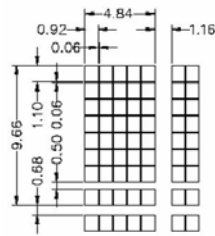


## SC1602LCPro 16 x 2 Large Characters Serial LCD Module User's Manual



Large Character  
Size.

4.88mmx9.66mm

### Features

- 16 x 2 Large Characters
- RS485 Serial Interface
- Programmable Device Address
- Programmable Baud Rate ( 4800 or 9600 bps )
- Simple Serial Command
- Addressing and broadcast mode support
- Wide Range Voltage Operation 9-15V.
- 8 General Purpose Open Drain outputs
- 8 General Purpose Pulled-up Input
- Programmable Startup Screen
- 100 bytes Receive Buffer eliminates delay requirement
- 8 User's Defined Characters.
- 10 User's Defined Text ( 16 Characters Each )
- Backlight Control, On/Off/Flash

### Communication

RS485 Serial Link  
Data Format 8,N,1 ( 8 Data Bits, No Parity , 1 Stop Bit )  
Baud Rate : 4800 or 9600 Programmable

Factory Default : 9600  
Maximum Cable Length : 1000 m  
Maximum Device on bus : 32  
Device address range : 101 to 132  
Factory Default : 101

Baud rate and Device Address is display for 3 s  
Upon power up.

### Start Up Screen

This screen of 16 x 2 characters is displayed after the baud rate and device address is displayed.

The screen is preset as

```
" SILICON CRAFT "  
" SC1602LC-RS485 "
```

This can be changed and stored in the non volatile memory.

### Serial Command

To initiate communication with SC1602LCPro, send START BYTE and Device ID

START BYTE is defined as 0xEF ( 239 in decimal )

Example : [ 0xEF ] [ 0x65 ] if the device address is 101.

LCD will response with [ 0xEE ] [ 0x65 ]

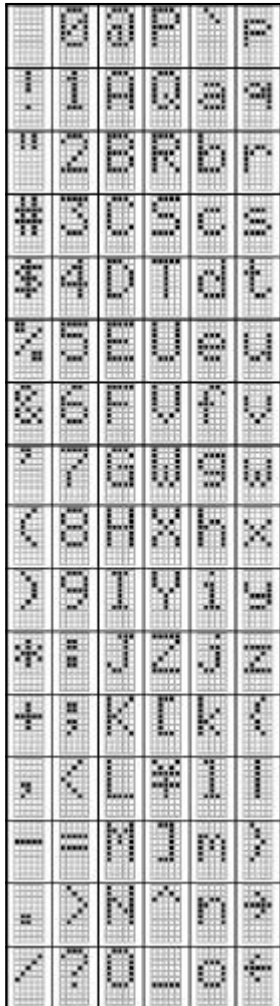
The LCD is then ready to accept command or characters to be displayed.

Example : Sending " SC1602 Test " string to has this displayed on the LCD.

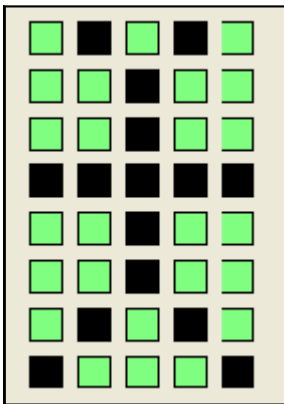
STOP BYTE must be send to end the session with currently connected LCD. Stop byte is 0xEA ( 234 )  
LCD will also response with [0xEE] [UID] when STOP BYTE is received.

Supported ASCII characters is listed below :

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Supported ASCII characters



<u>Function</u>	<u>Code ( in decimal )</u>
Insert Custom Character	0 to 7
Send Cursor Home	11
Move Cursor to the next row	12
Clear display and send cursor home	13
Turn On Underline Under	254,1
Turn On Block Blinking Cursor	254,2
Hide Cursor	254,3
Turn On Backlight	254,6
Turn Off Backlight	254,7
Flash Backlight	254,11
Turn On All Output	254,12
Turn Off All Output	254,13
Read Input	254,14
Display Startup Screen	254,20
Set 9600 baud rate	254,30
Set 4800 baud rate	254,31
Save settings onto memory	254,32
Clear Row	254,45,row number
Clear Column	254,46,column number
Set device address	254,48,UID
Set Cursor position	254,50,row,column
Set Single Output	254,51,output,status
Display User's Predefine Text	254,52,text number,row
Define Startup Screen	254,200,[32 ASCII Characters ]
User's Predefine Text	254, text , [16 ASCII Characters ]
Define User's Characters	254,100, [64 Bytes Bitmap ]

Serial Command Summary

**User's Defined Characters**

Apart from the ASCII characters listed on the left, user can define additional 8 characters.

