

Overview

The Spartan-II LC functional test consists of a MicroBlaze-based program that performs a User I/O loopback test, an RS232 circuitry test, and also a test of the four DIP switches, two user LEDs, two seven-segment displays, and the PROM. This bitstream will be downloaded to the PROM, after which the FPGA will be configured from the PROM.

Software Setup

This test procedure was developed with the following software:

- Windows 2000 or Windows XP
- Xilinx iMPACT software, version 5.2i (included in ISE Foundation, ISE Alliance, ISE BaseX, or ISE WebPack)
- ISE 5.2i Service Pack 3

Hardware Setup

Refer to Figure 1 for jumper locations. The Memec Spartan-II LC board should be configured as follows:

1. Install all three J1 jumpers (FPGA mode select jumpers).
2. Install jumper on J11.
3. Install jumper on J7 (pins 1-2).
4. Make sure a 25 MHz 3.3V oscillator is plugged into socket Y1.
5. Connect the JTAG cable to J2 and the parallel port of the PC.
6. Connect a straight through RS232 cable to the board's DB-9 connector (JD1) and the serial port of the PC.
7. Attach 2x15 loopback cables on JP3, JP4, and JP5.
8. Verify the Power switch, SW1, is in the OFF position.
9. Connect the 5V AC/DC adapter to JP1.
10. Slide the power switch to the ON position.
11. Verify that the two LEDs on the lower left hand side of the board are ON (DS1, DS2 → ON).

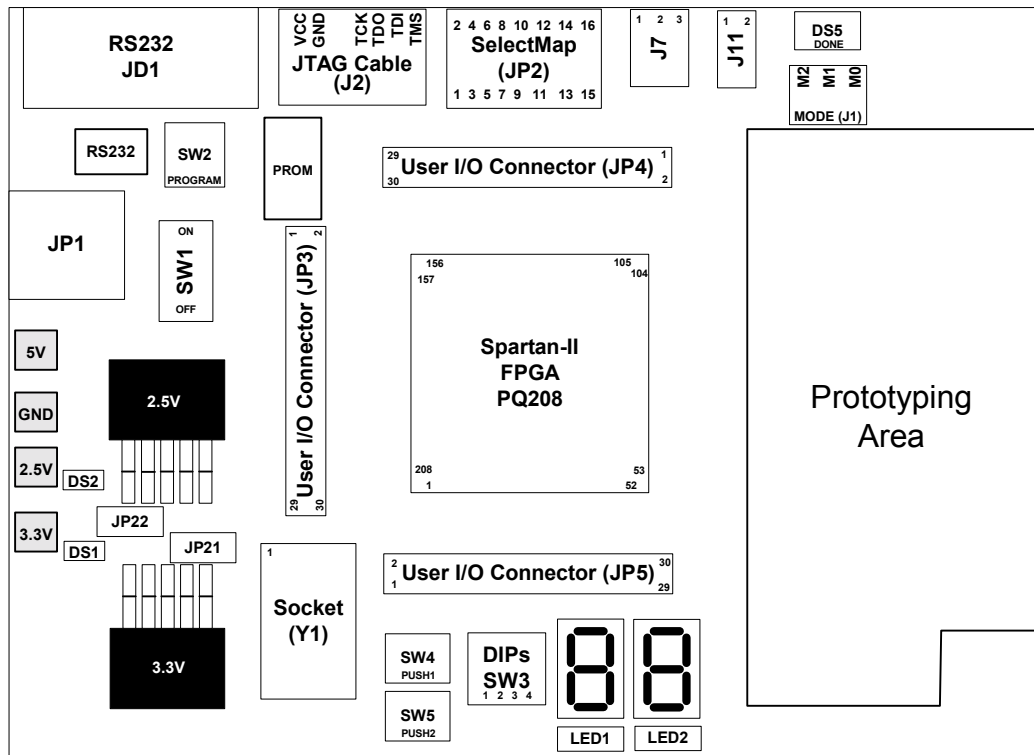


Figure 1 – Memec Spartan-II LC Jumper Locations

Experiments

1. Unzip Memec_S2LC100_Test.zip into any directory, referred to throughout this document as *<unzip_directory>*. In WinZip, be sure to check the box to “Use folder names.” The *<unzip_directory>* contains four items:

Filename	Description
com1_19200_8n1n.ht	HyperTerminal settings file
Memec_S2LC_Functional_Test_1_0.pdf	this test procedure document
s2lc100_test.bat	DOS batch file for automating PROM download
S2lc100_files	Directory containing the test files

The **s2lc100_files** subdirectory files will not be manipulated directly by the user, which contains three files:

Filename	Description
s2lc100_test.cmd	iMPACT script
s2lc100_test.mcs	PROM bitstream
xc2s100_pq208.bsd	FPGA BSDL file

2. Launch a HyperTerminal window by double-clicking `<unzip_directory>\com1_19200_8n1n.ht` (if COM1 is not an available serial port, launch HyperTerminal manually, using an available COM port with 19200 baud, 8 data bits, no parity, 1 stop bit, and no flow control). HyperTerminal should be displayed as shown in Figure 2

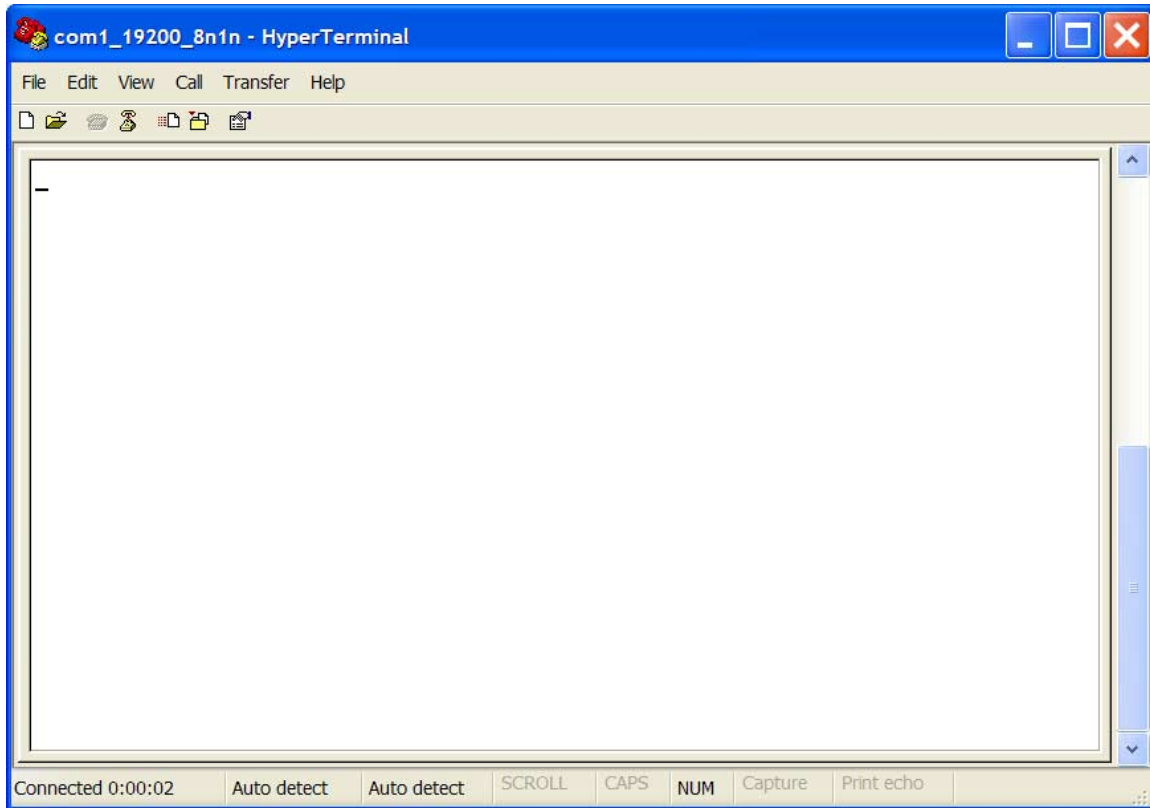


Figure 2 – HyperTerminal Launched

3. Program the PROM by double-clicking `<unzip_directory>\s2lc100_test.bat`. A command prompt window will be displayed. It will take approximately 15-20 seconds to erase, program, and verify the PROM. Near the bottom of the screen, look for the phrase, **“1’: Programming completed successfully.”** A successful download should look similar to Figure 3.
4. Toggle power on the S2LC board and verify that LED DS5 (DONE) lights up.
5. Verify that the two seven segment display display 0 through 9 correctly.
6. Verify that LED1 and LED2 are toggling.



```
C:\Windows\System32\cmd.exe

C:\tutorials\memec_board\Sp2lc\tests>impact -batch s2lc100_files\s2lc100_test.cm
d
// *** BATCH CMD : setMode -bs
// *** BATCH CMD : setCable -port auto0 -baud 9600
AutoDetecting cable. Please wait.
Connecting to cable (USB Port).
Cable connection failed.
Connecting to cable (Parallel Port - LPT1).
Checking cable driver.
Driver windrvr.sys version = 5.0.5.1. LPT base address = 0378h.
