



# AND1391ST/-EO

## 128 x 128 Dots

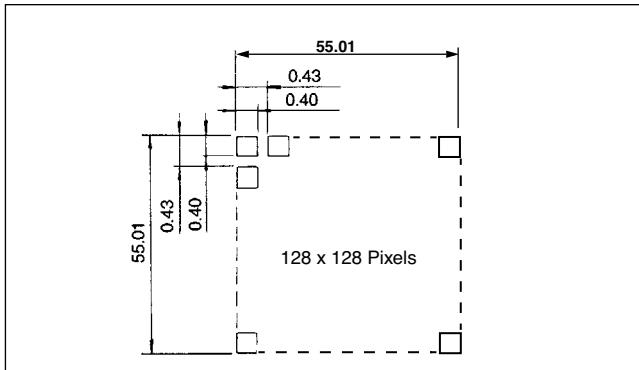
### Intelligent Graphics Display

The AND1391ST/-EO is a full dot matrix LCD module including an LCD controller and display RAM. This device can display graphic patterns and symbols and is suitable for a message display for various instruments such as business machine terminals.

#### Features

- Full dot-matrix structure with 128 dots x 128 dots
- 1/128 Duty, 1/12 bias
- STN LCD, positive, gray
- Transflective LCD
- 6 o'clock viewing angle
- 8 bits parallel data input, w/controller IC T5953C, QFP type
- Built-in EL backlight

#### Dot Matrix Dimensions



#### Mechanical Characteristics

Item	Specification	Unit
Outline Dimensions	85.0 H x 100.0 V x 14.5 D	mm
Number of Dots	128 H x 128 V	
# of Characters	16 x 16 (256) Characters 8 x 8 dot format, alpha-numeric	
Viewing Area	62.0 H x 62.0 V	mm
Active Area	55.01 H x 55.01 V	mm
Dot Size	0.40 H x 0.40 V	mm
Dot Pitch	0.43 H x 0.43 V	mm
Weight (approx.)	100	gram

#### Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit
Power Supply Voltage	$V_{DD}$	0	7.0	V
LCD Drive Supply Voltage	$V_{DD} - V_{EE}$	-	25	V
Input Voltage	$V_{IN}$	-0.3	$V_{DD} + 0.3$	V
Operating Temp.	$T_{op}$	-20	70	°C
Storage Temperature	$T_{stg}$	-30	80	°C
Humidity	$H_D$	-	90	%RH

#### Electrical Characteristics (TA = 25°C)

Item	Symbol	Min.	Typ.	Max.	Unit
Logic Supply Voltage	$V_{DD}$	4.5	5.0	5.5	V
"H" Input Voltage	$V_{IH}$	$V_{DD} - 2.2$	-	$V_{DD}$	V
"L" Input Voltage	$V_{IL}$	0	-	0.8	V
"H" Output Voltage	$V_{OH}$	$V_{DD} - 0.3$	-	$V_{DD}$	V
"L" Output Voltage	$V_{OL}$	0	-	0.3	V
Supply Current	$I_{DD}$	-	12.1	14.0	mA
LC D Driving Voltage ( $V_{DD} - V_O$ )	$V_{O-P}$	-	17.3	19.1	V

Note:  $V_{DD} = +5V \pm 10\%$ ,  $V_{SS} = +0V$ ,  $T_A = 25^\circ C$

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.



