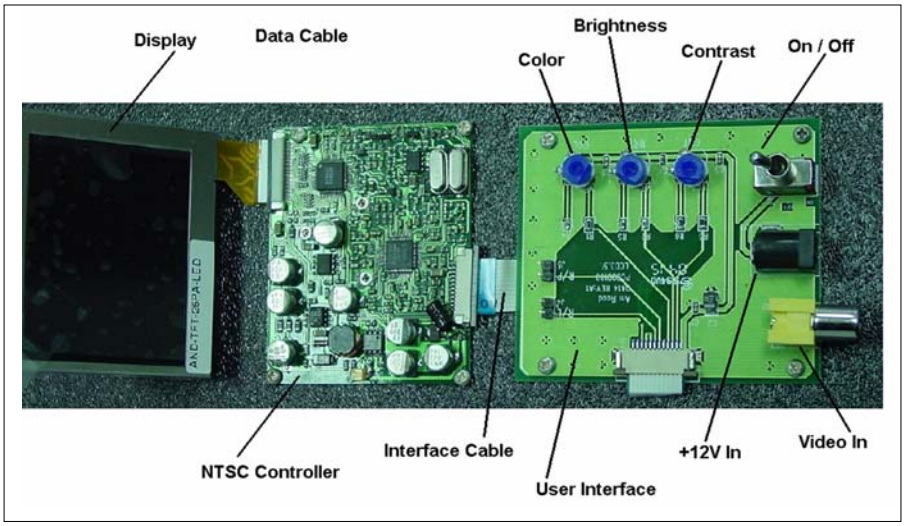


Parts List

- AND-TFT-25PA-LED, color display
- PC-TFT-2535PA-LED, NTSC/PAL controller
- PC-Demo, User interface board
- FC-12D, User interface cable
- AC/DC Power supply
- RoHS compliant

AND-TFT-25PA-LED-KIT

160 x 234 Pixels
LCD Color Monitor

The AND-TFT-25PA-LED-KIT 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.

Mechanical Characteristics

Item	Specification	Unit
Screen Size	2.45 inch (6.4 cm) diagonal	inch
Outline Dimensions	58.8 (H) x 49.9 (V) x 5.8 (D)	mm
Active Area	49.2 (H) x 38.14 (V)	mm
Input Signal	NTSC/PAL	–
Pixel Number	160 (W) x 234 (H)	
Sub Pixel Arrangement	R.G.B. Delta	–
Dot Pitch	0.1025 (H) x 0.163 (V)	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	+40	
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 conrast, 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)	CR ≥ 10	10	15	–	
		θ (to 6 o'clock)		30	35	–	
Contrast Ratio		CR	At optimized viewing angle	100	120	–	
Response Time	Rise	Tr	θ = 0°	–	15	30	ms
	Fall	Tf	ϕ = 0°	–	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	θ = 0°	0.250	0.300	0.350	–
		Y		0.280	0.330	0.380	
		Tc		6650	6850	7050	
LED Life Time	+ 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	
	I_{GL}	V_{GL} = -11V	–	0.35	0.4		V_{GL} center voltage
	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 OEH & CKV	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)	tcvwll	10	31.7	48	μs	
Phase Difference Between OEH & 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	GLED1	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	

