Zeppelinstrasse 19 D-82205 Gilching Fon +49-8105-778090 *info@lcd-module.de* http://www.lcd-module.de

# SPECIFICATION

**CUSTOMER :** _____

**MODULE NO.:** **EA TFT057-32ATS**

| | |
|---|---|
| **APPROVED BY:**<br>**( FOR CUSTOMER USE ONLY )** | **PCB VERSION:** **DATA:** |

| SALES BY | APPROVED BY | CHECKED BY | PREPARED BY |
|---|---|---|---|
| | | | |
| **ISSUED DATE:** 2018/07/12 | | | |

# Content

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# 1.Summary

This technical specification applies to 5.7’ color TFT-LCD panel. The 5.7’ color TFT-LCD panel is designed for camcorder, digital camera application and other electronic products which require high quality flat panel displays. This module follows RoHS.

### 1.1. Accessories

| | |
|---|---|
| ZIF connector for display, bottom contact | **EA WF050-40S** |
| ZIF connector for display, top contact | **EA WF050-40ST** |
| ZIF connector for touch panel, top contact | **EA WF050-10T** |

# 2.General Specifications

| Item | Dimension | Unit |
|---|---|---|
| Size | 5.7 | inch |
| Dot Matrix | 320 x RGBx240(TFT) | dots |
| Module dimension | 141.12(W) x 101.55(H) x 8.235 (D)(MAX) | mm |
| Active area | 115.2 x 86.40 | mm |
| Dot pitch | 0.12 x 0.36 | mm |
| LCD type | TFT, Normally White, Transmissive | |
| View Direction | 12 o'clock | |
| Gray Scale Inversion Direction | 6 o'clock | |
| Backlight Type | LED,Normally White | |
| With /Without TP | With CTP | |
| Surface | Glare | |

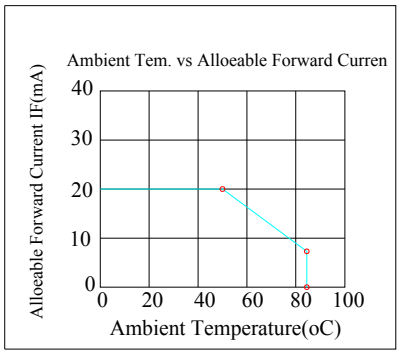
*Color tone slight changed by temperature and driving voltage.

# 3.Absolute Maximum Ratings

| Item | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Operating Temperature | TOP | -20 | — | +70 | ℃ |
| Storage Temperature | TST | -30 | — | +80 | ℃ |

Note: Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above

1. Temp. ≦60℃, 90% RH MAX. Temp.＞60℃, Absolute humidity shall be less than 90% RH at 60℃



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# 4.Electrical Characteristics

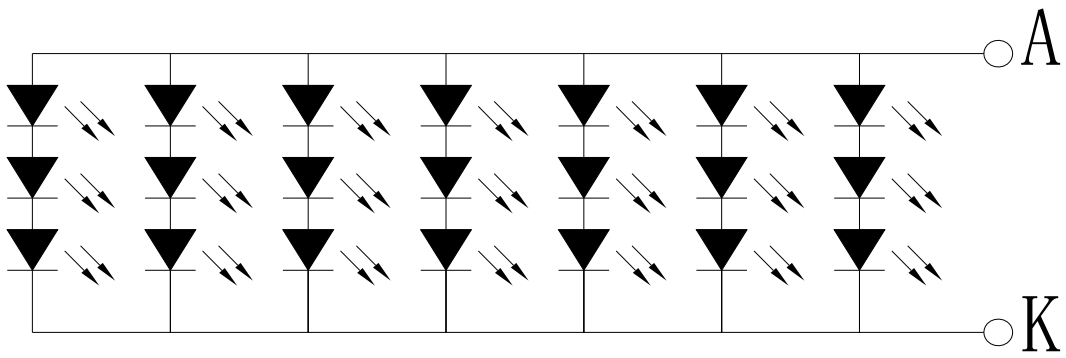
## 4.1. Operating conditions:

| Item | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Supply Voltage For Logic | VCC | — | 3.0 | 3.3 | 3.6 | V |
| Supply Voltage For Touch Logic | VDDT | — | 2.8 | | 3.3 | V |
| Supply Current | Icc | VCC=3.3V | — | 140 | 210 | mA |

## 4.2. LED driving conditions

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|
| LED current | | - | 140 | - | mA | |
| Power Consumption | | 1260 | | 1470 | mW | |
| LED voltage | VBL+ | 9.0 | | 10.5 | V | Note 1 |
| LED Life Time | | | 50,000 | | Hr | Note 2,3,4 |

Note 1 : There are 1 Groups LED




Note 2 : Ta = 25 □
Note 3 : Brightness to be decreased to 50% of the initial value
Note 4 : The single LED lamp case.