# AND1391ST/-EO Intelligent Graphics Display

## Optical Characteristics (TA = 25°C, φ = 0°, θ = 0)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Viewing Angle	θ	C≥2.0, φ=0°	-40	-	-	degree
Contrast	C	θ=5°, φ=0°	-	3	-	-
Response Time (rise)	T <sub>r</sub>	θ=5°, φ=0°	-	280	420	ms
Response Time (fall)	T <sub>f</sub>	θ=5°, φ=0°	-	250	375	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	V <sub>SS</sub>	Power Supply (V <sub>SS</sub> =0)
3	V <sub>DD</sub>	Power Supply (V <sub>DD</sub> >V <sub>SS</sub> )
4	V <sub>O</sub>	Operating Voltage for LCD
5	$\overline{WR}$	Data Write (write data to the module at "L")
6	$\overline{RD}$	Data Read (read data from the module at "L")
7	$\overline{CE}$	Chip Enable for the modul (active at "L")
8	C/ $\overline{D}$	$\overline{WR}$ = "L"; C/ $\overline{D}$ = "H": Command Write, C/ $\overline{D}$ = "L": Data Write $\overline{RD}$ = "L", C/ $\overline{D}$ = "H": Command Read C/ $\overline{D}$ = "L": Data Read
9	NC	No connection
10	$\overline{RESET}$	Controller Reset (module reset)
11	D0	Data Input/Output (D0=MSB)
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 (D7=LSB)
19	FS	Font select. Open or connect to V <sub>DD</sub> : 6 x 8 dot font Connect t o V <sub>SS</sub> : 8 x 8 dot
20	NC	No connection

## Power Supply

The LCD panel is driven by the voltage V<sub>DD</sub>-V<sub>EE</sub>, so an adjustable V<sub>EE</sub> is required for contrast control and temperature compensation.

## Temperature Variations

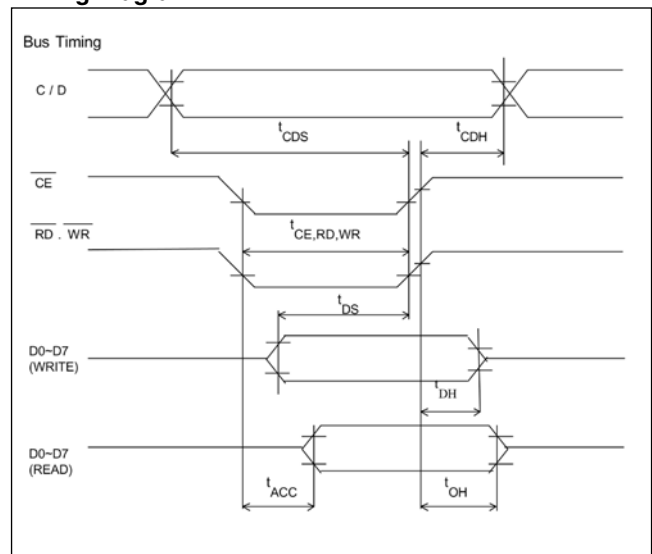
Temperature	V <sub>DD</sub> -V <sub>EE</sub> (EO option)
0°C	14.1
+25°C	13.0
+50°C	11.1

