

DisplayModule



DM-TFT13-377

1.3" 240 x 240 IPS TFT DISPLAY
MODULE-SPI

Contents

- 1 Revision History
- 2 Main Features
- 3 Pin Description
 - 3.1 Panel Pin Description
 - 3.2 Module Pin Description
- 4 Mechanical Drawing
 - 4.1 Panel Mechanical Drawing
 - 4.2 Module Mechanical Drawing
- 5 Optics & Electrical Characteristics
 - 5.1 Optical Characteristics
 - 5.2 DC Characteristics
 - 5.3 AC characteristics
 - 5.3.1 Serial Interface Timing Characteristics: (4-line serial)
 - 5.3.2 RESET Timing
- 6 Schematic
- 7 Reliability
- 8 Warranty and Conditions

1 Revision History

Date	Changes
2018-10-30	First release
2020-04-07	Second release

2 Main Features

Item	Specification	Unit
Diagonal Size	1.3	inch
Resolution	240 x 240	pixel
Controller IC	ST7789	-
Interface	4wire SPI	-
Active Area	23.4 x 23.4	mm
Module Dimension	39.22 x 27.78	mm
Dot pitch	0.0975 x0.0975	mm
View angle	ALL	-
Weight	TBD	g

3 Pin Description

3.1 Panel Pin Description

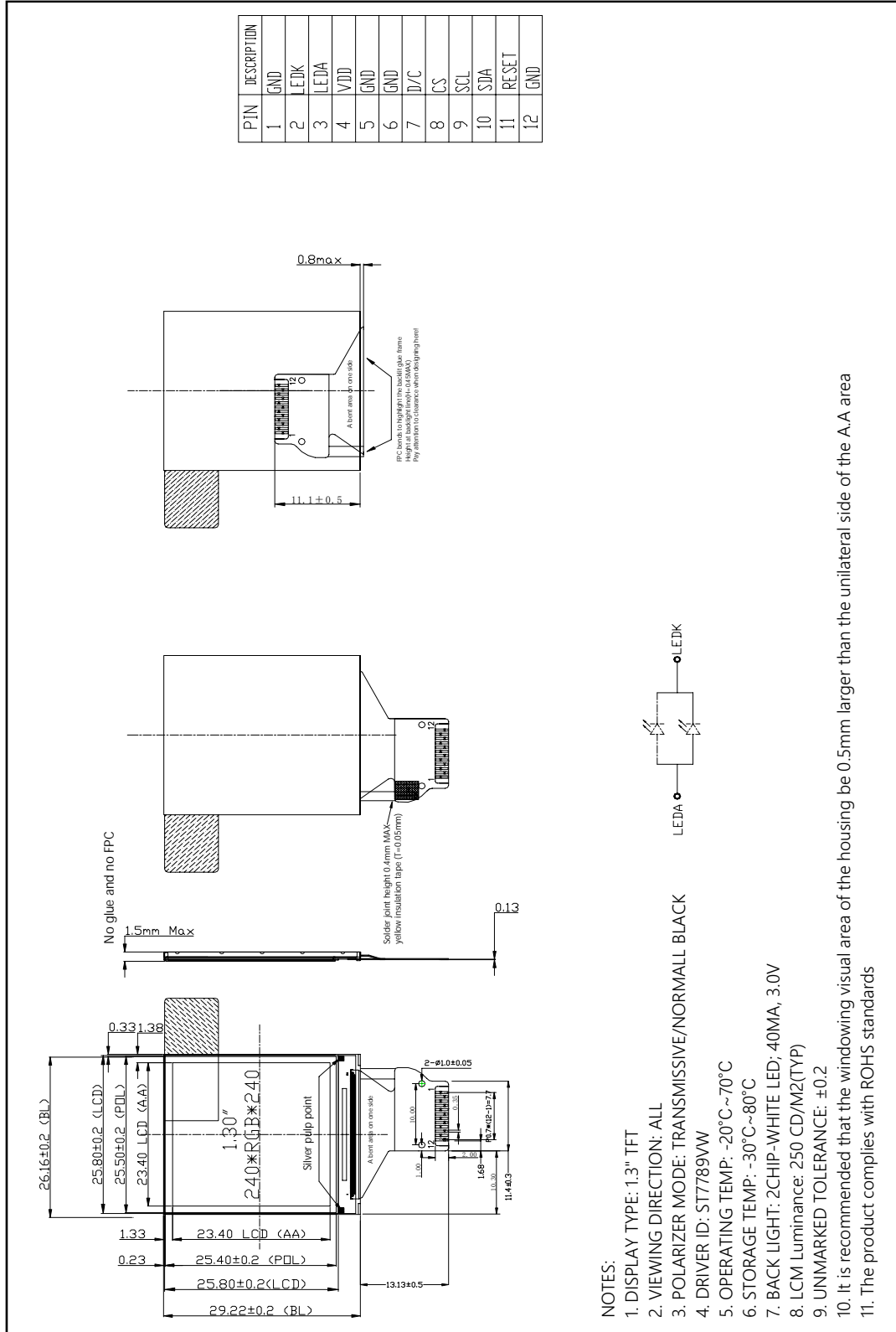
Pin No.	Symbol	Function Description
1	GND	Power Ground
2	LEDK	LED Cathode
3	LEDA	LED Anode
4	VDD	Power Supply for Analog
5	GND	Power Ground
6	GND	Power Ground
7	D/C	Display data/command selection pin in 4-line serial interface
8	CS	Chip selection pin, Low enable, high disable
9	SCL	This pin is used to be serial interface clock
10	SDA	SPI interface input/output pin. the data is latched on the rising edge of the SCL signal
11	RESET	This signal will reset the device and it must be applied to properly initialize the chip. Signal is active low
12	GND	Power Ground

