



## AND-TFT-35PA-4HB

### 3.5" TFT LCD LCD Color Monitor

The AND-TFT-35PA-4HB is a compact full color TFT LCD module, that is suitable for 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 3.5 inch diagonal screen, X and Y drivers, an LSI controller, and a built-in U-shape CCFL backlight.

#### Features

- No controller chip is necessary
- Compatible with NTSC or PAL system (switchable)
- High Resolution: 160 x 234
- Optimum viewing direction: 6 o'clock
- Up/Down and Left/Right image inversion
- Anti-glare
- Highbright 1500 cd/m<sup>2</sup>
- **RoHS compliant**

#### Mechanical Characteristics

Item	Specification	Unit
Screen Size	3.5 inch diagonal	inch
Outline Dimensions	83.7 (W) x 68.6 (H) x 9.0 (D)	mm
Active Area	72.0(W)x 50.54(H)	mm
Input Signal	NTSC/PAL	–
Pixel Number (RGB trio)	160 (W) x 234 (H)	–
Sub Pixel Arrangement	0.150 (W) x 0.216 (H)	–
Dot Pitch	0.149 (W) x 0.225 (H)	mm
Weight	80	g

#### Absolute Maximum Rating

Item			Symbol	Conditions	Absolute Maximum Rating		Unit
					Min.	Max.	
Supply Voltage	for Source Driver	Analog	$AV_{DD}$	$Ta = 25^{\circ}C$	-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 ( means $V_R, V_G, V_B$ )			$V_{VIDEO}$		-0.3	+7.3	V
Operating Temperature (define that contrast, response time, other display optical characters are $Ta=+25$ )			Top	—	0	+60	°C
Storage Temperature			Tstg	—	-20	+70	°C
Humidity (No condensation of water)			—	60°C	—	95%	RH

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	Remarks	Specifications			Units
			Min.	Typ.	Max.	
LCD Panel Power Consumption	–	–	–	33.5	–	mW
CCFL Current	$I_L$	–	–	5.0	–	mA
CCFL Starting Voltage	$V_L$	–	–	665.0	–	V
Backlight Power Consumption	$P_L$	–	–	2.4	–	W

(Ta =25°C)

**Backlight Connector**

JST BHR-03VS-2

**Recommended Operating Conditions**

Item	Symbol	Remarks	Specifications			Unit
			Min.	Typ.	Max.	
Power Supply (Ta = 25°C)	$V_{CC}$		+4.5	+5.0	+5.5	V
	$V_{DD}$		+3.0	+3.3	+3.6	
	$AV_{DD}$		+4.5	+5.0	+5.5	
	$V_{GH}$		+15.0	+17.0	+19.0	
	$V_{EE}$		-15.5	-15.0	-14.5	
	$V_{GL\ AC}$	AC Component of $V_{GL}$	–	+6.0	–	$V_{P-P}$
	$V_{GL\ DC}$	DC Component of $V_{GL}$	-13.0	-12.0	-10.5	V
Video Signal ( $V_R$ , $V_G$ , $V_B$ )	$V_{i\ AC}$	AC Component	–	+4.0	+4.2	$V_{P-P}$
	$V_{i\ DC}$	DC Component	–	+2.5	–	V
$V_{COM}$	$V_{COM\ AC}$	AC Component of $V_{COMM}$	–	+6.0	–	$V_{P-P}$
	$V_{COM\ DC}$	DC Component of $V_{COMM}$	–	TBD	–	V
	H Level	$V_{IH}$	Note 1	–	–	V
	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	$\theta$	CR≥ 10	± 45	± 60	–	deg
	Vertical	$\theta$ (to 12 o'clock)		10	45	–	
		$\theta$ (to 6 o'clock)		30	45	–	
Contrast Ratio <u>Luminance when LCD is White</u> Luminance when LCD is Black		CR	At optimized viewing angle	200	350	–	–
Response Time	Rise	Tr	$\theta=0^{\circ}$	–	15	30	ms
	Fall	Tf	$\phi=0^{\circ}$	–	25	50	
Transmission	Ratio	T	–	8.5	9.0	9.5	%
Uniformity		U	–	65	70	–	–
Brightness		LUM	–	200	1500	–	cd/m <sup>2</sup>
White Chromaticity		X	$\theta=0^{\circ}$	0.280	0.310	0.340	–
		Y		0.310	0.340	0.370	
		Tc		66.50	68.50	70.50	
Lamp Life Time	+25°C	–	–	10,000	–	–	hr

**Interface Pin Assignment**

Pin No.	Symbol	Function	Input/Output	Remark
1	STH1	Start pulse for source driver	Input/Output	Note 1
2	AV <sub>SS</sub>	Analog GND for source driver	Input	
3	AV <sub>DD</sub>	Analog power input for source driver	Input	AV <sub>DD</sub> = +5V (Typ..)
4	V <sub>B</sub>	Video Input B	Input	V <sub>COM</sub> = 6V <sub>PP</sub>
5	V <sub>G</sub>	Video Input G	Input	
6	V <sub>R</sub>	Video Input R	Input	
7	V <sub>SS</sub>	Digital GND	Input	
8	V <sub>DD</sub>	Digital power input	Input	V <sub>DD</sub> = +3.3V (Typ..)
9	CPH1	Sampling and shift clock for source driver	Input	
10	CPH2	Sampling and shift clock for source driver	Input	
11	CPH3	Sampling and shift clock for source driver	Input	
12	STH2	Start pulse for source driver	Input/Output	Note 1
13	Q2H	Video input rotation control	Input	V <sub>COM</sub> = 6V <sub>PP</sub>
14	INH	Output enable for source driver	Input	
15	R/L	Left/Right Control for source driver	Input	Note 1
16	V <sub>COM</sub>	Common electrode voltage	Input	
17	V <sub>COM</sub>	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 <sub>GL</sub>	Gate off voltage (alternative every 1-H)	Input	V <sub>COM</sub> = 6V <sub>PP</sub>
24	V <sub>EE</sub>	Gate driver negative voltage	Input	V <sub>EE</sub> = -15V (Typ..)
25	V <sub>SS</sub>	GND	Input	
26	V <sub>CC</sub>	Logic power for gate driver	Input	V <sub>CC</sub> = +3.3V (Typ..)
27	V <sub>GH</sub>	Gate on voltage	Input	V <sub>GH</sub> = +17V (Typ..)
28	NC	No connection	–	–

**Note 1: STH1, STH2 and R/L 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

**Dimensional Outline**
