
10 Digit 7 Segment Display Controller

Features

- Control 1 to 10 digits.
- Unused digits are disabled to save power.
- Sleep mode available to save power.
- Each digit is programmable for common anode or cathode control.
- 27 display control commands.
- Up to 11ma supply current per segment.
- Intelligent shifting of character left or right.
- Variable refresh rate.
- Variable blink rate.
- Individual digits can be selected for blink / no blink.
- Built in ASCII character may be used to convert displayed characters.
- SPI (mode 1,1) serial communication.

In addition, the display's refresh rate can be altered to suite specific application needs.

To add versatility to the display controller, the display controller supports common anode and common cathode 7 segment displays. Each individual digit can be configured as CA or CC, permitting the use off CA and CC displays at the same time.

Communication with the display controller is accomplished using SPI (mode 1,1).

Description

The NeoLoch, LLC NLDC-10D7S-S1 display controller removes the overhead of operating a multiple digit 7 segment LED display from the MCU by handling display refresh, character conversion, and special effects.

The display controller can be configured to section out the display, allowing for multiple actions to be applied to the display while only effecting the desired digits. Features include:

Scrolling display data left or right and placing the supplied character in the LSB or MSB. Only those digits designated to be included in the scroll will be updated. This allows for display segmentation and the display / updating of multiple data sets.

Each character can be configured to blink or not blink via several registers.

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1.0 Device Overview

The NLDC-10D7S001 evaluation board provides a test bed for applications using the NLDC-10D7Sxxxx display controllers.

The evaluation board comes with two 4-digit 7-segment displays, a NLDC-10D7S display controller, a PIC16F1823 microcontroller, an ICSP port to program the PIC16F1823, a reset switch, 2 user programmable switches, and an expansion port.

1.1 SPI Communication

The MCU communicated with the display controller using SPI (Serial Peripheral Interface) in mode 1,1.

A communication session consists of bringing CS low, transmitting the command byte, followed by the data byte. And then bringing CS high if more than one SPI device is on the communication buss.

Note: Some commands only require a single command byte, and don't require a data byte. See section 2.0 for a complete list of commands.

Whenever a command is transmitted to the display controller, the previous command's data byte will be transmitted back to the MCU. This data can be discarded or used to confirm correct command execution.

A NOP command is included in the command structure to provide a method of retrieving the last active command executed.

1.2 Device Start up

Upon device power up or reset, the display controller takes approximately 1ms to process internal configurations instructions. The display controller then enters sleep mode and waits for a SPI command byte.

The first command byte sent to the device must be the wake command. This will increase the internal operating frequency to 8 Mhz and configure the ports for display control.

Once the device is awake, configuration commands are required to set the device to the desired operational state. Refer to the NLDC-10D7S-xxxx datasheet for more information.

1.2 Jumpers 1 & 2

Jumpers 1 & 2 provide a means to remove one or both ICs from the reset switch. Under most circumstances there is no need to remove these. However, if your application requires testing of reset stats on just one of the devices, remove the jumper to aid in testing.

