

AND1013ST-30/-EO

160 x 128 Dots

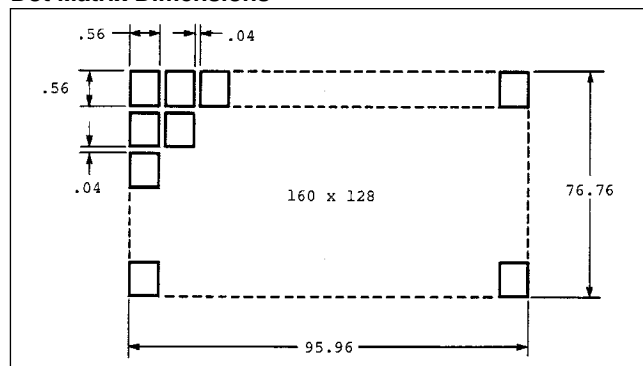
Intelligent Graphics Display

The AND1013ST-30/-EO devices are compact, full dot matrix, LCD modules that have an on-board LCD controller (T6963C) and display memory (RAM). The AND1013ST-30 /EO can display TEXT information, numerals, letters and symbols, as well as GRAPHIC patterns. These devices are suitable for medical and measurement equipment, point-of-sale terminals, portable equipment, and marine instrumentation.

Features

- Super twisted, transfective, gray mode
- RoHS Compliant
- 20 characters x 16 line capability
- 160 x 128 dot graphic display
- Excellent readability and high-contrast ratio
- Built-in LCD controller (T6963C)
- Wide operating temperature range (0° to 50°C)
- Available with EL backlighting (-EO option) or fiberoptic backlight

Dot Matrix Dimensions



Mechanical Characteristics

Item	Specification	Unit
Outline Dimensions	129.0 (W) x 104.5 (H) x 14.0 Max (D)	mm
Number of Dots	160 x 128 dots	
# of Characters	20 x 16 (320), 8 x 8 font	
Viewing Area	101.0 (W) x 82.0 (H)	mm
Bezel Opening	101.0 (W) x 82.0 (H)	mm
Dot Size	0.56 (W) x 0.56 (H)	mm
Dot Pitch	0.60 (W) x 0.60 (H)	mm
Weight (approx.)	150	gram

Absolute Maximum Ratings

Item	Symbol	Rating	Unit
Supply Voltage	V_{DD}	7.0	V
	V_{EE}	24	
	V_{EL}	130 (EO)	V_{rms}
Input Voltage	V_{IN}	$GND \leq V_{IN} \leq V_{DD}$	V
Operating Temperature	T_{op}	0 to +50	°C
Storage Temperature	T_{stg}	-10 to +60	°C

Electrical Characteristics (TA = 25°C)

Item	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	V_{DD}	4.75	5.0	5.25	V
	V_{EE}	11.7	12.4	12.8	
High Level In Voltage ($V_{DD} = 5.0V$)	V_{IH}	$V_{DD} - 2.2$	—	V_{DD}	V
Low Level In Voltage ($V_{DD} = 5.0V$)	V_{IL}	—	—	0.5	
High Level Output Volt. ($V_{DD} = 5.0V$)	V_{OH}	$V_{DD} - 0.3$	—	—	V
Low Level Output Volt. ($V_{DD} = 5.0V$)	V_{OL}	—	—	0.3	V
Power Consumption ⁽¹⁾	I_{DD}	—	—	10.0	mA
	I_{EE}	—	—	2.0	
	I_{EL}	—	—	15	(2)

1. All dots on. ($V_{DD} = .5V$, $V_{EE} = -8.5V$, $V_{EL} = 110$, $f_{EL} = 500$ Hz or at Typ.)

2. mA rms

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.



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Optical Characteristics (TA = 25°C, $\phi = 0^\circ$, $\theta = 0$)

Item	Symbol	Min.	Typ.	Max.	Unit
Viewing Angle	Right to Left	–	80	–	degree
	Up & Down	–	55	–	
Contrast	K	2.5	3.8	–	–
Turn On	T _{on}	–	200	350	ms
Turn Off	T _{off}	–	250	350	ms

Note: Refer to Applications Section for definitions of viewing angle, contrast ratio, response time (on and off) and luminance.

