The Built in Self Test

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Contents

1 Functionality

Tests:

- **DC Offset**: Outputs the correct DC offset for your radio.

- **Basic Transmit and Receive** : This tests for the successful transmission of a range of frequencies through the radio.

Necessary programs:

- Xilinx Impact, Xilinx Platform Studio, or Chipscope

- Tera Term

Necessary files:

- WARP BIST download.bit

Hardware:

- The BIST is programmed to test a radio daughtercard placed in the second slot of the WARP board.

2 Design

The BIST is based on a SysGen model that creates sinusoids and passes them through an fft. The code in Platform Studio varies the frequencies of the sinusoids and sweeps through the resulting output fft, looking for the location of the highest peak. If the peak is located where we would expect for corresponding phase increments, the radio checks out as correctly running a basic transmit and receive.

When initializing the radio in Platform Studio, WARP Radio Library commands were used to put the radio into loopback mode. Loopback mode short circuits the transmit and receive together such that the radio can then receive its own transmissions.

3 Understanding the Outputs

3.1 DC Offset

The scan results choose the correct DC Offset settings for your system.

3.2 Transmit and Receive Test

The test runs 10 times and prints out how many transmit/receive pairs were successful for each phase increment. It is normal to see less than perfect run results for the edge frequencies but the rest should transmit without fail each time.

4   Running the BIST

The results of the test on your radio will be printed out to Tera Term. Impact, Platform Studio, or Chipscope can be used to download the BIST to the board.

4.1   Using Tera Term

Figure 1: Opening Tera Term

The opening screen allows you to choose your connection. Select 'Serial' and the corresponding port for your computer.
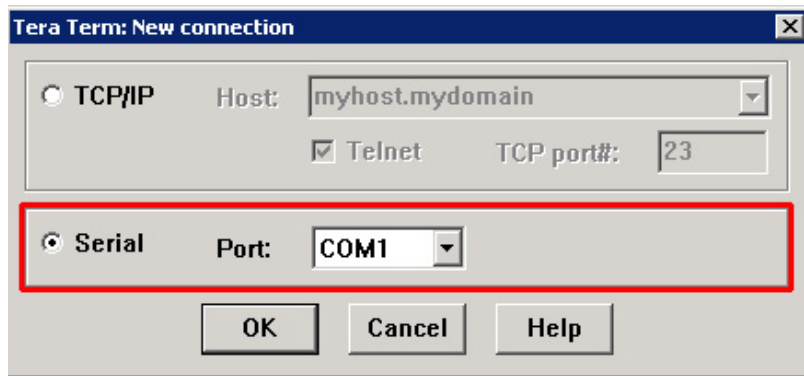

Figure 2: Select Connection

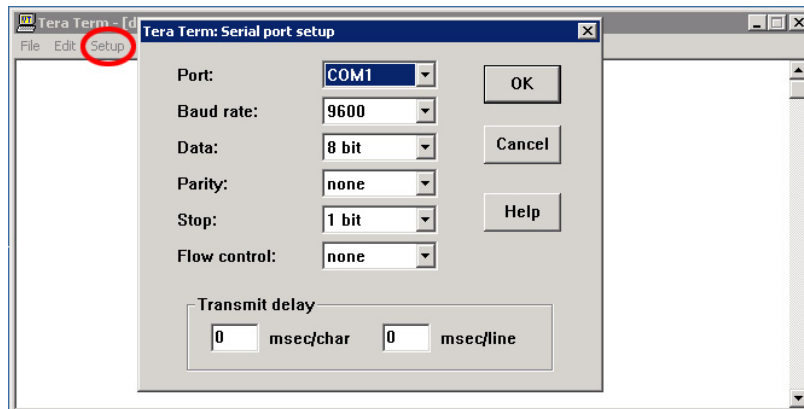Check the setup of the Tera Term found at Setup → Serial port. Make sure that the Baud rate is at 9600.