3.2 Module Pin Description

Pin No.	Symbol	Function Description
1	GND	Ground
2	VCC	Power Supply 3.3V
3	SCL	SPI Clock
4	SDA	SPI DATA
5	RES	OLED reset Pin.
6	D/C	Display data/command selection pin in 4-line serial interface
7	CS	Chip Select This pin is pulled low to active. Connect to ground if no used .

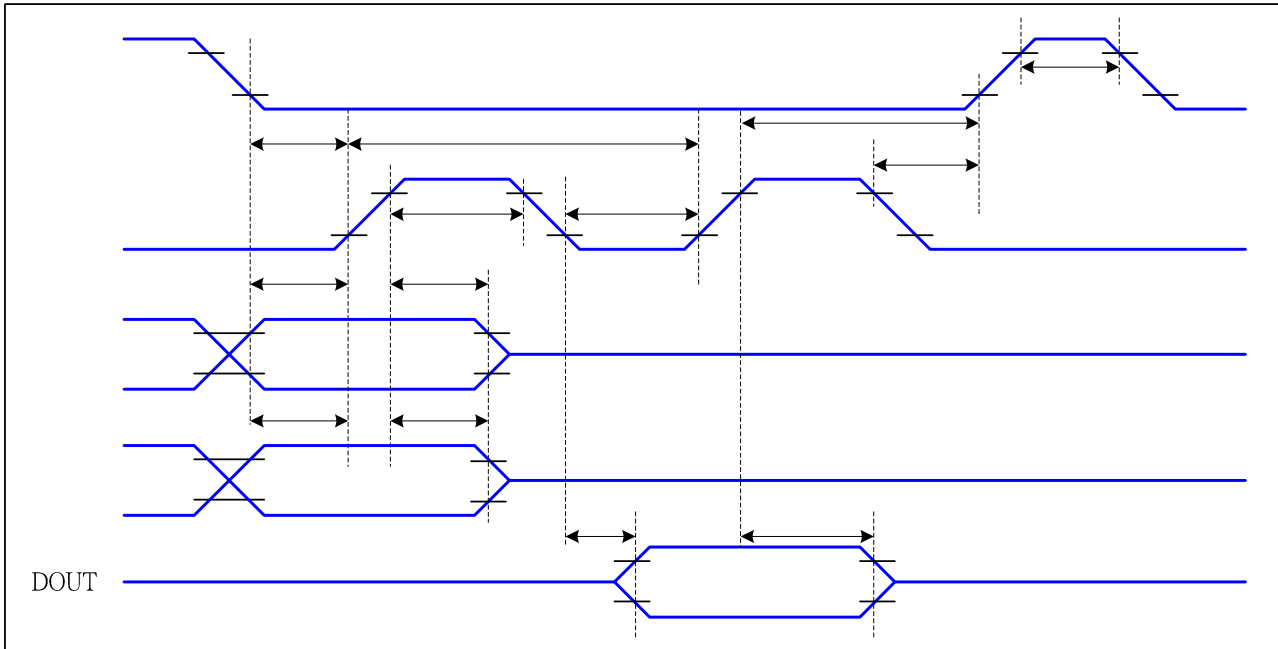
4 Mechanical Drawing

4.1 Panel Mechanical Drawing



5.3 AC characteristics

5.3.1 Serial Interface Timing Characteristics: (4-line serial)

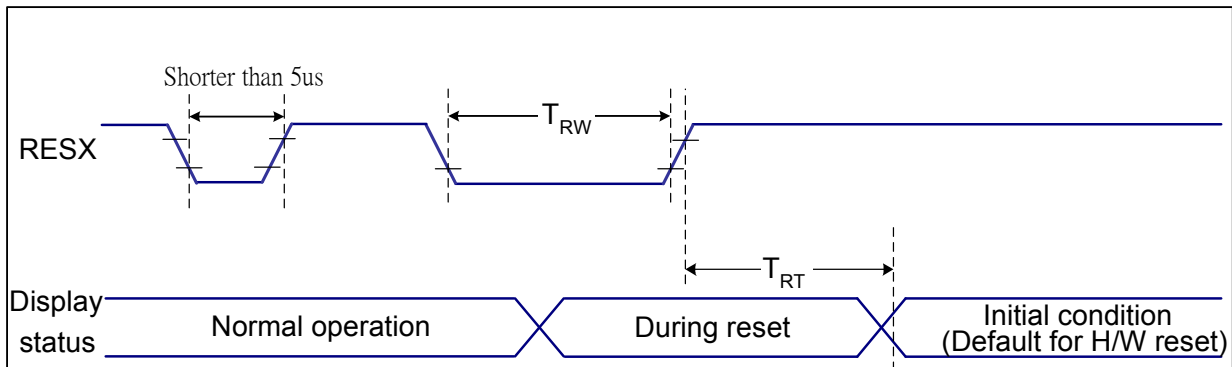


VDDI=1.65 to 3.3V, VDD=2.4 to 3.3V, AGND=DGND=0V, Ta=25 °C

Signal	Symbol	Description	Min	Max	Unit	Remark
CSX	T _{CSS}	Chip Select Setup Time (Write)	15	-	ns	
	T _{CSH}	Chip Select Hold Time (Write)	15	-	ns	
	T _{CSS}	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)	16	-	ns	-Write Command & Data Ram
	T _{SHW}	SCL "H" Pulse Width (Write)	7	-	ns	
	T _{SLW}	SCL "L" Pulse Width (Write)	7	-	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	-		
