

DM-TFT096-396

0.96" 80 × 160 IPS TFT DISPLAY
MODULE - SPI

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1 Revision History

| Date | Changes |
|------------|---------------|
| 2019-08-13 | First release |

2 Main Features

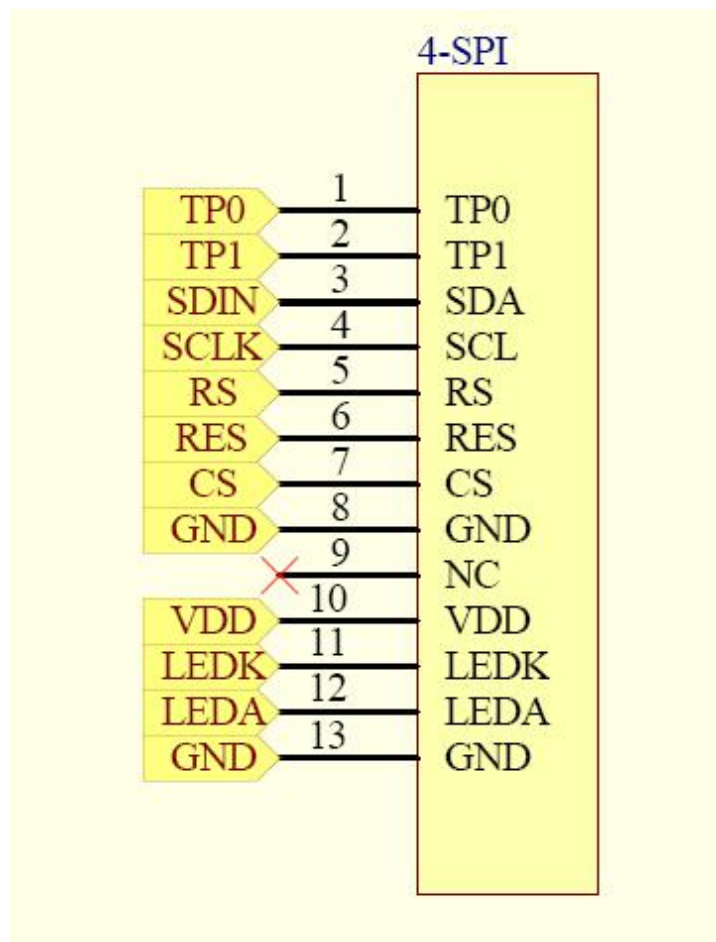
| Item | Specification | Unit |
|-------------------|-------------------------|-------------------|
| Diagonal Size | 0.96 | inch |
| Display Mode | Normally black | - |
| Display Colors | 65K | Colors |
| Color arrangement | RGB Vertical stripe | - |
| Resolution | 80RGB x 160 | pixel |
| Controller IC | ST7735S | - |
| Interface | 4 wire SPI | - |
| Active Area | 10.8 x 21.7 | mm |
| Module Dimension | 13.5 x 27.95 x 1.5(Max) | mm |
| Pixel Pitch | 0.135 x 0.1356 | mm |
| Luminance | 300(Type) | cd/m ² |
| Viewing Direction | All View | - |
| Backlight | 1 White LED | - |
| Operating Temp. | -20°C ~ 70°C | °C |
| Storage Temp. | -30°C ~ 80°C | °C |
| Weight | TBD | g |

3 Pin Description

3.1 Panel Pin Description

| Pin No. | Symbol | Function Description |
|---------|--------|--|
| 1 | TP0 | Touch Pin,If not used,please open this pin. |
| 2 | TP1 | Touch Pin,If not used,please open this pin. |
| 3 | SDA | SPI interface input/output pin. |
| 4 | SCL | This pin is used to be serial interface clock. |
| 5 | RS | Display data/command selection pin in 4-line serial interface. |
| 6 | RESET | This signal will reset the device,Signal is active low. |
| 7 | CS | Chip selection pin,Low enable,High disable. |
| 8 | GND | Power Ground. |
| 9 | NC | No Connect. |
| 10 | VDD | Power Supply for Analog |
| 11 | LEDK | LED Canthode |
| 12 | LEDA | LED Anode |
| 13 | GND | Power Ground. |

Note:

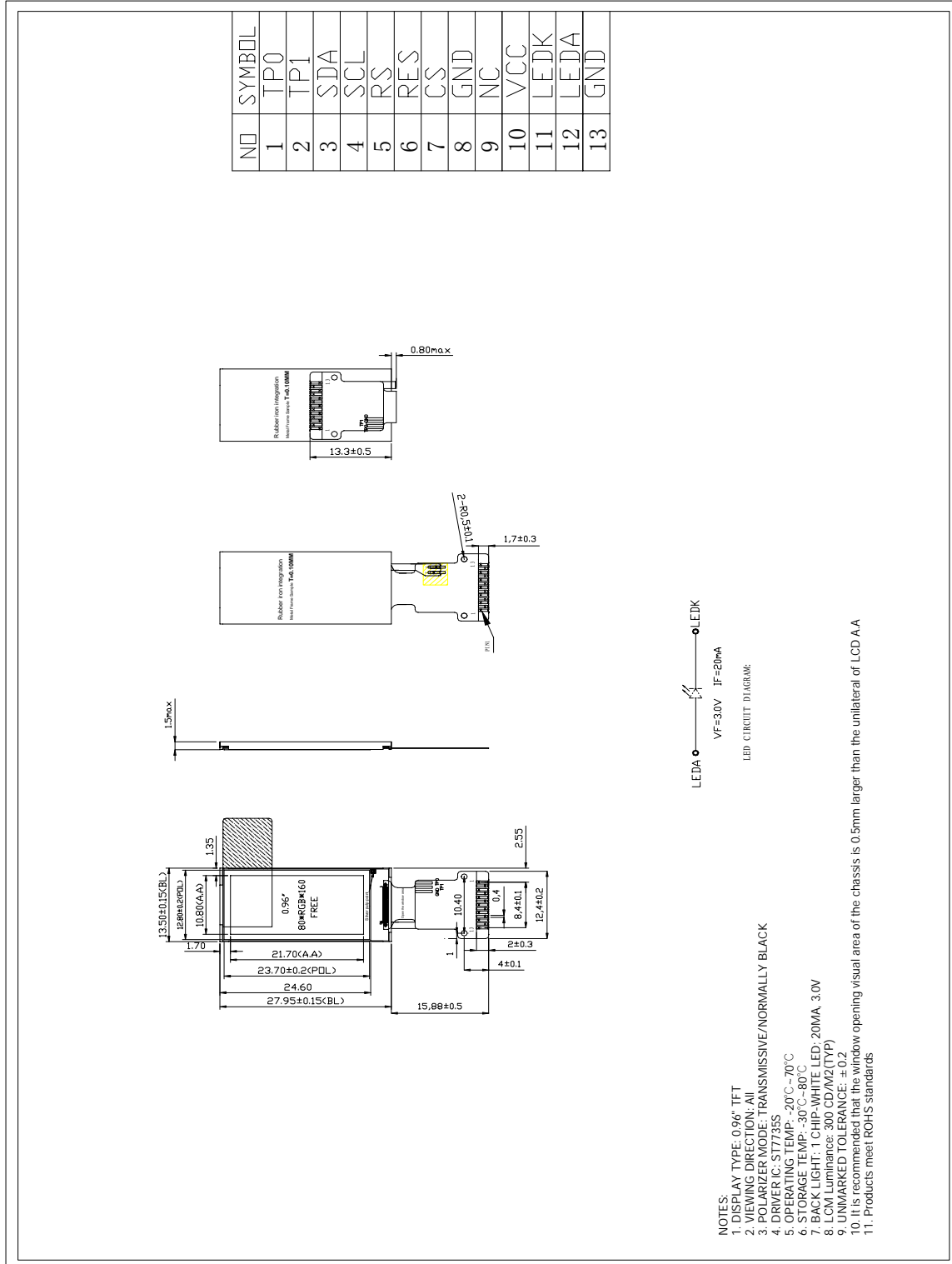


3.2 Module Pin Description

| Pin No. | Symbol | Function Description |
|---------|--------|--|
| 1 | GND | Ground |
| 2 | VCC | Power Supply 3.3V~5V |
| 3 | SCL | SPI Clock |
| 4 | SDA | SPI DATA |
| 5 | RES | Reset Pin |
| 6 | D/C | SPI Data/Command Select Pin |
| 7 | CS | SPI Chip Select |
| 8 | BLK | LCD Backlight Control The default is float, and the backlight is turned off at low power. |

