

# ***XDS560v2 LC Traveler*** ***JTAG Emulator***

*Technical  
Reference*



***XDS560v2 LC Traveler  
JTAG Emulator  
Technical Reference***

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## **TRADEMARKS**

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Code Composer Studio IDE is a trademark of Texas Instruments

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## About This Manual

This document describes the module level operations of the XDS560v2 LC Traveler JTAG Emulator. This emulator is designed to be used with digital signal processors (DSPs) and microcontrollers designed by Texas Instruments.

The XDS560v2 LC Traveler JTAG Emulator is a table top module that attaches to a personal computer or laptop to allow hardware engineers and software programmers to develop applications with DSPs and microcontrollers.

## Notational Conventions

This document uses the following conventions.

The XDS560v2 LC Traveler JTAG Emulator will sometimes be referred to as the XDS560v2 LC, JTAG Emulator, or Emulator.

Code Composer Studio IDE will sometimes be referred to as CCS.

Program listings, program examples, and interactive displays are shown in a special italic typeface. Here is a sample program listing.

```
equations  
!rd = !strobe&rw;
```

## Information About Cautions

This book may contain cautions.

***This is an example of a caution statement.***

A caution statement describes a situation that could potentially damage your software, or hardware, or other equipment. The information in a caution is provided for your protection. Please read each caution carefully.

## Related Documents

- Texas Instruments document SPRU655d.pdf
- MIPI Alliance Recommendation for Test and Debug: Debug and MIPI System Trace Connectors, Version 1.00.00, 5 June 2007

# Chapter 1

## Introduction to the XDS560v2 LC Traveler JTAG Emulator

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This chapter provides you with a description of the XDS560v2 LC Traveler JTAG Emulator along with the key features.

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## 1.0 Overview of the XDS560v2 LC Traveler JTAG Emulator

The XDS560v2 LC Traveler JTAG Emulator is designed to be used with digital signal processors (DSPs) and microprocessors which operate from +1.2 to +4.1 volt levels on the JTAG interface. The power for the emulator comes from the USB interface on a PC/laptop/USB hub. This means no power is drawn from the target system or host PC.

The XDS560v2 LC Traveler is designed to be compatible with the existing Texas Instruments XDS560 emulator and operates with debuggers provided by Texas Instruments.

**Note:** The XDS560v2 LC Traveler does not support MIPI System Trace. The MIPI System Trace feature is available on the XDS560v2 STM Traveler and XDS560v2 STM products.

### 1.1 Key Features of the XDS560v2 LC Traveler JTAG Emulator

The XDS560v2 LC Traveler JTAG Emulator has the following features:

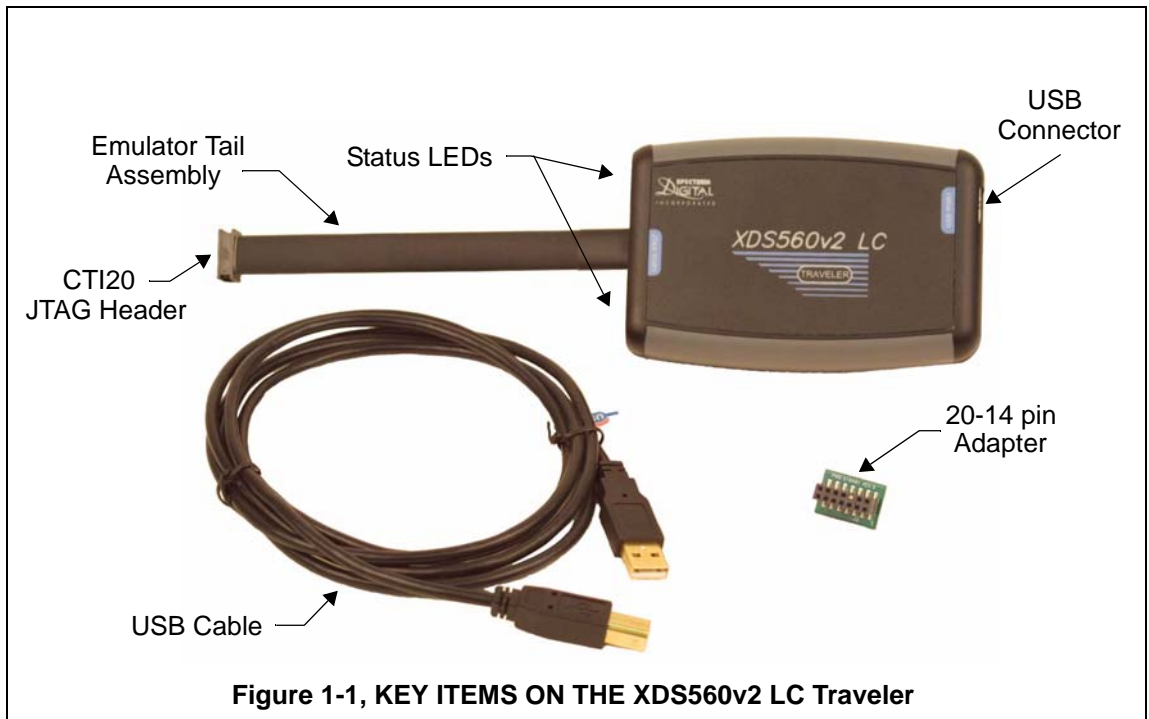
- Supports Texas Instrument's Digital Signal Processors with JTAG (IEEE 1149.1) and CJTAG (IEEE 1149.7) interfaces.
- Advanced emulation controller provides high performance.
- USB 2.0 communications to host PC.
- Supports +1.2 volt to +4.1 volt JTAG interfaces.
- 1 power LED
- 6 LEDs for operational status.
- User accessible RESET switch
- Power provided by USB cable, **No Power supply** required
- Compatible with Texas Instruments Code Composer Studio and DSP BIOS
- Compatible with XP/Vista/Win 7/Linux Operating Systems