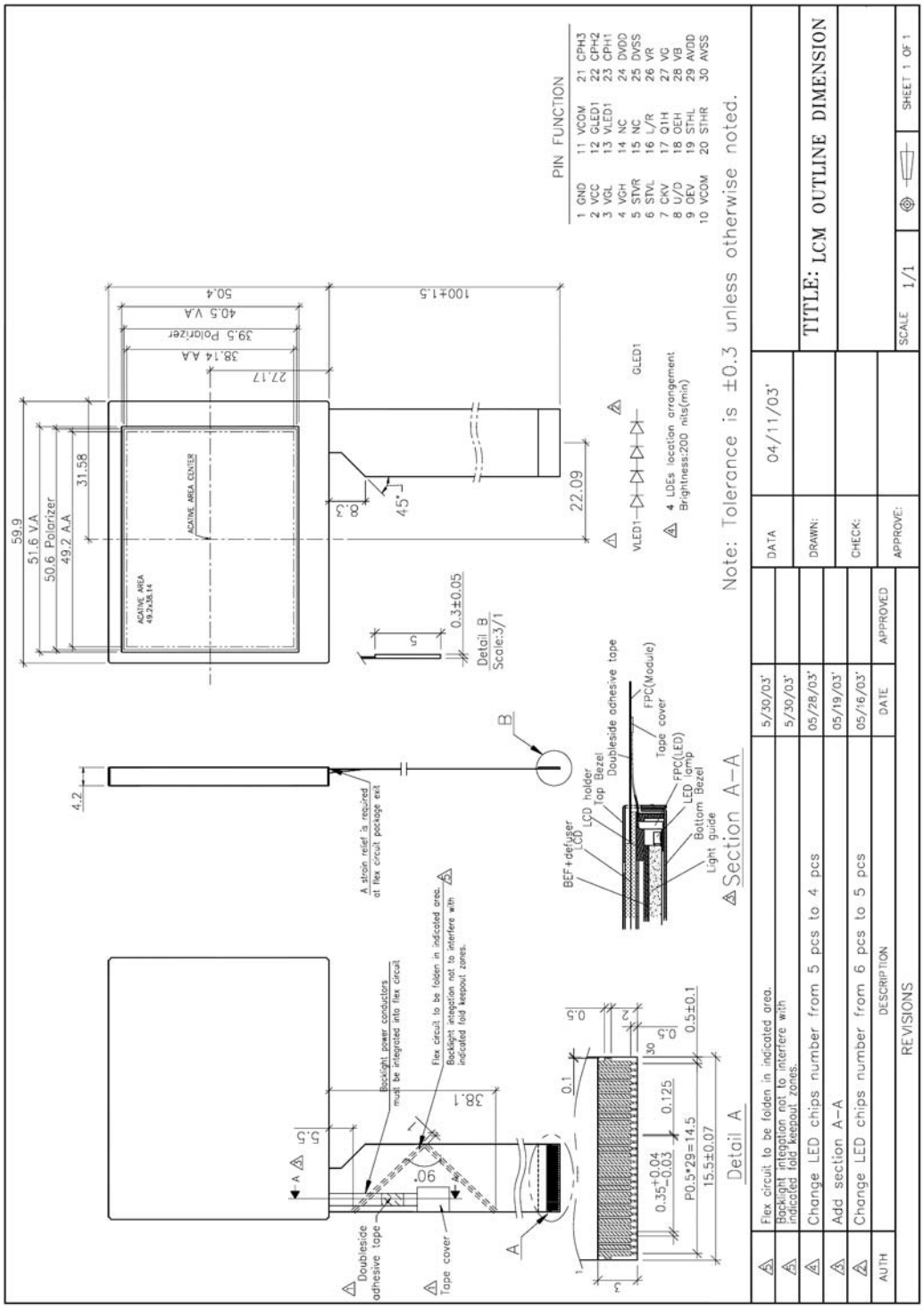
Note 1: R/L, STHL and STHR mode

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
Hiigh (VDD)	Input	Output	Down to Up
Low (0 Volt.)	Output	Input	Up to Down

Dimensional Outline



General mechanical tolerance = 0.5mm

PC-TFT-2535PA-LED

Interface Board

Features

- Used for TFT-LCD display: 2.5”/3.5” AND-TFT-25PA
- Compact, light, thin and small
- Short circuit protection
- Low EMI interference
- External pin to allow user to adjust color, brightness and contrast.

The PC-TFT-2535PA-LED is designed to work with the AND-TFT-25PA and the AND-TFT-35PA color TFT display which is suitable for security, video game, door phone, video phone, portable TV and instrument display applications..

Mechanical Characteristics

Item	Specification	Unit
Outline Dimension	62.5 (W) x 52 (H) x 7.5 (D)	mm
Weight	20	g

Absolute Maximum Rating

Item	Symbol	Conditions	Min.	Max.	Unit
Operating Temperature	Top	–	0	60	°C
Storage Temperature	Tstg	–	-30	80	°C

DC to DC Converter

Voltage (V)	Current (mA)	Total Regulation			Ripple & Noise (mV)
		Min.	Typ.	Max.	
+5V	50-100	4.8	5.0	5.1	50
+7.5V	6~10	7	9.1	9.5	200
+15V	5~5	12	15	16	200
-12V	2-5	-9	-12	-15	200

Input

Characteristics:

Typical Input Voltage: 8V DC

Input Voltage Range: 6VDC to 15 VDC

I**nput Current:** 150mA, Typical at 12VDC with panel load.

