0.96" 80*160 IPS ST7735S 262K SPI FPC Connector 8 Pin

ALP ELECTRONIX

- ST7735S is driven with 18 bit color depth.
  - Full Color: 262K, RGB=(666) Max., Idle Mode OFF
- LCD can display 262K Colors (6R:6G:6B)
- Color Reduce Mode 3 bit - 8 Color RGB
- Programmable Pixel Color Format (Color Depth) for Various Display Data input Format:
  - 18-bit/pixel: RGB=(666) Using the 384k-bit Frame Memory and LUT
- Software Programmable Color Depth Mode
- Partial Window Moving & Data Scrolling
- SPI Interface
  - 4-line Serial Interface
- Power Supply
  - VDD: 2.5V - 3.7V
- IPS, all view direction.
- Normally black.
- Brightness: 400 cd/m^2.
- 8 Pin FPC Connector.

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1 General Specifications

1.1 Features

No.	Feature	Specifications	Unit
1	**LCD Size**	0.96 inch(Diagonal)	-
2	**Display Mode**	Normally black	-
3	**Resolution**	80(H)RGB x 160(V)	-
4	**Dot pitch**	0.135(H) x 0.1356(V) mm	-
5	**Active area**	10.8(H) x 21.7(V) mm	-
6	**Module size**	13.5(H) x 27.95(V) x 1.5Max(D) mm	-
7	**Color arrangement**	RGB Vertical stripe	-
8	**Interface**	4 Line SPI	-
9	**Drive IC**	ST7735S	-
10	**Luminance(cd/m2)**	400 (TYP)	-
11	**Viewing Direction**	All View	-
12	**Backlight**	1 White LED	-
13	**Operating Temp.**	-20°C~ + 70°C	-
14	**Storage Temp.**	-30°C~+ 80°C	-
15	**Weight**	1.1	g

2 Electrical Characteristics

2.1 Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Supply Voltage (I/O)	V_{DD}	-0.3	4.6	V
Operation Temperature	T_{opr}	-20	70	°C
Storage Temperature	T_{stg}	-30	80	°C

2.2 Driving TFT LCD Panel

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Voltage for LED backlight	V_{bL}	2.9	3.0	3.1	V	-
Supply Voltage	V_{DD}	2.5	2.8	3.7	V	
Gate Driver Voltage	V_{GH}	10	-	15	V	
	V_{GL}	-13	-	-75	V	
Operating Current for VDD	I_{DD}	-	2	3	mA	
Current for LED backlight	I_{BL}	15	-	20	mA	1 LED
Brightness	L_{BR}	350	400	-	cd/m2	
Sleep In Mode V_{DD}	I_{DD}	-	15	30	μA	

