TFT LCD MODULE

1.54 inch 240RGB*240DOTS

Customer:
Approved by

1. General Description

1.1 Description

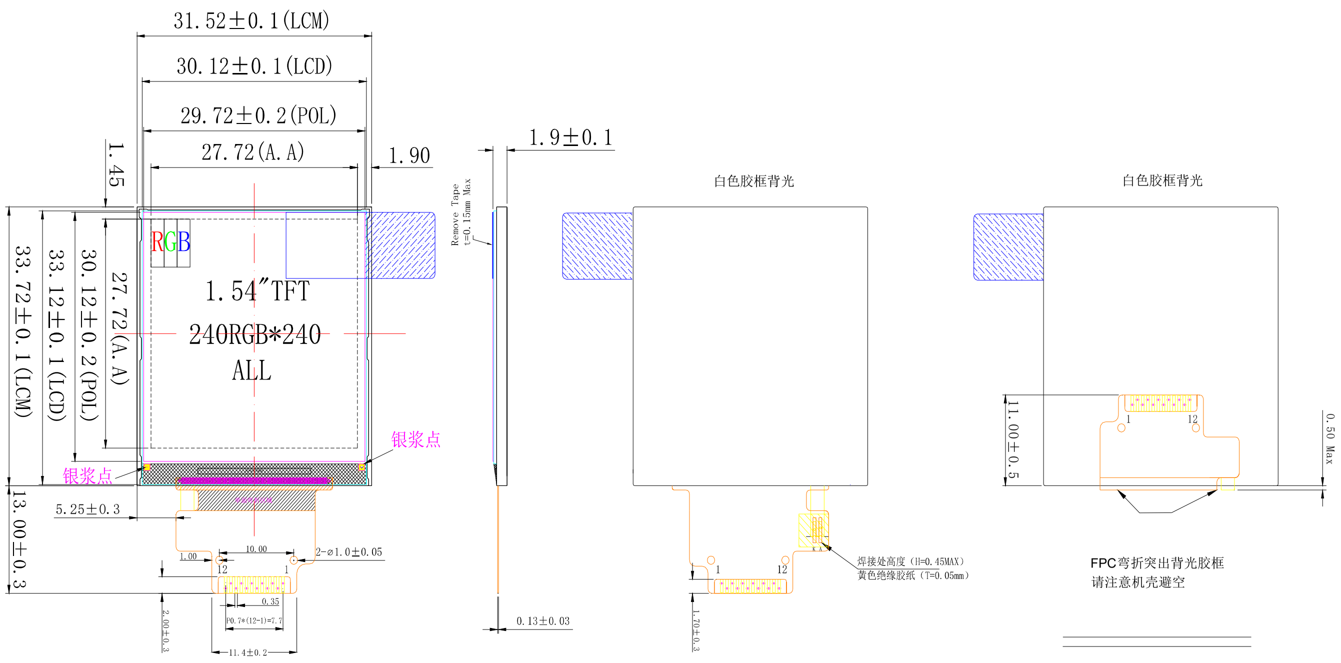
Z J Y154T-PG04 is a 240RGBX240 dot-matrix TFT LCD module. This module is composed of a TFT LCD Panel, driver ICs, FPC and a Backlight unit.

1.2 Features

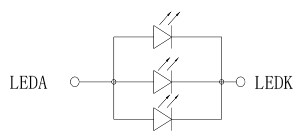
NO.	Item	Contents	Unit
1	LCD Size	1.54	inch
2	Display Mode	Normally black	-
3	Resolution	240(H)RGB x240(V)	pixels
4	Pixel pitch	0.1155(H) x 0.1155(V)	mm
5	Active area	27.72(H) x 27.72(V)	mm
6	Module size	31.52(H) x 33.72(V) x1.9 (D)	mm
7	Pixel arrangement	RGB Vertical stripe	-
8	Interface	4 Line SPI	-
9	Display Colors	262K	colors
10	Drive IC	ST7789V3	-
11	Luminance(cd/m2)	400 (TYP)	Cd/m2
12	Viewing Direction	All View	Best image
13	Backlight	3 White LED Parallel	-
14	Operating Temp.	-20℃~ + 70℃	℃
15	Storage Temp.	-30℃~+ 80℃	℃
16	Weight	2.8	g

2. Mechanical Drawing

Item	Date	Remark
A	20210412	Original Drawing



PIN	DESCRIPTION
1	GND
2	LEDK
3	LEDA
4	VDD
5	GND
6	GND
7	D/C
8	CS
9	SCL
10	SDA
11	RESET
12	GND



If=60mA Vf=2.8~3.2V

NOTES:

1. DISPLAY TYPE:1.54″IPS TFT/TRANSMISSIVE/NORMALLY BLACK
2. VIEWING DIRECTION: All
3. DRIVER IC:ST7789V3
4. OPERATING TEMP.: -20° C~70° C
5. STORAGE TEMP.: -30° C~80° C
6. BACKLIGHT: 3 CHIP-WHITE LED
7. LCM Luminance:400 CD/M2(TYP)
8. UNMARKED TOLERANCE:±0.2
9. 建议机壳开窗可视区比 LCD A.A区单边大 0.3mm
10. 产品符合ROHS标准

1.54'' TFT A

Letter

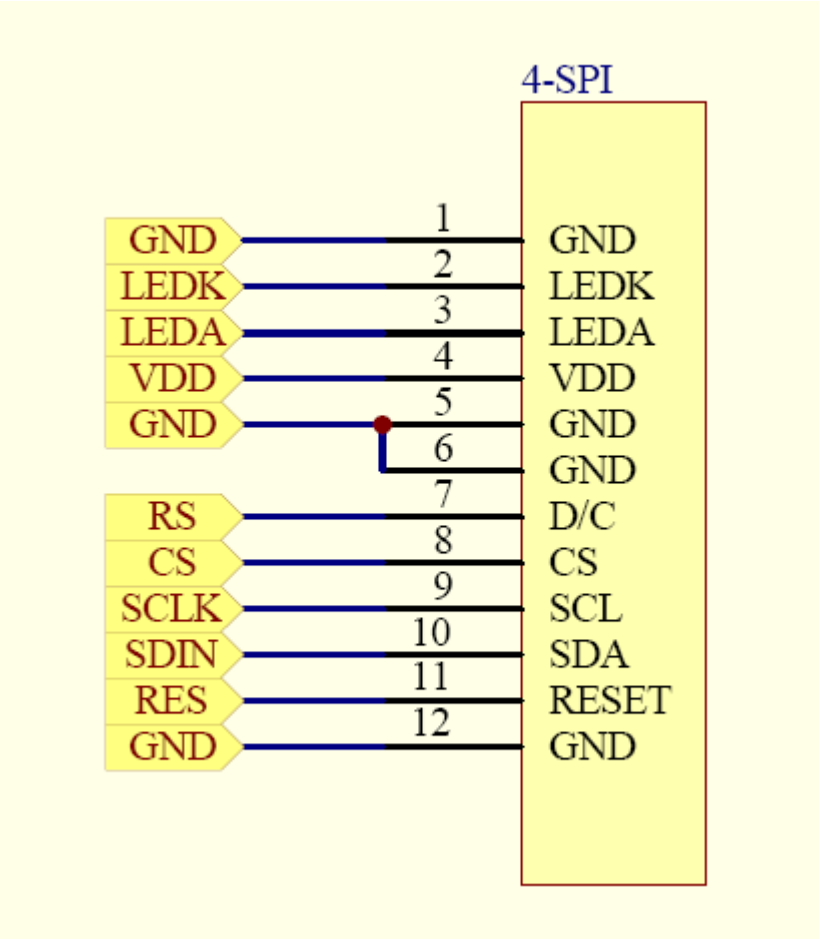
±1

3. Pin Definition

FPC Connector is used for the module electronics interface.

NO.	Symbol	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

Note:



4. Electrical Characteristics

4.1 Absolute Maximum Ratings

Parameter	Symbol	Min	MAX	Unit	Notes
Supply Voltage (I/O)	VDD	-0.3	4.6	V	
Analog Supply Voltage	VDDIO	-0.3	4.6	V	
Logic Input Voltage	VIN	-0.3	VDDIO+0.5	V	
Operation Temperature	Top	-20	70	℃	
Storage Temperature	Tst	-30	80	℃	

4.2 Operating Conditions

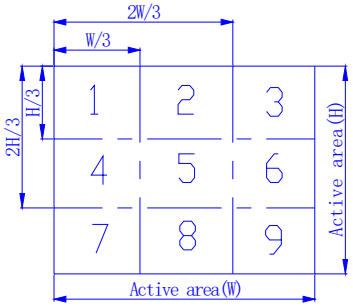
Parameter	Symbol	Min	TYP	MAX	Unit	Notes
System Voltage	VDD	2.5	2.8	3.3	V	
Gate Driver High Voltage	VGH	12.2	-	14.97	V	
Gate *Driver Low* Voltage	VGL	-12.5	-	-7.16	V	
Operating Current for V_{DD}	I_{DD}	-	8	10	mA	
Sleep_In Mode VDD	I_{dd}	-	15	30	uA	
Sleep_In Mode VDDIO	I_{ddio}	-	5	10	uA	