## 1.2 Key Items on the XDS560v2 LC Traveler JTAG Emulator

Figure 1-1 shows the XDS560v2 LC Traveler. The key items identified are:

- Status LEDs
- JTAG Header
- Emulator Tail Assembly
- USB connector to the host PC or hub



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# Chapter 2

## Installing the XDS560v2 LC Traveler JTAG Emulator

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This chapter helps you install the XDS560v2 LC Traveler JTAG Emulator. For use with specific software packages such as the TI's Code Composer Studio refer to their respective documentation.

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## 2.1 What You'll Need

The following checklists detail items that are shipped with the XDS560v2 LC Traveler JTAG emulator and additional items you'll need to use these tools.

### **Hardware checklist**

- \_\_\_ **host computer**     An IBM PC/AT or 100% compatible PC or laptop running Windows XP/Vista/7 or Linux with the following peripherals:
  - 2 GB of free hard disk space
  - Minimum 1 GB ram, 2 GB recommended
  - Minimum 1.5 GHz., dual core recommended
  - Color display
  - Internet access
  - One USB port or a powered USB hub with 1 port
  - DVD reader
  
- \_\_\_ **emulator module**     XDS560v2 LC Traveler JTAG emulator with USB cable
  
- \_\_\_ **target system**     A board with a TI DSP or Microcontroller and power supply
  
- \_\_\_ **optional adapters to target system, included**     20-pin CTI (2x10) to 14-pin TI (2x7)

### **Software checklist**

Please refer to the Quick Start Guide for the specific requirements of the software development tool chain you are using.

## 2.2 Installing the XDS560v2 LC Traveler JTAG Emulator

The next three sections describe the steps for installing the XDS560v2 LC Traveler JTAG Emulator to interface to a PC or laptop via USB.

### **WARNING !**

Target Cable Connectors:

Be very careful with the target cable connectors. Connect them gently; don't force them into position, or you may damage the connectors.

Do **not** connect or disconnect the emulator tail while the target system is powered up.

Installing the XDS560v2 LC Traveler JTAG emulator is a three step process:

1. Installing the Code Composer Studio software
2. Configuring the emulator tail with correct target adapter
3. Installing the USB connection to the host PC

### 2.2.1 Installing Code Composer Studio Software

Code Composer Studio should be installed before starting the hardware installation. Please refer to the separate software installation guide for the installation of Code Composer Studio and XDS560v2 LC Traveler device drivers.

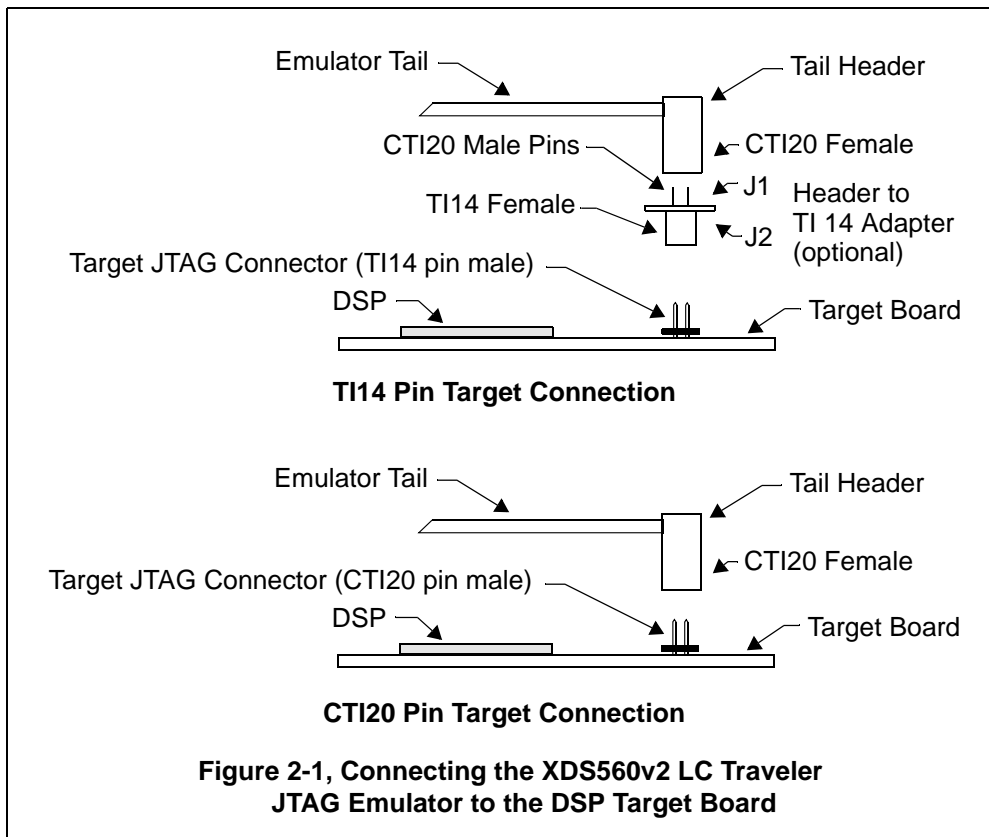
If you are doing a custom driver installation make sure the CD ROM is installed in the CD-ROM drive on your PC.

