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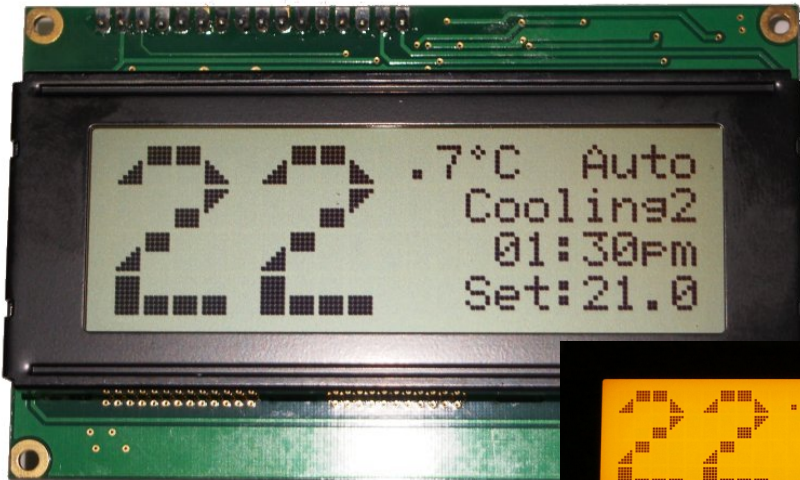
**Embedded
Digital
Technology**



EcoLCD 20X4 Serial 20x4 Character LCD Module

Features

- ◆ 20 character by 4 line sunlight viewable FSTN amber backlit LCD
- ◆ Super low profile flush surface-mounted module (4mm max)
- ◆ **Auto serial interface polarity** – RS-232 or logic levels up to 115Kbaud
- ◆ I2C serial interface, PLC message pulse input, counter modes
- ◆ Jumperless configuration – user defaults in EEPROM
- ◆ Popular industry compatible emulation modes and superset
- ◆ Vertical or Horizontal bargraph modes
- ◆ Push-button contrast control (also serially controlled)
- ◆ User programmable contrast, back-light, bell duration, splash screen
- ◆ +5V Buzzer output with programmable BELL duration
- ◆ +5V operation with soft-start backlight
- ◆ IDC 10-way Industry compatible connector inc. 3-pin basic mode
- ◆ PicKit programming interface



Overview

Character LCD modules are widely used in the industry for decades now but unfortunately the standard parallel LCD interface is not well suited to modern CPU systems where parallel I/O is eschewed in favor of simpler serial interfaces. Besides, a parallel interface requires bulky and noise sensitive cables and connectors.

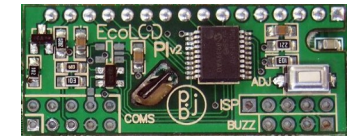
The EcoLCD backpack module is integrated with a 20x4 line LCD as a single wire serial interface for the host CPU hardware. Because the LCD driver software is built-in the host CPU can treat the LCD as a standard ASCII character device that responds to control characters. Other than a +5V power supply and the single serial input no other control lines are required.

As the EcoLCD's command set and connector is a superset of a popular serial LCD it is ready as a superior drop-in replacement and as such offers many additional, convenient, and powerful features.

Description

SERIAL INPUT

The serial input is typically driven from RS-232 signals where the line idles at 2.5V or more. Baud rates are programmable from 1200 to 115200 baud (9600 baud default). No handshaking is required and the unit can be driven from a single RS-232 transmit line (2-wire mode). Auto polarity sense is used so that RS-232 or non-inverted logic signals may be used without configuring. The serial input may also be programmed to accept device selection codes to permit operation of multiple displays on the one serial port. In addition to asynchronous serial input the module can also connect to an I2C bus as a slave device at address \$7A.



Backpack module (actual size)

CONTRAST

The contrast is software controlled, by pressing the ADJ button it will cycle through the contrast settings. The setting will be retained between power-ups. Alternatively a command sequence can adjust the contrast in like manner.

