

DM-TFT32-402

**3.2" 240 × 320 TFT LCD 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
- 5 Optics & Electrical Characteristics
 - 5.1 Optical Characteristics
 - 5.2 Absolute Maximum Ratings
 - 5.3 DC Characteristics
 - 5.4 Backlight Characteristics
 - 5.5 AC Characteristics
 - 5.5.1 3-wire Serial Interface Timing Characteristics:
 - 5.5.2 4-wire Serial Interface Timing Characteristics:
- 6 Module Schematic
- 7 Reliability
- 8 Warranty and Conditions

1 Revision History

Date	Changes
2019-10-23	First release
2020-04-23	Second release

2 Main Features

Item	Specification	Unit
Diagonal Size	3.2	inch
Display Mode	TFT TRANSMISSIVE	-
Resolution	240(RGB) x 320	pixel
Controller IC	ILI9341	-
Interface	SPI	-
Active Area	48.60 x 64.80	mm
Panel Dimension	54.00 x 77.40 x 3.45	mm
Module Dimension	56.00 x 89.40 x 4.70	mm
Pixel Pitch	0.2025 x 0.2025	mm
Viewing Direction	12	o'clock
Weight	TBD	g

3 Pin Description

3.1 Panel Pin Description

Pin No.	Symbol	Function Description
1	X(L)	Touch panel control pin
2	Y(U)	Touch panel control pin
3	X(R)	Touch panel control pin
4	Y(D)	Touch panel control pin
5	GND	Ground
6	IOVCC	Power supply for LCM (2.8V-3.3V)
7	VCI	Power supply for LCM (2.8V-3.3V)
8	FMARK	Tearing effect output pin to synchronize MPU to frame writing, activated by S/W command. When this pin is not activated, this pin is low. If not used, open this pin.
9	CS/SPI CS	Chip select pin ("Low" enable)
10	RS/SPI SCL/SCK	This pin is used to select "Data or Command" in the parallel interface or serial data interface. Parallel: When RS= '1', data is selected. When RS= '0', command is selected. Serial: This pin is used serial interface clock in 3-wire 9-bit / 4-wire 8-bit serial data interface. (If not used, this pin should be connected to IOVCC or GND)
11	WR/A0	Serves as a write signal and writes data at the rising edge. - 4-line system (D/CX): Serves as command or parameter select. Fix to IOVCC level when not in use.
12	RD	Serves as a read signal and MCU read data at the rising edge. Fix to IOVCC level when not in use.
13	SPI SDI/SDA	Serial input signal. The data is applied on the rising edge of the SCL signal. (If not used, fix this pin at IOVCC or GND)
14	SPI SDO	Serial output signal. The data is outputted on the falling edge of the SCL signal. (If not used, open this pin)
15	RESET	LCM Reset pin Signal is active low.
16	GND	Ground
17-24	DB0-DB7	Data bus (Fix to GND level when not in use)
25-32	DB8-DB15	Data bus (Fix to GND level when not in use)
33	A	Anode of Backlight (3.0V-3.4V Typical:3.2V)
34-36	K	Cathode of Backlight
37	GND	Ground
38	IM0	Select the MCU interface mode
39	IM1	
40	IM2	

IM2	IM1	IM0		D[8:1]	D[17:10]
0	0	0	80 MCU 16-bit bus interface II	D[8:1]	D[17:10], D[8:1]
0	0	1	80 MCU 8-bit bus interface II	D[17:10]	D[17:10]
0	1	0	80 MCU 18-bit bus interface II	D[8:1]	D[17:0]
0	1	1	80 MCU 9-bit bus interface II	D[17:10]	D[17:9]
1	0	1	3-wire 9-bit data serial interface II	SDI:In;	SDO:Out
1	1	0	4-wire 8-bit data serial interface II	SDI:In;	SDO:Out

NOTE:
D[8:1] is DB7 - DB0;
D[17:10] is DB15 - DB8.

Note:

IOVCC and VCC are connected together to supply power with 2.8v-3.3v; Backlit leds can be powered separately(3.0-3.4v), it can also share A set of voltage with VCC (A is positive connection VCC, K is connected together as negative ground).