### 2.2.2 Configuring the Emulator Tail

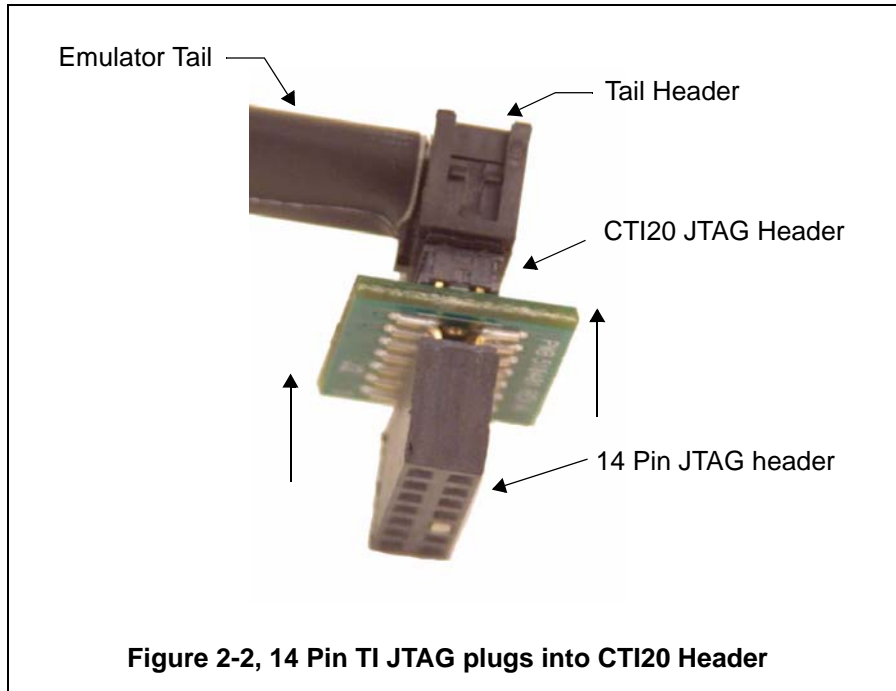
The emulator tail is the physical interface between the emulator and target board. The tail configuration will consist of 2 parts:

- A - Emulator tail with CTI20 pin header
- B - CTI20 to TI14 pin adapter

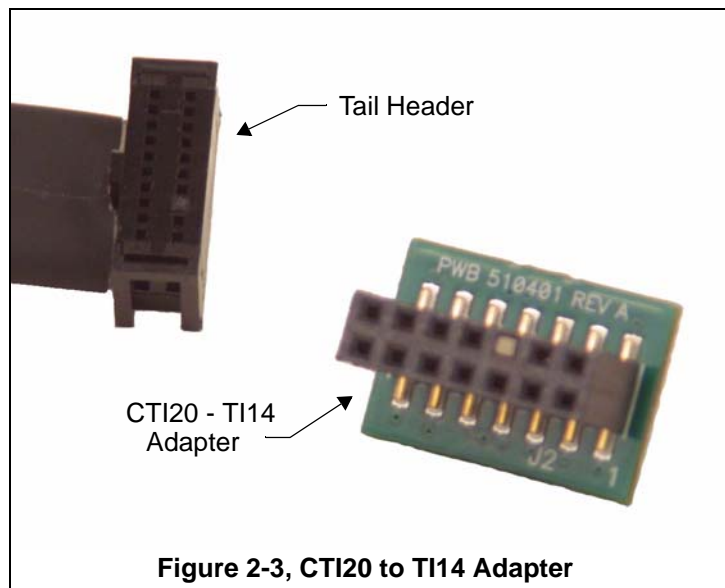
The female JTAG connector attached to the end of the emulator tail plugs onto the target's male pin header. The figure below shows how the XDS560v2 LC Traveler emulator header plugs onto the target's JTAG header



The figure below shows the factory installed configuration with the optional (CTI20 to TI14) adapter installed.



