



## AND-TFT-25XS-LED

480 x 234 Pixels

LCD Color Monitor

The AND-TFT-25XS-LED is a compact full color TFT LCD module, that is suitable for applications such as a camcorder, digital camera application and other electronics 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 480 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
- Ultra Compact
- Compatible with NTSC or PAL system
- DC/DC, LED Driver, Video Decoder all in one
- High Resolution: 112,320 dots
- Optimum Viewing Direction: 6 o'clock
- Up/Down and Left/Right Image Reversion
- Accepts Analog RGB input
- Applications: camcorder, digital camera applications

### Mechanical Characteristics

Item	Specification	Unit
Screen Size	2.45 inch (6.4 cm) diagonal	inch
Display Format	480 x 234	dot
Active Area	49.68 (W) x 37.44 (H)	mm
Dot Pitch	0.1035 (W) x 0.160 (H)	mm
Pixel Configuration	Delta	-
Outline Dimension	60.6 (W) x 48.4 (H) x 3.45(D)	mm
Weight	20 ± 3	g
Surface Treatment	Anti-Glare	-
Brightness	250	cd/m <sup>2</sup>

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

Item	Symbol	Absolute Maximum Rating		Unit	Remarks	
		Min.	Max.			
Supply Voltage for Source Driver	Analog	AV <sub>DD</sub>	-0.3	+7.0	V	
	Digital	V <sub>DD</sub>	-0.3	+7.0	V	
Supply Voltage for Gate Driver	Positive	V <sub>GH</sub>	-0.3	+45	V	
	Negative	V <sub>GL</sub>	-23	+0.3	V	
		V <sub>GH</sub> - V <sub>GL</sub>	+15	+40	V	
Operating Temperature	-	0	+60	°C	Note 2	
Storage Temperature	-	-20	+70	°C		
Analog input voltage	V <sub>Video</sub>	-0.3	+7.3	V	Note 1	

Note 1: Analog Input Voltage means V<sub>R</sub>, V<sub>G</sub>, V<sub>B</sub>

Note 2: Operating Temperature define that contrast, response time, other display optical character 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.



**Electrical Characteristics - Recommended Operating Conditions**

Item	Symbol	Specifications			Unit	Remarks	
		Min.	Typ.	Max.			
Power Supply	$V_{CC}$	+4.5	+5.0	+5.5	V		
	$V_{DD}$	+3.0	+3.3	+3.6	V		
	$AV_{DD}$	+4.5	+5.0	+5.5	V		
	$V_{GH}$	+14.5	+15.0	+15.5	V		
	$V_{EE}$	-15.5	-15.0	-14.5	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 ( $V_R, V_G, V_B$ )	$V_{I AC}$	-	+4.0	+4.2	V	AC Component Note 2	
	$V_{I DC}$	-	+2.5	-	V	DC Component	
$V_{COM}$	$V_{COM AC}$	-	+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 $V_{DD}$	V	

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

Note 2: Both NTSC and PAL system Video Signal input waveform is based on 8 steps gray scale.

**Current Consumption (GND = AV<sub>SS</sub> = 0V)**

Item	Symbol	Condition	Specifications			Unit	Remarks
			Min.	Typ.	Max.		
Current for Driver	$I_{GH}$	$V_{GH}=+15V$	-	0.1	0.2	mA	
	$I_{GL}$	$V_{GL}=-12V$	-	0.36	0.9	mA	$V_{GL}$ center voltage
	$I_{CC}$	$V_{CC}=+5V$	-	0.2	0.4	mA	
	$AI_{DD}$	$AV_{DD}=+5V$	-	3.5	5.0	mA	
	$I_{DD}$	$V_{DD}=+5V$	-	0.6	1.5	mA	
	$I_{EE}$	$V_{EE}=-15V$	-	0.3	0.6	mA	