BELL

An optional piezo-buzzer can be driven from the EcoLCD and is operated by the BELL character code 0x07 for a default period of 100ms which may be modified by the DURATION command. The buzzer may be driven in source or sink mode as the polarity is automatically detected.

POWER

The EcoLCD draws approximately 12ma @5V when the backlight is turned off. The backlight brightness can be adjusted by a command sequence to vary from off to full brightness (250ma) in 32 steps.



SERIAL CONTROL CODES				
H	C		NAME	DESCRIPTION
0	@		NULL	(ignored)
1	A		HOME	Display Home (top left, does not clear screen)
2	B		BIG	Start BIG digits (drawn from the current character position from the top)
3	C		NORMAL	End BIG digits
4	D		HIDE	Hide the cursor
5	E		UNDERLINE	Show underline cursor
6	F		BLINK	Show blinking cursor
7	G		BELL	Pulse the bell output for selected duration (auto-polarity)
8	H		BACKSPACE	Backspace (stops at leftmost column)
9	I		TAB	Horizontal tab to next column of 8
0A	J		LF	Move down one line (wraps)
0B	K		UP	Move up one line
0C	L		CLD	Clear the screen and return home
0D	M		CR	Move to the leftmost column of the current line
0E	N		LIGHT	Backlight ON
0F	O		DARK	Backlight OFF
10	P		CURSOR	Move the cursor to the position given in the next character (+64)
11	Q		NULL	
12	R		RIGHT	Display text following parameter as right justified. (n,text,<cr>)
13	S		CLRLINE	Clear current line and return to start of line
14	T	n	BRIGHT	Set the backlight brightness from 0 to 16 @..P (brightest)
15	U		DISPLAY	Turn the display on (visible)
16	V		BLANK	Turn the display off (hide)
17	W	n	CONTRAST	Accept the next 5-bit character and set the contrast "+" or "-" will increase or decrease the current setting.
18	X	n	DURATION	Accept the next 8-bit character as the current bell duration in 10ms increments. Range 0..2.55sec. Power-up defaults to 10 (100ms).
19	Y	n	BAUD	Set baud rate 0 to 15 (see baud rates)
1A	Z		RESET	Reset as in a power-up and select
1B	[		ESCAPE	Begin special instruction
1B	[	D n [8]	CUSTOM	Define custom 5x8 CG character (0-7) D n B0 B1 B2 B3 B4 B5 B6 B7
1B	[	E 1	PRESET	Use preset characters for BIG digits

1B	[!	BACKUP	Backup the current user settings into EEPROM
1B	[@	DEFAULTS	
1B	[?	REPORT	
1B	[+	UNLOCK	
1C	\	LCD DATA	Write the next binary character directly to the LCD data register
1D	]	LCD CONTROL	Write the next binary character directly to the LCD control register
1E	^	EEADDR	Use the next binary character as the EEPROM address pointer
1F	-	EEDATA	Write the next binary character to the current EEPROM location and increment the pointer . Use this to change Splash message.
F0		DESEL	Deselect all units
F1		SEL1	Select unit 1
Fx		SELx	Select unit x (1..0E)
FF		SELALL	Select all units
1B	[# n	ENUM	Enumerate this display as one of 8 display 1-8
		<BREAK>	RESET

[illegible]

CONNECTIONS

INTERACE CONNECTOR			
TOP		BOTTOM	
PIN	NAME	PIN	NAME
1	VCC	2	NC
3	GND	4	SCL
5	RXD	6	TXD
7	GND	8	SDA
9	VCC	10	NC

BUZZER	
PIN	NAME
1	BUZZER-
2	GND
3	ADJ
4	VCC

PROGRAMMING	
PIN	NAME
1	VPP
2	VCC
3	GND
4	ICSPDAT/BUZZER-
5	ICSPCLK/ADJ