SC1602Pro 16x 2 Characters Serial LCD Module
User’s Manual ( Rev 1.1 )

Features
- 16 x 2 Characters
- RS485 Serial Interface
- Programmable Device Address
- Programmable Baud Rate ( 4800 or 9600 bps )
- Simple Serial Command
- 1 General Purpose transistor output
- 1 General Purpose TTL Input
- Programmable Startup Screen
- 100 bytes Receive Buffer eliminates delay requirement
- 8 User’s Defined Characters.
- Backlight Control, On/Off/Flash
- Addressing and broadcast mode support
- 5V Operation.
- Mounting Kits and IP65 Enclosure Available

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 set as
" SILICON CRAFT "
" SC1602-RS485 "
This can be changed and stored in the non volatile memory.

Serial Command
To initiate communication with SC1602Pro, 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 :
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 consists of 8 bytes bitmap

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

\[ 0xFE \] \[ 0x08 \]

Note: User’s Defined Characters is unavailable when Graph Draw Command is in use.

**Backlight Control**

After 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 \[ 0xFE \] \[ 0x32 \] \[ row position \] \[ column position \]

<table>
<thead>
<tr>
<th>COLUMN</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROW 0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROW 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Broadcasting Command**

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

When broadcasting command replace UID with 100 when sending command.

Note : LCD will not response with \[0xEE\] \[UID\] when broadcasting command is use.
Drawing Bar Graph

Draw graph command is available to easily draw a horizontal bar graph onto the LCD screen.

The graph can be at any starting point and can be left to right or right to left.

Example to display screen above.

1. Send ASCII string “Graph Demo”
2. Init Graph by sending command [0xFE][0x04]
3. Set cursor position at row 1 column 0 , [0xFE][0x32][0x01][0x00]
4. Draw the graph of length 66 . [0xFE][0x2B][0x42]

SC1602Pro Software

This software is use to test and configure SC1602Pro LCD module. Available for download at www.siliconcraft.net/download.htm

Support Windows XP, 2000, Vista.

RS232 to RS485 converter is required.
**IO Command**

- Turn on Transistor Output [0xFE] [0x0C]
- Turn off Transistor Output [0xFE] [0x0D]
- Read Input Status [0xFE] [0x0E]
- Response [0xEE] [UID] [Status]

**Electrical Specification**

- **Power Supply:** 4.8 - 5.5VDC
- **Current Consumption:** 10mA (Backlight Off), 100mA (Backlight On)
- **Operation Temperature Range:** 0º C to 50º C
- **Storage Temperature Range:** -20º C to 60º C
- **Maximum transistor Q2 sink/source current:** 200mA

**IMPORTANT:** Ensure that the polarity of the power supply is correct before turning on the power.
Available Accessories

Aluminum Mounting Kit

Mounting Kit Dimension (mm)
Thickness 1.5mm

IP 65 Rated Enclosure with LCD mounting plate.

Material:
Top: Acrylic (Clear)
Bottom: ABS (Grey)