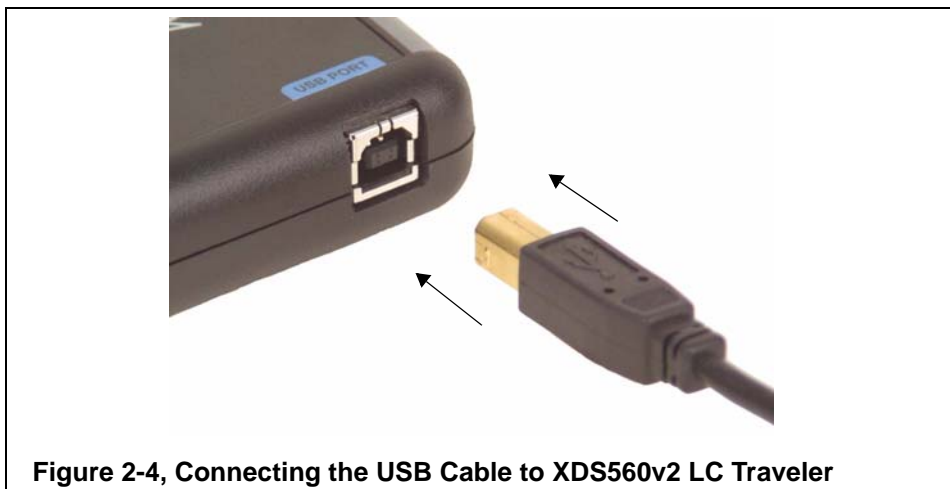
The adapter that comes with the XDS560v2 LC Traveler are shown in the figure below.



### 2.2.3 XDS560v2 LC Traveler Installation Checklist

The following section provides instructions to install the XDS560v2 LC Traveler JTAG emulator using the USB interface. To install the XDS560v2 LC Traveler JTAG emulator via the USB interface execute the following checklist:

- \_ Turn off the power to your target board.
- \_ The XDS560v2 LC Traveler must be connected to the host PC via USB. Connect the supplied USB cable to a USB port on your PC or laptop. The XDS560v2 LC Traveler may be used with a **powered** USB hub.
- \_ Connect the other end of the supplied USB cable to the XDS560v2 LC Traveler. This will apply power to the emulator.



**Figure 2-4, Connecting the USB Cable to XDS560v2 LC Traveler**

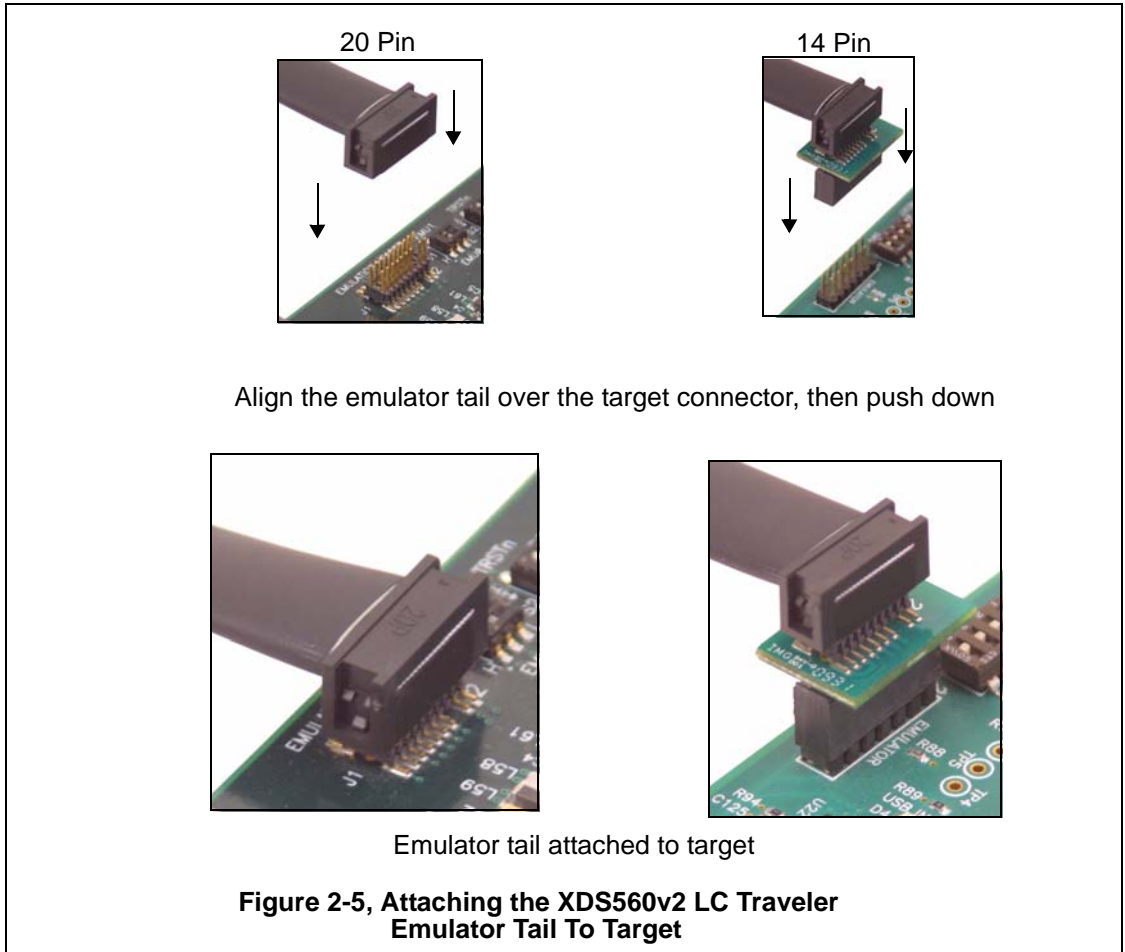
The "PWR" LED (see figure 2-8) on the XDS560v2 LC Traveler should illuminate. After about 45 seconds LED "State 3" should come on. At this point the XDS560v2 LC Traveler has booted its operating system and is ready for connecting via USB.