# 5.DC CHARATERISTICS

| Parameter | Symbol | Rating | | | Unit | Condition |
|---|---|---|---|---|---|---|
| | | Min | Typ | Max | | |
| Low level input voltage | $V_{IL}$ | 0 | - | 0.3VCC | V | |
| High level input voltage | $V_{IH}$ | 0.7VCC | - | VCC | V | |

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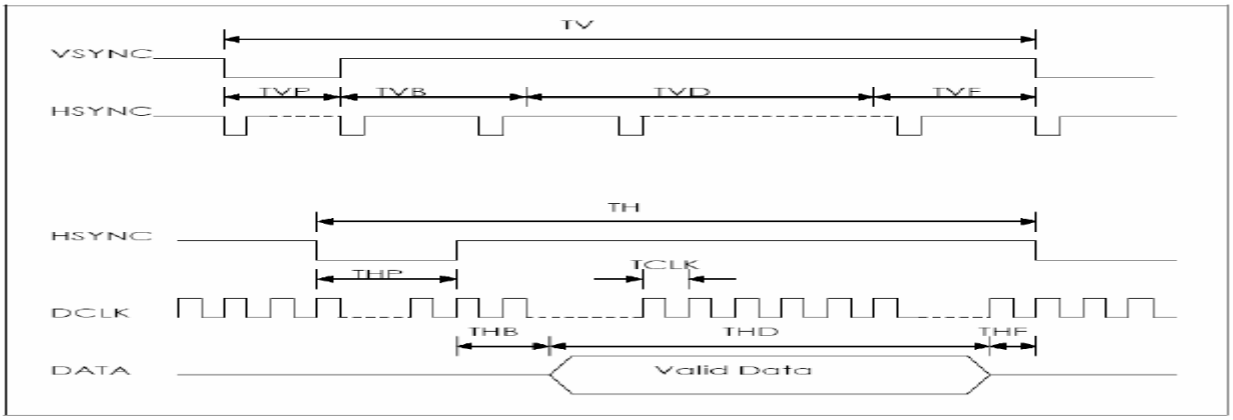
# 6.AC CHARATERISTICS

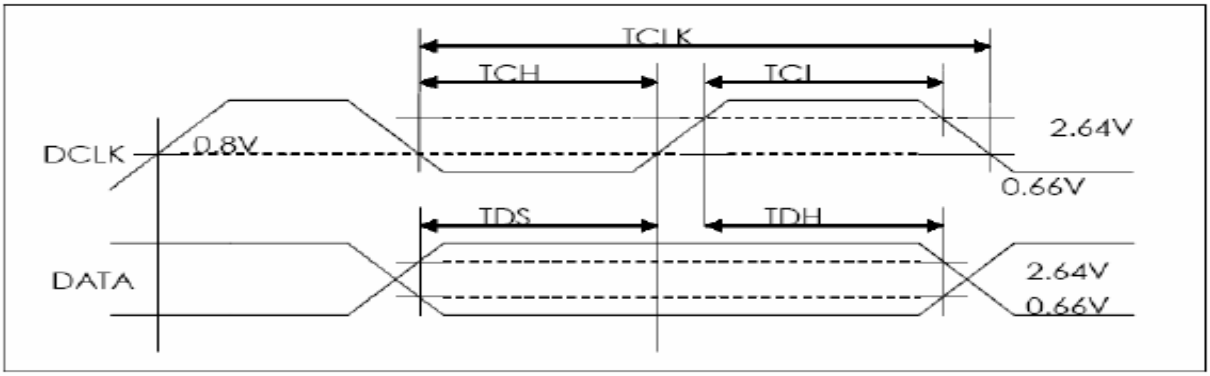
## 6.1. 24-bits parallel RGB Interface

### AC Timing Characteristics

| Signal | ltem | | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Dclk | Frequency | | Dclk | - | 6.4 | - | MHZ |
| | High time | | Tch | - | 78 | - | ns |
| | Low time | | Tcl | - | 78 | - | ns |
| Data | Setup time | | Tds | 12 | - | - | ns |
| | Hold time | | Tdh | 12 | - | - | ns |
| Hsync | Period | | TH | - | 408 | - | DCLK |
| | Pulse Width | | Thp | - | 30 | - | DCLK |
| | Back-Porch | | Thb | - | 38 | - | DCLK |
| | Display Period | | Thd | - | 320 | - | DCLK |
| | Front-Porch | | Thf | - | 20 | - | DCLK |
| Vsync | Period | NTSC | TV | - | 262.5 | - | DCLK |
| | | PAL | | | 312.5 | - | |
| | Pulse Width | | Tvp | 1 | 3 | 5 | TH |
| | Back-Porch | NTSC | Tvb | - | 15 | - | TH |
| | | PAL | | | 23 | | |
| | Display Period | | Tvd | - | 240 | - | TH |
| | Front-Porch | NTSC | Tvf | - | 4.5 | - | TH |
| | | PAL | | | 46.5 | | |

### AC Timing Diagrams




TCLK
TCH
TCL
DCLK
0.8V
2.64V
0.66V
TDS
TDH
DATA
2.64V
0.66V

# 7.Optical Characteristics

| Item | | Symbol | Condition. | Min | Typ. | Max. | Unit | Remark |
|---|---|---|---|---|---|---|---|---|
| Response time | | Tr | θ=0°、Φ=0° | - | 15 | 30 | .ms | Note 3,5 |
| | | Tf | | - | 35 | 50 | .ms | |
| Contrast ratio | | CR | At optimized viewing angle | 150 | 250 | - | - | Note 4,5 |
| Color Chromaticity | White | Wx | θ=0°、Φ=0 | 0.282 | 0.312 | 0.342 | | Note 2,6,7 |
| | | Wy | | 0.319 | 0.349 | 0.379 | | |
| Viewing angle (Gray Scale Inversion Direction) | Hor. | ΘR | CR≧10 | 60 | 70 | | Deg. | Note 1 |
| | | ΘL | | 60 | 70 | | | |
| | Ver. | ΦT | | 40 | 50 | | | |
| | | ΦB | | 60 | 70 | | | |
| Brightness | | - | - | 320 | 400 | - | cd/㎡ | Center of display |

Ta=25±2℃, IL=140mA

Note 1: Definition of viewing angle range

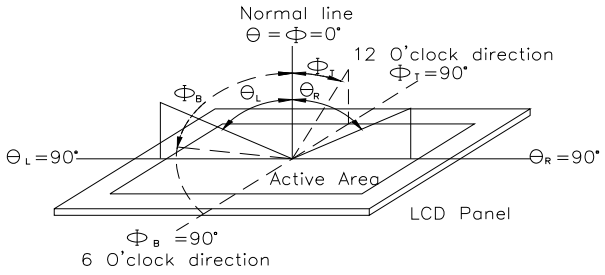



Fig.8.1. Definition of viewing angle

Note 2: Test equipment setup:

After stabilizing and leaving the panel alone at a driven temperature for 10 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7orBM-5 luminance meter 1.0° field of view at a distance of 50cm and normal direction.

