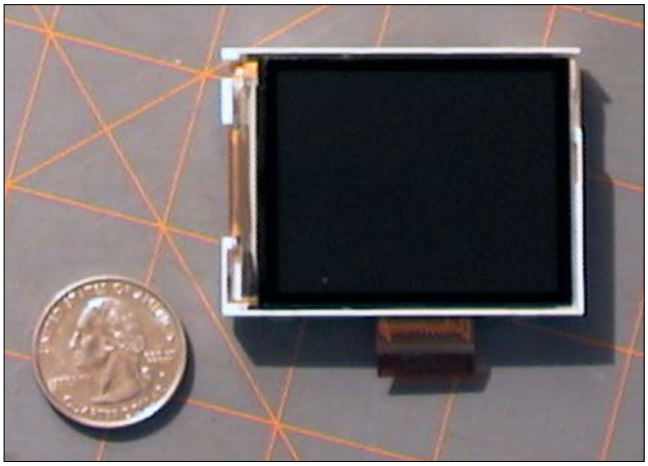
AND Displays



ANDpSi020TD-LED

2.0" Active color TFT LCD Module with Digital/Analog Interface

The ANDpSi020TD-LED is an 320 x 240 active matrix color TFT LCD Module with Digital and Analog Interface that utilizes new low temperature poly-silicon (p-Si) technology to provide brighter, thinner and lighter display with high resolution. Both of horizontal and vertical scan are reversible and controlled by the serial interface commands. The product is designed for the requirement of the green product, and the specification complies with Toppoly's "Green Product Chemical Substance Specification Standard Hand Book". All these features making it ideal for portable applications including personal digital assistants (PDAs), medical instruments and test & measurements instruments.

Features

- p-Si construction with drivers on glass
- High luminance
- Digital and Analog Interface
- NTSC and PAL format compatible
- 16 Million/Full Color
- Slim (2.53 mm) and lightweight design
- Transmissive type. FIxed current LED backlight
- **RoHS Compliant**

Mechanical Characteristics

Item	Specification	Unit
Display Size (diag.)	2.0	inch
Display Type	Transmissive	–
Active Area	40.672 (H) x 30.48 (V)	mm
Number of Dots	320 (H) x RGB x 240 (V)	dot
Dot Pitch	0.0635 (H) x 0.127 (V)	mm
Color Arrangement	RGB Delta	–
Color Numbers	16 Million/Full Color	–
Outline Dimensions	46.1(H) x 40.96(V) x 2.53* (D)	mm
Weight	8.5	g
Panel surface treatment	Hard Coating (3H)	–

* Exclude FPC and protrusions.

Absolute Maximum Ratings (GND=0V)

Item	Symbol	Min.	Max.	Unit
Logic Power Supply Voltage	V_{CC}	-0.5	4.5	V
Input Signal Voltage VD, HD, DCLK, DIN[0:7], SDA, SCL, SCEN, SHDB, GRESTB	V_{IN1}	0	VCC	V
Backlight Forward current	I_F	–	25	mA

Absolute Maximum Ratings (Cont.) (GND=0V)

Item	Symbol	Min.	Max.	Unit
Operating Temp.	Topr	-10	+60	ºC
Storage Temp.	Tstg	-30	+80	ºC

Electrical Characteristics (GND=0V, Ta = 25°C) Driving TFT LCD Panel

Item		Symbol	Min.	Typ.	Max.	Unit
Power Supply for H/V Driver		V_{CC}	2.85	3.0	3.6	V
Input Driver Voltage VD, HD, DCLK, DIN[0:7], SDA, SCL, SCEN, SHDB, GRESTB	Low	V_{IL}	GND	–	0.2 x V_{CC}*	V
	High	V_{IH}	0.8 x V_{CC}*	–	V_{CC}*	
PWM Output Voltage		V_{PWM}	0	–	V_{CC}*	V
Feedback Voltage		V_{FB}	0.55	0.6	0.65	V
Panel Power Consumption		Wp	–	50	60	mW

VCC*=VCC(TYP)
Note 1: The V_{CC} power is provided for overall panel module supply voltage.
Note 2: DC/DC feedback control voltage.