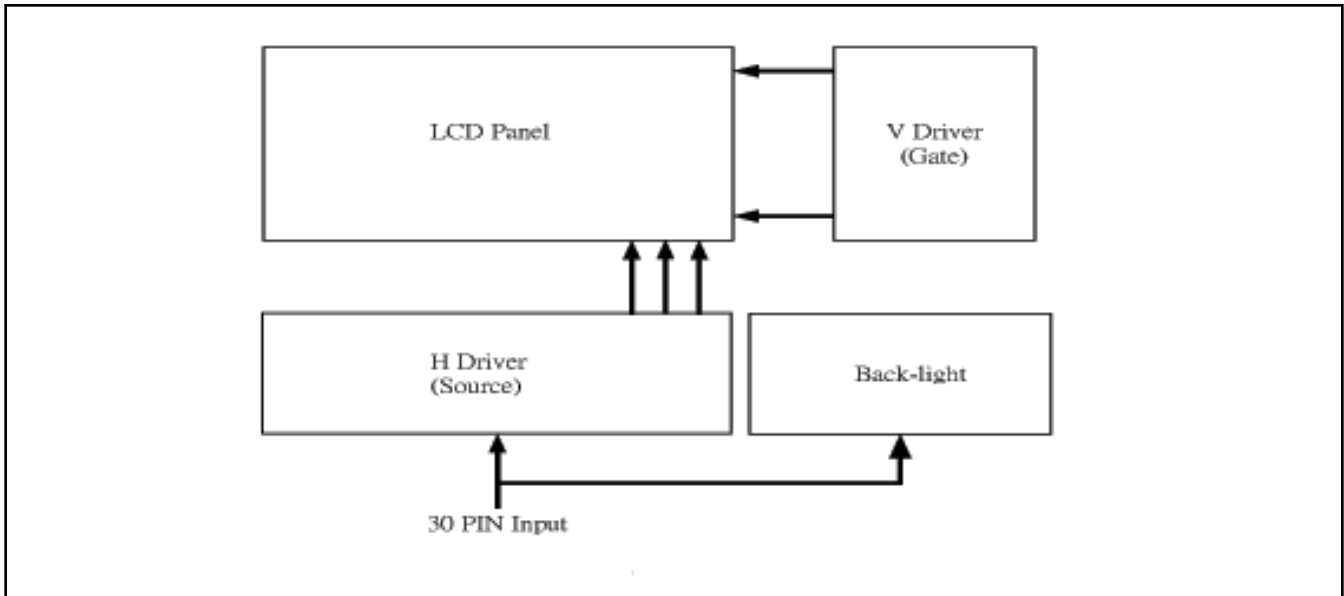
Note:  $T_a = 25^\circ C$

**Backlight Driving & Power Consumption**

Pin No.	Symbol	Description	Remark
29	GLED	Supply Current for LED	$I_L$
30	VLED	Supply voltage for LED	$V_L$ ; Note 3

Note 3: Supply voltage for LED would depend on supply current.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks
Supply Voltage	$V_L$	-	17	-	V	$I_L = 20 mA$
Supply Current	$I_L$	-	20	-	mA	

**Block Diagrams**

**Power Consumption**

Item	Symbol	Typ.	Unit	Remark
LCD Panel Power Consumption	–	31.82	mW	Note 5
Backlight Lamp Power Consumption	–	0.34	W	Note 6
Total Power Consumption	–	0.372	W	–

Note 5: The power consumption for backlight is not included

Note 6: Backlight power consumption is calculated by  $I_L \times V_L$ .

**Optical Specification**

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Viewing Angle	Horizontal	$\theta$	$\pm 45$	$\pm 50$	–	deg
	Vertical	$\theta$ (to 12 o'clock)	10	15	–	deg
		$\theta$ (to 6 o'clock)	30	35	–	deg
Contrast Ratio	CR	At optimized viewing angle	200	350	–	–
Response Time	Rise	$T_r$	–	15	30	–
	Fall	$T_f$	–	25	50	ms
Transmission Ratio	T		7.3	7.8	8.3	%
Uniformity	U		65	70	–	
Brightness			200	250		cd/m <sup>2</sup>
White Chromaticity	X	$\theta = 0^\circ$	0.280	0.310	0.340	
	Y		0.300	0.330	0.360	
	–		1000	5000		hrs

Note 5: The power consumption for backlight is not included

Note 6: Backlight power consumption is calculated by  $I_L \times V_L$ .



