AND Displays

AND-TFT-7PA-WV

1440 x 234 Pixels
LCD Color Monitor

The AND-TFT-7PA-WV is a compact full color TFT LCD module, whose driving board is capable of converting composite video signals to the proper interface of LCD panel and is suitable for car TV, portable DVD and GPS, multimedia applications and other AV systems.

This device consists of amorphous silicon TFT liquid crystal display. The display has 1440 x 234 pixels on a 7.0 inch diagonal screen. X and Y drivers, LSI controller, and a built-in CCFL backlight inverter (with optional board.)

Features

- Pixel in stripe configuration
- 7.0 inch (16.9 cm) diagonal screen
- High brightness (400 Nits)
- Slim and compact
- Amorphous silicon TFT-LCD
- Imager Reversion: Up/Down and Left/Right
- Support multi display mode
- High performance, low power consumption
- Wide viewing angle

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.

Mechanical Characteristics

Item	Specification	Unit
Screen Size	7.0 inch (16.9 cm) diagonal	–
Outline Dimensions	166.0 (W) x 100.0 (H) x 7.2 (D)	mm
Active Area	154.08 (W) x 87.05 (H)	mm
Surface Treatment	Anti-glare and hard coating	–
Weight	180 ± 10	g
Pixel Arrangement	stripe	–
Pixel Pitch	0.107 (W) x 0.372 (H)	mm
Display Format	1440 x 234	dot

Absolute Maximum Rating

Item		Symbol	Remarks	Absolute Maximum Rating		Unit
				Min.	Max.	
Supply Voltage for Source Driver		V_{DD2}		-0.3	+5.8	V
		V_{DD1}		-0.3	+7.0	
Supply Voltage for Gate Driver		V_{CC}		-0.3	+6.0	V
		V_{GH} - V_{EE}		-0.3	+40.0	
	H Level	V_{GH}		-0.3	+25.0	
	L Level	V_{EE}		-16	+0.3	
Analog Signal Input Level		V_R, V_G, V_B	Note 1	-0.2	V_{DD1} +0.2	V
Storage Temperature		–		-40	+95	°C
Operation Temperature		–	Note 2	-30	+85	°C

Note 1: Analog Input Voltage means V_R, V_G, V_B.

Note 2: Optical characteristics are measured under Ta=+25ºC.

Power Consumption (Ta = 25°C)

Item		Symbol	Conditions	Specifications		Units
				Typ.	Max.	
Supply Current for Gate Driver	Hi level	I_{GH}	V_{GH} = +17V	0.11	0.17	mA
	Low level	I_{EE}	V_{EE} = -12V	1.12	1.68	mA
Supply Current for Source Driver	Digital	I_{DD1}	V_{DD1} = +5V	1.80	4.50	mA
	Analog	I_{DD2}	V_{DD2} = +5V	10.5	15.0	mA
Supply Current for Gate Driver	Digital	I_{CC}	V_{CC} = +5V	0.02	0.05	mA
LCD Panel Power Consumption (Note 1)		–	–	76.9	120.8	mW
Backlight lamp Power Consumption (Note 2)		–	–	3.15	–	W

Note 1: The power consumption for backlight is not included.
Note 2: Backlight lamp power consumption is calculated by I_L x V_L.

Recommended Driving Conditions for TFT-LCD Panel **GND = OV, Ta = 25°**

Item		Symbol	Specifications			Unit	Remark
			Min.	Typ.	Max.		
Supply Voltage for Source Driver	Analog	V_{DD2}	4.5	5.0	5.5	V	–
	Logic	V_{DD1}	4.5	5.0	5.5		–
Supply Voltage for Gate Driver	H Level	V_{GH}	+15	+17	+19	V	–
	L Level	$V_{EE\ DC}$	-13	-12	-10.5		DC component of V_{EE}
		$V_{EE\ AC}$	–	6.0	–	V_{p-p}	AC component of V_{EE}
	Logic	V_{CC}	4.5	5.0	5.5	V	–
Analog Input SIgnal Voltage	Amplitude	–	0.3	–	V_{CC} -0.3	V	AC component
Digital Input Voltage	H Level	V_{IH}	0.7 V_{DD1}	–	V_{DD1}	V	–
	L Level	V_{IL}	-0.3	–	0.3 V_{DD1}		–
Digital Output Voltage	H Level	V_{OH}	0.7 V_{DD1}	–	V_{DD1}	V	–
	L Level	V_{OL}	-0.3	–	0.3 V_{DD1}		–
V_{COM}		$V_{COM\ AC}$	–	6.0	–	V_{p-p}	AC component of V_{COM}
		$V_{COM\ DC}$ *	1.3	1.5	1.7	V	DC component of V_{COM}

*Purdy strongly suggests that the $V_{COM\ DC}$ level shall be adjustable,and the adjustable level range is 1.5V±1V, every module's $V_{COM\ DC}$ level shall be carefully adjusted to show a best image performance.