	T _{DCH}	D/CX hold time	10	-		
SDA (DIN)	T _{SDS}	Data Setup Time	7	-	ns	
	T _{SDH}	Data Hold Time	7	-	ns	
DOUT	T _{ACC}	Access Time	10	50	ns	For Maximum CL=30pF For Minimum CL=8pF
	T _{OH}	Output Disable Time	15	50	ns	

Note: The rising time and falling time (Tr, Tf) of input signal are specified at 15 ns or less. Logic high and low levels are specified as 30% and 70% of VDDI for Input signals.

5.3.2 RESET Timing



VDDI=1.65 to 3.3V, VDD=2.4 to 3.3V, AGND=DGND=0V, $T_a=25\text{ }^\circ\text{C}$

Related Pins	Symbol	Parameter	Min	Max	Unit
RESX	T_{RW}	Reset pulse duration	10	-	μs
	T_{RT}	Reset cancel	-	5 (Note 1, 5) 120 (Note 1, 6, 7)	ms

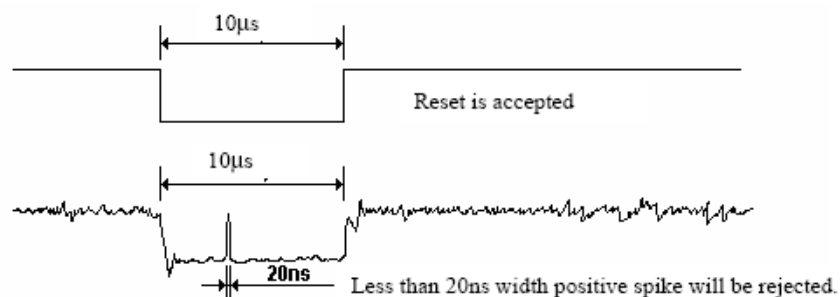
Note 1: The reset cancel includes also required time for loading ID bytes, VCOM setting and other settings from NVM (or similar device) to registers. This loading is done every time when there is HW reset cancel time (t_{RT}) within 5 ms after a rising edge of RESX.