4 Mechanical Drawing

4.1 Panel Mechanical Drawing



5 Optics & Electrical Characteristics

5.1 Optical Characteristics

| Item | Symbol | Min | Typ | Max | Unit | Remark |
|-----------------------------------|-----------------|----------------|----------------|----------------|-------------------|---------------|
| View Angles TOP | ΘU | - | 80 | - | ° | 25°C |
| View Angles Bottom | ΘD | - | 80 | - | ° | 25°C |
| View Angles Right | ΘR | - | 80 | - | ° | 25°C |
| View Angles Left | ΘL | - | 80 | - | ° | 25°C |
| C.I.E. (White) | (x) (y) | 0.304 0.325 | 0.306 0.327 | 0.308 0.329 | - | - |
| C.I.E. (Red) | (x) (y) | 0.608 0.331 | 0.610 0.333 | 0.612 0.335 | - | - |
| C.I.E. (Green) | (x) (y) | 0.279 0.531 | 0.281 0.533 | 0.283 0.535 | - | - |
| C.I.E. (Blue) | (x) (y) | 0.144 0.136 | 0.146 0.138 | 0.148 0.140 | - | - |
| Response Time | Tr+Tf | | 30 | 40 | ms | Θ=0°; 25°C |
| Brightness | L _{br} | 250 | 300 | - | cd/m ² | 1 LED |
| Contrast Ratio | CR | - | 800 | - | | |
| Transmittance (with polarizer) | | | | 5.09 | % | - |

Note: Definition of Response Time.(white-black)

The response time is defined as the time interval between the 10% and 90% amplitudes.

5.2 Absolute Maximum Ratings

| Parameter | Symbol | Min | Max | Unit |
|-------------------------|-------------------|------|----------------------|------|
| I/O Pins Supply Voltage | V _{DD} | -0.3 | 4.6 | V |
| Analog Supply Voltage | V _{DDIO} | -0.3 | 4.6 | V |
| Logic Supply Voltage | V _{IN} | -0.3 | V _{DD} +0.3 | V |
| Operating Temperature | T _{OP} | -20 | 70 | °C |
| Storage Temperature | T _{STG} | -30 | 80 | °C |

5.3 DC Characteristics

| Item | Symbol | Min | Typ. | Max | Unit | Remark |
|------------------------------------|------------|------|------|------|---------|--------|
| LED backlight Supply Voltage | V_{BL} | 2.4 | 2.8 | 3.5 | V | |
| Logic Supply Voltage | V_{DD} | 2.4 | 2.5 | 2.6 | V | |
| Interface Operation Supply Voltage | V_{DDIO} | 1.65 | 1.8 | VCI | V | |
| Gate Driver High Voltage | V_{GH} | 10 | - | 15 | V | |
| Gate Driver Low Voltage | V_{GL} | -13 | - | -7.5 | V | |
| VDD Operating Current | I_{DD} | - | 2 | 3 | mA | |
| Current for LED backlight | I_{BL} | 15 | - | 20 | mA | 1 LED |
| Sleep In Mode V_{DD} | I_{dd} | - | 15 | 30 | μ A | |
| Sleep In Mode V_{DDIO} | I_{ddio} | - | 5 | 10 | μ A | |