Recommended Driving Conditions for Backlight

Item	Symbol	Min.	Typ.	Max.	Unit	Remarks
Lamp Voltage	V_L	474	527	580	Vrms	IL=6mA
Lamp Current	I_L	3	6	8	MA	Note 1
Lamp Frequency	P_L	40	55	80	KHz	Note 2
Kick-off Voltage (25° C) (Reference Value)	V_S	–	–	630	Vrms	Note 3
Kick-off Voltage (0° C) (Reference Value)	V_S	–	–	890	Vrms	Note 3
Life Expectancy of CCFL Backlight	L_{BL}	–	40,000	–	hrs	

Note 1: In order to satisfy the quality of B/L, no matter use what kind of inverter, the output lamp current must be between Min. and Max. to avoid the abnormal display image caused by B/L.

Note 2: The waveform of lamp driving voltage should be as close to a perfect sine wave as possible.

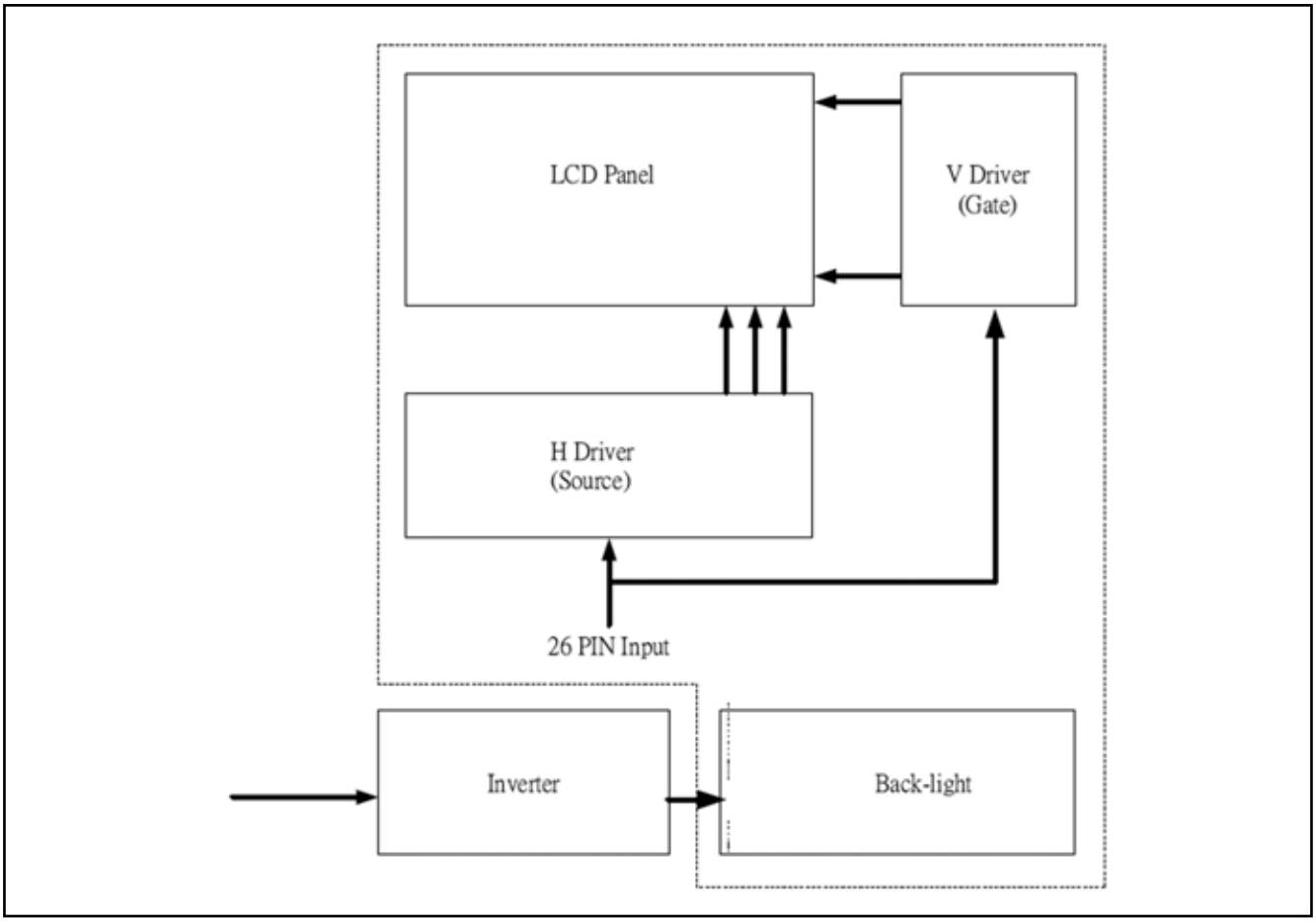
Note 3: This value is not output voltage of inverter. The voltage of inverter must be larger than the starting voltage. The kick-off time must be larger than 1 second.