4.3 Backlight Unit

Parameter	Symbol	Min	TYP	MAX	Unit	Notes
Voltage for LED backlight	VLED	2.8	3.0	3.2	V	
Current for LED backlight	ILED	-	60	90	mA	3 LED
Power Consumption	Pbl	-	180	288	mW	1
Brightness	L_{br}	350	400	-	cd/m^2	2
LED Life time	-	20000	-	-	hr	3

Note:

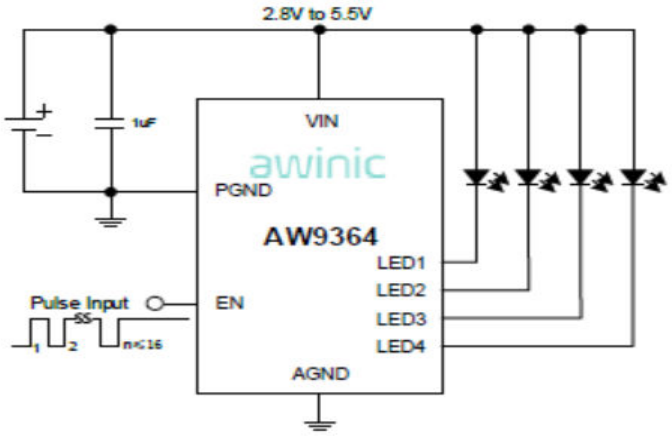
1. Where ILED =60mA , VLED=3.0V , Pbl= ILED x VLED
2. Uniform measure condition:
   a:Measure 9 point ,Measure location is show below:
   b:Uniform=(Min brightness/Max brightness)x100%
   c:Best Contrast.



3. The environmental conducted under ambient air flow ,at Ta=25±2°C,60%RH±5%

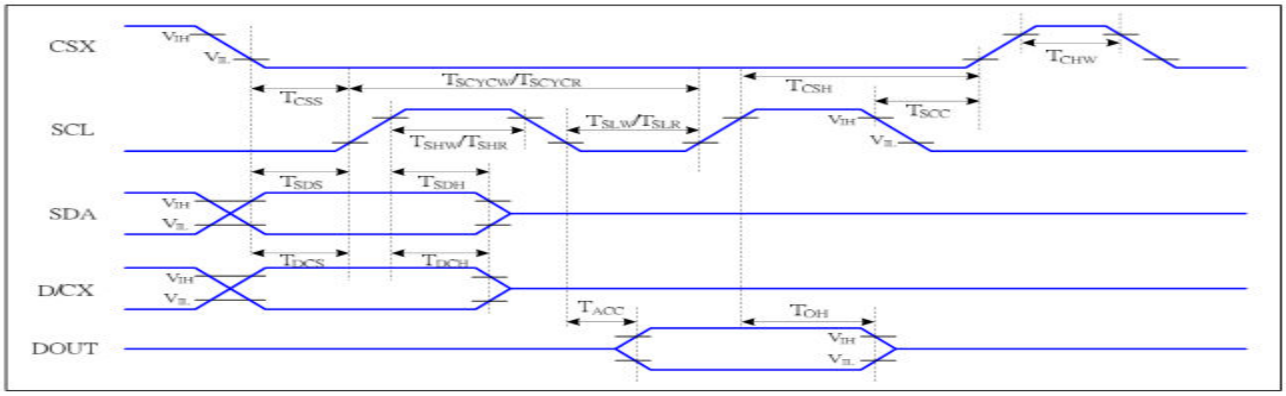
4.4 Backlight Recommended Circuit

Motherboard driver backlight is need constant current circuit , if threated voltage screen after light brightness difference . Current and power consumption of the machine are inconsistent , so recommend a backlight driving circuit is best rated current . It is recommended to use IC (AW9364) . The reference circuit is as follows:



4.5 AC Timing Characteristic of The LCD

Serial interface Characteristics(4-line serial):

