Data Byte 0 | A |
|---|---|---|---|---|---|---|---|---|---|---|---|

| Data Byte 1 | A | ----- | A | Data Byte N | NA | P |
|---|---|---|---|---|---|---|
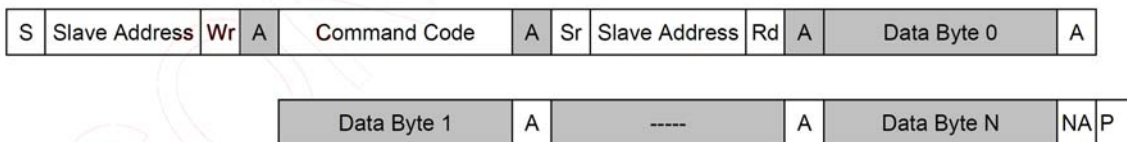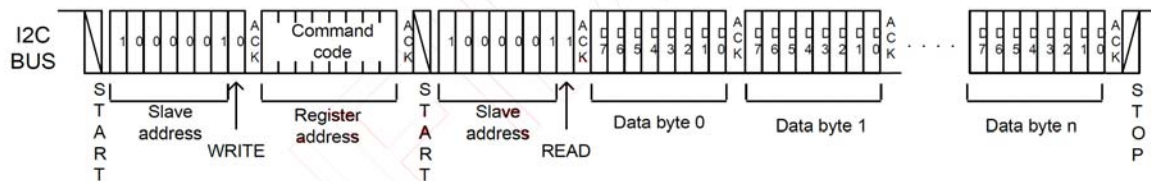
F    Multi-Byte Read

# 10 USE PRECAUTIONS

## 10.1   Handling precautions

1) The polarizing plate may break easily so be careful when handling it. Do not touch, press or rub it with a hard-material tool like tweezers.

2) Do not touch the polarizing plate surface with bare hands so as not to make it dirty. If the surface or other related part of the polarizing plate is dirty, soak a soft cotton cloth or chamois leather in benzine and wipe off with it. Do not use chemical liquids such as acetone, toluene and isopropyl alcohol. Failure to do so may bring chemical reaction phenomena and deteriorations.

3) Remove any spit or water immediately. If it is left for hours, the suffered part may deform or decolorize.

4) If the LCD element breaks and any LC stuff leaks, do not suck or lick it. Also if LC stuff is stuck on your skin or clothing, wash thoroughly with soap and water immediately.

## 10.2 Installing precautions

1) The PCB has many ICs that may be damaged easily by static electricity. To prevent breaking by static electricity from the human body and clothing, earth the human body properly using the high resistance and discharge static electricity during the operation. In this case, however, the resistance value should be approx. 1MΩ and the resistance should be placed near the human body rather than the ground surface. When the indoor space is dry, static electricity may occur easily so be careful. We recommend the indoor space should be kept with humidity of 60% or more. When a soldering iron or other similar tool is used for assembly, be sure to earth it.

2) When installing the module and ICs, do not bend or twist them. Failure to do so may crack LC element and cause circuit failure.

3) To protect LC element, especially polarizing plate, use a transparent protective plate (e.g., acrylic plate, glass etc) for the product case.

4) Do not use an adhesive like a both-side adhesive tape to make LCD surface (polarizing plate) and product case stick together. Failure to do so may cause the polarizing plate to peel off.

### 10.3 Storage precautions

1) Avoid a high temperature and humidity area. Keep the temperature between 0°C and 35°C and also the humidity under 60%.
2) Choose the dark spaces where the product is not exposed to direct sunlight or fluorescent light.
3) Store the products as they are put in the boxes provided from us or in the same conditions as we recommend.


### 10.4 Operating precautions

1) Do not boost the applied drive voltage abnormally. Failure to do so may break ICs. When applying power voltage, check the electrical features beforehand and be careful. Always turn off the power to the LC module controller before removing or inserting the LC module input connector. If the input connector is removed or inserted while the power is turned on, the LC module internal circuit may break.

2) The display response may be late if the operating temperature is under the normal standard, and the display may be out of order if it is above the normal standard. But this is not a failure; this will be restored if it is within the normal standard.

3) The LCD contrast varies depending on the visual angle, ambient temperature, power voltage etc. Obtain the optimum contrast by adjusting the LC dive voltage.

4) When carrying out the test, do not take the module out of the low-temperature space suddenly. Failure to do so will cause the module condensing, leading to malfunctions.

5) Make certain that each signal noise level is within the standard (L level: 0.2Vdd or less and H level: 0.8Vdd or more) even if the module has functioned properly. If it is beyond the standard, the module may often malfunction. In addition, always connect the module when making noise level measurements.

6) The CMOS ICs are incorporated in the module and the pull-up and pull-down function is not adopted for the input so avoid putting the input signal open while the power is ON.

7) The characteristic of the semiconductor element changes when it is exposed to light emissions, therefore ICs on the LCD may malfunction if they receive light emissions. To prevent these malfunctions, design and assemble ICs so that they are shielded from light emissions.

8) Crosstalk occurs because of characteristics of the LCD. In general, crosstalk occurs when the regularized display is maintained. Also, crosstalk is affected by the LC drive voltage. Design the contents of the display, considering crosstalk.

## 10.5 Other

1) Do not disassemble or take the LC module into pieces. The LC modules once disassembled or taken into pieces are not the guarantee articles.
2) Do not keep the LCD at the same display pattern continually. The residual image will happen and it will damage the LCD. Please use screen saver.
3) AMIPRE will provide one year warrantee for all products and three months warrantee for all repairing products.

