



AND-TFT-25PA-LED

160 x 234 Pixels LCD Color Monitor

The AND-TFT-25PA-LED is a compact full color TFT LCD module, that is suitable for applications such as a portable television (NTSC), camcorder, digital camera applications and other electronic products which require high quality flat panel displays. This device consists of a twisted nematic (TN) liquid crystal cell, that incorporates a TFT-array that has 160 x 234 pixels on a 2.45 inch diagonal screen, X and Y drivers, an LSI controller, and a built-in LED backlight.

Features

- Long Life LED Backlight
- Controller IC is not necessary
- Compatible with NTSC or PAL system
- High Resolution: 160 x 234
- High Brightness
- Optimum Viewing Direction: 6 o'clock
- Up/Down and Left/Right Image Reversion
- Accepts Analog RGB input
- Requires external chroma decoder to accept composite video card

Mechanical Characteristics

Item	Specification	Unit
Screen Size	2.45 inch (6.4 cm) diagonal	inch
Outline Dimensions	58.8 (W) x 49.9 (H) x 5.8 (D)	mm
Active Area	49.2 (W) x 38.14 (H)	mm
Input Signal	NTSC/PAL	-
Pixel Number	160 (W) x 234 (H)	
Sub Pixel Arrangement	R.G.B. Delta	-
Dot Pitch	0.1025 (W) x 0.163 (H)	mm
Weight	25 ± 5	g

Absolute Maximum Rating (GND = 0V, Ta = 25°C)

Item			Symbol	Conditions	Absolute Maximum Rating		Unit
					Min.	Max.	
Supply Voltage	for Source Driver	Analog	AV_{DD}	Ta = 25°C	-0.3	+7.0	V
		Digital	DV_{DD}		-0.3	+7.0	
	for Gate Driver	Positive	V_{GH}		-0.3	+45	
		Negative	V_{GL}		-23	+0.3	
					$V_{GH} - V_{GL}$	+15	
Analog Input Voltage (V_B, V_R, V_G)			V_{RGB}		-0.3	+7.3	V
Operating Temperature (note 1)			Top	-	0	+60	°C
Storage Temperature			Tstg	-	-30	+80	°C
Humidity (No condensation of water)			-	+60°C	-	95%	RH

note 1: Operating Temperature defines that contrast, response time, other display optical characteristics are Ta=+25.

Product specifications contained herein may be changed without prior notice.

It is therefore advisable to contact Purdy Electronics before proceeding with the design of equipment incorporating this product.



Power Consumption

Item	Symbol	Conditions	Specifications			Units
			Min.	Typ.	Max.	
Power Consumption	for LCD Panel	-	-	18.5	-	mW
	for Backlight Lamp	-	-	0.71	-	W
	TOTAL	-	-	0.73	-	W

(Ta = RT, VSS = 0V)

Recommended Operating Conditions

Item	Symbol	Specifications			Unit	Remarks
		Min.	Typ.	Max.		
Supply Voltage	V _{CC}	+4.5	+5.0	+5.5	V	
	DV _{DD}	+4.5	+5.0	+5.5	V	
	AV _{DD}	+4.5	+5.0	+5.5	V	
	V _{GH}	+14.5	+15.0	+15.5	V	
	-	-	-	-	-	
	V _{GL AC}	-	6.0	-	V _{P-P}	AC Component of V _{GL}
	V _{GL DC}	-12.5	-11.0	-9.5	V	DC Component of V _{GL}
Video Signal (V _B , V _R , V _G)	V _{I AC}	-	+4.0	+4.2	V _{P-P}	AC Component, Note 2
	V _{I DC}	-	+2.5	-	V	DC Component
Vcom	V _{COM AC}	-	+6.0	-	V _{P-P}	AC Component of V _{COM}
	V _{COM DC}	+1.0	+1.8	+2.0	V	DC Component of V _{COM}
H Level	V _{IH}	+0.7 V _{DD}	-	-	V	Note 1
	L Level	V _{IL}	-	+0.3 V _{DD}	V	

Note 1: STH1, STHR, CPH1, CPH2, CPH3, Q1H, OEV, CKV, OEH, STVR, STVL

Note 1: Both NTSC and PAL system Video Signal input waveform is based on 8 steps gray scale.

Optical Specifications

Item	Symbol	Conditions	Specifications			Unit
			Min.	Typ.	Max.	
Viewing Angle	Horizontal	θ	± 45	± 50	-	deg
	Vertical	θ (to 12 o'clock)	10	15	-	
		θ (to 6 o'clock)	30	35	-	
Contrast Ratio	CR	At optimized viewing angle	100	120	-	
Response Time	Rise	T _r	-	15	30	ms
	Fall	T _f	-	25	50	
Transmission	Ratio	T	7.5	8.0	8.5	%
Uniformity	U	-	65	70	-	ms
Brightness	LUM	-	200	220	-	cd/m ²
White Chromaticity	X	$\theta = 0^\circ$	0.250	0.300	0.350	-
	Y		0.280	0.330	0.380	
	T _c		6650	6850	7050	
LED Life Time	-	-	10,000	-	-	hr

Note 1: CR= Luminance when LCD is White
Luminance when LCD is Black

Contrast Ratio is measured in optimum common electrode voltage.