Figure 3: Click Setup → Serial port

4.2 Downloading the BIST to the Board

This shows how to download using Impact. These images correspond to v8.1, but a similar procedure works for v7.1
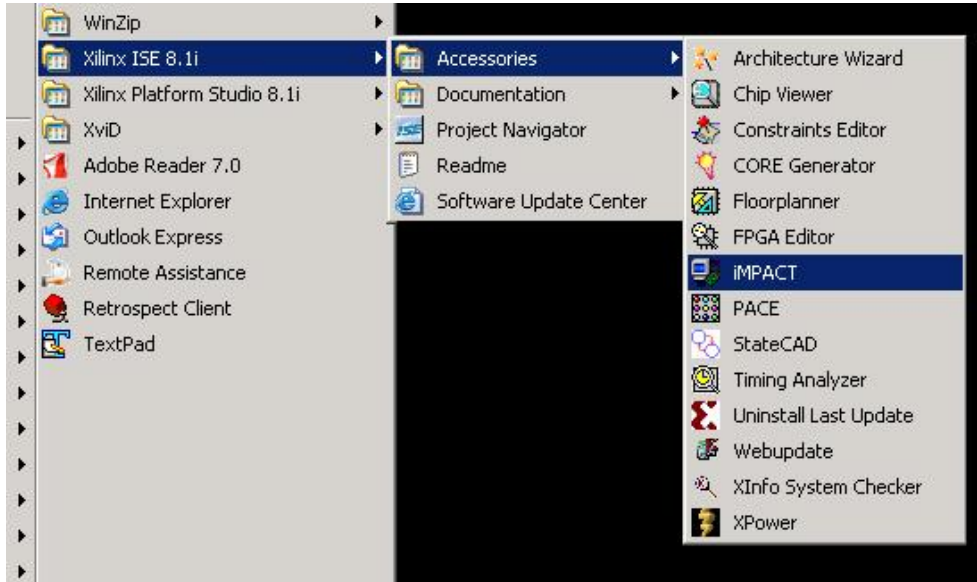

Figure 4: Open Impact

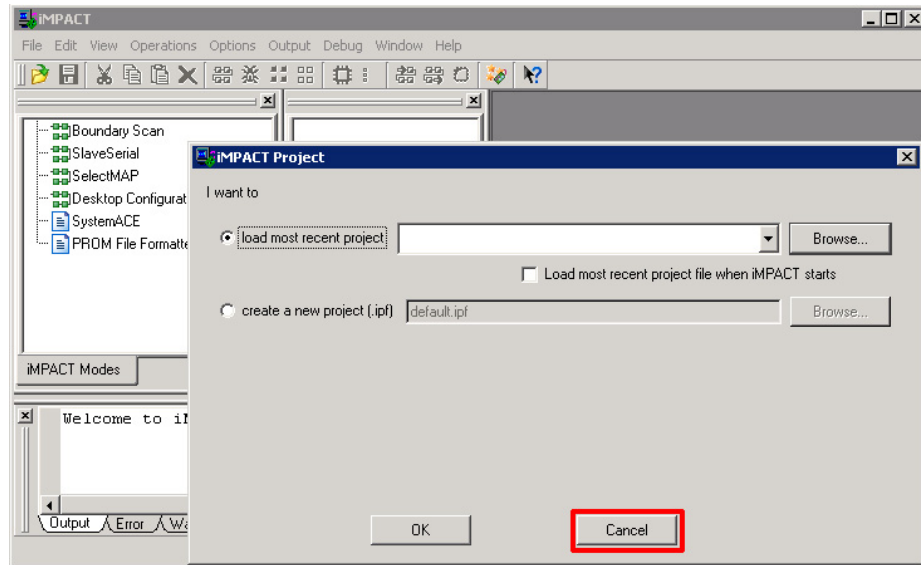Hit 'Cancel' for the opening popup, you won't need to make a project.

Figure 5: Work Outside of a Project, Hit Cancel

Select Boundary Scan first, followed by Initialize Chain to detect devices. Click 'ok' if a window pops up about 2 devices in the chain.
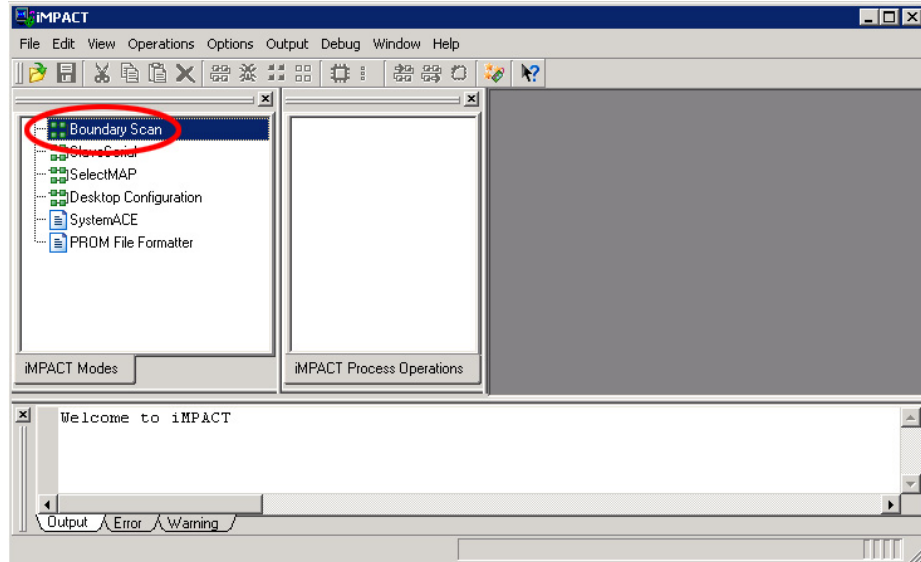