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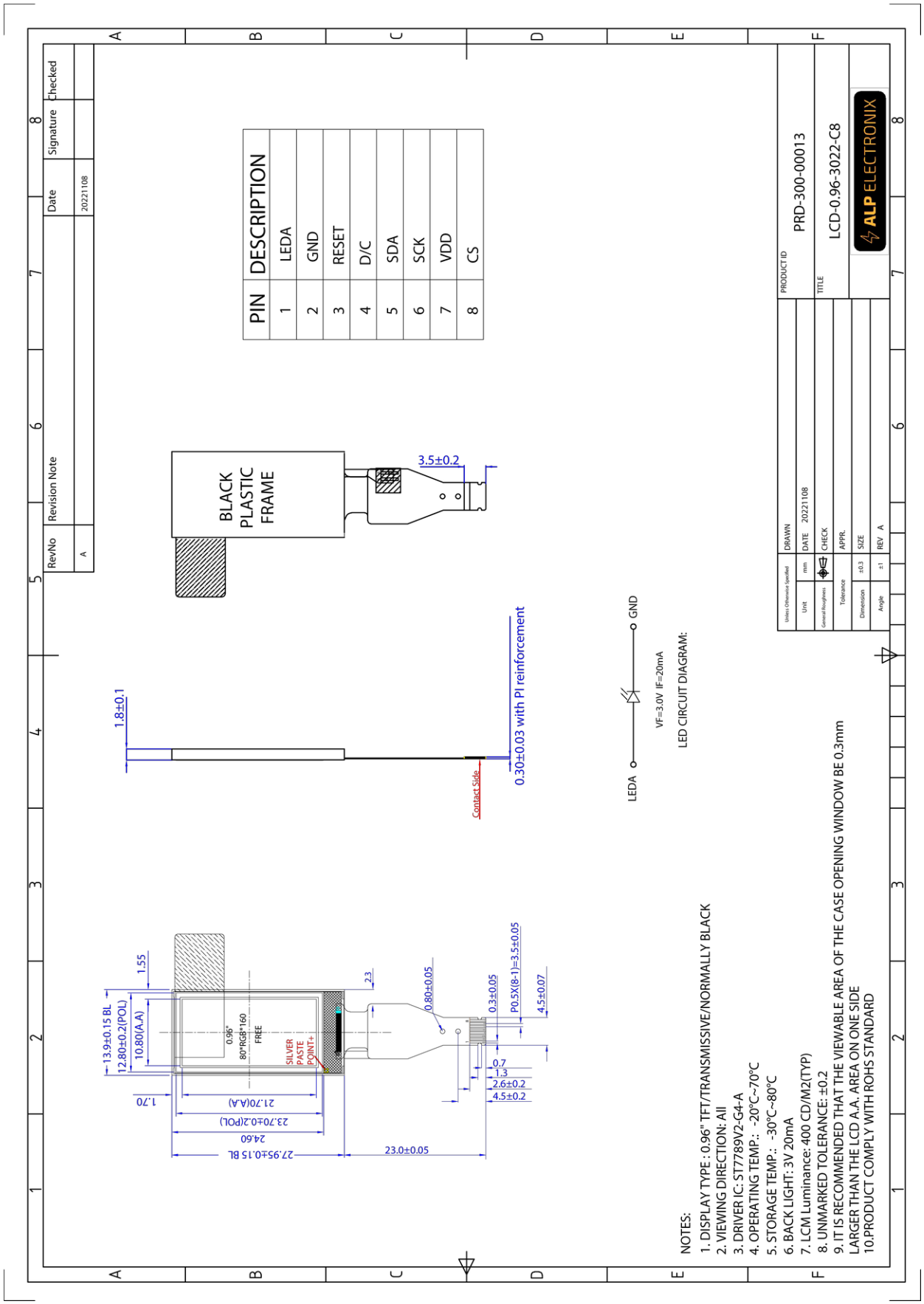
3 Mechanical Drawing



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4 Pin Definition

Pin no.	Symbol	Description
1	LEDA	Backlight LED anode.
2	GND	Ground pin.
3	$\overline{\text{RESET}}$	Reset signal. Active low.
4	D/C	Display data/command selection pin in 4-line serial interface.
5	SDA	SPI interface input/output pin.
6	SCK	SPI interface clock.
7	VDD	Power supply pin.
8	$\overline{\text{CS}}$	SPI chip select pin. Active low.

5 Optical Characteristics

Item	Symbol	Measuring Conditions		Min.	Typ.	Max.	Unit
Viewing Angle	θ_T	CR≥10	25°C	-	80	-	Degree
	θ_B			-	80	-	
	θ_L			-	80	-	
	θ_R			-	80	-	
Contrast Ratio	CR	-	25°C	-	800	-	-
Response Time	T_{ON} + T_{OFF}	θ=0° Φ=0°	25°C	-	30	40	mS
Color of CIE Coordinate	White	X	25°C	0.304	0.306	0.308	-
		Y	25°C	0.325	0.327	0.329	
	Red	X	25°C	0.608	0.610	0.612	
		Y	25°C	0.331	0.333	0.335	
	Green	X	25°C	0.279	0.281	0.283	
		Y	25°C	0.531	0.533	0.535	
	Blue	X	25°C	0.144	0.146	0.148	
		Y	25°C	0.136	0.138	0.140	
Transmittance (with polarizer)	-	-		-	5.09	-	%

Notes:

1. Definition of Response Time.(white-black). The response time is defined as the time interval between the 10% and 90% amplitudes
2. Definition of Viewing Angle:
   viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80).