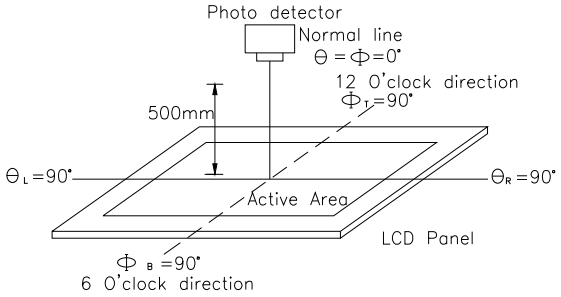
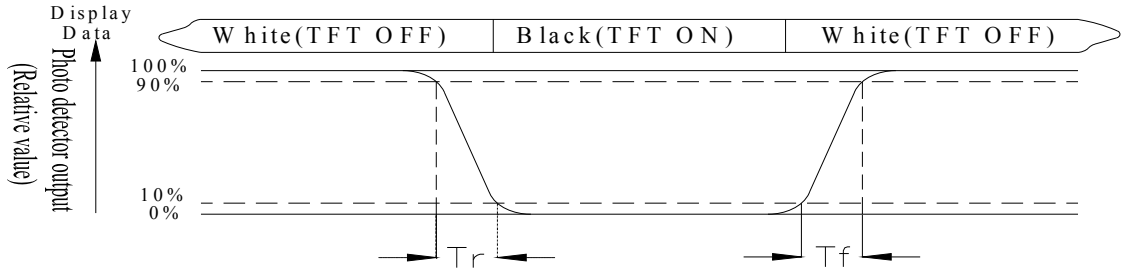



Fig. 8.2. Optical measurement system setup

Note 3: Definition of Response time:
The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time, Tr, is the time between photo detector output intensity changed from 90%to 10%. And fall time, Tf, is the time between photo detector output intensity changed from 10%to 90%




Note 4: Definition of contrast ratio:
The contrast ratio is defined as the following expression.

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5: White Vi = Vi50 ± 1.5V
Black Vi = Vi50 ± 2.0V
"±" means that the analog input signal swings in phase with VCOM signal.
"±" means that the analog input signal swings out of phase with VCOM signal.
The 100% transmission is defined as the transmission of LCD panel when all the input terminals of module are electrically opened.

Note 6: Definition of color chromaticity (CIE 1931)
Color coordinates measured at the center point of LCD

Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

# 8.Interface

## 8.1. LCM PIN Definition

| Pin | Symbol | Function | Remark |
|---|---|---|---|
| 1 | NC | No connection | |
| 2 | NC | No connection | |
| 3 | GND | System ground pin of the IC. Connect to system ground. | |
| 4 | VCC | Power Supply | |
| 5 | R0 | Red Data bit(LSB) | |
| 6 | R1 | Red Data bit | |
| 7 | R2 | Red Data bit | |
| 8 | R3 | Red Data bit | |
| 9 | R4 | Red Data bit | |
| 10 | R5 | Red Data bit | |
| 11 | R6 | Red Data bit | |
| 12 | R7 | Red Data bit (MSB) | |
| 13 | G0 | Green Data bit(LSB) | |
| 14 | G1 | Green Data bit | |
| 15 | G2 | Green Data bit | |
| 16 | G3 | Green Data bit | |
| 17 | G4 | Green Data bit | |
| 18 | G5 | Green Data bit | |
| 19 | G6 | Green Data bit | |
| 20 | G7 | Green Data bit (MSB) | |
| 21 | B0 | Blue Data bit(LSB) | |
| 22 | B1 | Blue Data bit | |
| 23 | B2 | Blue Data bit | |
| 24 | B3 | Blue Data bit | |
| 25 | B4 | Blue Data bit | |
| 26 | B5 | Blue Data bit | |
| 27 | B6 | Blue Data bit | |
| 28 | B7 | Blue Data bit (MSB) | |
| 29 | GND | System ground pin of the IC. Connect to system ground. | |
| 30 | CLK | Dot data clock | |
| 31 | L/R | Shift direction of device internal shift register control. | Note2,3 |
| 32 | Hsync | Horizontal sync signal | Note1 |
| 33 | Vsync | Vertical sync signal | Note1 |
| 34 | DE | Data Enable signal | Note1 |
| 35 | U/D | Up/down selection | Note2,3 |
| 36 | RESET | Hardware reset | |
| 37 | NC | No connection | |
| 38 | NC | No connection | |
| 39 | NC | No connection | |
| 40 | NC | No connection | |