Backlight Connector: JST BHSR-02VS-1, Pin No.:2, Pitch: 3.5mm

Pin No.	Symbol	Description	Remarks
1	VL1	Input terminal (Hi voltage side)	Wire color: pink
2	VL2	Input terminal (Low voltage side)	White color: white; Note 1

Note 1: Low voltage side of backlight inverter connects with Ground of inverter circuits.

Block Diagram



Input/Output Terminals LCD Module Connector FPC Down Connect, 30 pins, Pitch: 0.5 mm

Pin #.	Symbol	I/O	Function	Remark
1	GND	–	Ground for logic circuit	
2	V_{CC}	I	Supply voltage of lofic control circuit for scan driver	Note 3
3	NC	–	No Connection	
4	V_{EE}	I	Negative power gate driver	Note 4
5	NC	–	No Connection	
6	V_{GH}	I	Positive power for gate driver	Note 5
7	NC	–	No Connection	
8	STVD	I/O	Vertical start pulse	Note 1
9	STVU	I/O	Vertical start pulse	Note 1
10	CKV	I	Shift clock for gate driver	
11	U/D	I	Up/Down Control for gate driver	Note 1
12	OE3	I	Output enable for gate driver	
13	OE2	I	Output enable for gate driver	
14	OE1	I	Output enable for gate driver	
15	V_{COM}	I	Common electrode voltage	
16	STHL	I/O	Start pulse for source driver	Note 2
17	V_{SS2}	–	Grounda for analog circuit	
18	V_R	I	Video Input R	
19	V_G	I	Video Input G	
20	V_B	I	Video Input B	
21	V_{SS1}	–	Ground for digital circuit	
22	V_{DD2}	I	Supply power for analog circuit	Note 6
23	CPH1	I	Sampling and shift clock for source driver	
24	CPH2	I	Sampling and shift clock for source driver	
25	CPH3	I	Sampling and shift clock for source driver	
26	V_{DD1}	I	Supply power for digital circuit	Note 7
27	R/L	I	Left/Right control for source driver	Note 2
28	NC	I	No Connection	
29	OEH	I	Output enable for source driver	
30	STHR	I/O	Start pulse for source driver	Note 2

Note 1

U/D	STVD	STVU	Scanning direction
VCC	Input	Output	Down to up
GND	Output	Input	Up to down

Note 2

R/L	STHL	STHR	Scanning direction
VCC	Output	Input	Left to right
GND	Input	Output	Right to left