3.2 Module Pin Description

Pin No.	Symbol	Function Description
1	GND	Ground
2	VCC	Power supply for LCD (2.8V-3.3V)
3	CLK	This pin is used serial interface clock in 3-wire 9-bit / 4-wire 8-bit serial data interface.
4	MOSI	Serial input signal. The data is applied on the rising edge of the SCL signal.
5	RES	LCM Reset pin Signal is active low.
6	DC	Serves as a write signal and writes data at the rising edge. - 4-line system (D/CX): Serves as command or parameter select.
7	BLK	LCD Backlight Control The default is float, and the backlight is turned off at low power.
8	MISO	Serial output signal. The data is outputted on the falling edge of the SCL signal. If not used, open this pin

5 Optics & Electrical Characteristics

5.1 Optical Characteristics

Item	Symbol	Min	Typ	Max	Unit	Remark
View Angles TOP	ΘU	-	TBD	-	°	θ=φ=0°
View Angles Bottom	ΘD	-	TBD	-	°	
View Angles Right	ΘR	-	TBD	-	°	
View Angles Left	ΘL	-	TBD	-	°	
Response Time	T _R	-	TBD	-	ms	25°C; θ=0°
	T _F	-	TBD	-	ms	
Contrast Ratio	CR	-	≥10	-	-	θ=0°

The above “viewing angle” is the measuring position with the largest contrast ratio. Not for good image quality. Viewing direction for good image quality is 12 O’clock.

5.2 Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V	-0.3	4.6	V
Operation Supply Voltage	V _T	-0.3	V _{CC} +0.3	V
Operating Temperature	T _{OPR}	-20	70	°C
Storage Temperature	T _{STG}	-30	80	°C

5.3 DC Characteristics

Item	Symbol	Min	Typ.	Max	Unit
Logic Supply Voltage	V _{CC}	2.7	2.8	3.3	V
Low Level Input Voltage	T _{IL}	-0.3	-	0.2 x IOVCC	V
High Level Input Voltage	T _{IH}	0.8 x IOVCC	-	IOVCC	V

5.4 Backlight Characteristics

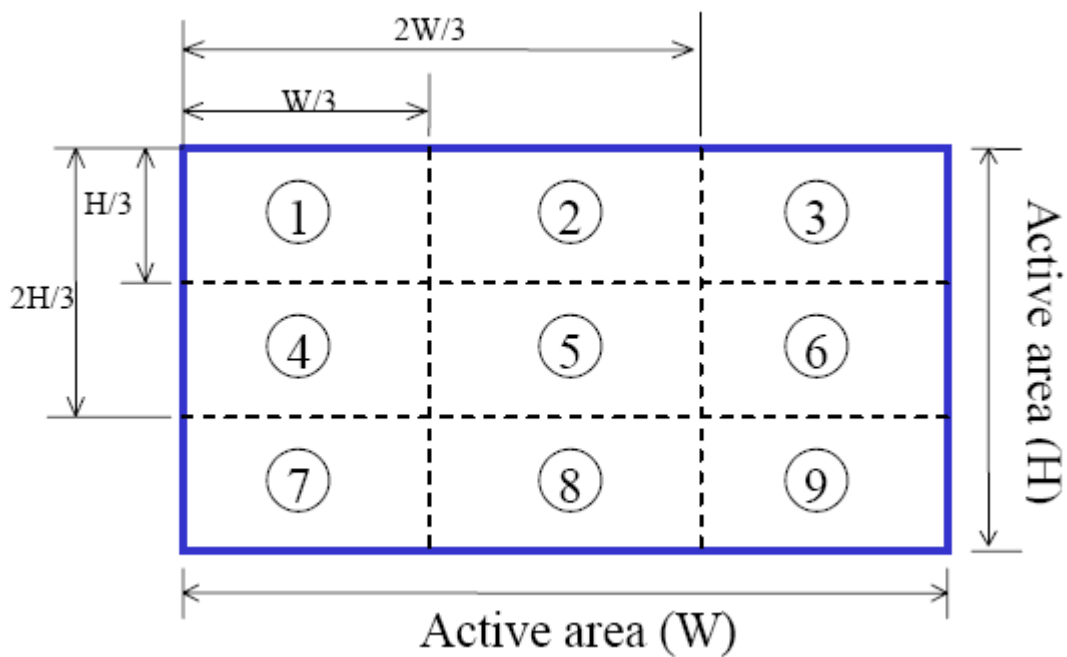
Parameter	Symbol	Min	Typ	Max	Unit	Remark
LED module Forward voltage	V_{LED}	3.0	3.2	3.4	V	
LED module current	V_{LED}	-	90	-	mA	
L/G Surface Luminance	L_S	350	-	-	Cd/m ²	Note 1
LCM Surface brightness uniform	L_D	80	-	-	%	Note 2

Note 1: Test condition is:

- (1) Center point on active area.
- (2) Best Contrast.