Defined characters can be displayed by sending 0 to 7 ( Decimal )

Example : Sending "0x00" or 0 to display user's defined character 1 on the current cursor position.

*Character Bitmap*

Each character consist of 8 bytes bitmap

- Byte 1 : 0x0A ( 00001010 )
- Byte 2 : 0x04 ( 00000100 )
- Byte 3 : 0x04 ( 00000100 )
- Byte 4 : 0x1F ( 00011111 )
- Byte 5 : 0x04 ( 00000100 )
- Byte 6 : 0x04 ( 00000100 )
- Byte 7 : 0x0A ( 00001010 )
- Byte 8 : 0x11 ( 00010001 )

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To define the characters, send command

[0xFE] [0x64] [0x0A] [0x04] [0x04] [0x1F] [0x04] [0x04] [0x0A] [0x11]

Followed by the remained 56 bytes bitmap for user's defined character 2 to 8.

The bitmap is saved onto the non volatile memory.

User's needs to load the bitmap onto the LCD RAM before you can utilize this characters. This is done by sending command

[0xFE] [0x08]

### **Backlight Control**

Upon power up, the backlight is turned on.

To turn off send command [0xFE] [0x07]

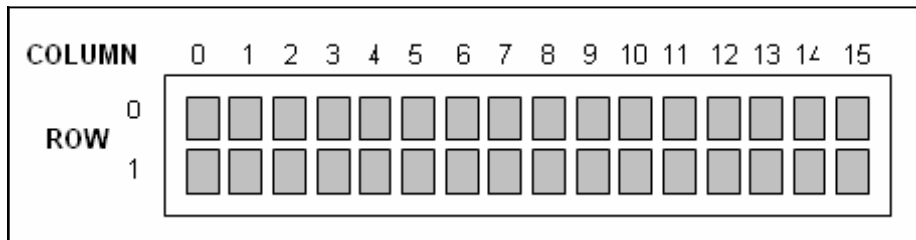
To turn back on send command [0xFE] [0x06]

The backlight can be made to flash too. This is done using command [0xFE] [0x0B]

Sending turn off or turn on command stops the flashes.

### **Cursor Control**

Cursor position can be moved by command [0xFE] [0x32] [row position] [column position]



### **Broadcasting Command**

Broadcast command enable all the LCD on the RS485 bus to receive the command.

All Selected device must be deselected by sending the STOP byte 234.

When broadcasting command replace UID with 100 when sending command.

Note : LCD will not response with [0xEE] [UID] when broadcasting command is use.  
Read Input command is invalid during broadcasting mode.

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### Output Port

8 channels of open drain output is available.  
Each channel rated at 33V and 100mA current sink capability.  
Output port is accessible via P2 header.

The output port is controlled with command

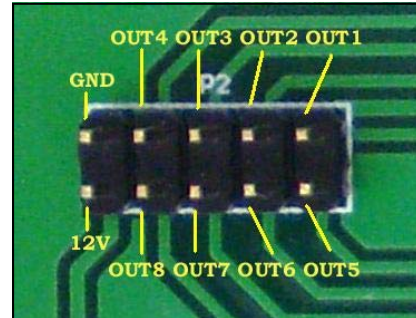
`[0xFE][0x33][ output ][ status ]`

Where output is 0 to 7 to select which channel to be controlled.

0 = OUT1 and 7 = OUT8

Status = 'H' is ASCII code to turn On and 'L' to turn off.

All channels can be turned on or off simultaneously by command `[0xFE] [0x0C]` and `[0xFE][0x0D]` respectively.



### Input Port

8 Pulled-up Input port is available via P1 header.  
Port is active by pulling the input pin to 0V or GND

Input status is read with command `[0xFE][0x0E]`  
LCD response with

`[0xEE][UID][ Status 1 ] [ Status 0 ]`

Where lower nibble of Status 0 byte denotes Input 1 to 4 status  
and lower nibble of Status 1 denotes Input 5 to Input 8

### User's Predefined Text

10 memory locations is available to store commonly used text.  
Each is 16 characters wide.