NLDC-10D7S001 Evaluation Board

2.0 Evaluation Board Layout

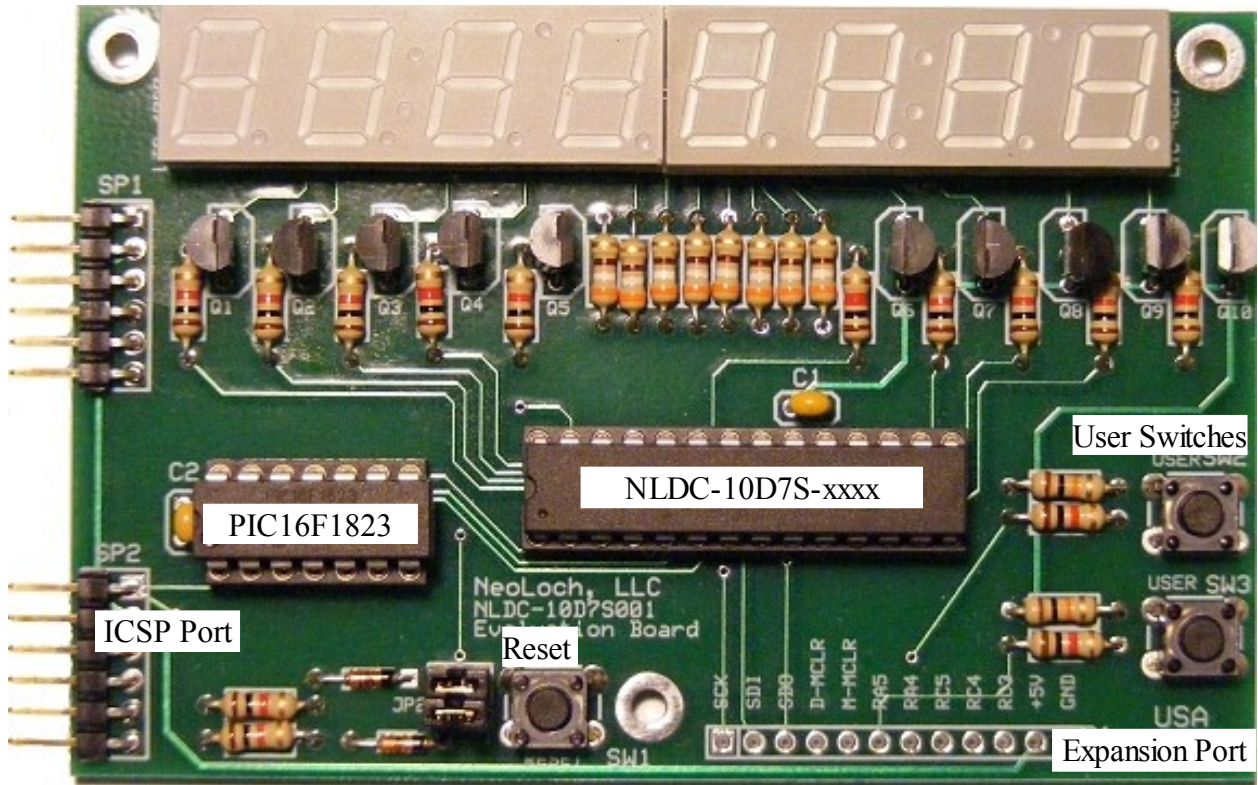
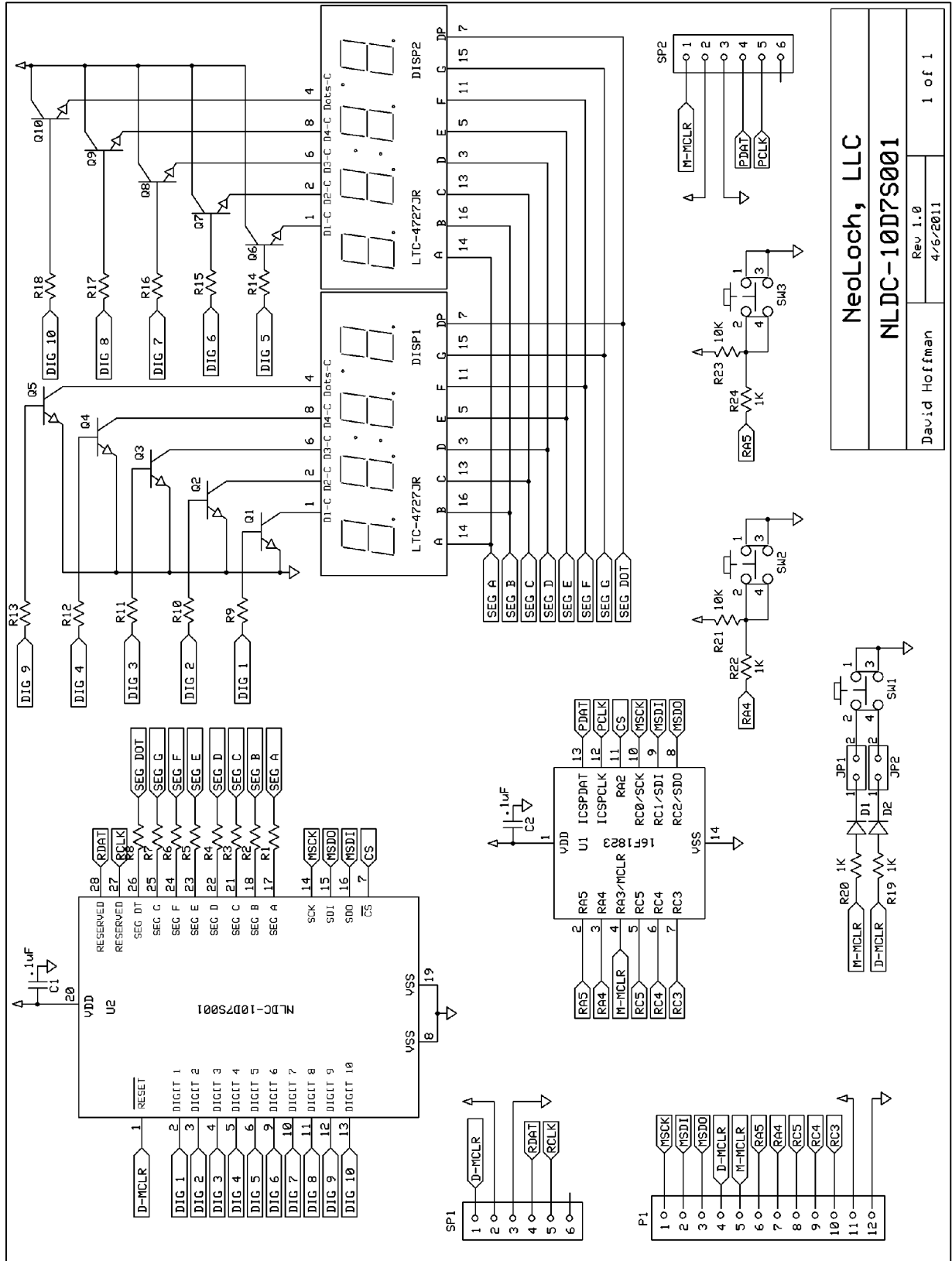


Table 2-1: Expansion Port Pinout.

Pin	Description
1	SCK – (PIC16F1823) serial clock for SPI.
2	SDI – (PIC16F1823) serial data in for SPI.
3	SDO – (PIC16F1823) serial data out or SPI.
4	NLDC-10D7S Display controller reset – normally high, pull low to reset.
5	PIC16F1823 reset – normally high, pull low to reset.
6	PIC16F1823 RA5 / User Switch 1
7	PIC16F1823 RA4 / User Switch 2
8	PIC16F1823 RC5
9	PIC16F1823 RC4
10	PIC16F1823 RC3
11	+5V
12	GND

2.1 Evaluation Board Schematic



NeoLoch, LLC	
NLDC-10D7S001	
David Hoffman	Rev 1.0 4/6/2011
1 of 1	

NOTES:

Revision History

Revision A (5/30/2011)

Initial release of this data sheet.

Revision B (6/6/2011)

Added evaluation board schematic.