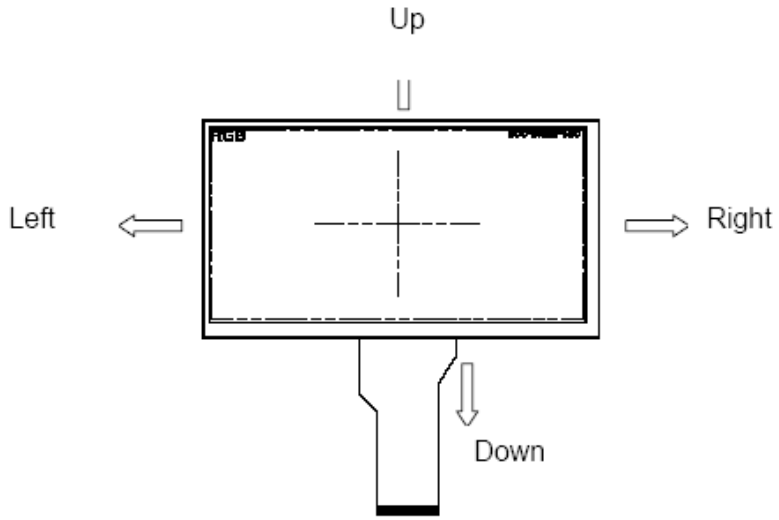
For digital 24Bit RGB input data format, both SYNC mode and DE mode are supported. If DE signal is fixed low, SYNC mode is used. Otherwise,DE mode is used. Suggest used SYNC mode!!

| Mode | D[23:16] | D[15:8] | D[7:0] | IHS | IVS | DEN |
|---|---|---|---|---|---|---|
| 24 bit RGB | R[7:0] | G[7:0] | B[7:0] | HSYNC | VSYNC | DE signal is fixed low for SYNC mode |
| | | | | Floating if not used | Floating if not used | DE for DE Mode |

Note 2: Selection of scanning mode

| Setting of scan control input | | Scanning direction |
|---|---|---|
| U/D | L/R | |
| GND | VCC | Up to down, left to right |
| VCC | GND | Down to up, right to left |
| GND | GND | Up to down, right to left |
| VCC | VCC | Down to up, left to right |

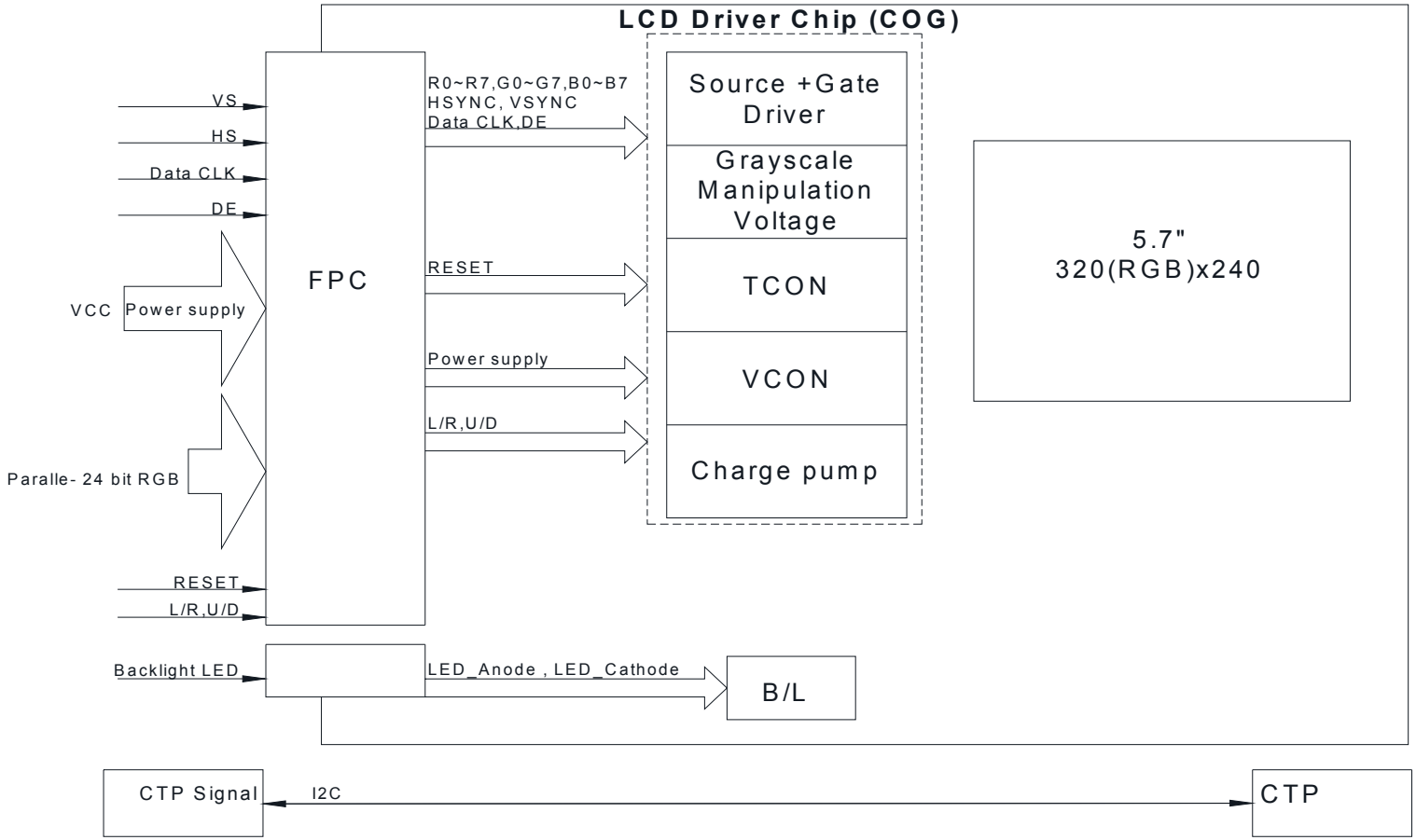
Note 3: Definition of scanning direction.Refer to the figure as below:




## 8.2. CTP PIN Definition

| Pin | Symbol | Function | Remark |
|---|---|---|---|
| 1 | VSS | Ground for analog circuit | |
| 2 | VDDT | Power Supply : +3.3V | |
| 3 | SCL | SPI Slave mode, chip select, active low / I2C clock input | |
| 4 | NC | No connect | |
| 5 | SDA | SPI Slave mode, data input / I2C data input and output | |
| 6 | NC | No connect | |
| 7 | /RST | External Reset, Low is active | |
| 8 | /WAKE | External interrupt from the host | |
| 9 | /INT | External interrupt to the host | |
| 10 | VSS | Ground for analog circuit | |

# 9.Block Diagram



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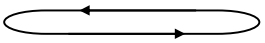
# 10.Reliability

Content of Reliability Test (Wide temperature, -20℃~70℃)

| **Environmental Test** | | | |
|---|---|---|---|
| **Test Item** | **Content of Test** | **Test Condition** | **Note** |
| High Temperature storage | Endurance test applying the high storage temperature for a long time. | 80℃<br>200hrs | 2 |
| Low Temperature storage | Endurance test applying the low storage temperature for a long time. | -30℃<br>200hrs | 1,2 |
| High Temperature Operation | Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time. | 70℃<br>200hrs | —— |
| Low Temperature Operation | Endurance test applying the electric stress under low temperature for a long time. | -20℃<br>200hrs | 1 |
| High Temperature/ Humidity Operation | The module should be allowed to stand at 60℃,90%RH max | 60℃,90%RH<br>96hrs | 1,2 |
| Thermal shock resistance | The sample should be allowed stand the following 10 cycles of operation<br>-20℃ 25℃ 70℃<br>  <br>30min 5min 30min<br>1 cycle | -20℃/70℃<br>10 cycles | —— |
| Vibration test | Endurance test applying the vibration during transportation and using. | Total fixed amplitude : 15mm<br>Vibration Frequency : 10~55Hz<br>One cycle 60 seconds to 3 directions of X,Y,Z for Each 15 minutes | 3 |
| Static electricity test | Endurance test applying the electric stress to the terminal. | VS=±600V(contact), ±800v(air),<br>RS=330Ω<br>CS=150pF<br>10 times | —— |

Note1: No dew condensation to be observed.
Note2: The function test shall be conducted after 4 hours storage at the normal Temperature and humidity after remove from the test chamber.
Note3: The packing have to including into the vibration testing.

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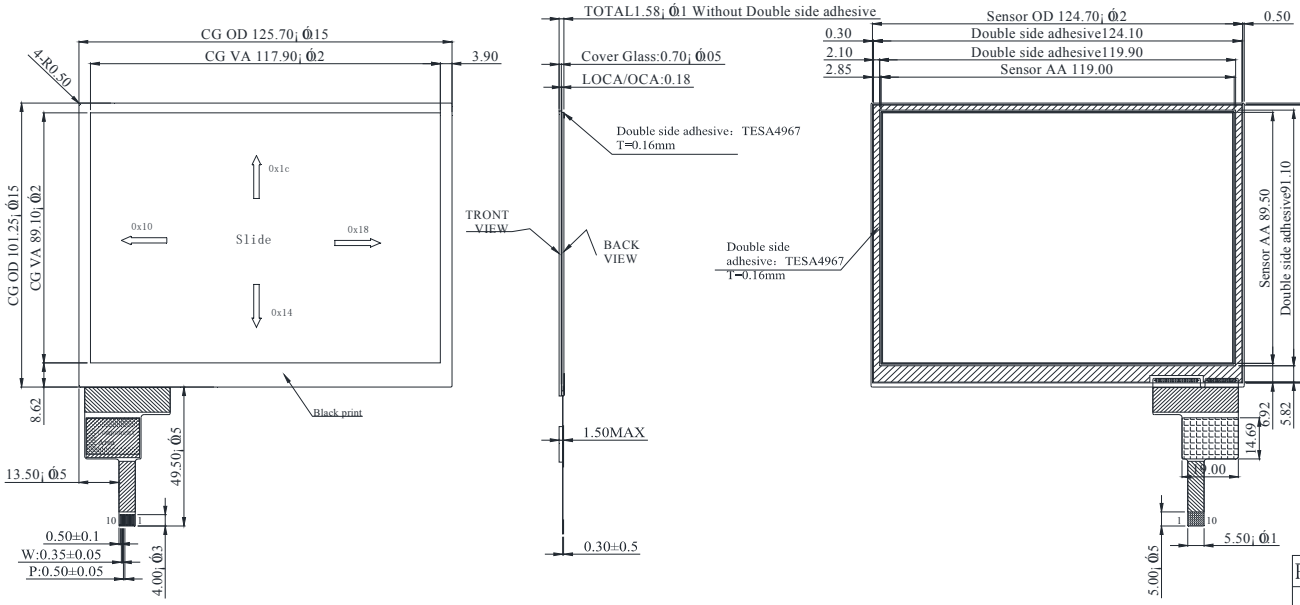
# 11.Touch Panel Information