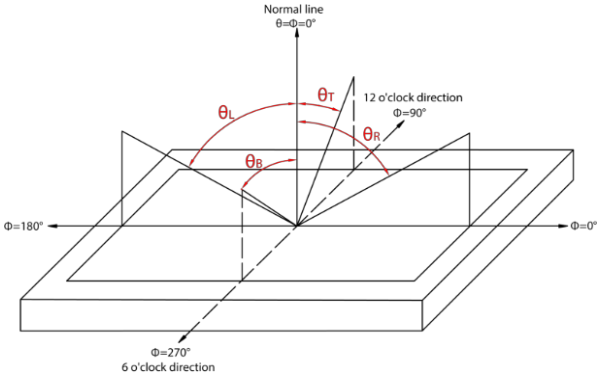

Figure 1:Definition of viewing angle

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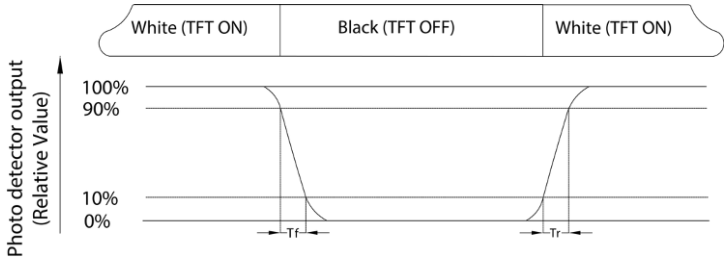
3. Definition of Contrast Ratio (CR): measured at the center point of panel

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

"White state ":The state is that the LCD should be driven by Vwhite.
"Black state": The state is that the LCD should be driven by Vblack.
Vwhite: To be determined Vblack: To be determined.

4. Definition of Response Time:
The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.



5. Definition of color chromaticity (CIE1931)
Color coordinates measured at center point of LCD.
6. Definition of Luminance Uniformity
Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

$$Luminance\ Uniformity(U)=\frac{Lmin}{Lmax}$$

L=Active area length W=Active area width

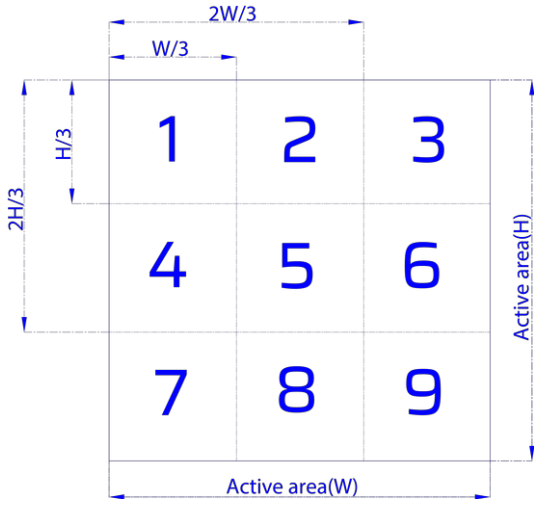


Figure 2: Definition of uniformity

Lmax: The measured maximum luminance of all measurement position.
Lmin: The measured minimum luminance of all measurement position.

7. Definition of Luminance:
Measure the luminance of white state at center point.

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6 Environmental / Reliability Test

6.1 Contents of Reliability Tests

Item	Condition	Time (hrs)	Assessment
High temp. Storage	80°C	120	No abnormalities in functions and appearance
High temp. Operating	70°C	120	
Low temp. Storage	-30°C	120	
Low temp. Operating	-20°C	120	
Humidity	50°C 85%RH	120	
Thermal Shock(Non-operation)	-10°C → 25°C →60°C →25°C 60mins/Cycle,12 Cycles	10 cycles	

Note:
No moisture condensation is observed during tests.
Condition of image sticking test: 25°C ±2°C.

6.2 Shock and Vibration

Test Item	Condition
High temp. Storage	Frequency range 10~50HZ, Stroke:1.0mm, sweep:10~50Hz, X, Y, Z 2 hours for each direction.

6.3 ESD

Test Item	Condition
ESD	150pF, 330Ω, Contact: ±2KV.
	150pF, 330Ω, Air: ±4KV.

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7 Revision History

Revision	Details
1.0	Initial Release – 01.01.2023

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