Cable connection established.
INFO:iMPACT:1366 -
Reading c:/xilinx52/xc18v00/data\xc18v01.bsd...
INFO:iMPACT:501 - '1': Added Device xc18v01 successfully.
-----
// *** BATCH CMD : addDevice -position 1 -part xc18v01
// *** BATCH CMD : setAttribute -position 1 -attr configFileName -value
s2lc100_files\s2lc100_test.mcs
'1': Loading file 's2lc100_files\s2lc100_test.mcs' ...
done.
INFO:iMPACT:501 - '2': Added Device UNKNOWN successfully.
-----
INFO:iMPACT:1366 -
Reading
C:\tutorials\memec_board\Sp2lc\tests\s2lc100_files\xc2s100_pq208.bsd...
INFO:iMPACT:1366 -
Reading c:/xilinx52/spartan2/data\xc2s100_pq208.bsd...
INFO:iMPACT:501 - '2': Added Device XC2S100_PQ208 successfully.
-----
-----
INFO:iMPACT:1366 -
Reading
C:\tutorials\memec_board\Sp2lc\tests\s2lc100_files\xc2s100_pq208.bsd...
// *** BATCH CMD : addDevice -position 2 -part s2lc100_files\xc2s100_pq208.bsd
// *** BATCH CMD : program -erase -verify -position 1
Validating chain...
Boundary-scan chain validated successfully.
'1': Putting device in ISP mode...done.
'1': Erasing device...done.
'1': Erasure completed successfully.
'1': Putting device in ISP mode...done.
'1': Programming device...done.
'1': Putting device in ISP mode...done.
'1': Putting device in ISP mode...done.
'1': Verifying device...done.
'1': Verification completed successfully.
'1': Calculated checksum matches expected checksum, 000e39a1c
'1': Putting device in ISP mode...done.
'1': Setting user-programmable bits...
done.
'1': Programming completed successfully.
-----
C:\tutorials\memec_board\Sp2lc\tests>del _impact.cmd

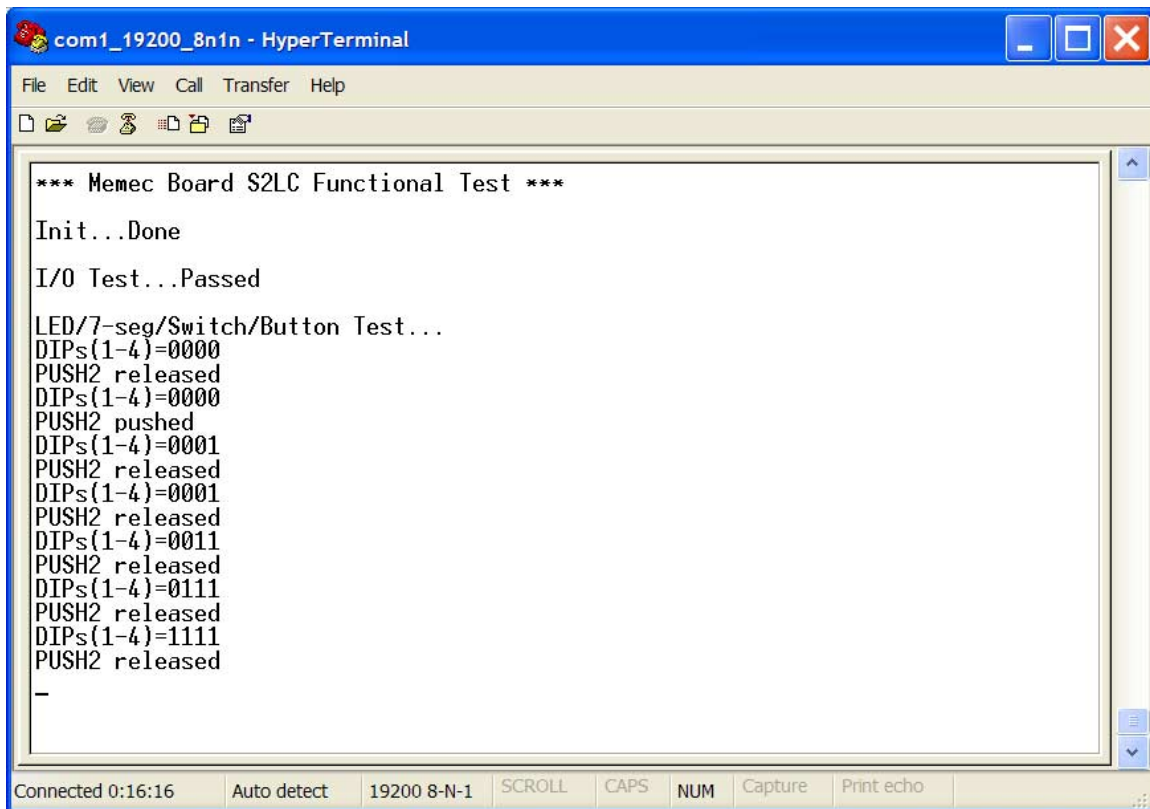
C:\tutorials\memec_board\Sp2lc\tests>echo Memec Spartan-II LC Functional Test Co
mplete
Memec Spartan-II LC Functional Test Complete

C:\tutorials\memec_board\Sp2lc\tests>pause
Press any key to continue . . . _
```