Text stored in these memory locations can be recalled and displayed on the LCD with command  
`[0xFE] [0x34] [ text location ] [ row to be displayed ]`

Where [ text location ] is which text to be displayed

101 to 110. [ row to be displayed ] is 0 or 1 depending on which row you want the text to be displayed.

*Example:*

*Text Stored in memory location 101 is "SC1602ProLC Test". To display this, instead of sending the text string, you can display the text by sending command*

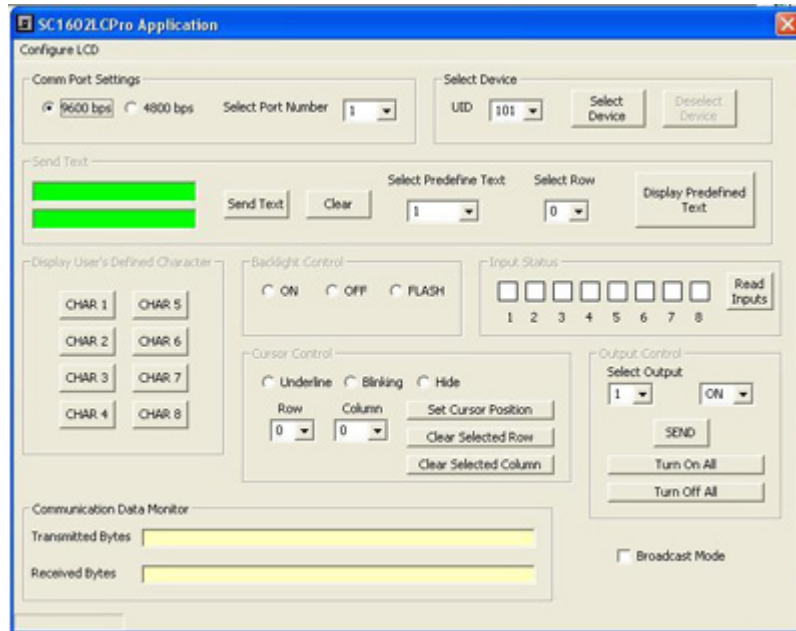
*`[ 0xFE ] [ 0x34 ] [ 0x65 ] [ 0x00 ]` to have "SC1602ProLC Test" displayed on row 0*

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### SC1602LCPro Application Software

This software enable user's to test and configure SC1602LCPro LCD Module easily.  
It is available on [www.siliconcraft.net/download.htm](http://www.siliconcraft.net/download.htm) page.

RS232 to RS485 converter is required.



### **Electrical Specification**

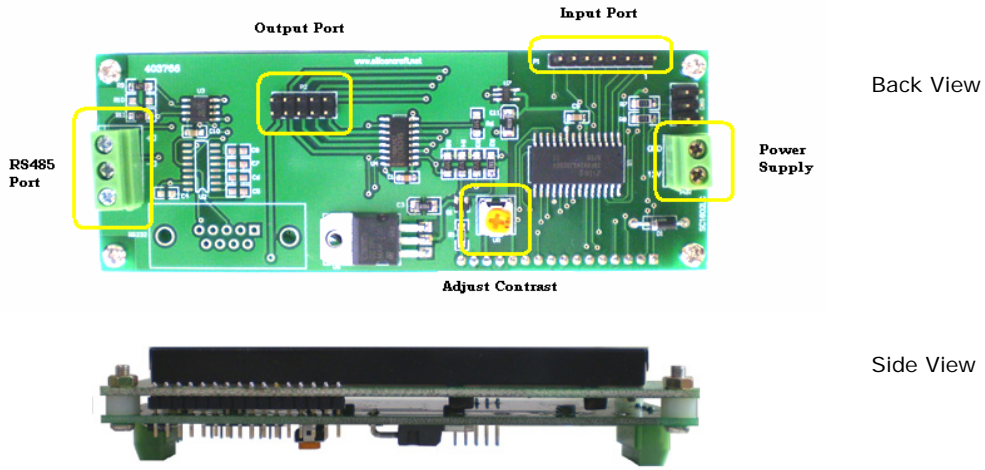
Power Supply : 9 - 15VDC ( Nominal 12VDC )  
Current Consumption : 15mA ( Backlight Off ) , 120mA ( Backlight On )

Operation Temperature Range : 0° C to 70° C

Storage Temperature Range : - 20° C to 85° C

LCD Type : STN  
Backlight : Yellow Green LED Light Guide

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## Mechanical Dimension ( mm )

