MSP430 Hardware Tools

User's Guide

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About This Manual

This manual describes the hardware of the Texas Instruments MSP-FET430 Flash Emulation Tool (FET). The FET is the program development tool for the MSP430 ultra-low-power microcontroller. Both available interface types, the parallel port interface and the USB interface, are described.

How to Use This Manual

Read and follow the instructions in Chapter 1. This chapter lists the contents of the FET, provides instructions on installing the hardware and according software drivers. After you see how quick and easy it is to use the development tools, TI recommends that you read all of this manual.

This manual describes the setup and operation of the FET but does not fully describe the MSP430 or the development software systems. For details of these items, see the appropriate TI documents listed in Section 1.18.

This manual applies to the following tools (and devices):

- MSP-FET430PIF (debug interface with parallel port connection, for all MSP430 flash-based devices)
- MSP-FET430UIF (debug interface with USB connection, for all MSP430 flash-based devices)
- eZ430-F2013 (USB stick form factor interface with attached MSP430F2013 target, for all MSP430F20xx devices)
- eZ430-T2012 (three MSP430F2012 based target boards)
- eZ430-RF2500 (USB stick form factor interface with attached MSP430F2274/CC2500 target, for all MSP430F20xx and MSP430F22xx devices)
- eZ430-RF2500T (one MSP430F2274/CC2500 target board including battery pack)
- eZ430-RF2500-SEH (USB stick form factor interface with attached MSP430F2274/CC2500 target and solar energy harvesting module)
- eZ430-Chronos-xxx (USB stick form factor interface with CC430F6137 based development system contained in a watch. Includes <1GHz RF USB access point)

The following tools contain the USB debug interface (MSP-FET430UIF) and the respective target socket module:

- MSP-FET430U14 (for MSP430F20xx devices in 14-pin PW packages)
- MSP-FET430U28 (for MSP430F11xx(A) devices in 20- and 28-in DW or PW packages)
- MSP-FET430U38 (for MSP430F22x2 and MSP430F22x4 devices in 38-pin DA packages)
- MSP-FET430U23x0 (for MSP430F23x0 devices in 40-pin RHA packages)
- MSP-FET430U48 (for MSP430F22x2 and MSP430F22x4 devices in 48-pin DL packages)
- MSP-FET430U64 (for MSP430F13x, MSP430F14x, MSP430F14x1, MSP430F15x, MSP430F16x(1), MSP430F23x, MSP430F24x, MSP430F24xx, MSP430F261x, MSP430F41x, MSP430F42x(A), MSP430FE42x(A), MSP430FE42x2, and MSP430FW42x devices in 64-pin PM packages)
- MSP-FET430U64A (for MSP430F41x2 devices in 64-pin PM packages)
- MSP-FET430U80 (for MSP430F241x, MSP430F261x, MSP430F43x, MSP430F43x1, MSP430FG43x, MSP430F47x, and MSP430FG47x devices in 80-pin PN packages)
- MSP-FET430U80USB (for MSP430F552x devices with USB peripheral in 80-pin PN packages)
- MSP-FET430U100 (for MSP430F43x, MSP430F43x1, MSP430F44x, MSP430FG461x, and MSP430F47xx devices in 100-pin PZ packages)
- MSP-FET430U100A (for MSP430F471xx devices in 100-pin PZ packages - red PCB)
- MSP-FET430U5x100 (for MSP430F54xx devices in 100-pin PZ packages)
- FET430F6137RF900 (for CC430F612x, CC430F613x, and CC430F513x devices in 64-pin RGC packages)

Stand-alone target-socket modules (without debug interface):

- MSP-TS430PW14 (for MSP430F20xx devices in 14-pin PW packages)
- MSP-TS430DW28 (for MSP430F11xx(A) devices in 28-in DW packages)
- MSP-TS430PW28 (for MSP430F11xx(A) devices in 28-in PW packages)
- MSP-TS430DA38 (for MSP430F22x2 and MSP430F22x4 devices in 38-pin DA packages)
- MSP-TS430DL48 (for MSP430F22x2 and MSP430F22x4 devices in 48-pin DL packages)
- MSP-TS430PM64 (for MSP430F13x, MSP430F14x, MSP430F14x1, MSP430F15x, MSP430F16x(1), MSP430F23x, MSP430F24x, MSP430F24xx, MSP430F261x, MSP430F41x, MSP430F42x(A), MSP430FE42x(A), MSP430FE42x2, and MSP430FW42x devices in 64-pin PM packages)
- MSP-TS430PM64A (for MSP430F41x2 devices in 64-pin PM packages)
- MSP-TS430PN80 (for MSP430F241x, MSP430F261x, MSP430F43x, MSP430F43x1, MSP430FG43x, MSP430F47x, and MSP430FG47x devices in 80-pin PN packages)
- MSP-TS430PN80USB (for MSP430F552x devices with USB peripheral in 80-pin PN packages)
- MSP-TS430PZ100 (for MSP430F43x, MSP430F43x1, MSP430F44x, MSP430FG461x, and MSP430F47xx devices in 100-pin PZ packages)
- MSP-TS430PZ100A (for MSP430F471xx devices in 100-pin PZ packages — red PCB)
- MSP-TS430PZ5x100 (for MSP430F54xx devices in 100-pin PZ packages)
- EM430F6137RF900 (for CC430F612x, CC430F613x, and CC430F513x devices in 64-pin RGC packages)

These tools contain the most up-to-date materials available at the time of packaging. For the latest materials (data sheets, user's guides, software, application information, etc.), visit the TI MSP430 web site at www.ti.com/msp430 or contact your local TI sales office.

