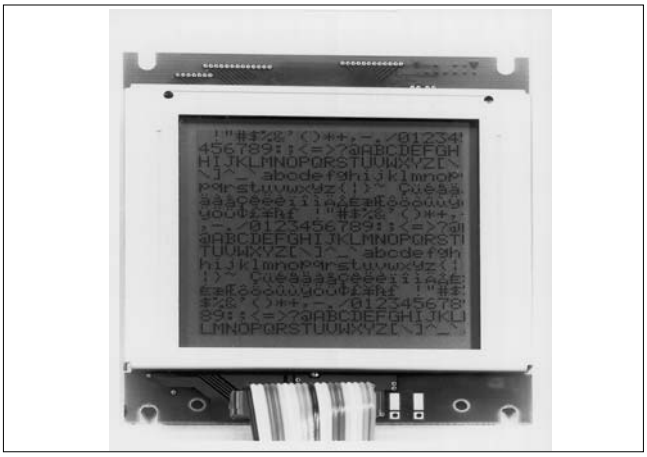


AND1391ST-EO

128 x 128 Dots
Intelligent Graphics Display

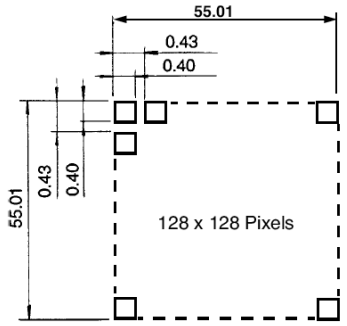
The AND1391ST-EO is a full dot matrix LCD module including an LCD controller and display RAM. This device can display graphic patterns and symbols and is suitable for a message display for various instruments such as business machine terminals.

Features

• RoHS Compliant

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

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 55.01V	mm
Dot Size	0.40 H x 0.40 V	mm
Dot Pitch	0.43 H x 0.43 V	mm
Weight (approx.)	82	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}	5.3	25	**V**
Input Voltage	V_{IN}	-0.3	V_{DD}+0.3	V
Operating Temp.	T_{op}	0	50	°C
Storage Temperature	T_{stg}	-20	70	˚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}	–	7.0	14.0	mA
LC D Driving Voltage (V_{DD} - V_O)	V_{O-P}	–	18.5	–	V

Note: V_{DD} = +5V ± 10%, V_{SS} = +0V, T_A = 25°C

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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.

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°	5	7	–	–
Response Time (rise)	T_r	θ=5°, ϕ=0°	–	150	–	ms
Response Time (fall)	T_f	θ=5°, ϕ=0°	–	300	–	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_{SS}	Power Supply (V_{SS}=0)
3	V_{DD}	Power Supply (V_{DD}>V_{SS})
4	V_O	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_{DD}: 6 x 8 dot font Connect t o V_{SS}: 8 x 8 dot
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

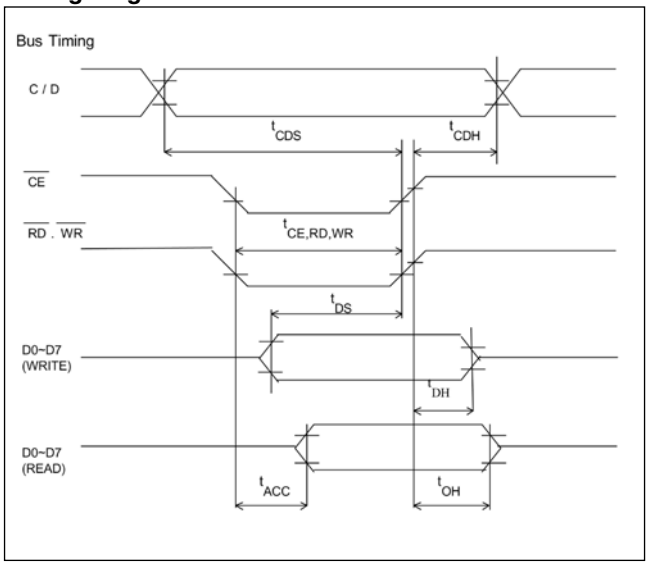
Temperature	V_{DD}–V_{EE} (EO option)
0°C	14.1
+25°C	13.0
+50°C	11.1