Note 2: Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below:

RESX Pulse	Action
Shorter than $5\mu\text{s}$	Invalid Reset
Longer than $10\mu\text{s}$	Valid Reset
Between $5\mu\text{s}$ and $10\mu\text{s}$	Reset starts (It depends on voltage and temperature condition.)

Note 3: During the Resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out –mode. The display remains the blank state in Sleep In –mode.) and then return to Default condition for Hardware Reset.

Note 4: Spike Rejection also applies during a valid reset pulse as shown below:

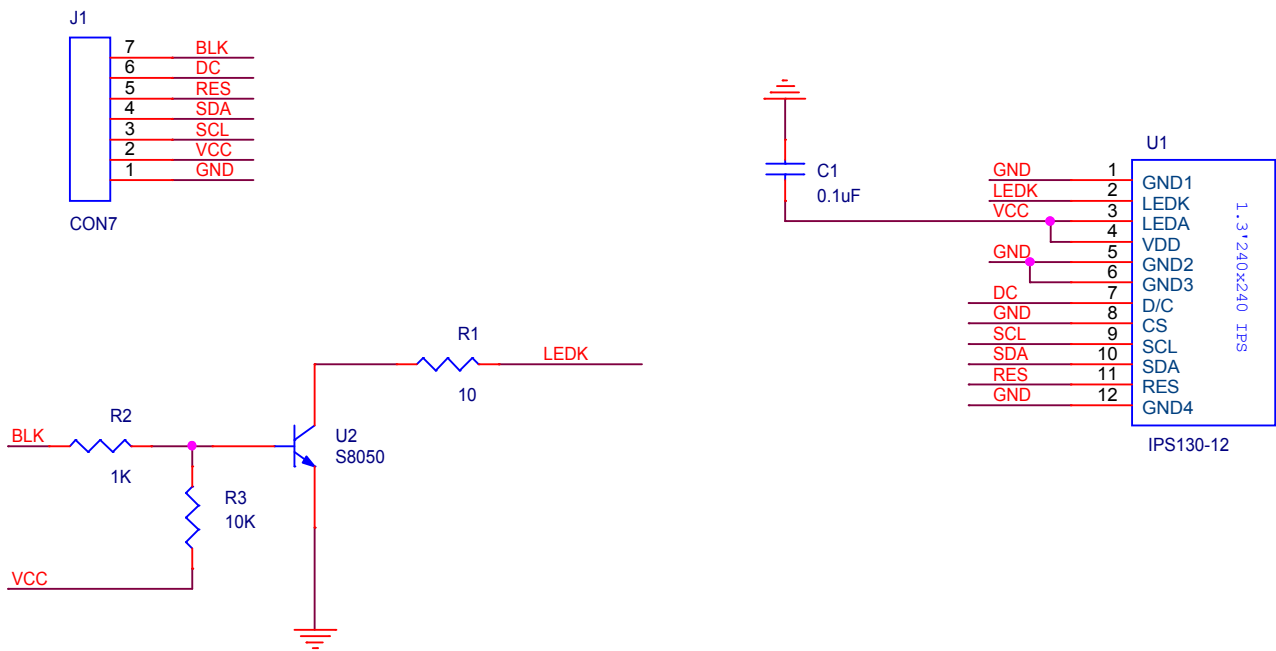


Note 5: When Reset applied during Sleep In Mode.


Note 6: When Reset applied during Sleep Out Mode.

Note 7: It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

6 Schematic



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 200hrs	2
Low Temperature Storage	Endurance test applying the high storage temperature for a long time.	-30°C 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°C 200hrs	-
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20 °C 200hrs	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.	60°C,90%RH 96hrs	1,2
Thermal Shock Resistance	The sample should be allowed stand the following 10 cycles of operation 	-30°C/80°C 10 cycles	-
Vibration Test	Endurance test applying the vibration during transportation and using	Total fixed amplitude: 15mm; Vibration: 10~55Hz; One cycle 60 seconds to 3 directions of X, Y, Z, for each 16 minutes.	3
Static Electricity Test	Endurance test apply the electric stress to the terminal.	VS=800V, RS=1.5kΩ, CS=100pF, 1 time.	-

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.

Note3: Test performed on product itself, not inside a container.

8 Warranty and Conditions

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

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