

DM-TFT24-401

**2.4" 240 × 320 TFT LCD DISPLAY
MODULE - SPI**

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1 Revision History

Date	Changes
2019-10-17	First release
2020-04-23	Second release

2 Main Features

Item	Specification	Unit
Diagonal Size	2.4	inch
Display Mode	TFT TRANSMISSIVE	-
Resolution	240(RGB) x 320	pixel
Controller IC	ILI9341	-
Interface	4 wire SPI	-
Active Area	36.72 x 48.96	mm
Panel Dimension	42.72 x 60.26 x 3.75	mm
Module Dimension	43.00 x 72.26 x 5.00	mm
Pixel Pitch	0.153 x 0.153	mm
Viewing Direction	12	o'clock
Weight	TBD	g

3 Pin Description

3.1 Panel Pin Description

Pin No.	Symbol	Function Description
1	GND	Ground
2	RESET	LCM Reset pin Signal is active low.
3	SCL	This pin is used serial interface clock in 4-wire 8-bit serial data interface. If not used, this pin should be connected to IOVCC or GND.
4	D/C	- 4-line system (D/CX): Serves as command or parameter select. Fix to IOVCC level when not in use.
5	CS	Chip select pin ("Low" enable)
6	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.
7	SDO	Serial output signal. The data is outputted on the falling edge of the SCL signal. If not used, open this pin.
8	GND	Ground
9	VCC	Power supply for LCM (2.8V-3.3V)
10	LEDA	Anode of Backlight (3.0V-3.4V Typical:3.2V)
11	LEDK1	Cathode of Backlight
12	LEDK2	Cathode of Backlight
13	LEDK3	Cathode of Backlight
14	LEDK4	Cathode of Backlight
15	XL	Touch panel control pin
16	YU	Touch panel control pin
17	XR	Touch panel control pin
18	YD	Touch panel control pin

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

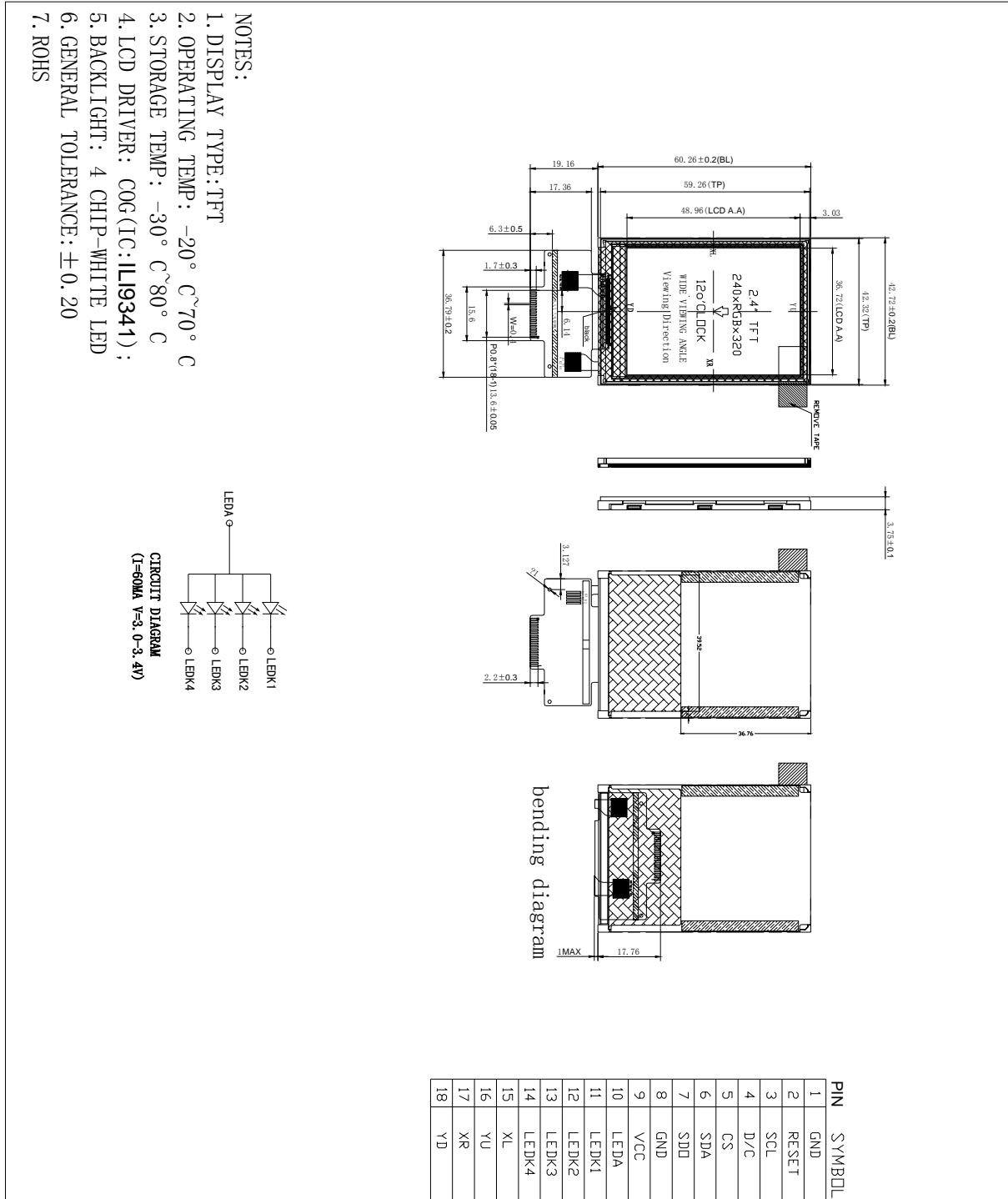
Pin No.	Symbol	Function Description
1	GND	Ground
2	VCC	Power Supply 3.3V
3	CLK	SPI Clock
4	MOSI	DATA input
5	RES	Reset Pin.
6	DC	Data/Command Control This pin is Data/Command control pin.
7	BLK	LCD Backlight Control The default is float, and the backlight is turned off at low power.
8	MISO	DATA output