Timing Relationships and Diagram

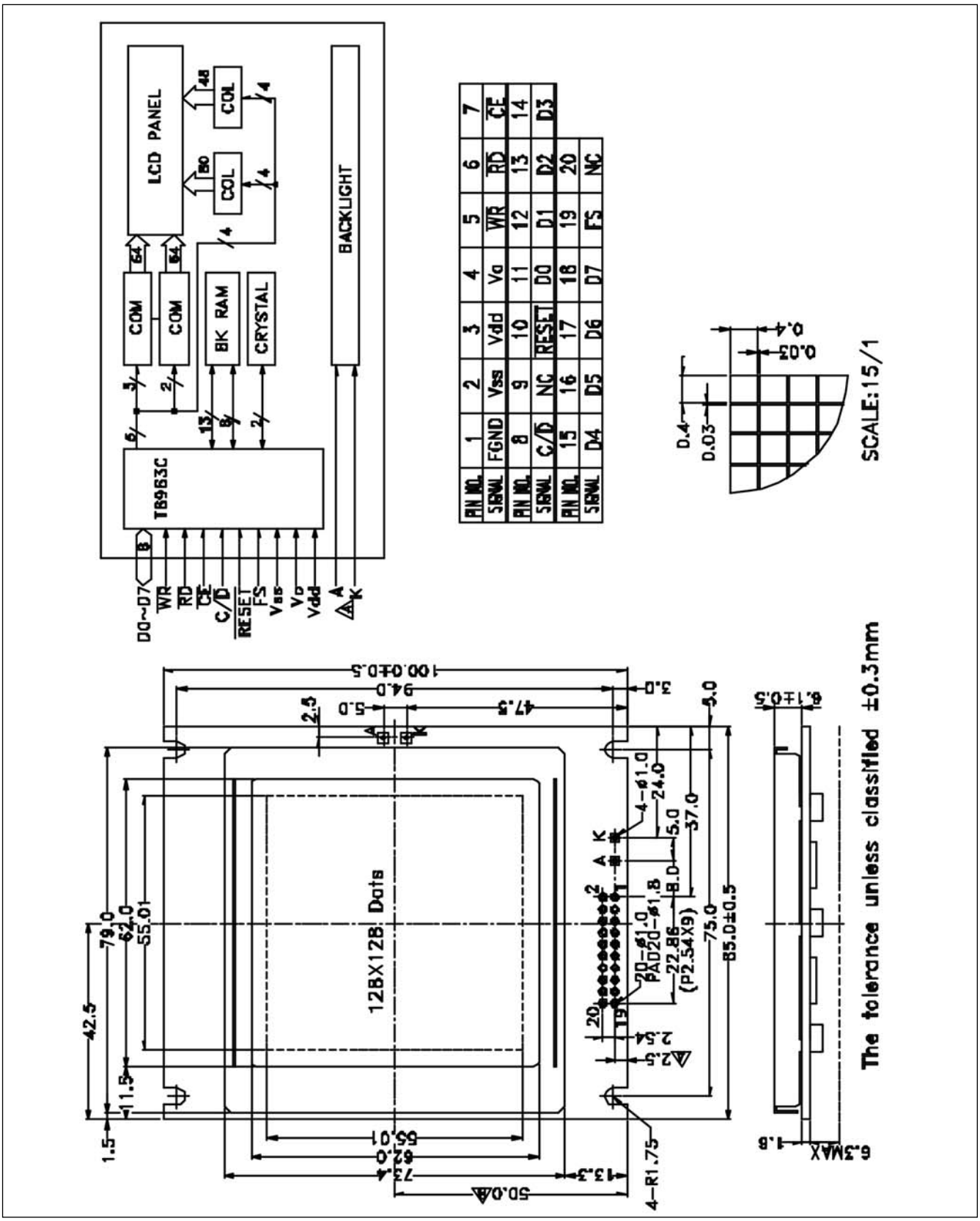
Signal Timing Relationships

Item	Symbol	Min.	Max.	Unit
C/D Set-Up Time	t_{CDS}	100	–	ns
C/D Hold Time	t_{CDH}	10	–	
$\overline{CE}$, $\overline{RD}$, $\overline{WR}$ 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



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^2	48	60	–
CIE color coordinate	X	VAC 110	–	–	0.3127	–
	Y	Vrms	–	–	0.4072	–
Current density		Freq 400	mA/cm^2	–	0.14	–
Power density		Hz	mW/cm^2	–	2.97	–
Color		–	–	–	White	–