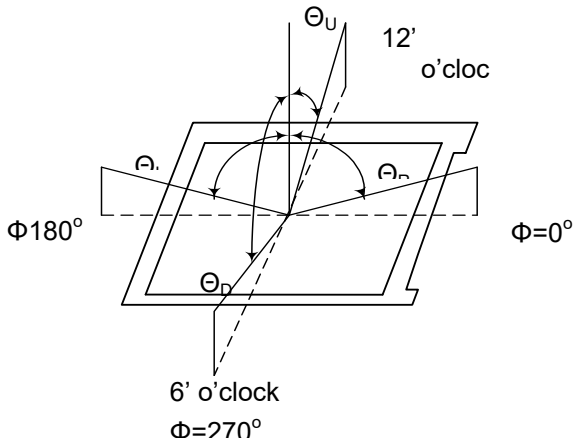


Signal	Symbol	Parameter	MIN	MAX	Unit	Description
CSX	T_{CSS}	Chip select setup time (write)	15		ns	
	T_{CSH}	Chip select hold time (write)	15		ns	
	T_{CSS}	Chip select setup time (read)	60		ns	
	T_{SCC}	Chip select hold time (read)	65		ns	
	T_{CHW}	Chip select “H” pulse width	40		ns	
SCL	T_{SCYCW}	Serial 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		ns	
	T_{DCH}	D/CX hold time	10		ns	
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
	T_{OH}	Output disable time	15	50	ns	For minimum CL=8pF

5. OPTICAL CHARACTERISTICS

Item	Symbol	Measuring Conditions		Min.	Typ.	Max.	Unit	Remark
Viewing Angle	θ	$\phi = 0^o$	25 °C	70	80	-	Deg	Note1
		$\phi = 180^o$	25 °C	70	80	-		
	θ	$\phi = 90^o$	25 °C	70	80	-		
		$\phi = 270^o$	25 °C	70	80	-		
Brightness	L_{br}	--	-	350	400	-	Cd/m2	
Luminance Uniformity	ΔL	--	-	70	75	-		
Contrast Ratio	CR	--	25 °C	700	900	-	--	Note2
Response Time	Tr+Tf	$\theta = 0^o$ $\phi = 0^o$	25 °C	-	30	40	ms	Note3
Color of CIE Coordinate	White	X	25 °C	-0.03	0.320	+0.03	--	BM-7A
		Y	25 °C		0.343			
	Red	X	25 °C		0.612			
		Y	25 °C		0.327			
	Green	X	25 °C		0.334			
		Y	25 °C		0.536			
	Blue	X	25 °C		0.137			
		Y	25 °C		0.150			
Transmittance (with polarizer)	--	--	--	4.4	4.9	-	%	--

Note 1 Definition of Viewing Angle:

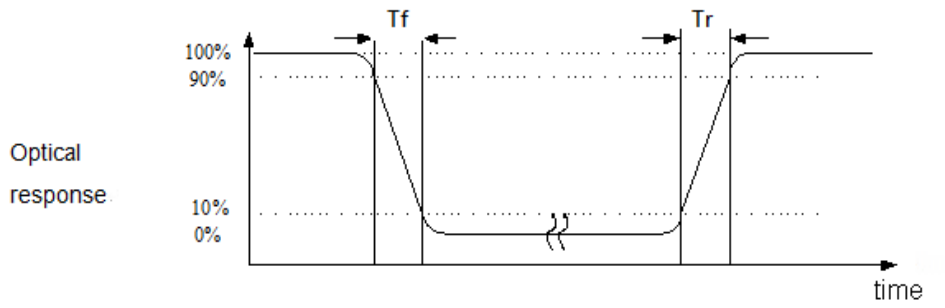


Note 2:Definition of Contrast Ratio (CR) :

measured at the center point of panel

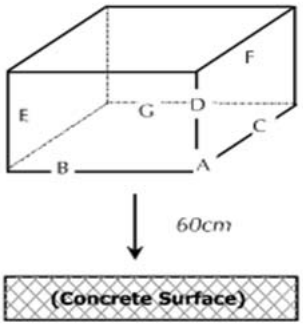
$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

Note 3: Definition of Response Time : Sum of Tr and Tf :



6. *Reliability*

Contents of Reliability Tests

No.	Item	Conditions	Note
1	High Temperature Operation	70°C±2°C, 120 hrs	
2	Low Temperature Operation	-20°C±2°C, 120 hrs	
3	High Temperature Storage	80°C±2°C, 120 hrs	
4	Low Temperature Storage	-30°C±2°C, 120 hrs	
5	High Temperature /Humidity Operation	60°C±2°C, 90% RH, 120 hrs	
6	Temperature Cycling	-10°C→25°C→60°C→25°C→-10°C 30min 5min 30min 5min 30min 10 cycle.	
7	Vibration Test	Total fixed amplitude:1.5mm. Vibration Frequency:10~55Hz One cycle 60 seconds to 3 direction of X,Y,Z each 15 minutes.	
8	ESD Test	Air Discharge:Apple ±4KV with 5 times.	
		Contact Discharge:Apple ±2KV with 5 times.	
9	Drop Test	To be measured after dropping from 60cm high on the concrete surface in packing state.  *Dropping method corner dropping:* *A corner: Once edge dropping.* *B, C, D edge: Once face dropping.* *E, F, G face: Once.*	