Note:

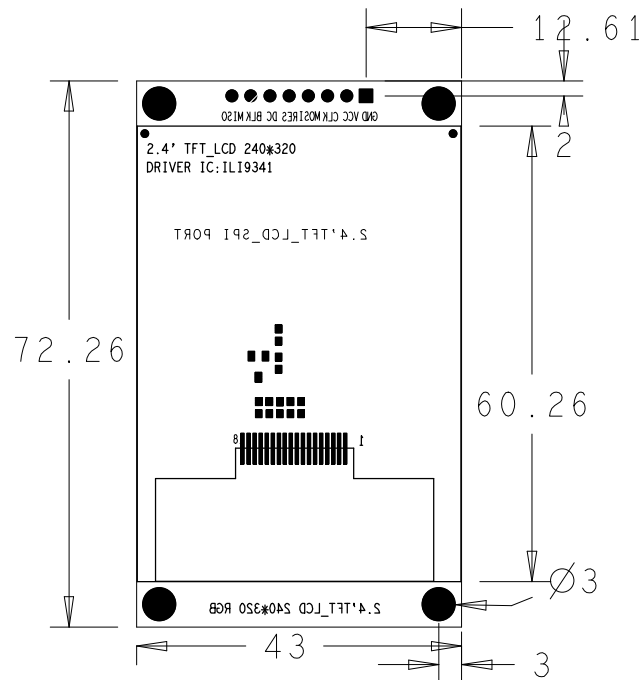
- 1) If you want to save IO ports, the BLK pin can be disconnect, because the system has been designed to pull up, it can also light the backlight without connecting the BLK pin.
- 2) If the backlight needs to be turned off, the BLK pin needs to be connected to a low level or directly grounded.
- 3) The MISO pin is the output signal of the screen, if you don't need to read the screen, the MISO pin can be disconnect.
- 4) A minimum of 4 IO ports are required to operate.

4 Mechanical Drawing

4.1 Panel Mechanical Drawing



4.2 Module Mechanical Drawing



5 Optics & Electrical Characteristics

5.1 Optical Characteristics

Item	Symbol	Min	Typ	Max	Unit	Remark
View Angles TOP	ΘU	-	TBD	-	$^{\circ}$	$\theta = \varphi = 0^{\circ}$
View Angles Bottom	ΘD	-	TBD	-	$^{\circ}$	
View Angles Right	ΘR	-	TBD	-	$^{\circ}$	
View Angles Left	ΘL	-	TBD	-	$^{\circ}$	
Response Time	T_R	-	TBD	-	ms	25°C; $\theta = 0^{\circ}$
	T_F	-	TBD	-	ms	
Contrast Ratio	CR	-	≥ 10	-	-	$\theta = 0^{\circ}$

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	-	$0.2 \times IOVCC$	V
High Level Input Voltage	T_{IH}	$0.8 \times IOVCC$	-	$IOVCC$	V