Inrush Current Max: 250mA at 6VDC, 130mA at 15VDC Cold start at 25C, 5.0VDC with panel load.

Sync. Pulse: 60KHz Typical

Terminal Pin Assignment

Pin No.	Symbol	I/O	Description	Remarks
1	+5V	O	5.0V output	–
2	COL	I	color adj.	–
3	BRT	I	brightness adj.	–
4	CNT	I	contrast adj.	–
5	Video	I	composite video signal	The signal resistance is 75Ω, 1V p-p.
6	U/P	I	up/down scan control	+5V or GND
7	R/L	I	left/right scan control	+5V or GND
8	GND	I	ground	–
9	GND	I	ground	–
10	+12V	I	+12V DC power input	–
11	HSY	O	HSY output	–
12	VSY	O	VSY output	–

Connector:

Pin No: FC12D (Bottom Contact)

Pitch: FC 1.0mm

Output Characteristics:

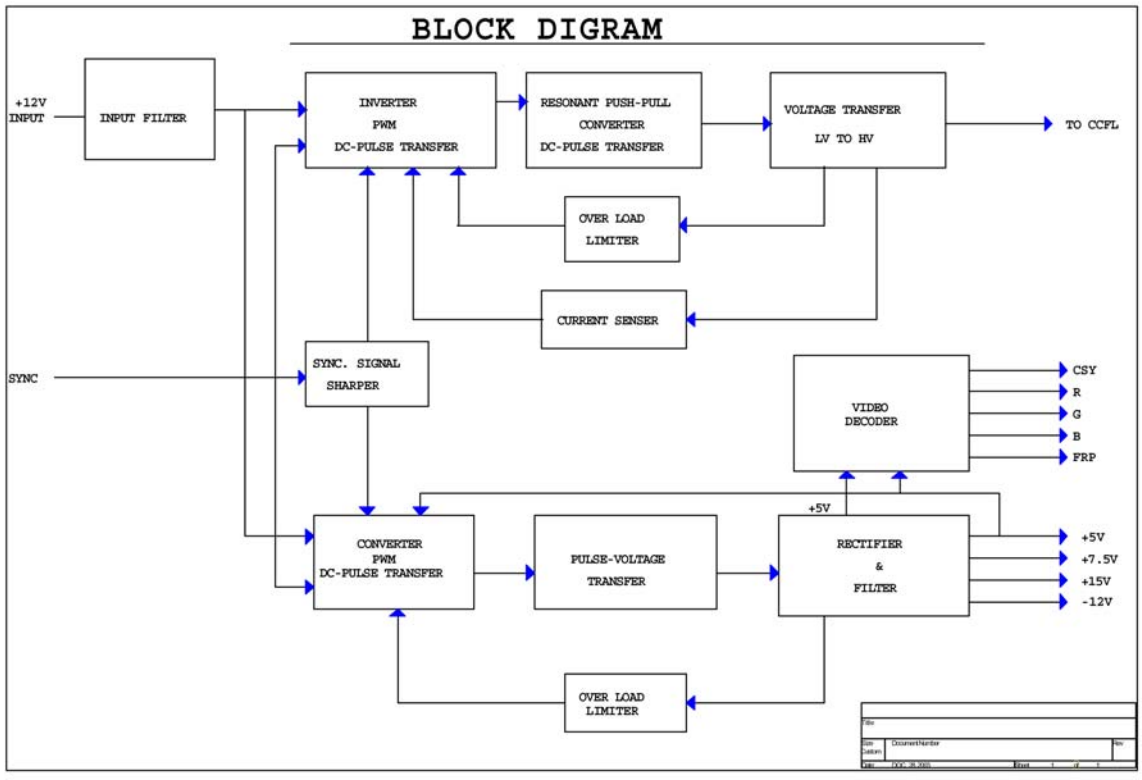
DC to DC Backlight Inverter:

Starting Voltage: 15.8VDC, typical at 6.0 VDC

Working Voltage: 16.0 VDC, typical at 15 VDC

Working Current: DC 10mA ± 20% typical for general application.

Block Diagram



Dimensional Outline