Note 3 V_{CC} Typ. = +5V

Note 4 V_{EE} Typ. = -12V

Note 5 V_{GH} Typ. = +17V

Note 6 V_{DD2} Typ. = +5V

Note 7 V_{DD1} Typ. = +5V

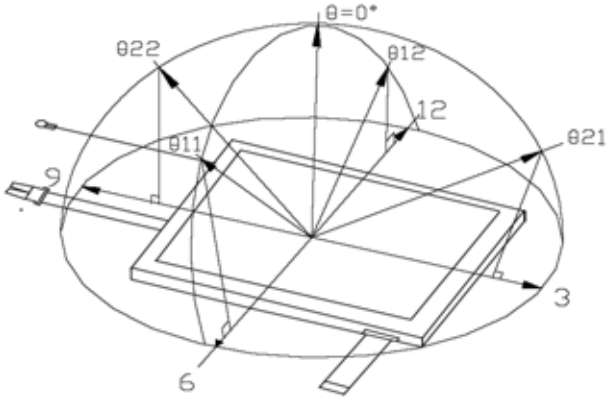
Timing Characteristics of Input Signals

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Remarks
Rising time	t_r	–	–	10	ns	–
Falling time	t_f	–	–	10	ns	–
HIgh and low level pulse width	t_{CPH}	9.2	9.6	10.0	MAz	CPH1~CPH3
CPH pulse duty	t_{CWH}	30	50	70	%	CPH1~CPH3
STH setup time	t_{SUH}	20	–	–	ns	STHR, STHL
STH hold time	t_{HDH}	20	–	–	ns	STHR, STHL
STH pulse width	t_{STH}	–	1	–	tCPH	STHR, STHL
STH period	t_H	61.5	63.5	65.5	μs	STHR, STHL
OEH pulse width	t_{OEH}	–	1.40	–	μs	OEH
Sample and hold disable time	t_{DIS1}	–	7.43	–	μs	–
OEV pulse width	t_{OEV}	–	18	–	μs	OEV
CKV puse width	t_{CKV}	–	31.75	–	μs	CKV
Clean enable time	t_{DIS2}	–	9.0	–	μs	–
Horizontal display start	t_{SH}	–	0	–	$t_{CPH}/3$	–
Horizontal display timing range	t_{DH}	–	480	–	t_{CPH}	–
STV setup time	t_{SUV}	400	–	–	Ns	STVR, STVL
STV hold time	t_{HDV}	400	–	–	Ns	STVR, STVL
STV pulse width	t_{STV}	–	–	1	t_H	STVR, STVL
Horizontal lines per field	t_V	256	262	268	t_H	–
Vertical display start	t_{SV}	–	3	–	t_H	–
Vertical display timing range	t_{DV}	–	234	–	t_H	–
VCOM rising time	t_{rCOM}	–	–	5	Ms	–
VCOM falling time	t_{fCOM}	–	–	5	Ms	–
VCOM delay time	t_{DCOM}	–	–	3	Ms	–
RGB delay time	t_{DRGB}	–	–	1	Ms	–

Optical Specifications (Ta = 25°C)

Item		Symbol	Conditions	Specifications			Unit
				Min.	Typ.	Max.	
Viewing Angle (Note 1)	Horizontal	θ = 21, θ = 22	CR ≥ 10	55	60	–	deg
	Vertical	θ = 12		35	40	–	
		θ = 11		45	50	–	
Contrast Ratio (Note 2)		CR	At optimized viewing angle	200	350	–	–
Response Time (Note 3)	Rise	Tr	θ = 0	–	15	30	ms
	Fall	Tf		–	25	50	
Luminance (Note 4)		L	θ = 0	350	400	–	cd/m^2
Transmission Ratio		T	–	7.8	8.3	–	%
Uniformity (Note 5)		U	–	70	75	–	%
White Chromaticity (Note 4)		x	θ = 0	0.260	0.290	0.320	–
		y		0.280	0.310	0.340	
Lamp Life Time +25 °C		–	-	–	40,000	–	hr

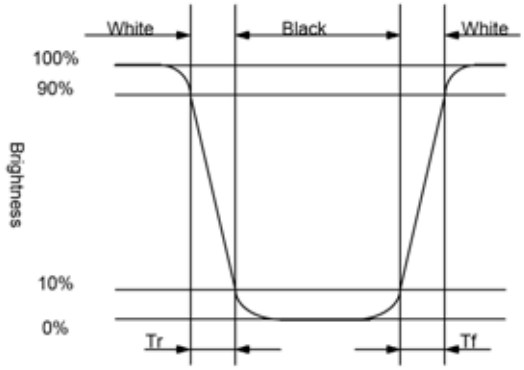
Note 1 : The definitions of viewing angles



Note 2 : CR = $\frac{\text{Luminance when Testing point is White}}{\text{Luminance when Testing point is Black}}$

Contrast Ratio is measured in optimum common electrode voltage.

Note 3 : The definition of response time:



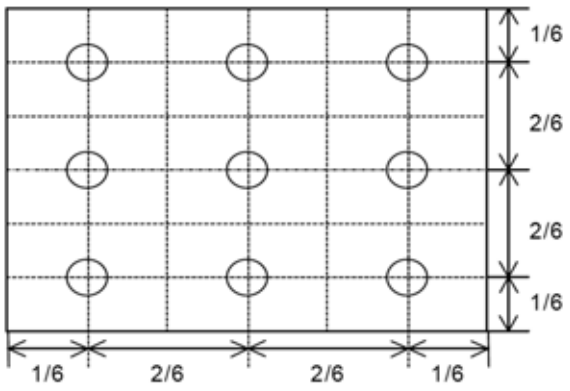
Note 4 : 1.Topcon BM-7(fast) luminance meter 1°field of view is used in the testing (afte
20~30 minutes operation).
2.Lamp current : 6 mA
3.Inverter model : TDK-347

Note 5 : The uniformity of LCD is defined as

U = $\frac{\text{The Minimum Brightness of the 9 testing Points}}{\text{The Maximum Brightness of the 9 testing Points}}$

Luminance meter : BM-5A or BM-7 fast (TOPCON)
Measurement distance : 500 mm +/- 50 mm
Ambient illumination : < 1 Lux
Measuring direction : Perpendicular to the surface of module

The test pattern is white (Gray Level 63).



Dimensional Outline

General mechanical tolerance = 0.5mm