**Pin Description: J201 LCD Panel Input/Output Terminals**

Pin No.	Symbol	Function	Input/Output	Remarks
1	STH1	Start pulse for source driver	I/O	Note 1
2	AV <sub>SS1</sub>	Analog GND for source driver	I	
3	AV <sub>DD</sub>	Analog power input for source driver	I	Note 2
4	V <sub>B</sub>	Video Input B	I	Note 4
5	V <sub>G</sub>	Video Input G	I	
6	V <sub>R</sub>	Video Input R	I	
7	V <sub>SS</sub>	Digital GND	I	
8	V <sub>DD</sub>	Digital power input	I	Note 3
9	CPH1	Sampling and shift clock for source driver	I	
10	CPH2	Sampling and shift clock for source driver	I	
11	CPH3	Sampling and shift clock for source driver	I	
12	STH2	Start pulse for source driver	I/O	Note 1
13	Q2H	Video input rotation control	I	
14	INH	Output enable for source driver	I	
15	R/L	Left/Right Control for source driver	I	Note 1
16	V <sub>COM</sub>	Common electrode voltage	I	Note 4
17	XOE	Output enable for gate driver	I	
18	CPV	Clock input for gate driver	I	
19	U/D	Up/Down Control for gate driver	I	
20	DIO2	Vertical start pulse	I/O	Note 5
21	DIO1	Vertical start pulse	I/O	
22	V <sub>GL</sub>	Gate off voltage (alternative every 1-H)	I	Note 4
23	V <sub>EE</sub>	Gate driver negative voltage	I	Note 6
24	V <sub>SS</sub>	GND	I	
25	V <sub>CC</sub>	Logic power for gate driver	I	Note 3
26	V <sub>GH</sub>	Gate on voltage	I	Note 7
27	NC	No connection	-	
28	NC	No connection	-	
29	GLED	Supply current for LED	-	Note 8
30	VLED	Supply voltage for LED	-	Note 9

**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 6: V<sub>EE</sub> = -15V (Typ.)**

**Note 7: V<sub>GH</sub> = +15V (Typ.)**

**Note 8: GLED = 20mA (Typ.)**

**Note 9: VLED = +17V (Typ.)**

**Note 2: AV<sub>DD</sub> = +5V (Typ.)**

**Note 3: V<sub>DD</sub>, V<sub>CC</sub> = +5V (Typ.)**

**Note 4: V<sub>COM</sub> = 6V<sub>PP</sub>**

**Note 5: 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



**Input/Output Connector**  
**LCD Module Connector**  
**FFC Down Connector,**  
**30 pins**  
**Pitch: 0.5 mm**

**Timing Characteristics of Input Signal**

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	fhc	1.0	3.14	5.0	MHz	
Signal Sampling Pulse Width	tchw	200	317.7	1000	ns	
Signal Sampling Pulse Delay	tchd	95.3	105.9	116.5	ns	tchd 12, 23
Signal Sampling Pulse Width (H)	tchwh	142.9	158.8	174.7	ns	
Signal Sampling Pulse Delay (L)	tchwl	14.29	158.8	174.7	ns	
Source Start Signal Pulse Width	tshw	90	317.7	630*	ns	*tshset=tshld
Source Start Signal Setup Time	tshset	20	158.8	–	ns	
Source Start Signal Hold Time	tshld	20	158.8	–	ns	
Source Output Enable Pulse Width	tohw	1.0	2.0	–	μs	
Source Start Signal Rising Time	tss	–	9.8	–	μs	
Video Input Signal Start Point	tvs	–	10.0	–	μs	
Phase Difference Between OEH & CPV	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	
Gate Start Signal Pulse Width	tsvw	5	63.5	126**	μs	**tsvset=tsvld
Gate Start Signal Setup Time	tsvset	5	53.2	–	μs	
Gate Start Signal Hold Time	tsvld	5	10.3	–	μs	
Phase Difference Between OEH & STH	tosp	–	4	–	μs	
Phase Difference Between SYNC & OEH	tohs	–	1.4	–	μs	
Gate Output Enable Pulse Width	toev	–	2.5	–	μs	
V <sub>COM</sub> Delay Time	t <sub>DCOM</sub>	–	–	3	μs	
RGB Delay Time	t <sub>DRGB</sub>	–	–	2	μs	
Vertical Display Start	tsv	–	3	–	tH	

Dimensional Outline