1. Test condition is:

a:Center point on active area

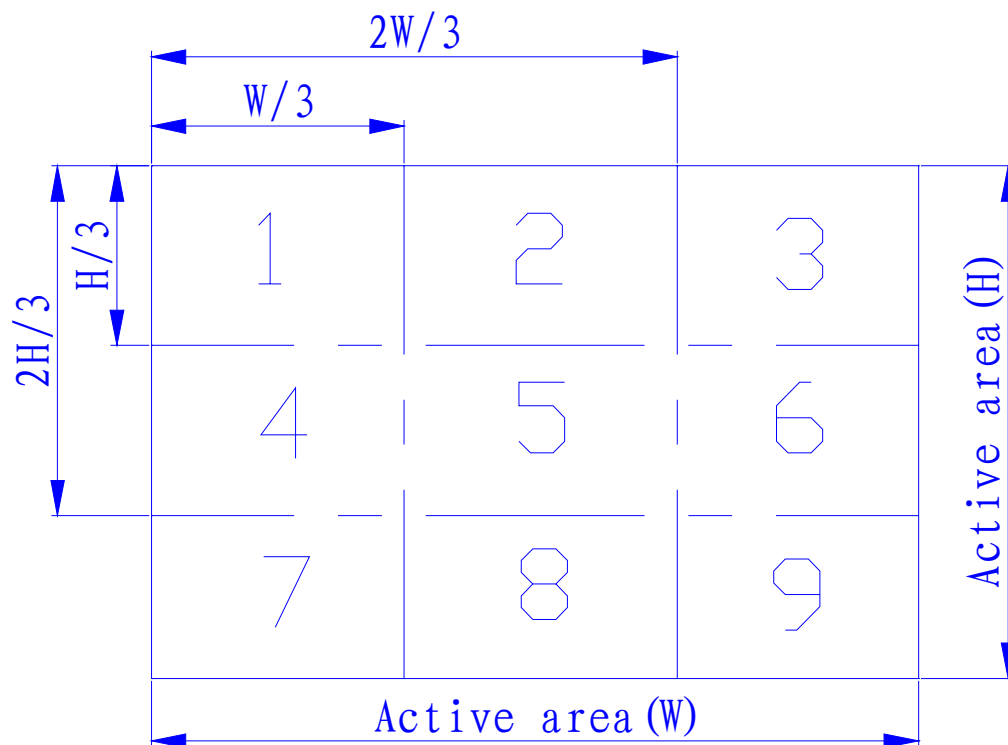
b:Best Contrast

2. Uniform measure condition:

a:Measure 9 point,Measure location is show below

b:Uniform=(Min brightness/Max.brightness)x100%

c:Best Contrast.



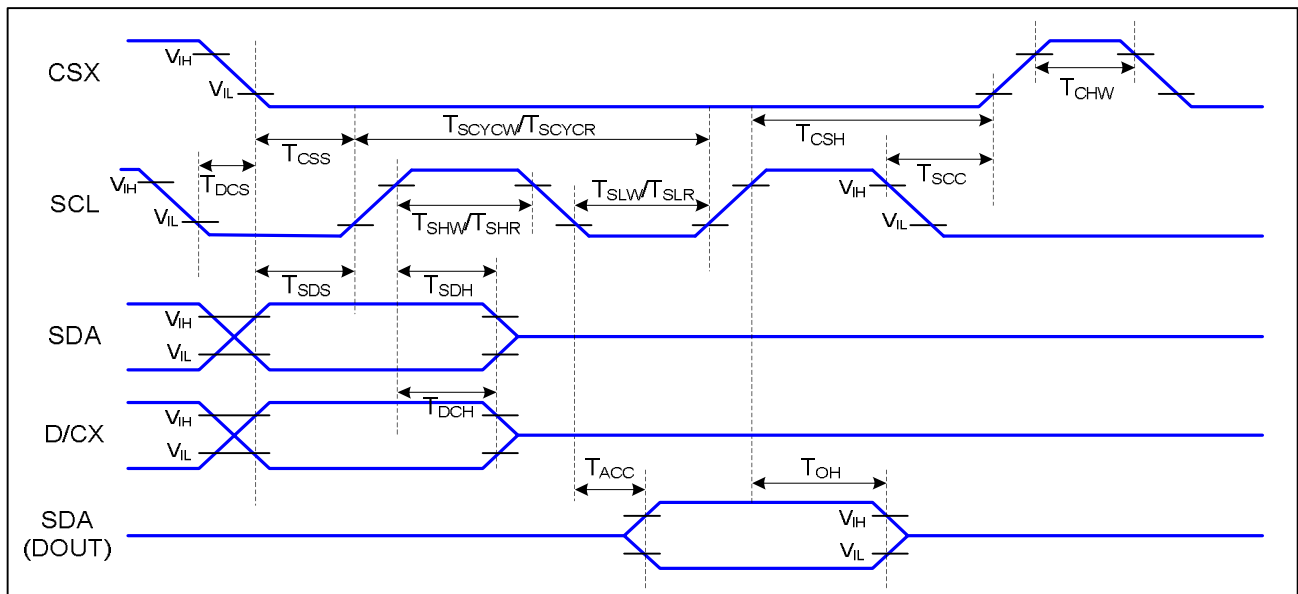
5.4 AC Characteristics

5.4.1 4-wire Serial Interface Timing Characteristics:

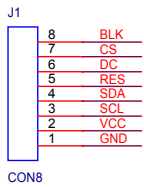
| Signal | Symbol | Description | Min | Max | Unit | Remark |
|------------------|--------------------|--------------------------------|-----|-----|------|---|
| CSX | T _{CSS} | Chip Select Setup Time (Write) | 45 | - | ns | |
| | T _{CSH} | Chip Select Hold Time (Write) | 45 | - | ns | |
| | T _{CCS} | Chip Select Setup Time (Read) | 60 | - | ns | |
| | T _{SCC} | Chip Select Hold Time (Read) | 65 | - | ns | |
| | T _{CHW} | Chip Select "H" Pulse Width | 40 | - | ns | |
| SCL | T _{SCYCW} | Serial Clock Cycle (Write) | 66 | - | ns | -Write Command & Data Ram |
| | T _{SHW} | SCL "H" Pulse Width (Write) | 15 | - | ns | |
| | T _{SLW} | SCL "L" Pulse Width (Write) | 15 | - | ns | |
| | T _{SCYCR} | Serial Clock Cycle (Read) | 150 | - | ns | -Read Command & Data Ram |
| | T _{SHR} | SCL "H" Pulse Width (Read) | 60 | - | ns | |
| | T _{SLR} | SCL "L" Pulse Width (Read) | 60 | - | ns | |
| D/CX | T _{DCS} | D/CX Setup Time | 10 | - | ns | |
| | T _{DCH} | D/CX Hold Time | 10 | - | ns | |
| SDA (DIN) (DOUT) | T _{SDS} | Data Setup Time | 10 | - | ns | For Maximum CL=30pF For Minimum CL=8pF |
| | T _{SDH} | Data Hold Time | 10 | - | ns | |
| | T _{ACC} | Access Time | 10 | 50 | ns | |
| | T _{OH} | Output Disable Time | 15 | 50 | ns | |

T_a=25 °C, V_{DDI}=1.65 ~ 3.7V, V_{DD}=2.5 ~ 4.8V

4-line Serial Interface Timing

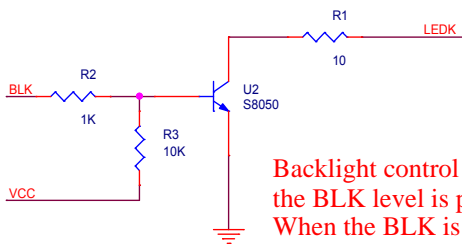


6 Module Schematic



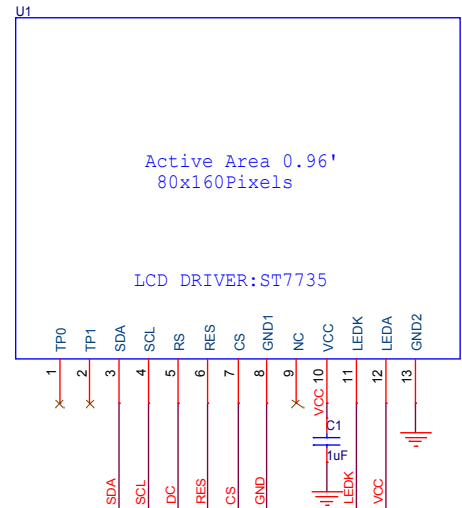
interface type: SPI

- 1.GND=Ground
- 2.VCC=Power Supply 3.3V
- 3.SCL=SPI Clock
- 4.SDA=SPI DATA
- 5.RES=reset Pin
- 6.DC=Data/Command control pin
- 7.CS=SPI Chip Select
- 8.BLK=Display backlight control switch
(backlight on by default, low level off)



Backlight control switch:

the BLK level is pulled-up by default, and the backlight is turned on;
When the BLK is low level, the backlight is off, and the screen
brightness can also be controlled by PWM control BLK switching time.



7 Reliability

| Test Item | Content of Test | Test Condition | Note |
|---|---|-------------------------|------|
| High Temperature Storage | Endurance test applying the high storage temperature for a long time. | 80°C 120hrs | 2 |
| Low Temperature Storage | Endurance test applying the high storage temperature for a long time. | -30°C 120hrs | 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°C 120hrs | - |
| Low Temperature Operation | Endurance test applying the electric stress under low temperature for a long time. | -20 °C 120hrs | 1 |
| High Temperature/ Humidity Operation | The module should be allowed to stand at 60°C,90%RH max, for 96hrs under no-load condition excluding the polarizer. Then taking it out and drying it at normal temperature. | 50°C,85%RH 120hrs | 1,2 |
| Thermal Shock Resistance | The sample should be allowed stand the following 10 cycles of operation | -10°C/60°C 12 cycles | - |

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 rest chamber.

8 Warranty and Conditions

<http://www.displaymodule.com/pages/faq> HYPERLINK

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