



AND-TFT-25PA 160 x 234 Pixels LCD Color Monitor

The AND-TFT-25PA 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 2.5 inch diagonal screen, X and Y drivers, an LSI controller, and a built-in CCFL backlight.

Features

- Controller IC is not necessary
- Compatible with NTSC or PAL system
- High Resolution: 37,440 dots
- 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	2.5 inch (6.4 cm) diagonal	inch
Outline Dimensions	61.6 (W) x 49.3 (H) x 5.9 (D)	mm
Active Area	50.21 (W) x 37.67 (H)	mm
Input Signal	NTSC/PAL	-
Sub Pixel No.	160 (W) x 234 (H)	-
Sub Pixel Arrangement	Delta	-
Dot Pitch	0.105 (W) x 0.161 (H)	mm
Weight	28 ± 3	g

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

Item			Symbol	Conditions	Absolute Maximum Rating		Unit
					Min.	Max.	
Supply Voltage	for Source Driver	Analog	V_{DD}	Ta = 25°C	-0.3	+7.0	V
		Digital	V_{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	+40	
Analog Input Voltage (V_B, V_R, V_G)			V_{VIDEO}		-0.3	+7.3	V
Operating Temperature (note 1)			Top	-	0	+60	°C
Storage Temperature			Tstg	-	-20	+70	°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} , V _{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 _{EE}	-14.5	-15.0	-15.5	V	
	V _{GL AC}	-	+6.0	-	V _{P-P}	AC Component of V _{GL}
	V _{GL DC}	-11.5	-12.0	-12.5	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
	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}	+0.9	+1.0	+1.1	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}	

Note 1: STH1, STH2, CPH1, CPH2, CPH3, Q2H, INH, CPV, XOE, DIO1, DIO2

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	110	150	-	
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	250	-	cd/m ²
White Chromaticity	X	$\theta = 0^\circ$	0.260	0.310	0.360	-
	Y		0.280	0.330	0.380	
	T _c		6650	6850	7050	
Lamp Life	-	+ 25°C	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} = -12V	–	0.35	0.4		
	I _{CC}	V _{CC} = +5V	–	0.1	0.15		
	AI _{DD}	AV _{DD} = +5V	–	1.73	1.83		
	I _{DD}	V _{DD} = +5V	–	0.66	0.7		
	I _{EE}	V _{EE} = -15V	–	0.1	0.15		

Timing Characteristics of Input Signals

Characteristics	Symbol	Min	Typ	Max	Unit	Remarks
1 Field Scanning Period	T1V	–	262.5	–	H	
1 Line Scanning Period	T1H	–	63.5	–	μs	
Source Driver Operating Frequency	f _{hc}	1.0	3.14	5.0	MHz	
Signal Sampling Pulse Width	t _{chw}	200	317.7	1000	ns	
Signal Sampling Pulse Delay	t _{chd}	95.3	105.9	116.5	ns	t _{chd} 12, 23
Signal Sampling Pulse Width (H)	t _{chwh}	142.9	158.8	174.7	ns	
Signal Sampling Pulse Width (L)	t _{chwl}	142.9	158.8	174.7	ns	
Source Start Signal Pulse Width	t _{shw}	90	317.7	630°	ns	*t _{shset} =t _{shhld}
Source Start Signal Setup Time	t _{shset}	20	158.8	–	ns	
Source Start Signal Hold Time	t _{shhld}	20	158.8	–	ns	
Source Output Enable Pulse Width	t _{ohw}	1.0	2.0	–	μs	
Source Start Signal Rising Time	t _{ss}	–	9.8	–	μs	
Video Input Signal Start Point	t _{vs}	–	10.0	–	μs	
Phase Difference Between OEH&CPV	t _{oc}	1.5	2.3	–	μs	
Gate Clock Period	t _{cvw}	10	63.5	–	μs	
Gate Clock Pulse Width (H)	t _{cvwh}	10	31.7	48	μs	
Gate Clock Pulse Width (L)	t _{cvwl}	10	31.7	48	μs	
Gate Start Signal Pulse Width	t _{svw}	5	63.5	126**	μs	**t _{svset} =t _{svhld}
Gate Start Signal Setup Time	t _{svset}	5	53.2	–	μs	
Gate Start Signal Hold Time	t _{svhld}	5	10.3	–	μs	
Phase Difference Between OEH&STH	t _{osp}	–	4	–	μs	
Phase Difference Between SYNC&OEH	t _{ohs}	–	1.4	–	μs	
Gate Output Enable Pulse Width	t _{oev}	–	2.5	–	μs	
V _{COM} Delay Time	t _{DCOM}	–	–	3	μs	
RGB Delay Time	t _{DRGB}	–	–	2	μs	
Vertical Display Start	t _{sv}	–	3	–	tH	



Interface Pin Assignment

Pin No.	Symbol	Function	Input/Output	Remarks
1	STH1	Start pulse for source driver	Input/Output	Note 1
2	AV _{SS}	Analog GND for source driver	Input	
3	AV _{DD}	Analog power input for source driver	Input	AV _{DD} = +5V (typ.)
4	V _B	Video input B	Input	V _{COM} = 6V _{PP}
5	V _G	Video input G	Input	
6	V _R	Video input R	Input	
7	V _{SS}	Digital GND	Input	
8	V _{DD}	Digital power input	Input	V _{DD} , V _{CC} = +5V (typ.)
9	CPH1	Sampling & shift clock for source driver	Input	
10	CPH2	Sampling & shift clock for source driver	Input	
11	CPH3	Sampling & shift clock for source driver	Input	
12	STH2	Start pulse for source driver	Input/Output	Note 1
13	Q2H	Video input rotation control	Input	
14	INH	Output enable for source driver	Input	
15	R/L	Left/Right control for source driver	Input	Note 1
16	V _{COM}	Common electrode voltage	Input	V _{COM} = 6V _{PP}
17	V _{COM}	Common electrode voltage	Input	
18	XOE	Output enable for gate driver	Input	
19	CPV	Clock input for gate driver	Input	
20	U/D	Up/Down control for gate driver	Input	
21	DIO2	Vertical start pulse	Input/Output	Note 2
22	DIO1	Vertical start pulse	Input/Output	
23	V _{GL}	Gate off voltage (alternative every 1-H)	Input	V _{COM} = 6V _{PP}
24	V _{EE}	Gate driver negative voltage	Input	V _{EE} = -15V (typ.)
25	V _{SS}	GND	Input	
26	V _{CC}	Logic power for gate driver	Input	V _{DD} , V _{CC} = +5V (typ.)
27	V _{GH}	Gate on voltage	Input	V _{GH} = +15V (typ.)
28	NC	No Connection	-	-

Note 1: R/L, STH1 and STH2 mode

R/L	STH1	STH2	Remarks
High (VDD)	Input	Output	Left to Right
Low (0 Volt)	Output	Input	Right to Left

Note 2: DIO1, DIO2, and U/D mode

U/D	DIO1	DIO2	Remarks
High (VDD)	Input	Output	Down to Up
Low (0 Volt)	Output	Input	Up to Down