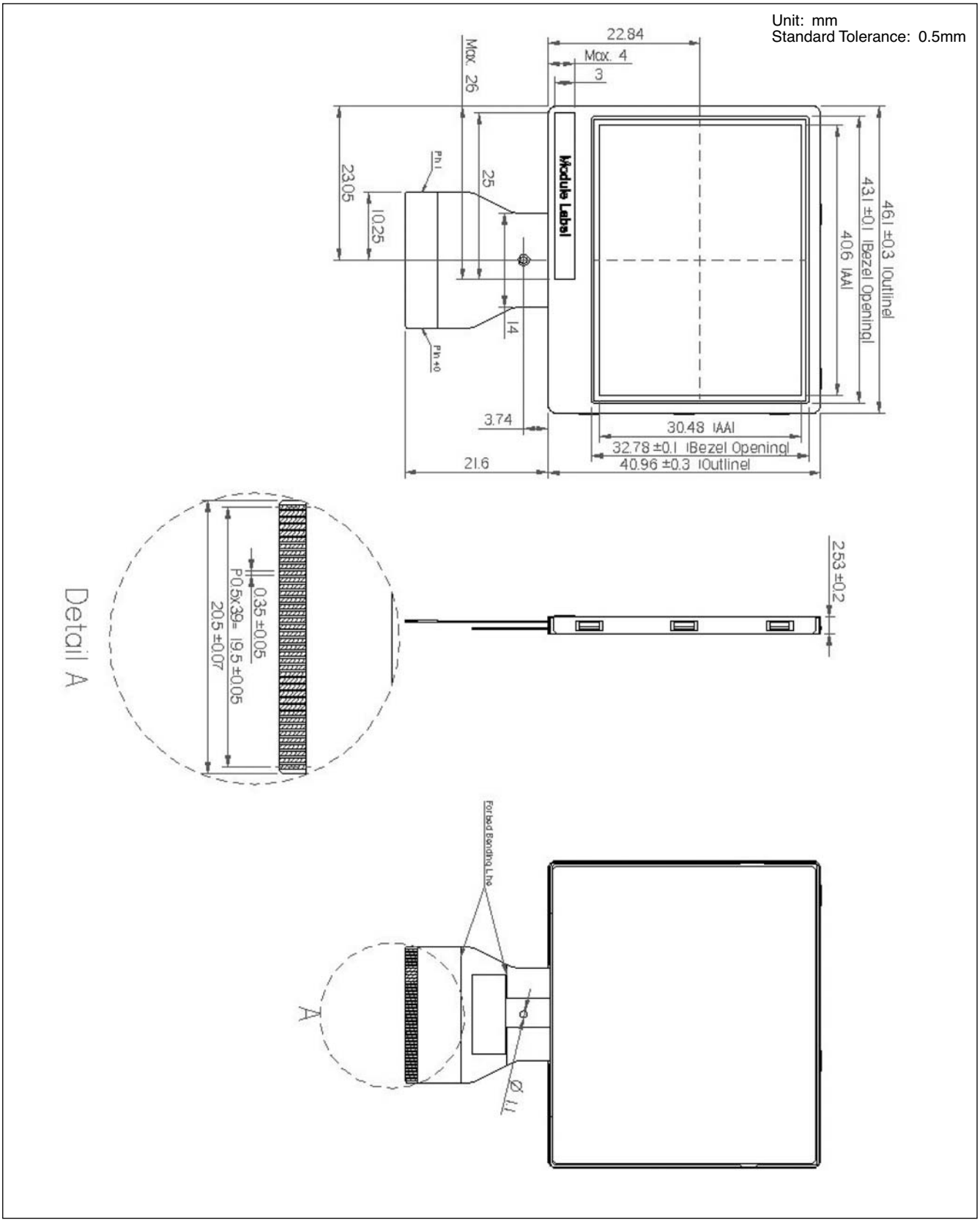
Driving Backlight in Standard Mode (Ta = 25°C)

Item	Symbol	Min.	Typ.	Max.	Unit
Forward Current	I_F	–	23	25	mA
Forward Current Volt.	V_F	–	3.4	3.6	V
Backlight Power Consumption*	W_{BL}	–	78.2	90	mW

* Backlight driving circuit is recommended as the fix current circuit

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.

