2.40" 320*240 IPS ST7789V3 16.7M 8 Bit B2B 24 Pin Connector

ALP ELECTRONIX

- ST7789V3 is driven with 18 bit color depth.
- LCD can display 16.7M Colors (8R:8G:8B).
- Single chip TFT-LCD Controller/Driver with On-chip Frame Memory (FM).
- Display Features
  - Programmable Partial Display Duty.
  - CABC for saving current consumption.
- Driving Algorithm
  - Dot Inversion.
  - Column Inversion.
  - Color enhancement.
- Display Colors (Color Mode)
  - Full Color: 262K, RGB=(666), Idle Mode Off
  - Color Reduce: 8-color, RGB=(111), Idle Mode On
- Programmable Pixel Color Format (Color Depth) for Various Display Data input Format
  - 12-bit/pixel: RGB=(444).
  - 16-bit/pixel: RGB=(565).
  - 18-bit/pixel: RGB=(666).
- 8 Bits Parallel Interface.
- Normally black.
- IPS, all view direction.
- Power Supply
  - VDD: 2.5V - 3.3V.
  - VDDIO: 1.65V - 3.3V.
- Brightness: 300 cd/m^2.
- Low Profile Board-to-Board Connector.

Copyright © 2023 Alptron AB

1 General Specifications

No.	Item	Contents	Unit	Remark
1	**LCD Size**	2.40	inch	
2	**Panel Type**	IPS	-	
3	**Resolution**	240RGB x 320	Pixel	
4	**Display Mode**	Normally Black	-	
5	**Number of Colors**	16.7M	-	
6	**Viewing Direction**	ALL	-	Note 1
7	**NTSC**	70%		Typ.
8	**Contrast Ratio**	1000	-	Typ.
9	**Luminance**	300	cd/m2	Typ.
10	**Module Size**	40.44 x 57 x 204	mm	Note 1
11	**Panel Active Area**	36.72 (H) x 48.96 (V)	mm	Note 1
12	**Pixel Pitch**	0.051 (H) x 0.153 (V)	mm	
13	**Pixel Arrangement**	RGB Vertical Stripe	-	
14	**Driver IC**	ST7789V3	-	
14	**Light Source**	4 white LEDs	-	
15	**Interface**	MCU-8BIT	-	
16	**Operating Temperature**	-20~+70	°C	
19	**Storage Temperature**	-30~+80	°C	
20	**Weight**	TBD	g	

Note 1: Please refer to the mechanical drawing;

Copyright © 2023 Alptron AB

2 Electrical Characteristics

2.1 Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Analog Power Supply Voltage	V_{CI}	-0.3	4.6	V
Digital Power Supply Voltage	V_{CC}	-0.3	4.6	V
I/O Power Supply Voltage	I_{OVCC}	-0.3	4.5	
Operation Temperature	T_{OP}	-20	70	°C
Storage Temperature	T_{ST}	-30	80	°C

2.2 Operating Conditions

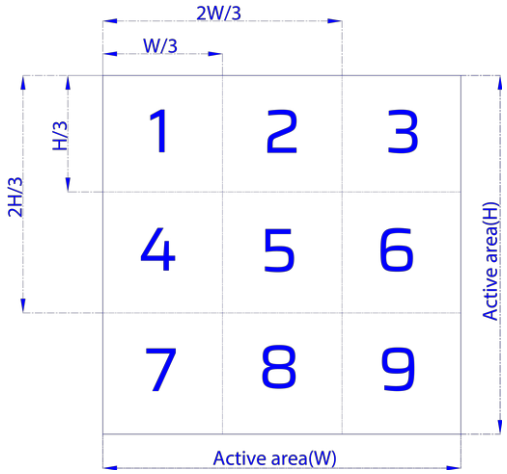
Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	V_{DD}	2.5	2.8	3.3	V
Supply Voltage for Interface Logic	V_{DDIO}	1.65	1.8-2.8	3.3	V
Input Voltage	V_{IH}	0.8*V_{DDIO}	-	V_{DDIO}	V
	V_{IL}	0	-	0.2*V_{DDIO}	V
Output Voltage	V_{OH}	0.8*V_{DDIO}	-	V_{DDIO}	V
	V_{OL}	0	-	0.2*V_{DDIO}	V