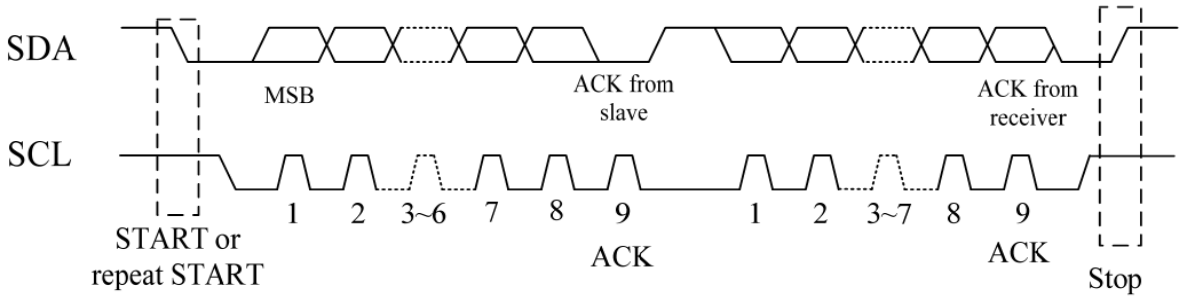

FRONT VIEW

SIDE VIEW

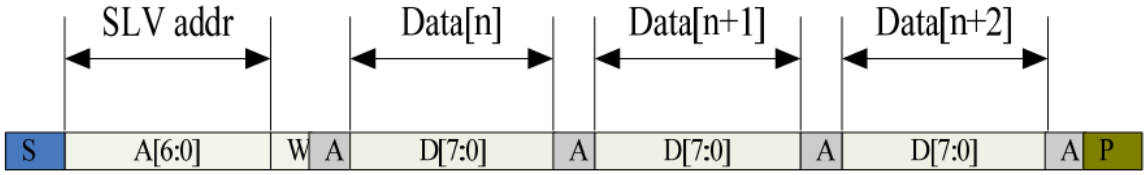
BACK VIEW

| PIN NO. | SYMBOL |
|---|---|
| 1 | VSS |
| 2 | VDDT |
| 3 | SCL |
| 4 | NC |
| 5 | SDA |
| 6 | NC |
| 7 | /RST |
| 8 | /WAKE |
| 9 | /INT |
| 10 | VSS |

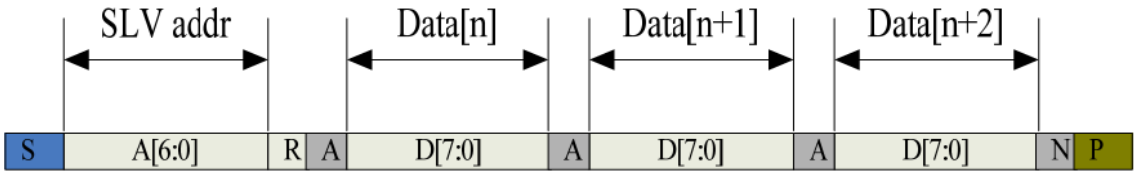
## 11.1. CTP I2C Timing:




I2C Serial Data Transfer Format




I2C master write, slave read




I2C master read, slave write

| Mnemonics | Description |
|---|---|
| S | 12C Start or 12C Restart |
| A[6:0] | Slave address<br>A[6:4]:3'b011<br>A[3:0]:data bits are identical to those of 12CCON[7:4]register |
| W | 1'b0:Write |
| R | 1'b1:Read |
| A(N) | ACK(NACK) |
| P | STOP :the indication of the end of a packet(if this bit is missing, S will indicate the end of the current packet and beginning of the next packet) |

Lists the meanings of the mnemonics used in the above figures

| Parameter | Unit | Min | Max |
|---|---|---|---|
| SCL frequency | KHz | 0 | 400 |
| Bus free time between a STOP and START condition | us | 4.7 | \ |
| Hold time (repeated) ST ART condition | us | 4.0 | \ |
| Data setup time | ns | 250 | \ |
| Setup time for a repeated START condition | us | 4.7 | \ |
| Setup time for STOP condition | us | 4.0 | \ |

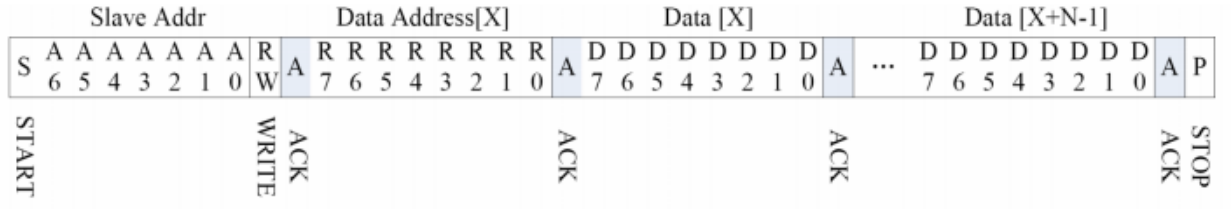
Interface Timing Characteristics

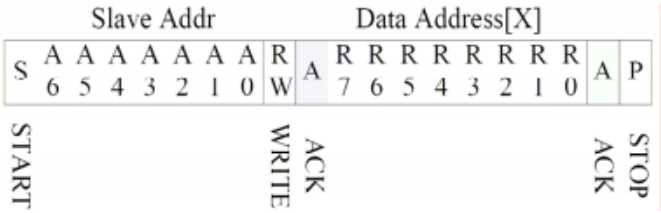
AS FOR STANDARD CTPM, HOST NEED TO USE BOTH INTERRUPT CONTROL SIGNAL AND SERIAL DATA INTERFACE TO GET THE TOUCH DATA.

HERE IS THE TIMING TO GET TOUCH DATA.