Figure 3 – Programming the PROM

7. Press PUSH1 to reset the HyperTerminal display.

8. The third line of text should say, "I/O Test...Passed." If not, then the I/O failures will be listed.
9. Press the PUSH2 button. The scrolling output on the HyperTerminal should change from "**PUSH2 released**" to "**PUSH2 pushed.**"
10. Set all four DIP switches to the OFF position. The scrolling output should show:
DIPs(1-4)=0000
11. Slide DIP #4 to ON (leaving 1-3 OFF). The output should read:
DIPs(1-4)=0001
12. Slide DIP #3 to ON (leaving 1-2 OFF and 4 ON). The output should read:
DIPs(1-4)=0011
13. Slide DIP #2 to ON (leaving 1 OFF and 3-4 ON). The output should read:
DIPs(1-4)=0111
14. Slide DIP #1 to ON (leaving 2-4 ON). The output should read:
DIPs(1-4)=1111
15. Figure 4 shows the expected results for test steps 7 through 14.



The screenshot shows a HyperTerminal window titled "com1_19200_8n1n - HyperTerminal". The window contains the following text:

```
*** Memec Board S2LC Functional Test ***  
Init...Done  
I/O Test...Passed  
LED/7-seg/Switch/Button Test...  
DIPs(1-4)=0000  
PUSH2 released  
DIPs(1-4)=0000  
PUSH2 pushed  
DIPs(1-4)=0001  
PUSH2 released  
DIPs(1-4)=0001  
PUSH2 released  
DIPs(1-4)=0011  
PUSH2 released  
DIPs(1-4)=0111  
PUSH2 released  
DIPs(1-4)=1111  
PUSH2 released  
-
```

The status bar at the bottom of the window shows "Connected 0:16:16", "Auto detect", "19200 8-N-1", "SCROLL", "CAPS", "NUM", "Capture", and "Print echo".

Figure 4 – HyperTerminal Output

16. Press SW2 (PROGRAM). Verify that LED DS5 (DONE) goes off then comes back on. The board test will be reset and start operating again.
17. Slide SW1 to the OFF position. Unplug all cables.

The test is now complete. To test another board, complete the Hardware Setup and then repeat steps 3 through 17 of the Experiments.

Revision History

Date	Version	Revision
07/03/03	1.0	Initial Memec release of S2LC Functional Test.