2.3 Backlight Unit

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
Voltage for LED backlight	V_{LED}	3	3.2	3.4	V	
Current for LED backlight	I_{LED}	-	80	-	mA	3 LED
Power Consumption	P_{bl}	-	256	-	mW	1

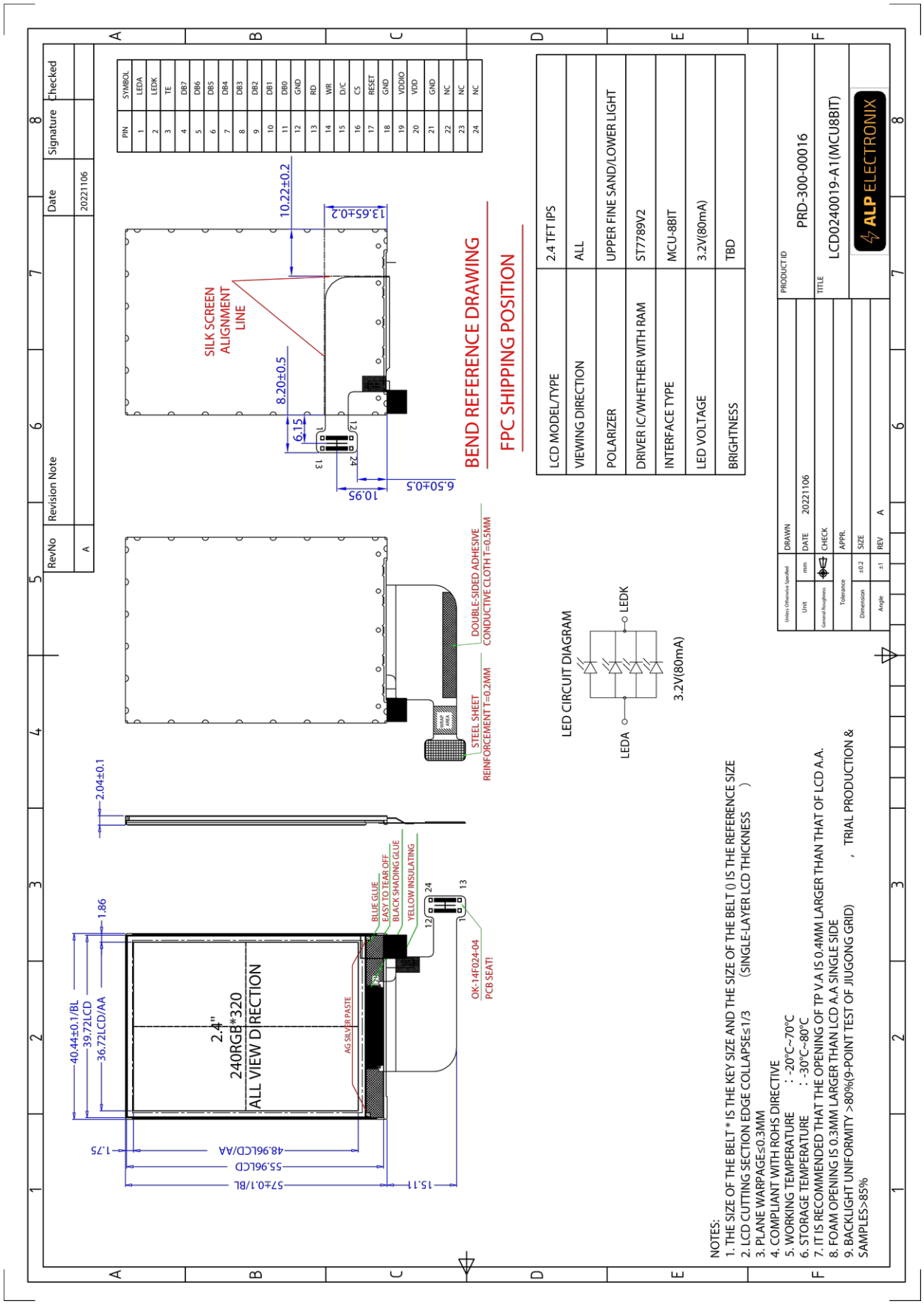
Notes:

1. Where I_{LED} = 80mA, V_{LED} = 3.2V, $P_{CONSUMPTION}$ = I_{LED} * $V_{LED.}$
2. Uniform measure condition:
   a) Measure 9 point, measure location is shown on the right side.
   b) Uniform = (Min. brightness / Max brightness) * 100%
   c) Best contrast.
3. The environmental conducted under ambient air flow ,at Ta=25±2°C,60%RH±5%



Copyright © 2023 Alptron AB

3 Mechanical Drawing



Copyright © 2023 Alptron AB

4 Pin Definition

Pin No.	Symbol	Description
1	**LEDA**	Backlight LED anode.
2	**LEDK**	Backlight LED cathode.
3	**TE**	Tearing effect signal.
4	**DB7**	Data pin.
5	**DB6**	Data pin.
6	**DB5**	Data pin.
7	**DB4**	Data pin.
8	**DB3**	Data pin.
9	**DB2**	Data pin.
10	**DB1**	Data pin.
11	**DB0**	Data pin.
12	**GND**	Ground pin.
13	**RD**	Read data.
14	**WR**	Write data.
15	**D/C**	Select data or command pin.
16	**$\overline{CS}$**	Chip select pin. Active Low.
17	**$\overline{RESET}$**	Reset signal pin. Active Low.
18	**GND**	Ground pin.
19	**VDDIO**	Power supply pin. VDDIO=1.65~3.3V.
20	**VDD**	Power supply pin. VDD=2.5~3.3V.
21	**GND**	Ground pin.
22	**NC**	No connection.
23	**NC**	No connection.
24	**NC**	No connection.

5 Optical Characteristics

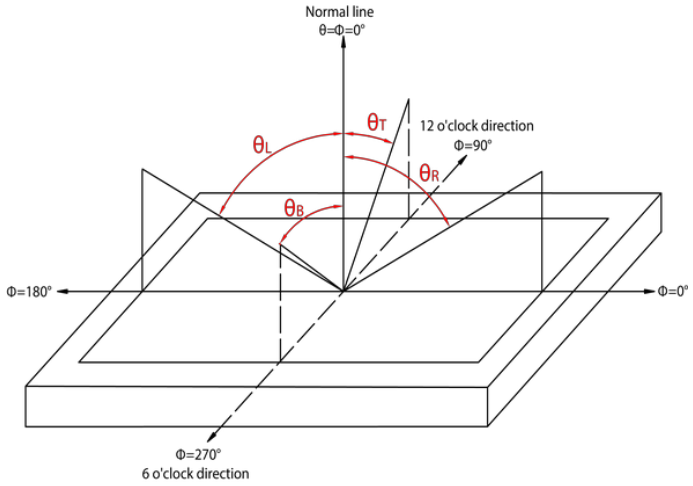
Item	Symbol	Measuring Conditions		Min.	Typ.	Max.	Unit	Remark
Viewing Angle[1]	**θ**	Φ = 0°	25°C	75	80	-	Degree	CR≥10 Note 1
		Φ = 180°	25°C	75	80	-		
	θ	Φ = 90°	25°C	75	80	-		
		Φ = 270°	25°C	75	80	-		
Luminance	**L**	--	-	-	300		Cd/m^2	
Contrast Ratio	**CR**	-	25°C	-	1500	-	-	Note 2
Response Time	**T_R+T_F**	θ = 0° Φ = 0°	25°C	-	35	45	mS	Note 3
Color of CIE Coordinate	**White**	X	25°C	-	0.307	-	-	BM-7A
		Y	25°C		0.334			
	Red	X	25°C		0.652			
		Y	25°C		0.322			
	Green	X	25°C		0.276			
		Y	25°C		0.582			
	Blue	X	25°C		0.141			
		Y	25°C		0.091			