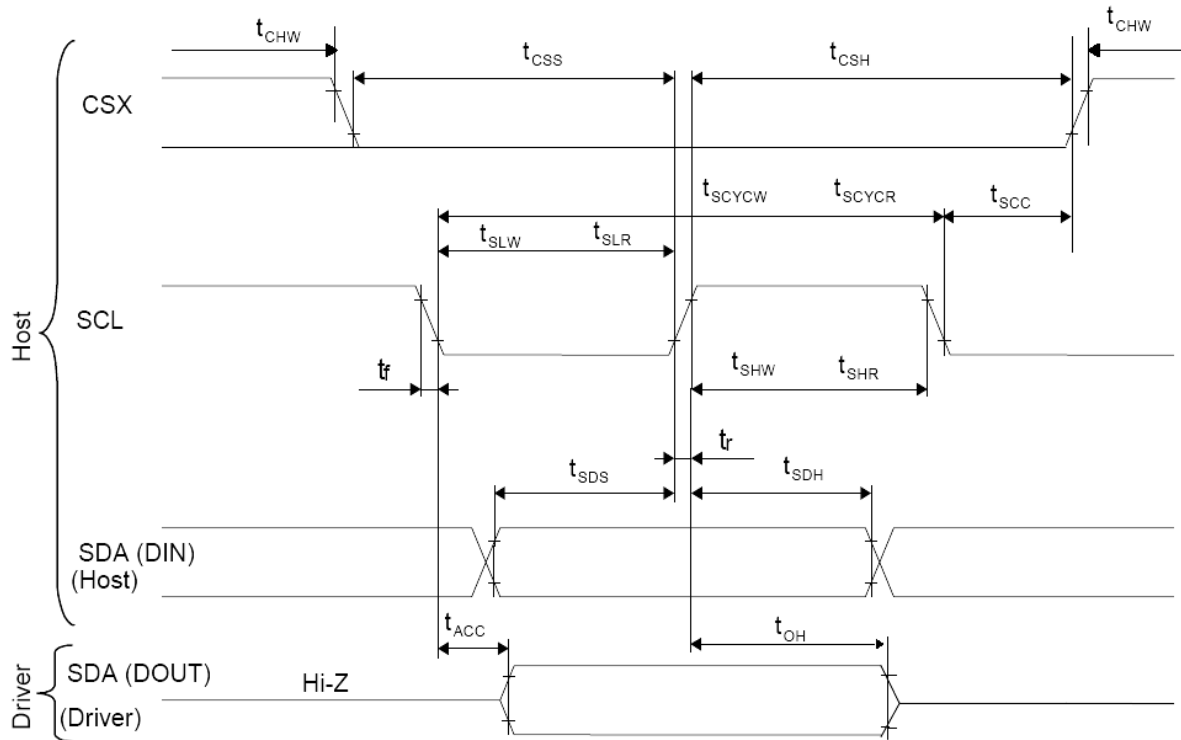
Note 2: Uniform measure condition:

- (1) Measure 9 point. Measure location show below;
- (2) $Uniform = (Min. \text{ brightness} / Max. \text{ brightness}) * 100\%$
- (3) Best Contrast.



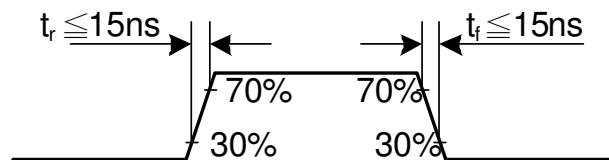
5.5 AC Characteristics

5.5.1 3-wire Serial Interface Timing Characteristics:

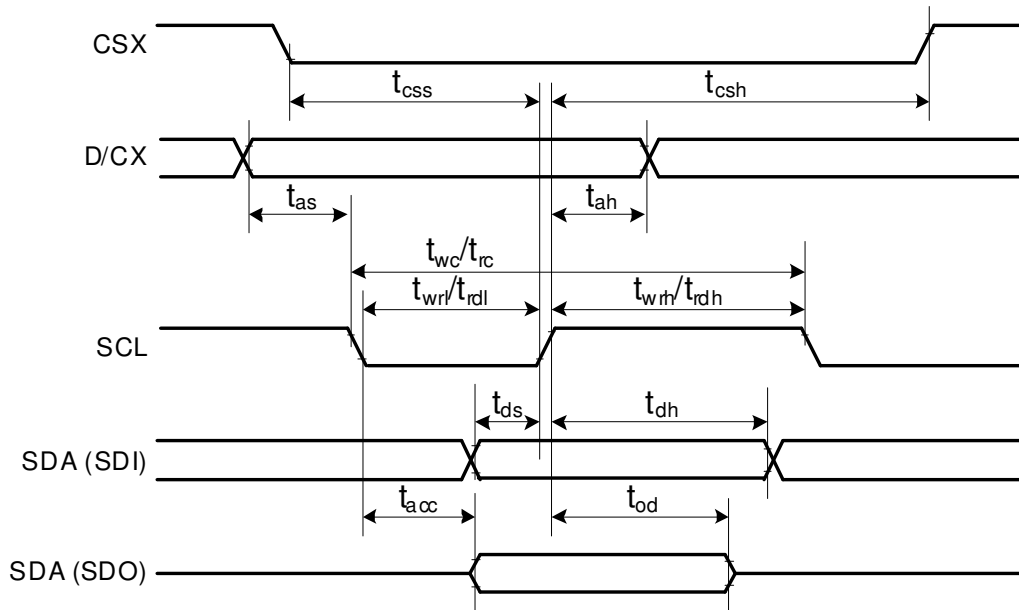


Signal	Symbol	Description	Min	Max	Unit	Remark
SCL	tscyww	Serial Clock Cycle (Write)	100	-	ns	
	tshw	SCL "H" Pulse Width (Write)	40	-	ns	
	tslw	SCL "L" Pulse Width (Write)	40	-	ns	
	tscywr	Serial Clock Cycle (Read)	150	-	ns	
	tshr	SCL "H" Pulse Width (Read)	60	-	ns	
	tslr	SCL "L" Pulse Width (Read)	60	-	ns	
SDA/SDI (Input)	tsds	Data setup time (Write)	30	-	ns	
	tsdh	Data hold time (Write)	30	-	ns	
SDA/SDO (Output)	tacc	Access time (Read)	10	-	ns	
	toh	Output disable time (Read)	10	50	ns	
CSX	tsc	SCL-CSX	20	-	ns	
	tch	CSX "H" Pulse Width	40	-	ns	
	tcss	CSX-SCL Time	60	-	ns	
			65	-	ns	

Ta=25 °C, VDDI=1.65V ~ 3.3V, VCI=2.5V to 3.3V, AGND=VSS=0V

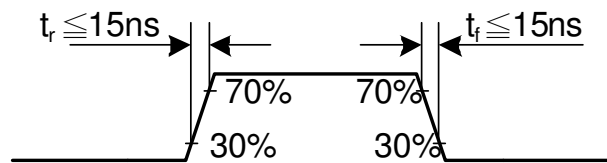


5.5.2 4-wire Serial Interface Timing Characteristics:

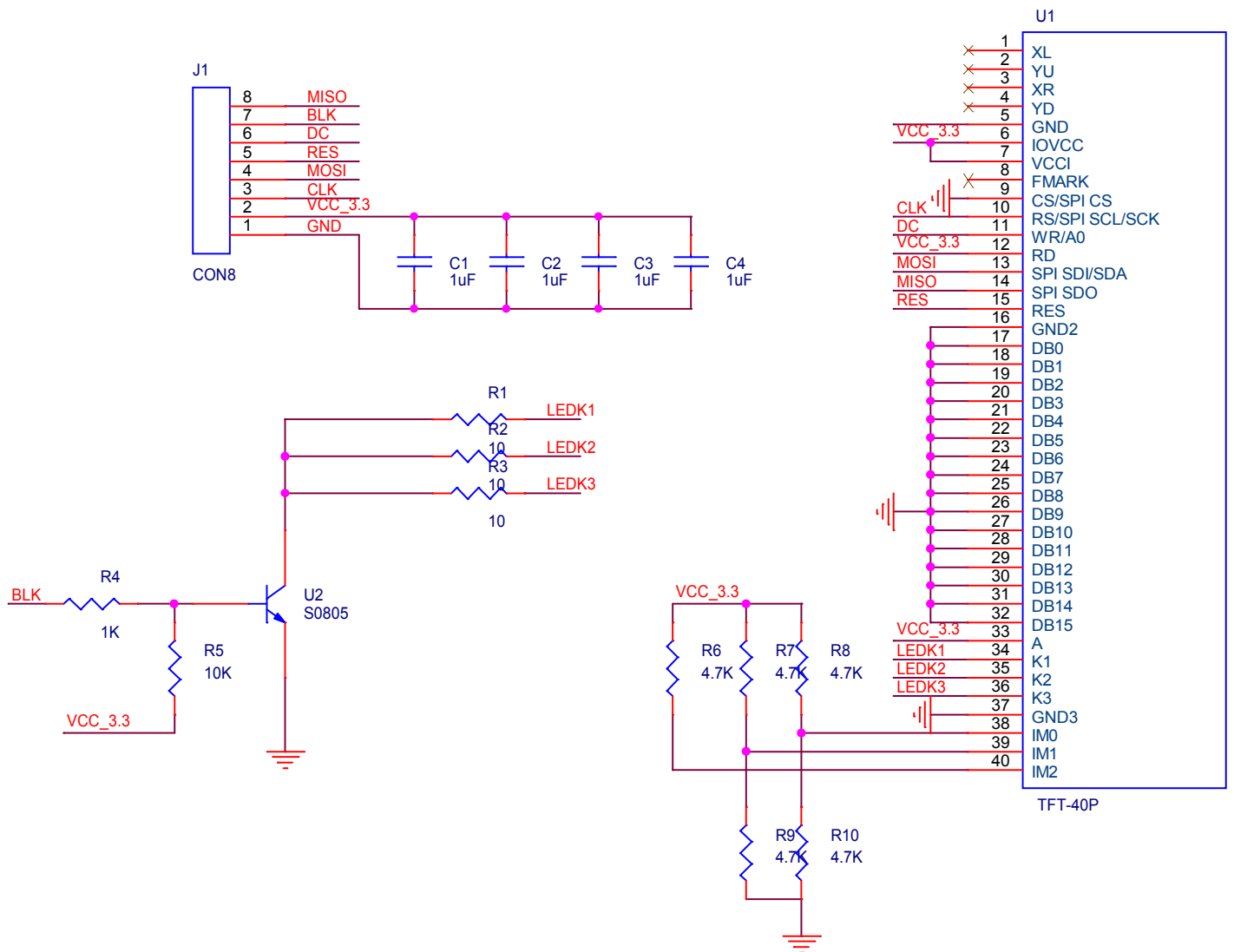


Signal	Symbol	Description	Min	Max	Unit	Remark
CSX	tcss	Chip Select Time (Write)	40	-	ns	
	tcsh	Chip Select Hold Time (Read)	40	-	ns	
SCL	twc	Serial Clock Cycle (Write)	100	-	ns	
	twrh	SCL "H" Pulse Width (Write)	40	-	ns	
	twrl	SCL "L" Pulse Width (Write)	40	-	ns	
	trc	Serial Clock Cycle (Read)	150	-	ns	
	trdh	SCL "H" Pulse Width (Read)	60	-	ns	
	trdl	SCL "L" Pulse Width (Read)	60	-	ns	
D/CX	tas	D/CX setup time	10	-	ns	
	tah	D/CX hold time (Write / Read)	10	-	ns	
SDA/SDI (Input)	tds	Data setup time (Write)	10	-	ns	For Maximum CL=30pF For Minimum CL=8pF
	tdh	Data hold time (Write)	30	-	ns	
SDA/SDO (Output)	tacc	Access time (Read)	10	-	ns	
	tod	Output disable time (Read)	10	50	ns	

Ta=25 °C, VDDI=1.65V ~ 3.3V, VCI=2.5V to 3.3V, AGND=VSS=0V



6 Module Schematic



IM2 IM1 IM0

1	0	1	3-wire 9-bit data serial
1	1	0	4-wire 8-bit data serial

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 240hrs	2
Low Temperature Storage	Endurance test applying the high storage temperature for a long time.	-30°C 240hrs	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 240hrs	-
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20 °C 240hrs	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 240hrs	1,2
Thermal Shock Resistance	The sample should be allowed stand the following 10 cycles of operation	-20°C/70°C 10 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

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