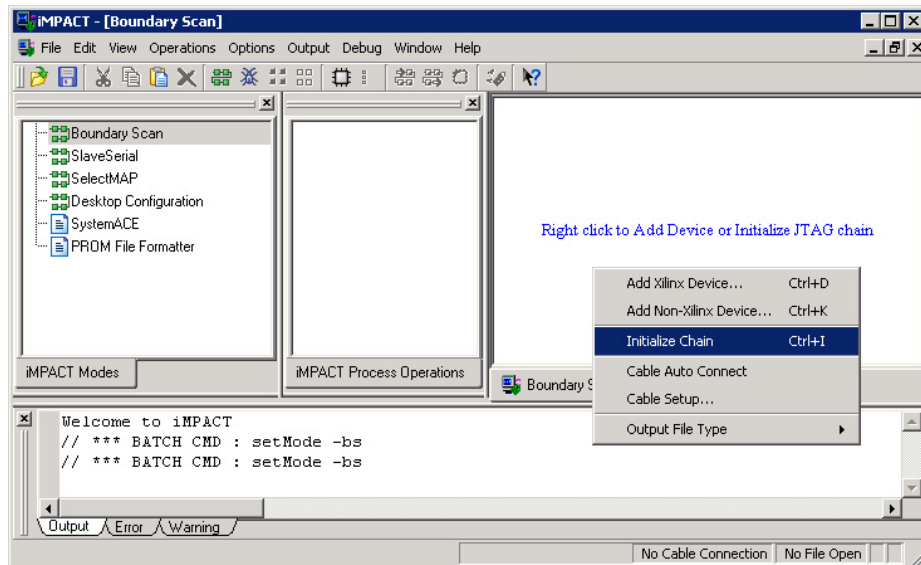Figure 6: Double Click on Boundary Scan

Figure 7: Right Click in the Boundary Scan Window and Initialize Chain

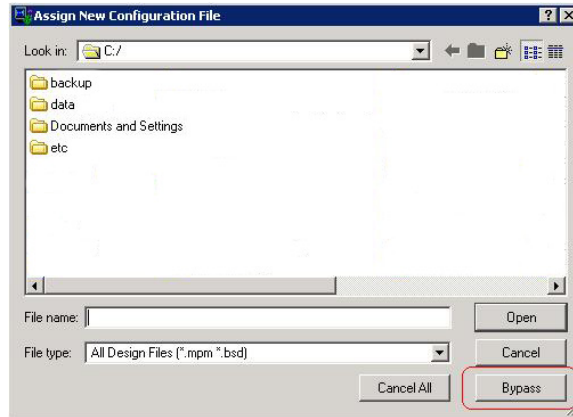You'll only need to configure the second chip in the chain, bypass the first.

Figure 8: Bypass the First Config

The config file for the second chip can is the WARP BIST download.bit, open it and click 'ok' in the window that pops up to finalize.
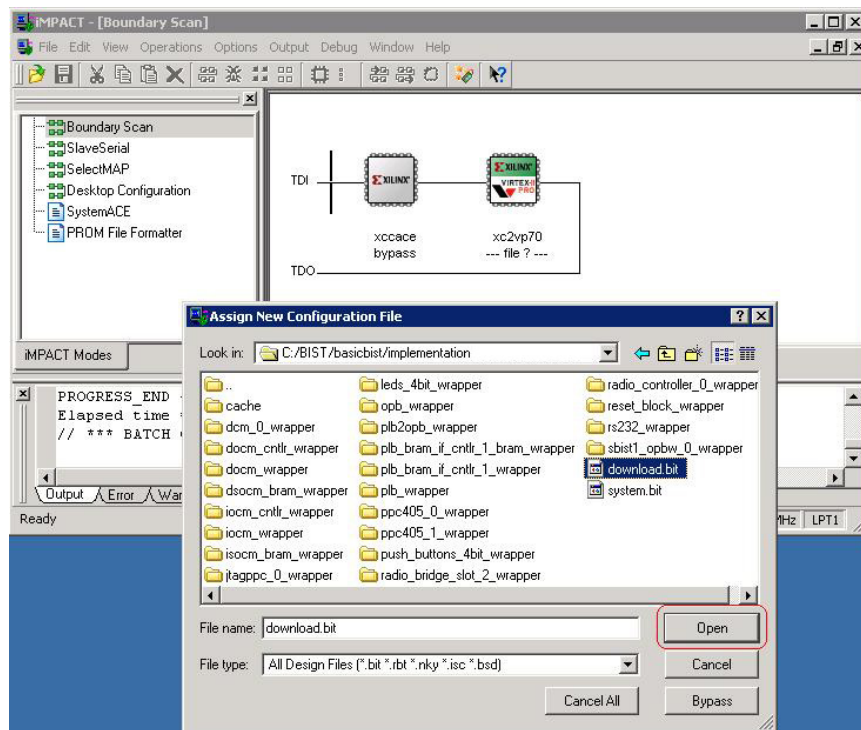