Copyright © 2023 Alptron AB

Uniformity	U_L	Φ = θ = 0°	-	2.7	3.0	-	%	
Flicker	-			≤20%				

Notes:

1. Definition of Viewing Angle:

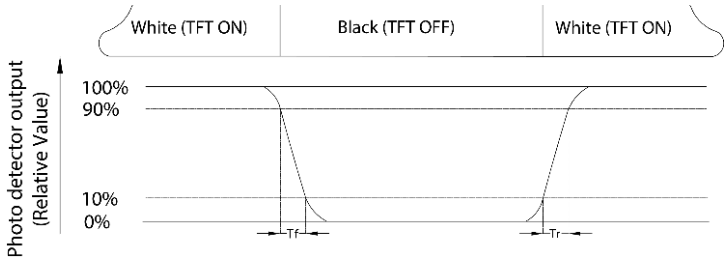


Viewing angle is the angle at which the contrast ratio is greater than 10.The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface.

2. Definition of Contrast Ratio (CR): Surface luminance is the center point across the LCD surface 500mm from the surface with all pixels displaying white.

$$Contrast\ Ratio(CR) = \frac{Luminance\ measured\ when\ LCD\ is\ on\ the\ White\ state}{Luminance\ measured\ when\ LCD\ is\ on\ the\ Black\ state}$$

3. Definition of Response Time: Sum of T_R and T_F
Response time is the time required for the display to transition from white to black (Rising time, Tr) and from black to white (Falling time, Tf) for additional information.



Copyright © 2023 Alptron AB

6 Reliability

6.1 Contents of Reliability Tests

No.	Item	Conditions	Test result determinant gist
1	**High Temperature Operation**	70±3°C,24 hrs	Inspection after 2~4hours storage at room temperature, the sample shall be free from defects: • Air bubble in the LCD; • Non-display; • Glass crack; • The electrical characteristics requirements shall be satisfied.
2	**Low Temperature Operation**	-20±3°C,24 hrs	
3	**High Temperature Storage**	80±3°C,24 hrs	
4	**Low Temperature Storage**	-30±3°C,24 hrs	
5	**High Temperature /Humidity Operation**	50°C±3°C,90%±3%RH,24 hrs;	
6	**Temperature Cycling**	-30°C→80°C 30min 30min 24 cycle.	
7	**Vibration Test**	Total fixed amplitude:1.5mm. Vibration frequency:10~55Hz X, Y, Z direction for total 1 hrs	
	ESD Test	±8KV, Air Mode,150pF/330Ω;	

Remark:

- The test samples should be applied to only one test item.
- Sample size for each test item is 2pcs.
- Failure Judgment Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic,
- Optical Characteristic.

Find Us Online

Copyright © 2023 Alptron AB

7 Revision History

Revision	Details
1.0	Initial Release – 01.01.2023

Copyright © 2023 Alptron AB

IMPORTANT NOTICE AND DISCLAIMER

AE PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATA SHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with AE products. You are solely responsible for (1) selecting the appropriate AE products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. AE grants you permission to use these resources only for development of an application that uses the AE products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other AE intellectual property right or to any third party intellectual property right. AE disclaims responsibility for, and you will fully indemnify AE and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

AE’s products are provided subject to AE’s Terms of Sale or other applicable terms available either on alpelectronix.com or provided in conjunction with such AE products. AE’s provision of these resources does not expand or otherwise alter AE’s applicable warranties or warranty disclaimers for AE products.

AE objects to and rejects any additional or different terms you may have proposed.

Mailing Address: Alp Electronix, Sjöhagvägen 6A, Västerås 721 32, Sweden
Copyright © 2023, Alptron AB

Copyright © 2023 Alptron AB