If this is the first connection over the USB the Windows Hardware Wizard should find the XDS560v2 LC Traveler and install its USB drivers.



- Now connect the tail of the emulator to the JTAG header on your target board. If your target board requires a 14 pin JTAG header please attach the CTI20-TI14 pin adapter to the female 20 pin connector on the Tail header.

Caution should be used in the routing of the tail ribbon cable to insure it does not go near the processor(s), power traces, or power cords.



- \_ Apply power to the target board.
- \_ Your system configuration should be similar to the one in Figures 2-6 and 2-7.

Figure 2-6 shows a typical configuration in which the XDS560v2 LC Traveler can be used with a host PC and target board via the USB interface.

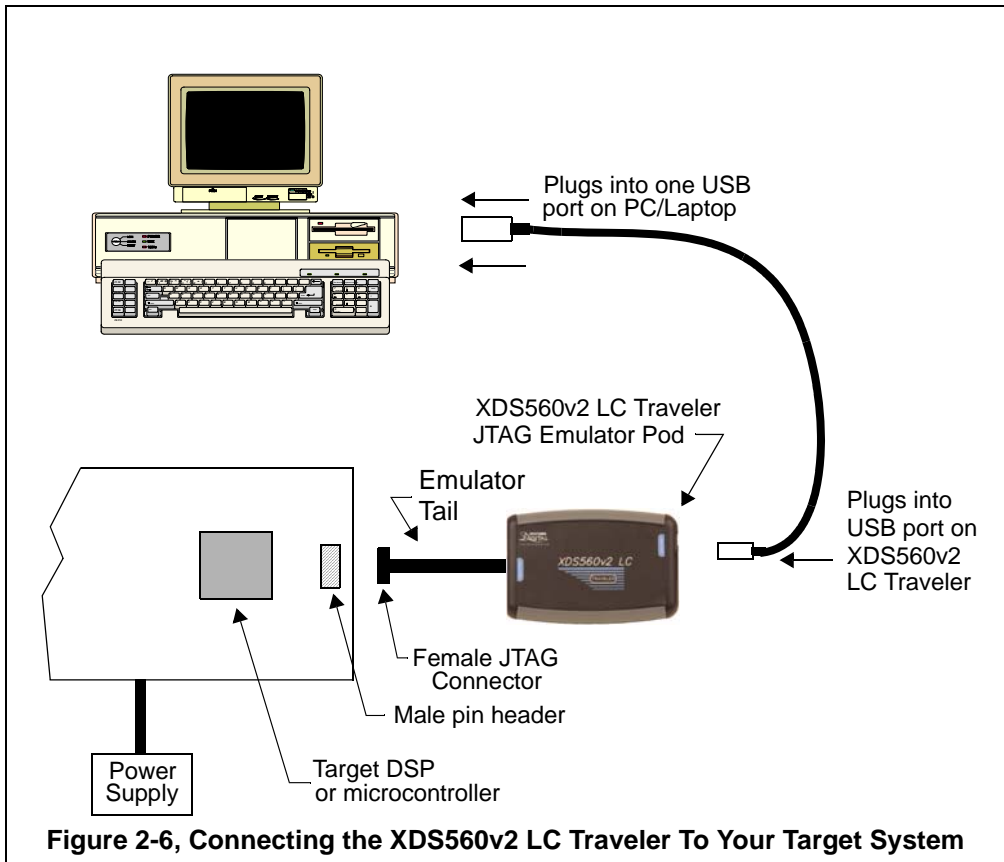
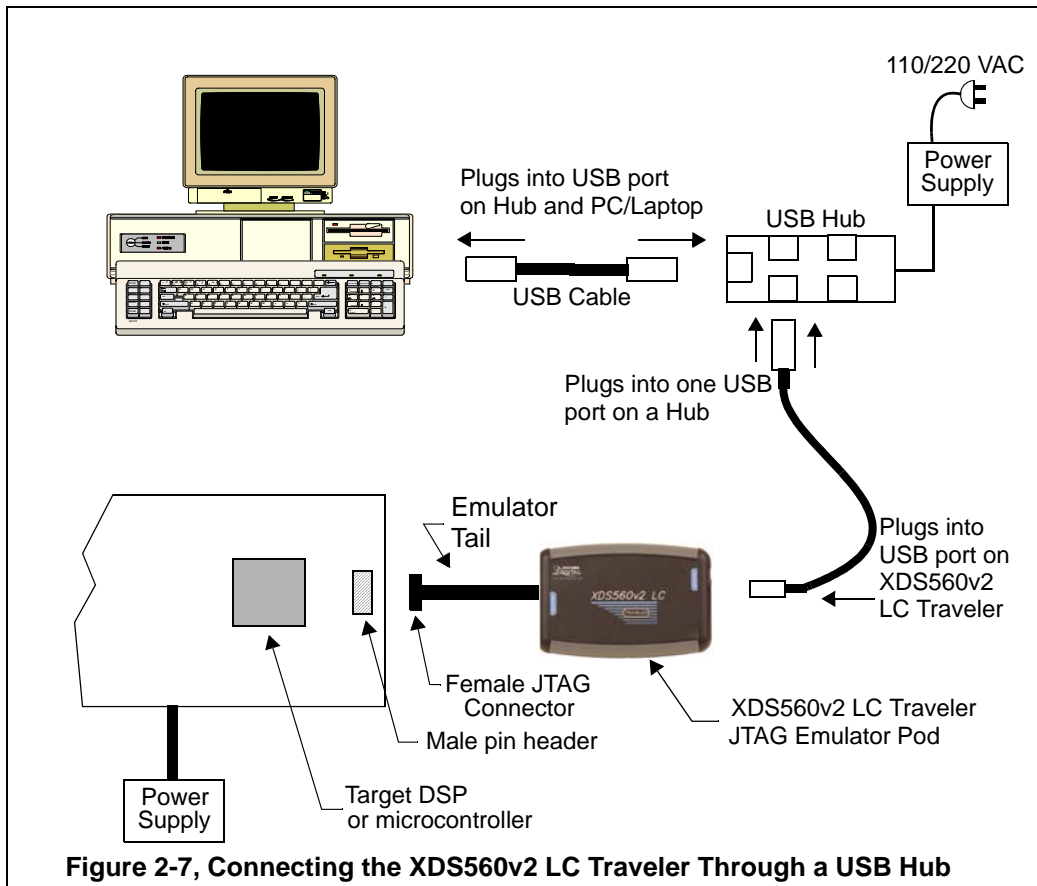
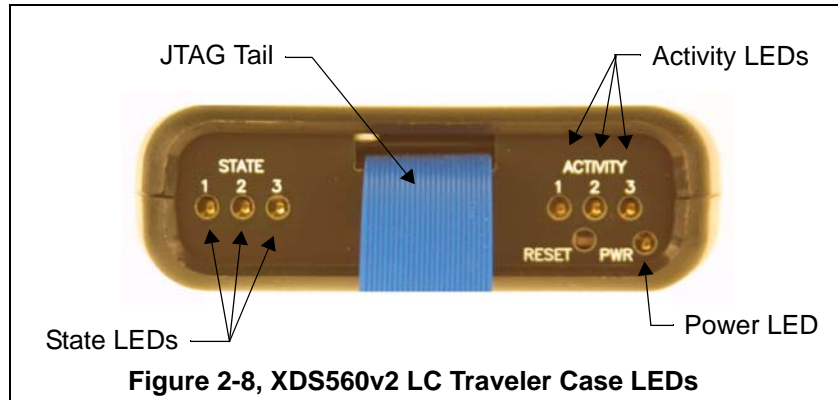


