

SERDISP-4002

Serial Display module (40 characters x 2 lines) alphanumeric.

Designed for embedding into products manufactured by third-parties, the SERDISP-4002 Serial Display module is a 40 character by 2 line LCD display mounted to a carrier PCB with processing electronics. The on board electronics receives commands in either RS232 or TTL level serial communications and displays the required text.

- **Large 40 character x 2 line display.**
Character size 3.2 x 5.55mm.
- **LED Backlight with Software control.**
- **Serial RS232 or TTL Communications, 9600 Baud.**
- **Supply voltage from 5.5-12V dc.**



Description.

The SERDISP-4002 receives serial commands in simple ASCII strings allowing the unit to be connect to any basic TTY terminal or processing device with a serial port. Commands are sent to the display via the RS232 input line, or the TTL serial input line. Any status information is received from the unit on the RS232 and TTL serial output line.

A simply command set allows alphanumeric text and control functions to be quickly sent. Additionally a free to use PC application program is provided to allow quick use and set up of various unit parameters.

ABSOLUTE MAXIMUM RATINGS (1)

V+ to GND	-0.3V to 15V
RX TTL Inputs to GND	-0.3V to 5.3V
Operating Current Backlight off.....	16mA
Operating Current Backlight on 100%	64mA
Operating Temperature Range	-20° C to 70°C

NOTE: (1) Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. Exposure to absolute maximum conditions for extended periods may affect unit reliability.

Connector Pin Description

Interface is via 4 line connection and RS232 DB9 connector. Table 1. describes the pin connections to the unit.

Pin.	Label.	Description.
1	V+	System power, +5.5V to 12V DC input.
2	V-	System ground. Connect to power supply's ground (GND) terminal.
3	TX TTL	Uart Tx (TTL levels only) (1) Command responses from the unit are received on this line.
4	RX TTL	Uart Rx (TTL levels only) (1) Commands to the unit are sent on this line.

Table 1. 4 line interface.

NOTE: (1) These serial lines have voltage ranges at standard TTL level. Care must be taken to ensure that voltages outside the range of -0.3V to 5.3V are not applied to these lines. If a RS232 interface is required then J2 should be used.

Connector J2, RS232 signal port lines are described in Table 2.

Pin.	Description.
2	TX RS232 output. Command responses from the unit are received on this line.
3	RX RS232 input. Commands to the unit are sent on this line.
5	Signal Ground line.

Table 2. J2 connector interface. RS232 signal port.

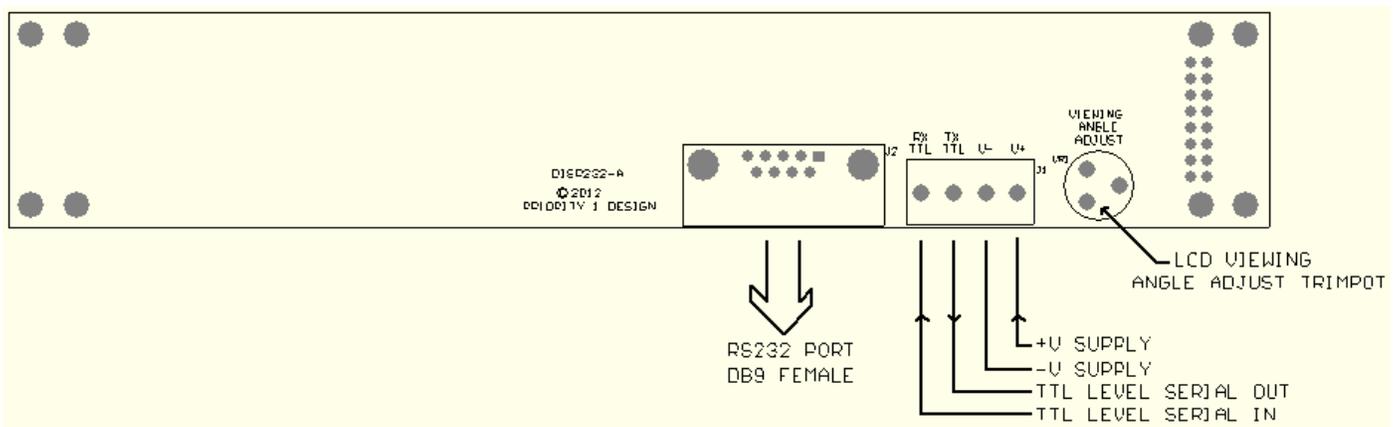


Figure 1. Unit connection overlay

SERDISP-4002 command description.