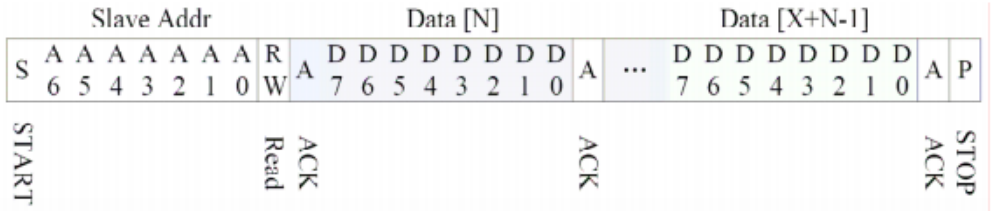
## 12.2. WRITE BYTES TO I2C SLAVE

The I²C address is set to 0x70 (0x38). Controller is FT5426DQ8 or compatible and resolution 1048x1024 dots.

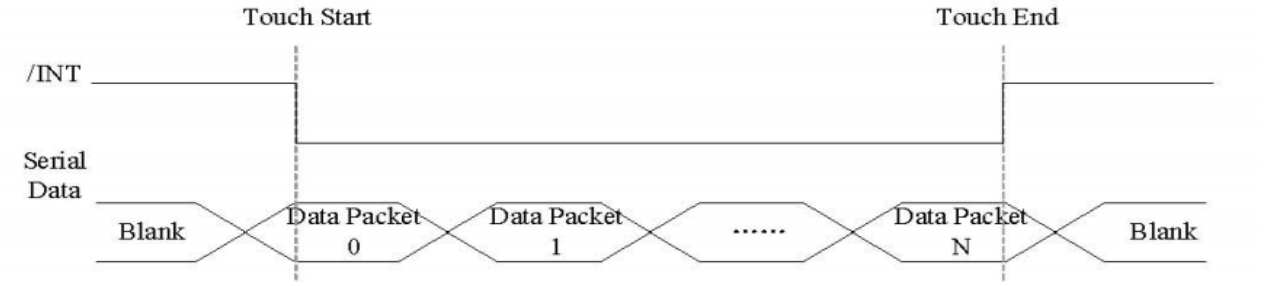



READ X BYTES FROM I2C SLAVE



AS FOR STANDARD CTPM, HOST NEED TO USE BOTH INTERRUPT CONTROL SIGNAL AND SERIAL DATA INTERFACE TO GET THE TOUCH DATA, HERE IS THE TIMING TO GET TOUCH DATA.




TOUCH DATA READ PROTOCOL

| NAME | VALUE | DESCRIPTION |
|---|---|---|
| START CH | 0X00 | START COMMAND FOR CTPM TOUCH DATA PACKET,HOST MUST SEND CTPM A START CH COMMAND BEFORE READ TOUCH DATA |
| Ist READ BYTE～ LAST READ BYTE | | TOUCH DATA PACKET<br>SENT BY CTPM,EACH BYTE HAS 8-BIT DATA ,A TOUCH DATA PACKET CONSISTS OF N BYTE |

A DATA PACKET STARTS WITH A HEADER AND ENDS WITH CRC CODE,AS FOR 5 POINTS DATA PACKET,THE LENGTH OF THE PACKET IS ALWAYS 26 BYTES IN SPITE OF ACTUAL TOUCH POINTS.

| Address | Name | Bit7 | Bit6 | Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 | Host Access |
|---|---|---|---|---|---|---|---|---|---|---|
| 00h | Devide__Mode | | Device Model[2:0] | | | | | | | RW |
| 01h | Gest__ID | Gesture ID[7:0] | | | | | | | | R |
| 02h | TD__Status | | | | | Number of touch points[3:0] | | | | R |
| 03h | Touch1__XH | 1st Event Flag | | | | 1st Touch X Position[11:8] | | | | R |
| 04h | Touch1__XL | 1st Touch X Position[7:0] | | | | | | | | R |
| 05h | Touch1__YH | 1st Touch ID[3:0] | | | | 1st Touch Y Position[11:8] | | | | R |
| 06h | Touch1__YL | 1st Touch Y Position[7:0] | | | | | | | | R |

| | | | | | |
|---|---|---|---|---|---|
| 09h | Touch2__XH | 2nd Event Flag | | 2nd Touch X Position[11:8] | R |
| 0Ah | Touch2__XL | 2nd Touch X Position[7:0] | | | R |
| 0Bh | Touch2__YH | 2nd Touch ID[3:0] | | 2ndTouch Y Position[11:8] | R |
| 0Ch | Touch2__YL | 2nd Touch Y Position[7:0] | | | R |

| | | | | | |
|---|---|---|---|---|---|
| 0Fh | Touch3__XH | 3rdEvent Flag | | 3rdTouch X Position[11:8] | R |
| 10h | Touch3__XL | 3rd Touch X Position[7:0] | | | R |
| 11h | Touch3__YH | 3rdTouch ID[3:0] | | 3rdTouch Y Position[11:8] | R |
| 12h | Touch3__YL | 3rd Touch Y Position[7:0] | | | R |
| 15h | Touch4__XH | 4thEvent Flag | | 4thTouch X Position[11:8] | R |
| 16h | Touch4__XL | 4th Touch X Position[7:0] | | | R |
| 17h | Touch4__YH | 4thTouch ID[3:0] | | 4thTouch Y Position[11:8] | R |
| 18h | Touch4__YL | 4th Touch Y Position[7:0] | | | R |
| 1Bh | Touch5__XH | 5thEvent Flag | | 5thTouch X Position[11:8] | R |
| 1Ch | Touch5__XL | 5th Touch X Position[7:0] | | | R |
| 1Dh | Touch5__YH | 5thTouch ID[3:0] | | 5thTouch Y Position[11:8] | R |
| 1Eh | Touch5__YL | 5th Touch Y Position[7:0] | | | R |