Figure 9: To Configure, Choose the download.bit File in the BIST's Implementation Folder

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Finally, program the board. Just program again every time you want to run the BIST again. The outputs should appear on Tera Term as soon as the programming is complete.
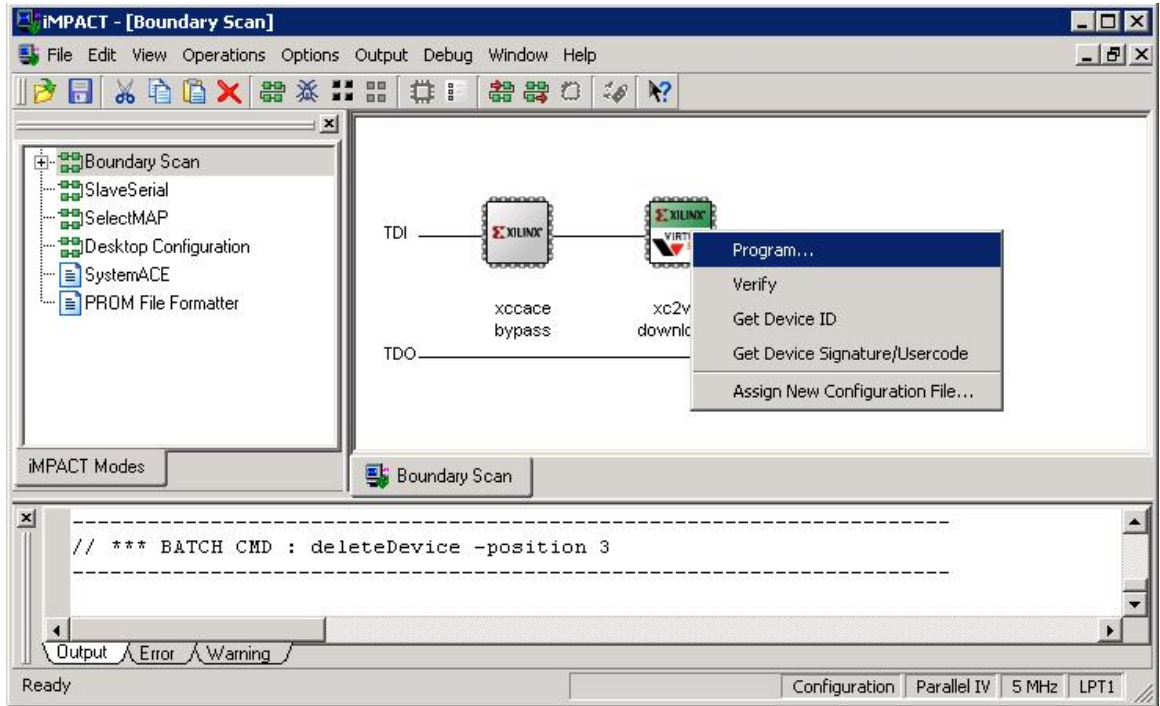

Figure 10: Right Click on the Chip and Select 'Program'

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5   Help

5.1   Tera Term

- **I don't have Tera Term.** Download at: http://hp.vector.co.jp/authors/VA002416/teraterm.html

- **Tera Term won't connnect** Only one user can be connected through Tera Term at a time, make sure no one else has an open session. Otherwise, check which port is connected on your computer and make sure that your settings (Setup→Serial port) correspond.

- **Nothing is showing up on Tera Term.** Check that your serial port cable is well connected, then try programming the board again.

- **The output doesn't make any sense.** Go to Setup→Serial port and make sure that the Baud Rate is at 9600.

5.2   Impact

- **Impact won't connnect** Only one user can be connected through Impact at a time, make sure no one else has an open session.

5.3   Results

- **The outputs are all indicating radio failure.** Make sure that the radio daughtercard is in slot 2. If it is, your radio is failing.

- **The transmit test fails on edge cases.** That happens, run the test a few more times if they are remarkably low (less than 3 out of 10), low transmission success on frequencies .05 and .95 is not unusual.