Various commands and parameter data are sent to the SERDISP-4002 via the RX line on the interface connector J1 (TTL level uart), or J2 (RS232 level signals). Commands sent to the unit consist of simple ASCII strings terminated with a carriage return. The unit will then process the command and respond by transmitting data or status information on the TX line on the interface connector J1 (TTL level uart), or J2 (RS232 level signals).

If the command is misunderstood, a status code is sent back. See **Error Codes and Status Description**.

Additionally the SERDISP-4002 features the following commands as summarized in Table 3. Unit command summary.

Command Description	Serial Command Code.
DISPLAY TEXT	Dx:<data><crn>
DISPLAY AT CURSOR	DAC:<data><crn>
CLEAR SCREEN	CL:<crn>
LOCATE CURSOR IN LINE, POSITION:0	L1x:<crn>
SET CURSOR LOCATION	SCx:<position><crn>
SET DEFAULT CURSOR TYPE	CT:x<crn>
SET DEFAULT BACKLIGHT INTENSITY	DB:x<crn>
SET CURRENT BACKLIGHT INTENSITY	SB:x<crn>
SET SPLASH SCREEN DATA	SSx:<data><crn>
SET DEFAULT SPLASH SCREEN OPTIONS	ST:x<crn>

Table 3. Unit Command Summary.

Display text command.

This command is used to send alphanumeric characters to the display in a particular line. Characters are displayed from left most position on the line (position 0). Up to 40 characters may be sent for this command. When less than the maximum allowed characters are sent the unit automatically adds space characters to the end of data in order to clear the displayed line of any previous characters shown.

Protocol: **Dx:<data><crn>** ,where x = line number where text is to be displayed (1,2)
, <data> is the alphanumeric data required to be displayed.
A maximum of 40 characters is allowed.
, <crn> is \$0D carriage return.

Command Protocol Example	Response.	Description.
D1:Hello world.<crn>	OK<crn>	“Hello world” is displayed on line 1.
D2:This is me<crn>	OK<crn>	“This is me” is displayed on line 2.

Display at cursor.

This command is used to send alphanumeric characters to the display at the current cursor position.). Up to 40 characters may be sent for this command.

Protocol: **DAC:< data><crn>** where <data> is the alphanumeric data required to be displayed.
A maximum of 40 characters is allowed.
, <crn> is \$0D carriage return.

Command Protocol Example	Response.	Description.
DAC: and me too!<crn>	OK<crn>	“This is me and me too!” is displayed on line 2.

This example assumes that the previous command sent was “D2: This is me.<crn>” as shown in the display text command, and also that the cursor is located at position 10 before the DAC command is issued.

Clear Screen command.

This command is used to clear the display of all characters. After sent the cursor is located at the home position of Line 1, position 0.

Protocol: **CL:<crn>** ,where <crn> is \$0D carriage return.

Command Protocol Example	Response.	Description.
CL:<crn>	OK<crn>	Display is cleared. Cursor is at line 1, position 0

Locate cursor in line command.

This command is used to move the cursor to the specified line, position 0.

Protocol: **Lx:<crn>** ,where x = line number where the cursor is to be placed (1,2)
, <crn> is \$0D carriage return.

Command Protocol Example	Response.	Description.
L1:<crn>	OK<crn>	Cursor is placed at Line 1, position 0
L2:<crn>	OK<crn>	Cursor is placed at Line 2, position 0

Set cursor location command.

This command is used to move the cursor to the specified line, and the specified position. Two decimal characters are required to specify position within the range of 00 to 39

Protocol: **SCx:<position><crn>** ,where x = line number where the cursor is to be placed (1,2)
, <position> is the position within the line (0-39)
, <crn> is \$0D carriage return.

Command Protocol Example	Response.	Description.
SC1:10<crn>	OK<crn>	Cursor is placed at Line 1, position 10
SC2:05<crn>	OK<crn>	Cursor is placed at Line 1, position 5

Set default cursor type command.

This command is used to set the default cursor used when the display is reset or power is applied. There are 3 cursor types available, None, Fixed Underline, or Blinking.

Protocol: **CT:x<crn>** ,where x = cursor type
0 = None
1 = Fixed underline (factory default value)
2 = Blinking
, <crn> is \$0D carriage return.

Command Protocol Example	Response.	Description.
CT:2<crn>	OK<crn>	Cursor is blinking

Default backlight intensity command.

This command is used to set the default backlight intensity used when the display is reset or power is applied.

There are 4 intensity levels available, None, 25%, 50%,75% and full intensity.

Protocol: **DB:x<crn>** ,where x = default backlight intensity
0 = None
1 = 25% Intensity
2 = 50% Intensity
3 = 75% Intensity
4 = 100% Intensity (factory default value)
, <crn> is \$0D carriage return.