Figure 2-7 shows a typical configuration in which the XDS560v2 LC Traveler can be used with a host PC and target board via the USB Hub interface



### 2.3 XDS560v2 LC Traveler LEDs

The XDS560v2 LC Traveler has seven (7) Light Emitting Diodes (LEDs). These LEDs provide the user with the status of the emulator. The position of each LED is shown in the figure below.



**Figure 2-8, XDS560v2 LC Traveler Case LEDs**

The function of each LED is described in the table below.

**Table 1: XDS560v2 LC Traveler LEDs**

LED Name	LED Color	Function
POWER	Green	Emulator power indicator
ACTIVITY-3	Red	Target to XDS560v2 LC Traveler trace activity
ACTIVITY-2	Yellow	XDS560v2 LC Traveler to host activity
ACTIVITY-1	Green	Reserved
STATE-3	Red	On = XDS560v2 LC Traveler ready Off = XDS560v2 LC Traveler not ready
* STATE-2	Yellow	On = FPGA programmed Off = FPGA not programmed
STATE-1	Green	On = CCS connected Off = CCS disconnected

\* On the XDS560v2 LC Traveler the internal FPGA programming is deferred to the first target connection. This is a minor difference between the standard XDS560v2 and is done to conserve power.

### 2.3.1 XDS560V2 LC Traveler LEDs During Boot

When power is applied to the XDS510v2 LC Traveler it will begin booting its OS and provide a visual indication of its progress and also indicate if booting for normal operation or into safe mode. The boot manager will go to “Safe Mode” if it detects a problem during OS boot or a potential hardware problem with the emulator. When in “Safe Mode” you cannot run CCS instead you can use the **Sd560v2Cnfg** utility to diagnose the problem and return to normal boot mode. The following sequences with approximate timings are provided for reference. From the sequences you can see that it may take the XDS560v2 LC Traveler around 40 seconds to boot so during this time do **not** power cycle the unit.

#### Normal Boot Progress:

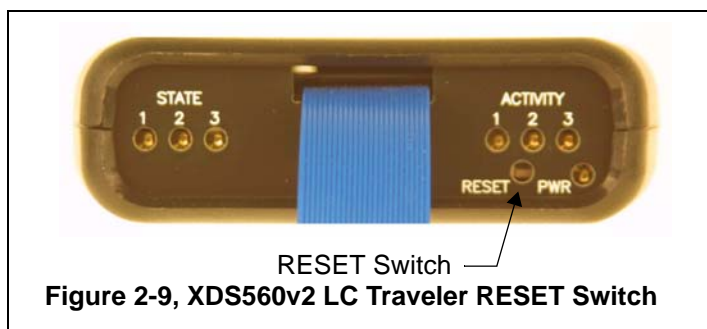
POWER.....ON time0  
 ACTIVITY-1...ON time0 + 3 seconds : Linux+Application booting  
 STATE-3.....ON time0 + 39 seconds : Communications application running  
 ACTIVITY-1...OFF time0 + 39 seconds : Boot process complete

#### Safe Mode Boot Progress:

POWER.....ON time0  
 ACTIVITY-1...ON time0 + 3 seconds : Linux+Application booting  
 STATE-3.....ON time0 + 4 seconds : Linux boot to Safe Mode  
 ACTIVITY-1, STATE-3 ..... OFF time0 + 39 seconds : Safe Boot process complete

## 2.4 RESET Switch

If the emulator becomes non-responsive the unit can be reset by depressing the RESET switch. The RESET switch is recessed and should be depressed with a non-metallic tool. The position of the RESET switch is shown in the figure below.