Current Consumption (GND = AV_{SS} = 0V)

Parameter	Symbol	Condition	Specifications			Unit	Remark
			Min.	Typ.	Max.		
Current for Driver	I _{GH}	V _{GH} = +15V	–	0.026	0.03	mA	V _{GL} center voltage
	I _{GL}	V _{GL} = -11V	–	0.35	0.4		
	I _{CC}	V _{CC} = +5V	–	0.1	0.15		
	AI _{DD}	AV _{DD} = +5V	–	1.73	1.83		
	DI _{DD}	V _{DD} = +5V	–	0.66	0.7		
	–	–	–	–	–		

Timing Characteristics of Input Signals

Characteristics	Symbol	Min	Typ	Max	Unit	Remarks
Source Start Signal Pulse Width	tshw	90	317.7	630°	s	*tshset=tshhld
Source Output Enable Pulse Width	tohw	1.0	2.0	–	μs	
RGB Input Signal Start Point	tvS	–	10.0	–	μs	
Phase Difference Between OE _H & CK _V	toc	1.5	2.3	–	μs	
Gate Clock Period	tcvw	10	63.5	–	μs	
Gate Clock Pulse Width (H)	tcvwh	10	31.7	48	μs	
Gate Clock Pulse Width (L)	tcvwl	10	31.7	48	μs	
Phase Difference Between OE _H & STH	tosp	–	4	–	μs	
Gate Output Enable Pulse Width	toev	–	2.5	–	μs	
V _{COM} Delay Time	t _{DCOM}	–	–	3	μs	
V _{COM} Rise (fall) Time	tr(tf) _{VCOM}	–	2	3	μs	
RGB Delay Start	t _{DRGB}	–	–	2	μs	

Backlight Driving for Power Consumption

Pin No.	Symbol	Description	Remarks
2	VLED1	Input terminal (Hi voltage side)	
6	GLED1	Input terminal (Low voltage side)	

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks
LED voltage	V _L	13.8	14.0	14.2	V	I _L =20mA Ta=25° C
LED current	I _L	–	20	–	mA	Ta=25° C



Interface Pin Assignment

Pin No.	Symbol	Function	Input/Output	Remarks
1	GND	Ground of Gate Driver	-	
2	V _{CC}	Logic power of Gate Driver	Input	DV _{DD} , V _{CC} = +5V (typ.)
3	V _{GL}	Gate off Voltage (Alternative Every 1-H)	Input	V _{COM} = 6V _{PP}
4	V _{GH}	Gate on Voltage	Input	V _{GH} = +15V (typ.)
5	STVR	Vertical Start Pulse Input, when U/D=High	Input/Output	Note 2
6	STVL	Vertical Start Pulse Input, when U/D=Low	Input/Output	Note 2
7	CKV	Shift clock input for gate driver	-	
8	U/D	Up/Down Control for Gate Driver	Input	
9	OEV	Output enable for Gate Driver	Input	
10	V _{COM}	Common Electrode Voltage	Input	V _{COM} = 6V _{PP}
11	V _{COM}	Common Electrode Voltage	Input	V _{COM} = 6V _{PP}
12	GLLED1	Ground of LED 1.	-	
13	VLED1	Voltage of LED 1.	-	
14	NC	No connection	-	
15	NC	No connection	-	
16	L/R	Left/Right for Source Driver	Input	Note 1
17	Q1H	Analog signal rotate input	-	
18	OEH	Output enable for Source driver	-	
19	STHL	Start Pulse for Source Driver input, when L/R=High	Input/Output	Note 1
20	STHR	Start Pulse for Source Driver input, when L/R=Low	Input/Output	Note 1
21	CPH3	Sampling and Shift Clock for Source Driver	Input	
22	CPH2	Sampling and Shift Clock for Source Driver	Input	
23	CPH1	Sampling and Shift Clock for Source Driver	Input	
24	DVDD	Logic power input of Source Driver	-	
25	DVSS	Ground of Source Driver	-	
26	V _R	Video Input R	Input	V _{COM} = 6V _{PP}
27	V _G	Video Input G	Input	V _{COM} = 6V _{PP}
28	V _B	Video Input B	Input	V _{COM} = 6V _{PP}
29	AV _{DD}	Analog Power Input of Source Driver	Input	AV _{DD} = +5V (typ.)
30	AV _{SS}	Analog GND of Source Driver	Input	

Note 1: R/L, STHL and STHR mode

R/L	STH1	STH2	Remarks
High (V _{CC})	Input	Output	Left to Right
Low (0 Volt.)	Output	Input	Right to Left

Note 2: STVR, STVL and U/D mode

U/D	DIO1	DIO2	Remarks
High (V _{DD})	Input	Output	Down to Up
Low (0 Volt.)	Output	Input	Up to Down