Connector Pin Assignment

Pin No.	Signal	Function
1	FGND	Frame Ground (connected to metal bezel)
2	GND	Ground (signal)
3	V _{DD}	Power Supply for logic (5V)
4	V _{EE}	Power Supply for LCD Drive
5	WR	Data Write
6	RD	Data Read
7	CE	Chip Enable
8	C/D	WR = "L", C/D = "H": Command Write WR = "L", C/D = "L": Data Write RD = "L", C/D = "H": Status Read RD = "L", C/D = "L": Data Read
9	NC	No connection
10	RESET	Controller Reset
11	D0	Data Input/Output
12	D1	Data Input/Output
13	D2	Data Input/Output
14	D3	Data Input/Output
15	D4	Data Input/Output
16	D5	Data Input/Output
17	D6	Data Input/Output
18	D7	Data Input/Output
19	NC	No connection
20	NC	No connection

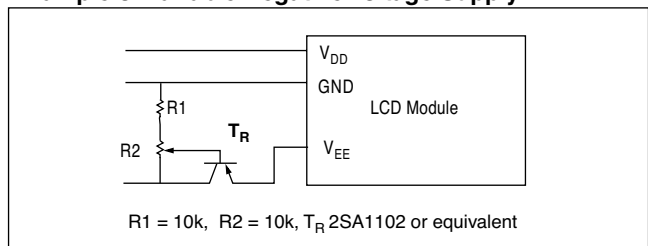
Power Supply

The LCD panel is driven by the voltage V_{DD}–V_{EE}, so an adjustable V_{EE} is required for contrast control and temperature compensation.

Temperature Variations

Temperature	V _{DD} –V _{EE}
0°C	14.1
+25°C	13.0
+50°C	11.1

Example of Variable Negative Voltage Supply

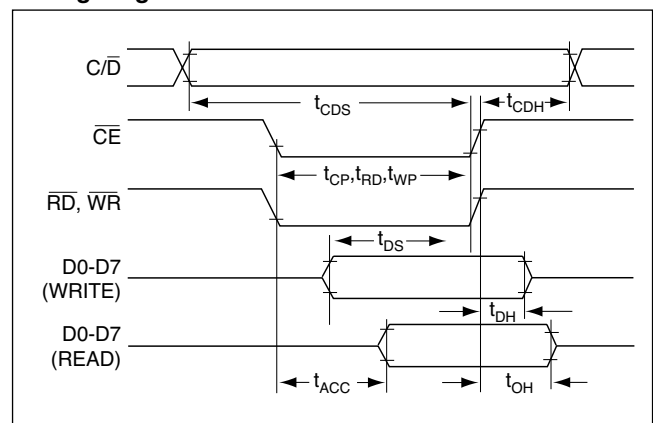


Timing Relationships and Diagram

Signal Timing Relationships

Item	Symbol	Min.	Max.	Unit
C/D Set Up Time	t _{CDS}	100	–	ns
C/D Hold Time	t _{CDH}	10	–	
CE, RD, WR Pulse Width	t _{CE} , t _{RD} , t _{WR}	80	–	
Data Set Up Time	t _{DS}	80	–	
Data Hold Time	t _{DH}	40	–	
Access Time	t _{ACC}	–	150	
Output Hold Time	t _{OH}	10	50	

Timing Diagram





The diagram shows the T6963C LCD controller interfaced to RAM and an LCD display. The T6963C has several control inputs: \overline{WR} , \overline{RD} , \overline{CE} , $\overline{C/D}$, \overline{RESET} , and \overline{HALT} . It has an 8-bit data bus (D0-D7) connected to RAM. The RAM has an 8-bit data bus (I/O0-I/O7), a 12-bit address bus (A0-A11), and control signals $\overline{R/\overline{W}}$ and $\overline{CE1}$. The T6963C also has control signals HSCP, FR, LP, and CDATA. The LCD display is driven by two 80-bit X-Driver outputs and two 64-bit Y-Driver outputs. The X-Driver outputs are connected to the LCD, and the Y-Driver outputs are connected to the LCD. The LCD is a 640x480 pixel display.

Because signal lines are directly connected to C-MOS and are not pull-up or pull-down internally, except RESET which is pull-up to V_{DD} , you must guard all signals from external noise.

Unit mm

129±0.5
122±0.3
116.5±0.5
101±0.3(Bezel Opening)
95.96±0.3(Active Area)

3.5±0.5
0.5±0.5
7.75±0.5
10.83±0.5

104.5±0.5
97.5±0.3
96.5±0.5
82±0.3(Bezel Opening)
76.8±0.3(Active Area)

3.5±0.5
5±0.5
10.5±0.5
13.02±0.5

2±0.3
6±0.3
5±0.3
16.15±0.3
67.14±0.3

Pin 2
Pin 1

2.54±0.3
2.54±0.3

4-φ3.5

14 MAX

7±0.5
1.6±0.3