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## Specifications For Your Target System's Connection to the Emulator

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This chapter contains information about connecting the XDS560v2 LC Traveler JTAG emulator to your target system. The emulator tail may plug directly onto the target board or use an intermediate adapter.

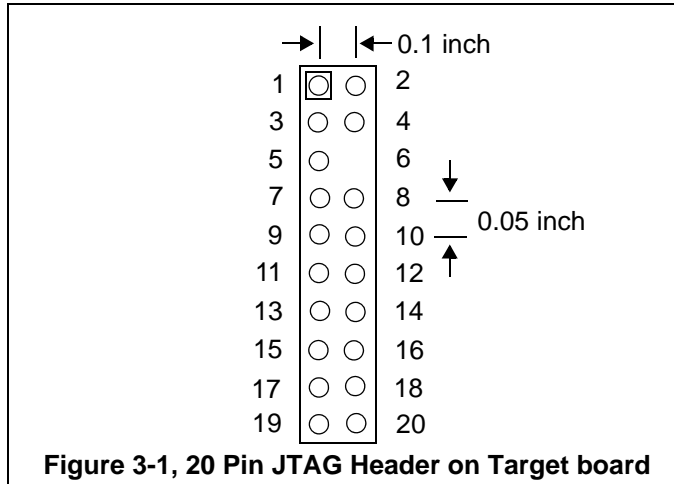
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### 3.1 Designing Your Target System’s Emulator Connector

The XDS560v2 LC Traveler JTAG emulator tail provides the CTI 20 pin interface. If your target board cannot use or accommodate this connector a target adapter will be required. A CTI20 to TI14 pin adapter comes with the XDS560v2 LC Traveler.

#### 3.1.1 Physical Layout of CTI20 Pin JTAG Connector

If your target board has a 20 pin JTAG header it should be laid out as shown in the figure below.



The signals on these pins are shown in the table below.

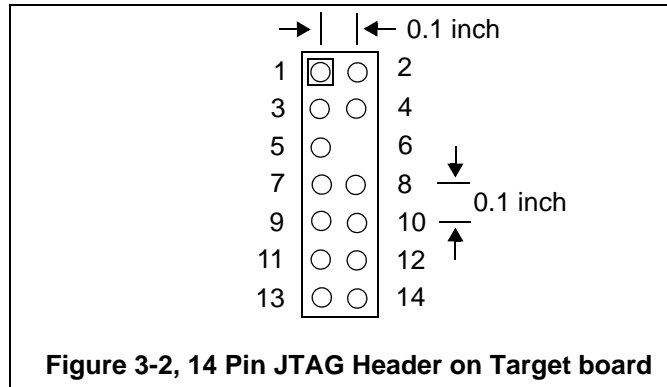
**Table 1: 20 Pin JTAG Header Signals**

Pin #	Signal	Pin #	Signal
1	TMS	2	nTRST
3	TDI	4	TDIS
5	TVD	6	No pin
7	TDO	8	GND
9	TCK_RET	10	GND
11	TCK	12	GND
13	EMU0	14	EMU1
15	nSRST	16	GND
17	EMU2	18	EMU3
19	EMU4	20	GND



### 3.1.1 Physical Layout of TI14 Pin JTAG Connector

If your target board has a 14 pin JTAG header it should be laid out as shown in the figure below. If your board does have a 14 pin header you should use the CTI20 to TI14 pin adapter that came with the XDS560v2 LC Traveler.



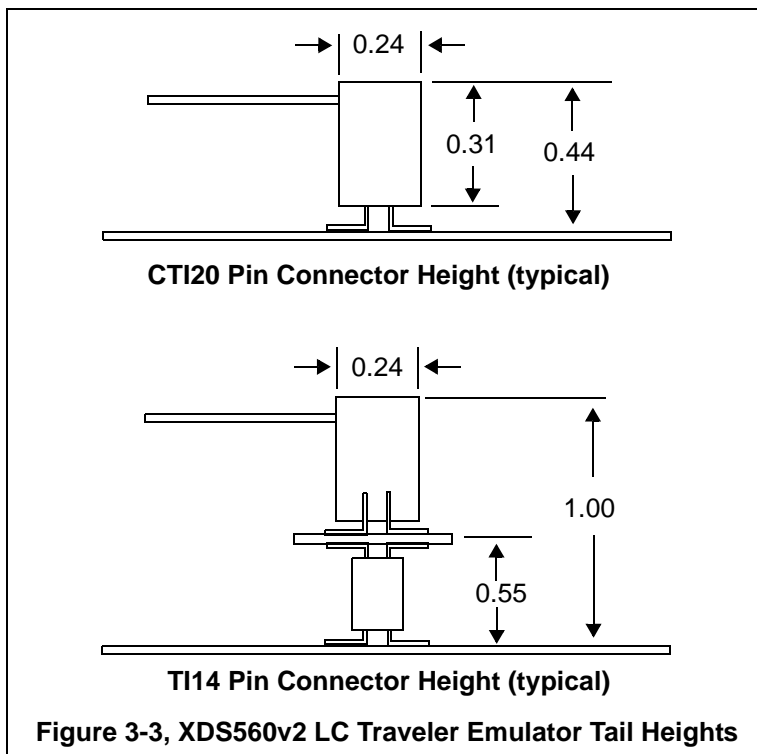
The signals on these pins are shown in the table below.