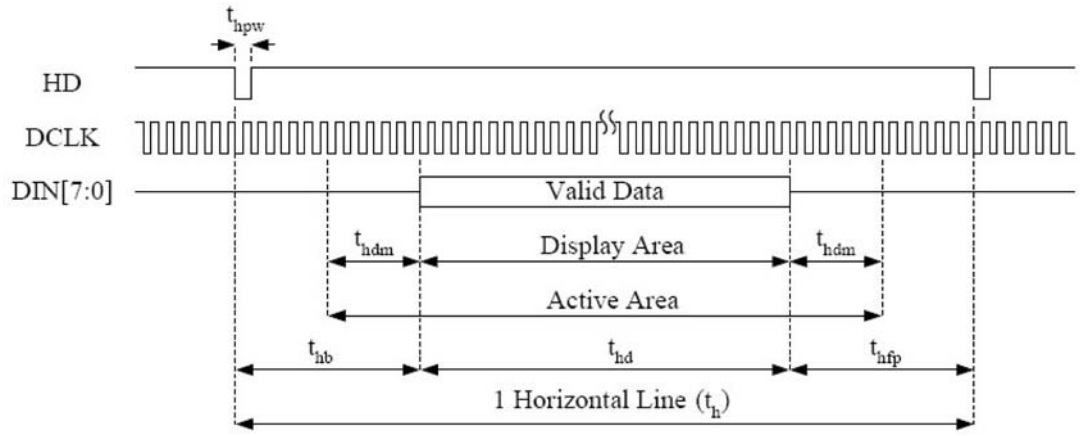
Dimensional Outline



Timing Chart
YUV Mode: ITUR601-NTSC

Item	Symbol	Min.	Typ.	Max.	Unit
Dot Clock Frequency	DCLK	–	27	–	MHz
Horizontal Display Active	Display Area	–	1440	–	DCLK
Horizontal Line	t_h	–	1716	–	DCLK
HSYNC PUlse Width	t_{hpw}	1	1	–	DCLK
Horizontal Back Porch	t_{hb}	–	240	–	DCLK
Horizontal Front Porch	t_{hfp}	–	36	–	DCLK
Horizontal Dummy Time	t_{hdm}	–	4	–	DCLK

Serial RGB Dummy Mode and Serial YUV 4:2:2 Mode: Horizontal



YUV Mode: ITUR601-PAL

Item	Symbol	Min.	Typ.	Max.	Unit
Dot Clock Frequency	DCLK	–	27	–	MHz
Horizontal Display Active	Display Area	–	1440	–	DCLK
Horizontal Line	t_h	–	1728	–	DCLK
HSYNC PUlse Width	t_{hpw}	1	1	–	DCLK
Horizontal Back Porch	t_{hb}	–	240	–	DCLK
Horizontal Front Porch	t_{hfp}	–	48	–	DCLK
Horizontal Dummy Time	t_{hdm}	–	4	–	DCLK

Timing Chart With Analog Interface

Item		Symbol	Min	Typ	Max	Unit
Dot Clock Frequency	QVGA	DCLK	–	25	–	MHz
	NTSC		–	24.54	–	
	PAL		–	24.38	–	
Horizontal Display Active		Display Area	–	1280	–	DCLK
Horizontal Line		t_h	–	1560	–	DCLK
HSYNC PUlse Width		t_{hpw}	–	1	–	DCLK
Horizontal Back Porch		t_{hb}	–	240	–	DCLK
Horizontal Front Porch		t_{hfp}	–	40	–	DCLK
Horizontal Dummy Time		t_{hdm}	–	4	–	DCLK

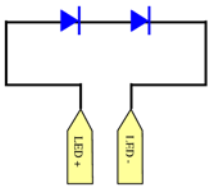
Optical Specification Ta=25°C

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Viewing Angle		θ11	CR ≥ 10	30	40	–	degree
		θ12		30	40	–	
		θ21		15	20	–	
		θ22		40	50	–	
Contrast Ratio		CR	θ = 0°	200	300	–	–
Response Time	Rising	Tr		–	13	20	ms
	Falling	Tf		–	22	30	
Luminance	I_F=23mA	L		200	250	–	cd/m^2
Chromaticity	White	x_w		0.26	0.31	0.36	–
		y_w		0.29	0.34	0.39	

Input/Output Terminals

TFT LCD Panel - Recommended connector Molex 51374-4073

Pin	Symbol	Input/Output	Description
1	CP3	C	Capacitor for power setting
2	CP4	C	Capacitor for power setting
3	CP5	C	Capacitor for charge pump
4	CP6	C	Capacitor for charge pump
5	CP7	C	Capacitor for charge pump
6	CP8	C	Capacitor for charge pump
7	DUMMY	–	Dummy
8	DUMMY	–	Dummy
9	PCD	C	Capacitor for pre-charge data signal high
10	VCOML	C	Capacitor for VCOM low
11	VCOMH	C	Capacitor for VCOM high
12	AGND	–	Analog ground
13	DUMMY	–	Dummy
14	AVDD	C	Regulation capacitor for analog voltage
15	CP1	C	Capacitor for charge pump
16	CP2	C	Capacitor for charge pump
17	PWM	O	Power transistor gate signal for the boost converter
18	FB	I	Main boost regulator feedback input
19	LED-	–	LED power: cathode; Note 1 below
20	DUMMY	–	Dummy
21	DUMMY	–	Dummy
22	LED+	–	LED power: anode; Note 1 below
23	GND	–	Ground
24	VCC	–	Power supply for digital circuit and charge pump circuit
25	VSYNC	I	Vertical sync input. Negative polarity
26	HSYNC	I	Horizontal syn input. Negative polarity
27	DCLK	I	Clock signal, latch data onto line latches at the rising edge
28	DIN0	I	Data input
29	DIN1	I	Data input
30	DIN2	I	Data input
31	DIN3	I	Data input
32	DIN4	I	Data input
33	DIN5	I	Data input
34	DIN6	I	Data input
35	DIN7	I	Data input
36	SDA	I/O	Serial interface data line
37	SCL	I	Serial interface clock line
38	SCEN	I	Serial interface chip enable line
39	SHDB	I	Shutdown input
40	GREST	I	System reset pin



Note 1: The figure to the left shows the connection of backlight LED.