## Timing Relationships and Diagram

### Signal Timing Relationships

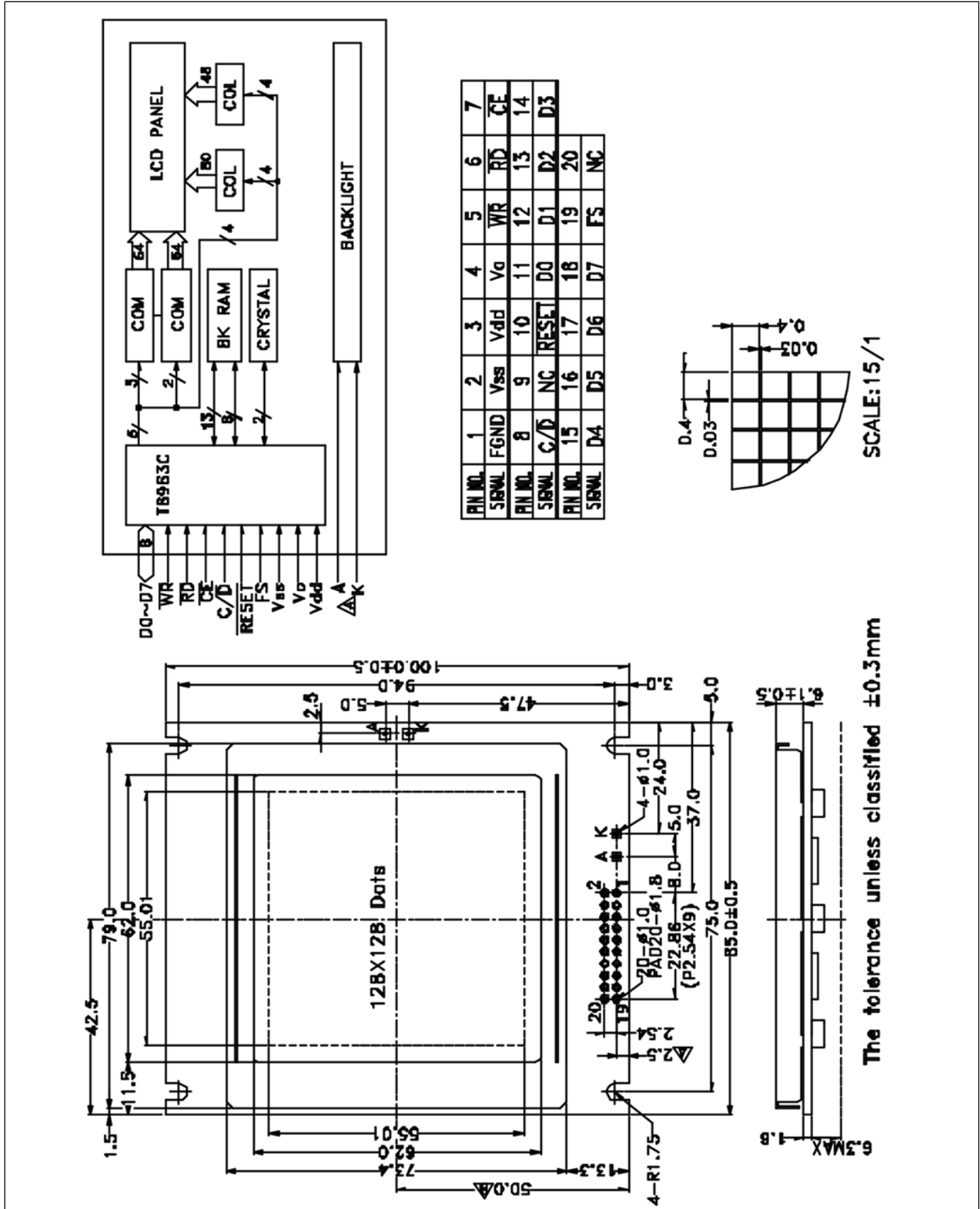
Item	Symbol	Min.	Max.	Unit
C/D Set-Up Time	t <sub>CDS</sub>	100	-	ns
C/D Hold Time	t <sub>CDH</sub>	10	-	
$\overline{CE}$ , $\overline{RD}$ , $\overline{WR}$ Pulse Width	t <sub>CE</sub> , t <sub>RD</sub> , t <sub>WR</sub>	80	-	
Data Set-Up Time	t <sub>DS</sub>	80	-	
Data Hold Time	t <sub>DH</sub>	40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

### Timing Diagram





Block Diagram





### Backlight Characteristics

#### Maximum Ratings

Item	Symbol	Max.	Unit
Supply voltage	Vmax	170	Vrms
Supply frequency	Fmax	1000	Hz
Operating Temperature	Topr	-35~+50	°C
Operating humidity	Hopr	90	%RH
Storage temperature	Tstg	-40~+60	°C
Storage humidity	Hstg	70	%RH

#### Using Specification

Item	Specification	Unit
Operating voltage	110	Vrms
Frequency	400	Hz

### Electrical Characteristics

Item	Condition	Unit	Min.	Typ.	Max.
Initiate Intensity	(sine wave)	cd/m <sup>2</sup>	48	60	-
CIE color coordinate	X	VAC 110	-	0.3127	-
	Y	Vrms	-	0.4072	-
Current density	Freq 400	mA/cm <sup>2</sup>	-	0.14	-
Power density	Hz	mW/cm <sup>2</sup>	-	2.97	-
Color	-	-	-	White	-