**Table 2: 14 Pin JTAG Header Signals**

Pin #	Signal	Pin #	Signal
1	TMS	2	TRST-
3	TDI	4	GND
5	PD	6	No pin
7	TDO	8	GND
9	TCK_RET	10	GND
11	TCK	12	GND
13	EMU0	14	EMU1

### 3.2 Emulator Tail Header Height

The emulator tail header is a stack of plugable adapters. This stack consumes more physical height than just the target JTAG connector. This height should be taken into consideration if the target board fits in an enclosure. The figure below shows the height of the tail header with adapters. All numbers are in inches.



## Mechanical Information

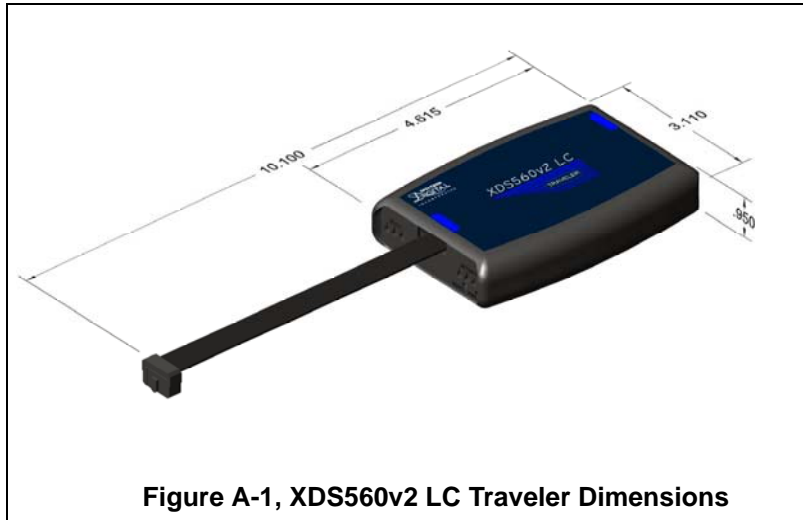
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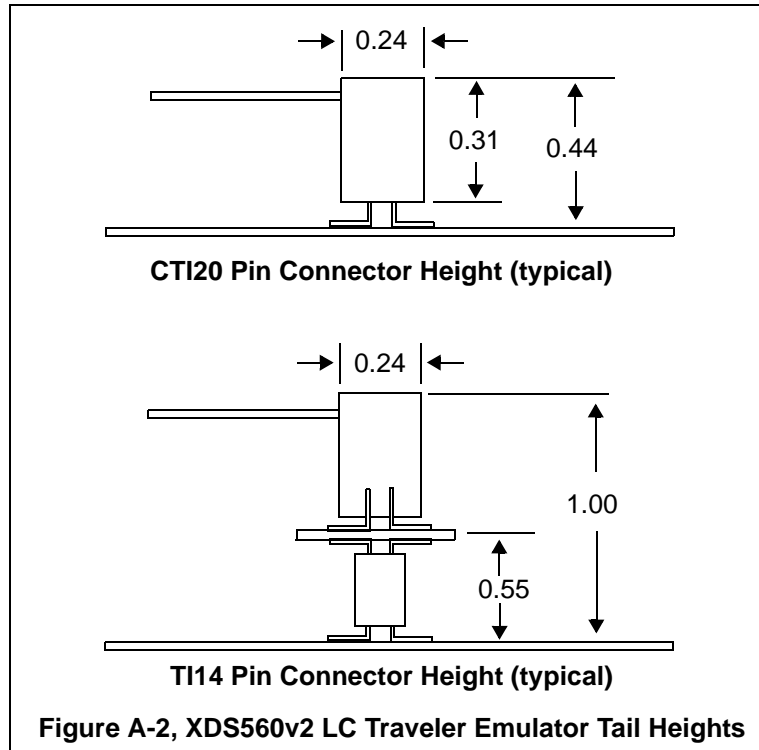
This appendix contains the mechanical information about the XDS560v2 LC Traveler JTAG Emulator produced by Spectrum Digital.

The figure below provides the physical dimensions of the XDS560v2 LC Traveler JTAG emulator.



**Note:** All dimensions are in inches and are nominal dimensions, unless otherwise specified.

The figure below provides the physical dimensions of the XDS560v2 LC Traveler JTAG tail header and adapter.



**Note:** All dimensions are in inches and are nominal dimensions, unless otherwise specified.

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