### 10.6 Mechanism

(1) Please mount LCD module by using mounting holes arranged in four corners tightly.

(2) The square adhesive tape which is between the touch panel and display can't provide well supporting in the long term and high ambient temperature condition. Whether upright or horizontal position the support holder which is in the back side of the display is needed. Do not let the display floating.

Touch Panel&
Cover Lens

Square
adhesive
tape

Display

Housing

CN1

| | | | |
|---|---|---|---|
| 1 | NC | 21 | LV3P |
| 2 | VDD | 22 | GND |
| 3 | VDD | 23 | LED_GND |
| 4 | VDD_EDID | 24 | LED_GND |
| 5 | SCL_EDID | 25 | LED_GND |
| 6 | SDA_EDID | 26 | NC |
| 7 | NC | 27 | LED_PWM |
| 8 | LV0N | 28 | LED_EN |
| 9 | LV0P | 29 | CABC_EN |
| 10 | GND | 30 | NC |
| 11 | LV1N | 31 | LED_VCC |
| 12 | LV1P | 32 | LED_VCC |
| 13 | GND | 33 | LED_VCC |
| 14 | LV2N | 34 | NC |
| 15 | LV2P | 35 | BIST |
| 16 | GND | 36 | NC |
| 17 | LVCLKN | 37 | NC |
| 18 | LVCLKP | 38 | NC |
| 19 | GND | 39 | NC |
| 20 | LV3N | 40 | NC |

I2C interface:

| | |
|---|---|
| 1 | VIN |
| 2 | SCL |
| 3 | SDA |
| 4 | INT |
| 5 | RESET |
| 6 | GND |

Note:
1. Unless indicated, Tolerance "±0.5"
2. HDMI1:HDMI Type A P0.5 19Pin/HDFP1L-1N51 or Equivalent
3. CTP:P1.0 6PIN/CSA10-06-P-R or Equivalent

| | | | |
|---|---|---|---|
| 1 | 1280800W LCM | 7 | |
| 2 | 1280800N3 Bezel(上板+下板) | 8 | |
| 3 | 1280800NZ-T50 CTP (I2C) | 9 | |
| 4 | | 10 | |
| 5 | | 11 | |
| 6 | | 12 | |

| TOLERANCE GRADE(±) | | A | B |
|---|---|---|---|
| DIM. | | | |

| PART'S NO. LCM 1280800WZ-T51 | | | |
|---|---|---|---|

| DIM. | MM |
| DWN. | MILLY | DATE | 10-14-20' |
| CHK. | | DATE | |
| APPD. | | DATE | |

### 128080WZ-T51
(10.1")

DWG. NO. *2202106MA SHEET 1 OF 1

REV | REVISION RECORD | DATE | NAME
0 | NEW RELEASE | 10-14-20 | MILLY

**CN1**

| | | | |
|---|---|---|---|
| 1 | NC | 21 | LV3P |
| 2 | VDD | 22 | GND |
| 3 | VDD | 23 | LED_GND |
| 4 | VDD_EDID | 24 | LED_GND |
| 5 | SCL_EDID | 25 | LED_GND |
| 6 | SDA_EDID | 26 | NC |
| 7 | NC | 27 | LED_PWM |
| 8 | LVON | 28 | LED_EN |
| 9 | LVOP | 29 | CABC_EN |
| 10 | GND | 30 | NC |
| 11 | LV1N | 31 | LED_VCC |
| 12 | LV1P | 32 | LED_VCC |
| 13 | GND | 33 | LED_VCC |
| 14 | LV2N | 34 | NC |
| 15 | LV2P | 35 | BIST |
| 16 | GND | 36 | NC |
| 17 | LVCLKN | 37 | NC |
| 18 | LVCLKP | 38 | NC |
| 19 | GND | 39 | NC |
| 20 | LV3N | 40 | NC |

**I2C interface:**

| 1 | VIN |
|---|---|
| 2 | SCL |
| 3 | SDA |
| 4 | INT |
| 5 | RESET |
| 6 | GND |

Note:
1. Unless indicated, Tolerance "±0.5"
2. HDMI1:HDMI Type A P0.5 19Pin/HDFP1L-1N51 or Equivalent
3. CTP:P1.0 6PIN/CSA10-06-P-R or Equivalent

| 7 | 1280800W LCM |
|---|---|
| 2 | 1280800N3 Bezel(上框+下框) |
| 3 | 1280800NZ-T50 CTP (I2C) |

Back view



[83.0±0.3]
166.0±0.3 (Cover Lens)
247.0±0.3 (Cover Lens)
231.86±0.5 (LCM outline)
Stiffener
P1.0x5
(77.35±0.5)
(123.5±0.3)
40
1
IPEX:20455-040E-66 or equivalent
(5.39)
(61.69±0.5)
151.5±0.5 (LCM outline)
(8.82)

| TOLERANCE GRADE(±) | A | B | DIM. | MM | DRN. | CHK. | APPD. | DATE |
|---|---|---|---|---|---|---|---|---|
| IF NO. | | | | | MILLY | | | |
| PARTS NO.LCM-1280800WZ-T51 | | | | | DATE 10-14-20' | DATE | DATE | |

AMPIRE 晶采光電科技

TITLE 1280800WZ-T51 (10.1")

DWG. NO. *2202107MA  SHEET 1 OF 1