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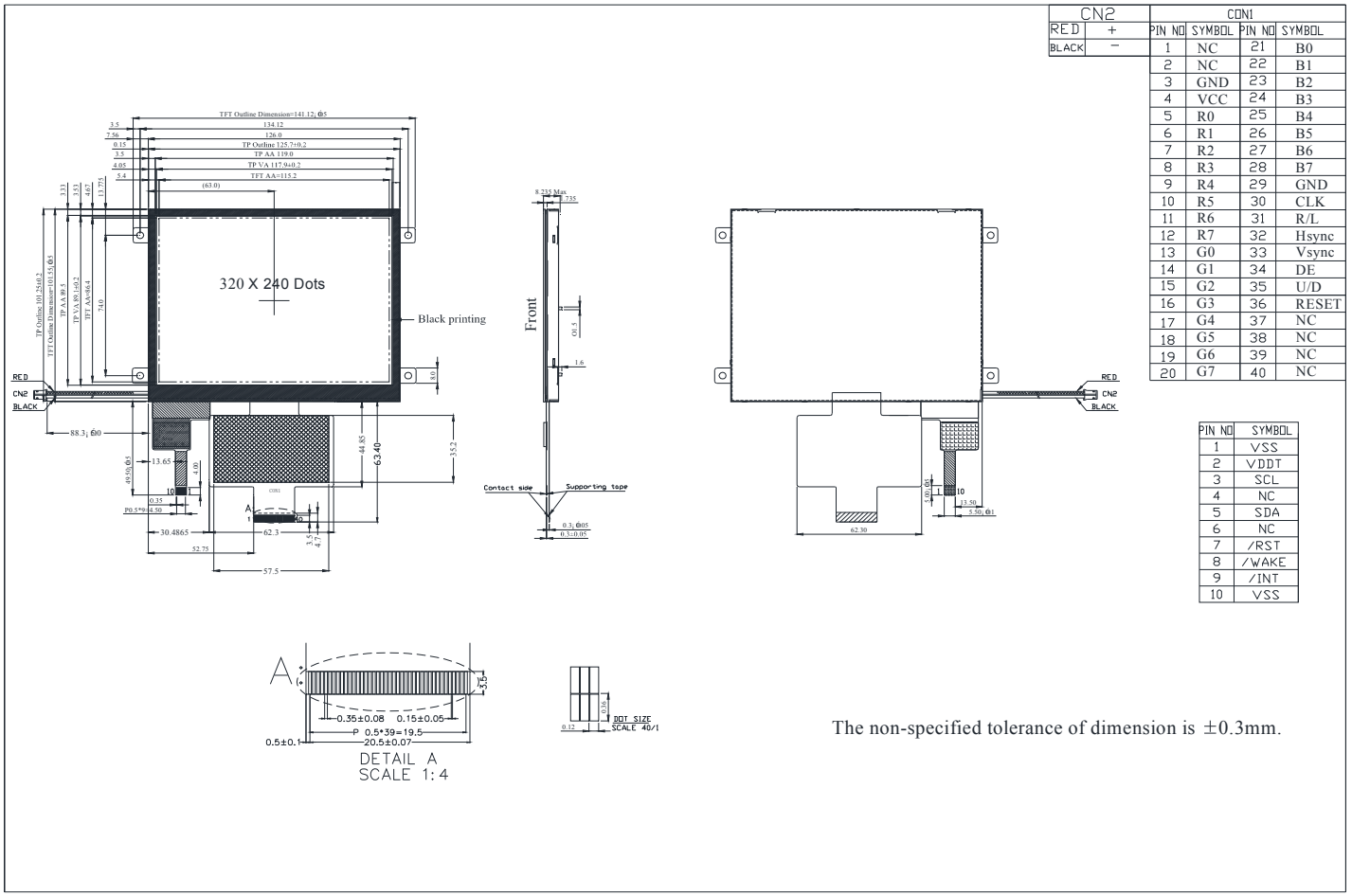
# 12.Contour Drawing




| CN2 | |
|---|---|
| RED | + |
| BLACK | − |

| CON1 | | | |
|---|---|---|---|
| PIN NO | SYMBOL | PIN NO | SYMBOL |
| 1 | NC | 21 | B0 |
| 2 | NC | 22 | B1 |
| 3 | GND | 23 | B2 |
| 4 | VCC | 24 | B3 |
| 5 | R0 | 25 | B4 |
| 6 | R1 | 26 | B5 |
| 7 | R2 | 27 | B6 |
| 8 | R3 | 28 | B7 |
| 9 | R4 | 29 | GND |
| 10 | R5 | 30 | CLK |
| 11 | R6 | 31 | R/L |
| 12 | R7 | 32 | Hsync |
| 13 | G0 | 33 | Vsync |
| 14 | G1 | 34 | DE |
| 15 | G2 | 35 | U/D |
| 16 | G3 | 36 | RESET |
| 17 | G4 | 37 | NC |
| 18 | G5 | 38 | NC |
| 19 | G6 | 39 | NC |
| 20 | G7 | 40 | NC |

| PIN NO | SYMBOL |
|---|---|
| 1 | VSS |
| 2 | VDDT |
| 3 | SCL |
| 4 | NC |
| 5 | SDA |
| 6 | NC |
| 7 | /RST |
| 8 | /WAKE |
| 9 | /INT |
| 10 | VSS |