5.4 Backlight Characteristics

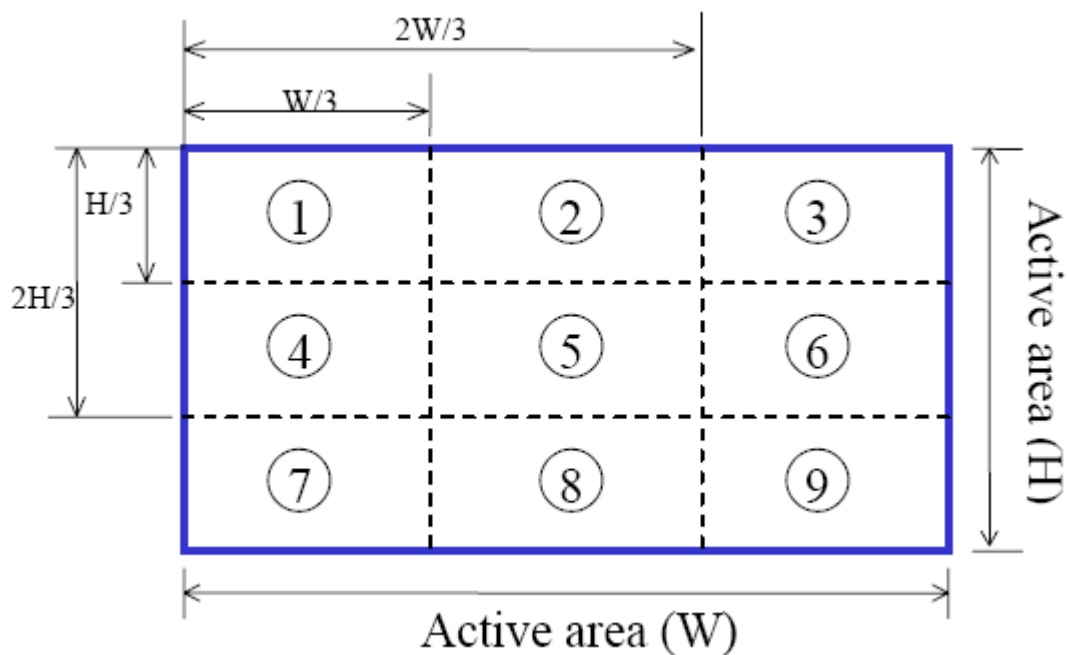
Parameter	Symbol	Min	Typ	Max	Unit	Remark
LED module Forward voltage	V_{LED}	3.0	3.2	3.4	V	
LED module current	V_{LED}	-	60	-	mA	
L/G Surface Luminance	L_S	300	-	-	Cd/m^2	Note 1
LCM Surface brightness uniform	L_D	80	-	-	%	Note 2

Note 1: Test condition is:

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

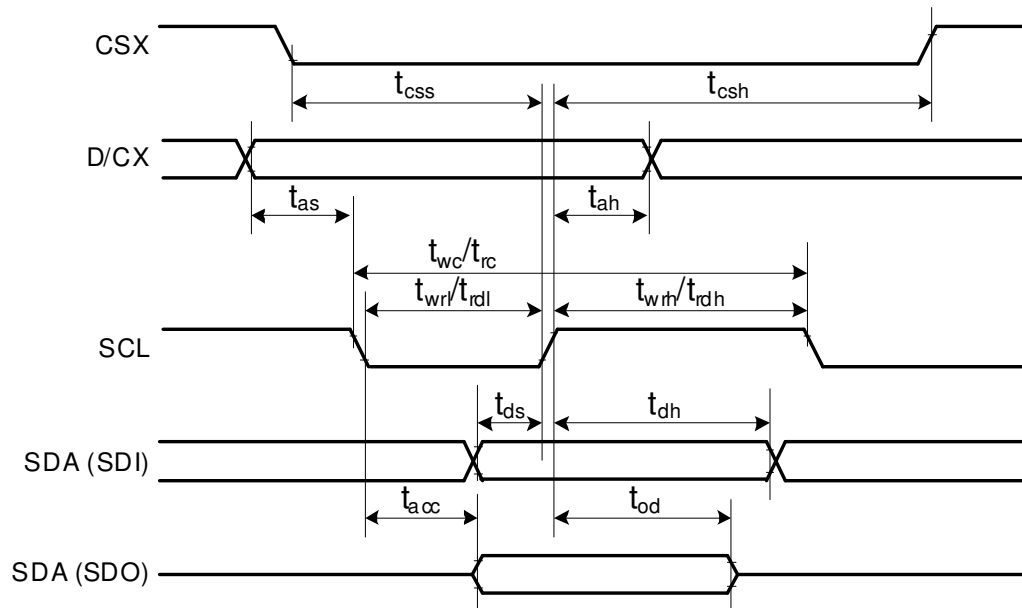
Note 2: Uniform measure condition:

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



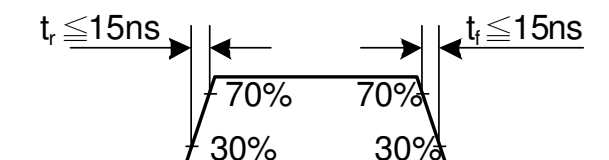
5.5 AC Characteristics

5.5.1 4-wire Serial Interface Timing Characteristics:

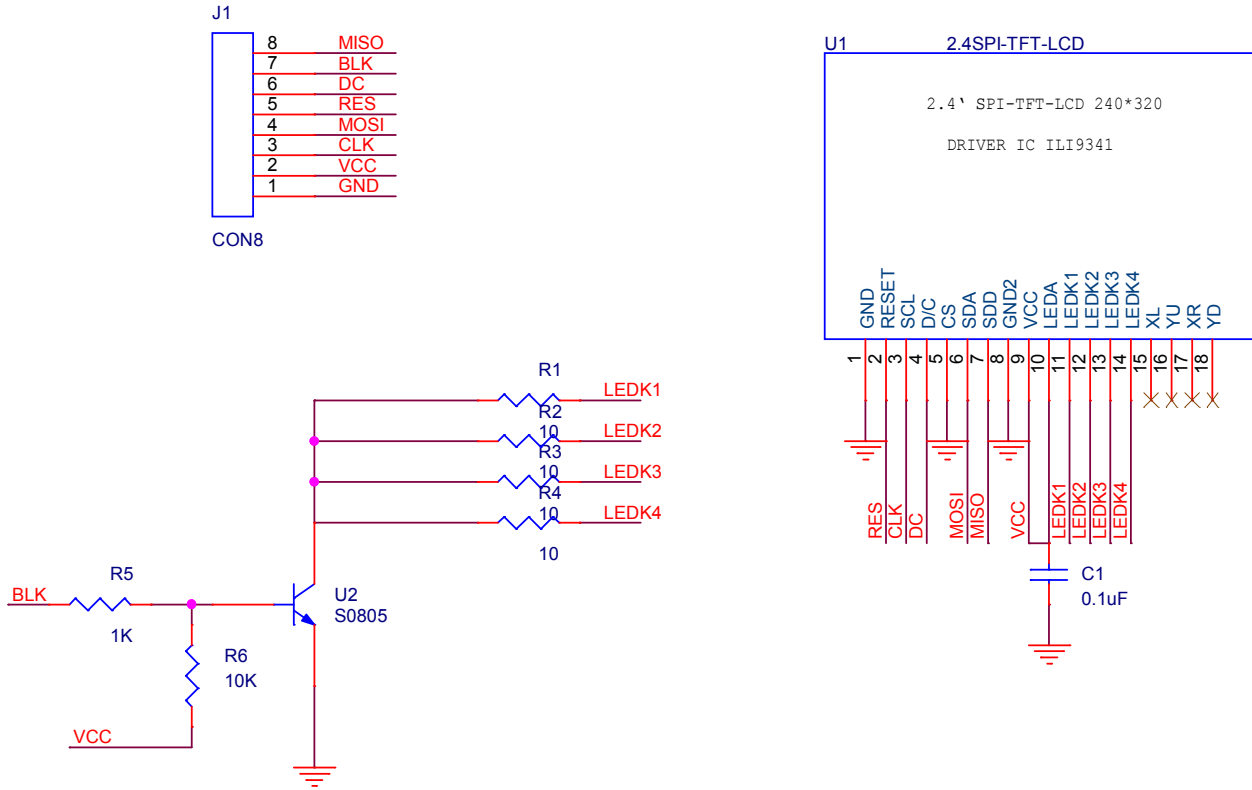


Signal	Symbol	Description	Min	Max	Unit	Remark
CSX	t_{css}	Chip Select Time (Write)	40	-	ns	
	t_{csh}	Chip Select Hold Time (Read)	40	-	ns	
SCL	t_{wc}	Serial Clock Cycle (Write)	100	-	ns	-Write Command & Data Ram
	t_{wrh}	SCL "H" Pulse Width (Write)	40	-	ns	
	t_{wrl}	SCL "L" Pulse Width (Write)	40	-	ns	
	t_{rc}	Serial Clock Cycle (Read)	150	-	ns	-Read Command & Data Ram
	t_{rdh}	SCL "H" Pulse Width (Read)	60	-	ns	
	t_{rdl}	SCL "L" Pulse Width (Read)	60	-	ns	
D/CX	t_{as}	D/CX setup time	10	-	ns	
	t_{ah}	D/CX hold time (Write / Read)	10	-	ns	
SDA/SDI (Input)	t_{ds}	Data setup time (Write)	10	-	ns	For Maximum CL=30pF For Minimum CL=8pF
	t_{dh}	Data hold time (Write)	30	-	ns	
SDA/SDO (Output)	t_{acc}	Access time (Read)	10	-	ns	
	t_{od}	Output disable time (Read)	10	50	ns	

$T_a=25\text{ }^\circ\text{C}$, $V_{DDI}=1.65\text{V} \sim 3.3\text{V}$, $V_{CI}=2.5\text{V}$ to 3.3V , $AGND=V_{SS}=0\text{V}$



6 Module 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 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

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