Command Protocol Example	Response.	Description.
DB:2<crn>	OK<crn>	Backlight is at 50% intensity.

Set backlight intensity command.

This command is used to set the current backlight intensity. Unlike the default backlight setting this command sets the current intensity value and only remains active till a reset occurs or a new set intensity command is issued. This command is useful in allowing the backlight to flash or signify some status information if required.

There are 4 intensity levels available, None, 25%, 50%,75% and full intensity.

Protocol: **SB:x<crn>** ,where x = default backlight intensity
0 = None
1 = 25% Intensity
2 = 50% Intensity
3 = 75% Intensity
4 = 100% Intensity (factory default value)
, <crn> is \$0D carriage return.

Command Protocol Example	Response.	Description.
SB:2<crn>	OK<crn>	Backlight is at 50% intensity.

Set splash screen data command.

This command is used to store alphanumeric data in the module to be displayed whenever the module is reset or power is applied. Often this will be a company name, product label, or other welcome message.

Protocol: **SSx:<data><crn>** ,where x = line number where the cursor is to be placed (1,2)
, <data> is the Alphanumeric data for the defined line,
40 characters maximum, with spaces post added to fill the line.
, <crn> is \$0D carriage return.

Command Protocol Example	Response.	Description.
SS1: Welcome to<crn>	OK<crn>	Display “ Welcome to” in line 1
SS2: Priority 1 Design<crn>	OK<crn>	Display “ Priority 1 Design” line 2

Set default splash screen options command.

This command is used to set the splash screen behaviour when the display is reset or power is applied. There are 3 options available, No Splash screen, Fixed till removed, and 1 second delay.

Protocol: **ST:x<crn>** ,where x = splash screen option
0 = None. No splash screen displayed
1 = Fixed. Remains present till new data is sent to the display.
2 = 1 second delay. Displayed for 1 second before the screen is cleared. (factory default value)
, <crn> is \$0D carriage return.

Command Protocol Example	Response.	Description.
ST:2<crn>	OK<crn>	Splash on for 1s before clear.

Error Codes and Status Description.

The SERDISP-4002 unit will respond to every command with either the requested data, or one of these status strings summarized here.

ERROR AND STATUS CODES.	DESCRIPTION.
?0<crn>	Command not understood.
OK<crn>	Function Performed Successfully.

Table 4. Error Codes and Status Description summary.

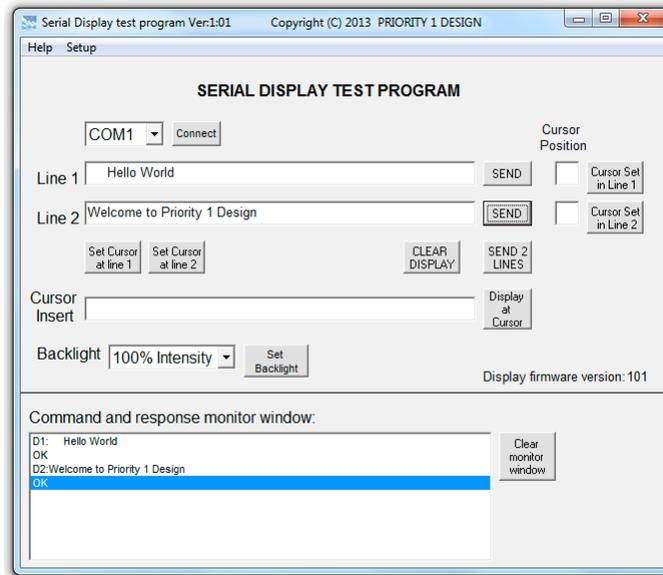
Serial protocol description:

The protocol for the Serial Input and Output lines is 9600 Baud, 8 data bits, 1 stop bit, no parity. These lines are TTL level only on connector J1, and RS232 only on connector J2.

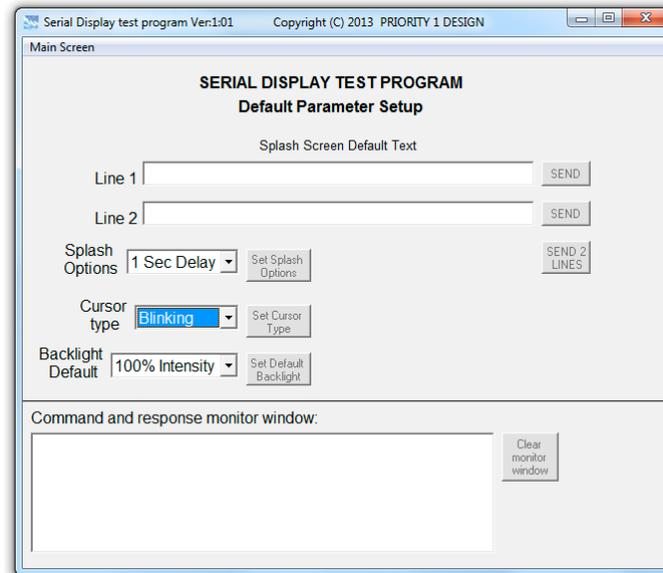
Serial Display Test Program:

Our free PC application program allow users to quickly test and set up the SERDISP-4002 and can be downloaded from <http://www.priority1design.com.au/download.html>

Test program main screen:

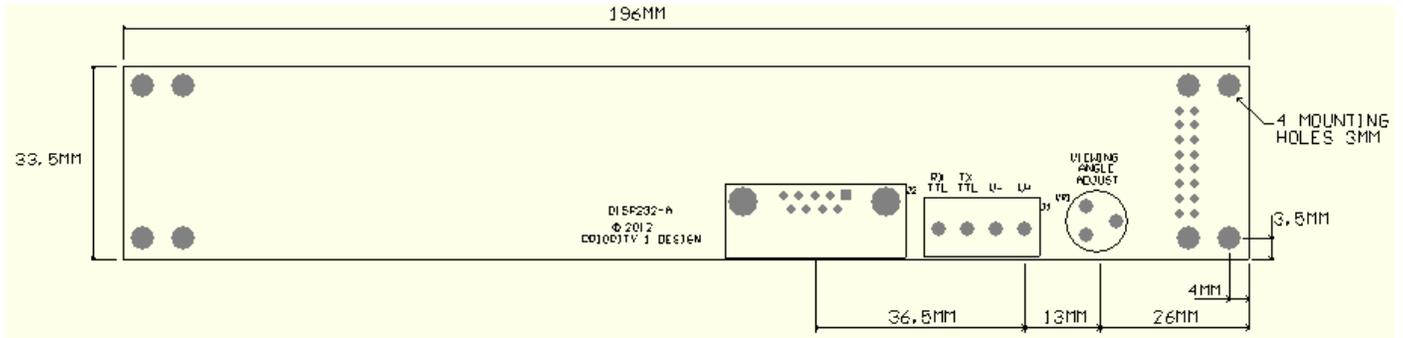


Test program Setup screen:

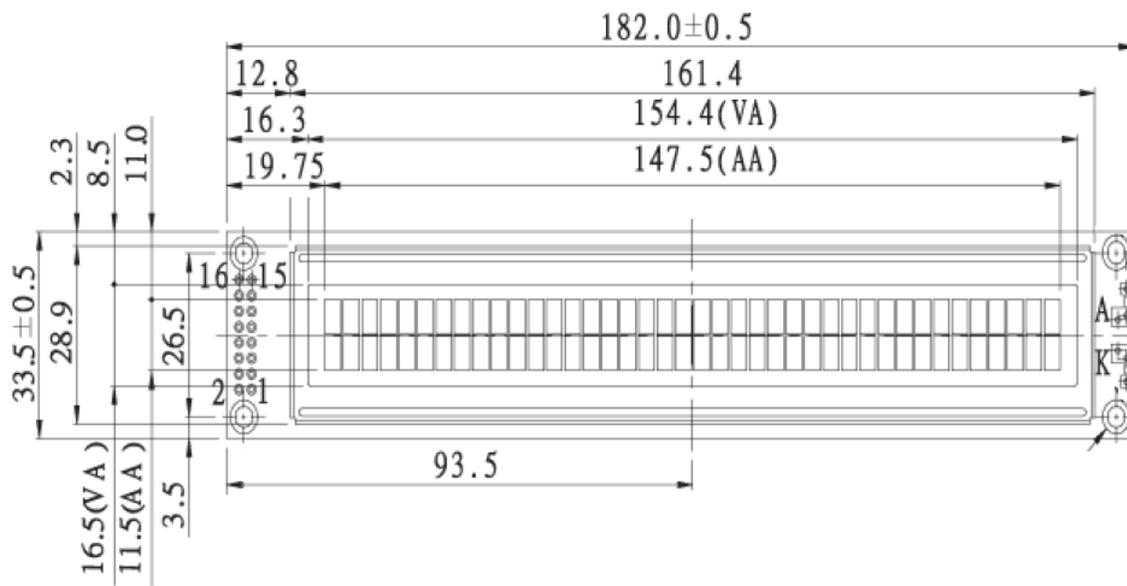


Dimensions:

Component view (rear of LCD):



LCD display dimensions (unmounted, front view).



All Dimensions in mm.

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