Information About Cautions and Warnings

This document may contain cautions and warnings.

CAUTION

This is an example of a caution statement.

A caution statement describes a situation that could potentially damage your software or equipment.

WARNING

This is an example of a warning statement.

A warning statement describes a situation that could potentially cause harm to you.

The information in a caution or a warning is provided for your protection. Read each caution and warning carefully.

Related Documentation From Texas Instruments

MSP430 development tools documentation

CCS for MSP430 User's Guide, literature number SLAU157

IAR for MSP430 User's Guide, literature number SLAU138

eZ430-F2013 Development Tool User's Guide, literature number SLAU176

eZ430-RF2480 User's Guide, literature number SWRA176

eZ430-RF2500 Development Tool User's Guide, literature number SLAU227

eZ430-RF2500-SEH Development Tool User's Guide, literature number SLAU273

eZ430-Chronos Development Tool User's Guide, literature number SLAU292

MSP430xxxx device user's guides

MSP430x1xx Family User's Guide, literature number SLAU049

MSP430x2xx Family User's Guide, literature number SLAU144

MSP430x3xx Family User's Guide, literature number SLAU012

MSP430x4xx Family User's Guide, literature number SLAU056

MSP430x5xx Family User's Guide, literature number SLAU208

If You Need Assistance

Support for the MSP430 devices and the FET development tools is provided by the Texas Instruments Product Information Center (PIC). Contact information for the PIC can be found on the TI web site at www.ti.com/support. The Texas Instruments E2E Community support forums for the MSP430 provide open interaction with peer engineers, TI engineers, and other experts. Additional device-specific information can be found on the MSP430 web site.

FCC Warning

This equipment is intended for use in a laboratory test environment only. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to subpart J of part 15 of FCC rules, which are designed to provide reasonable protection against radio-frequency interference. Operation of this equipment in other environments may cause interference with radio communications, in which case, the user is required to take whatever measures may be required to correct this interference at his own expense.

Get Started Now!

This chapter lists the contents of the FET and provides instruction on installing the hardware.

Topic **Page**

1.1 Flash Emulation Tool (FET) Overview

TI offers several flash emulation tools according to different requirements.

Table 1-1. Flash Emulation Tool (FET) Features

	eZ430-F2013	eZ430-RF2500	eZ430-Chronos	MSP-FET430UIF	MSP-FET430PIF
Supports all MSP430 flash-based devices (F1xx, F2xx, F4xx, F5xx, F6xx)				X	X
Supports MSP430F20xx devices only	X				
Supports MSP430F20xx/F21x2/F22xx only		X			
Supports CC430F51xx/CC430F61xx/ MSP430F20xx/F21x2/F22xx/F41x2/ F54xx/F54xxA/F55xx only			X		
Allows fuse blow				X	
Adjustable target supply voltage				X	
Fixed 2.8-V target supply voltage					X
Fixed 3.6-V target supply voltage	X	X	X		
4-wire JTAG				X	X
2-wire JTAG(1)	X	X	X	X	
Application UART		X	X		
Supported by CCE	X	X		X	X
Supported by CCS	X	X	X	X	X(2)
Supported by IAR	X	X	X	X	X

(1) The 2-wire JTAG debug interface is also referred to as Spy-Bi-Wire (SBW) interface.
(2) Not supported by default. Driver installation needs to be selected manually during the CCS installation process.

1.2 Kit Contents, MSP-FET430PIF

- One READ ME FIRST document
- One MSP430 CD-ROM
- One MSP-FET430PIF interface module
- One 25-conductor cable
- One 14-conductor cable

1.3 Kit Contents, eZ430-F2013

- One QUICK START GUIDE document
- One eZ430-F2013 CD-ROM
- One eZ430-F2013 development tool including one MSP430F2013 target board

1.4 Kit Contents, eZ430-T2012

- Three MSP430F2012-based target boards

1.5 Kit Contents, eZ430-RF2500

- One QUICK START GUIDE document
- One eZ430-RF2500 CD-ROM
- One eZ430-RF2500 development tool including one MSP430F2274/CC2500 target board
- One eZ430-RF2500T target board
- One AAA battery pack with expansion board (batteries included)

1.6 Kit Contents, eZ430-RF2500T

- One eZ430-RF2500T target board
- One AAA battery pack with expansion board (batteries included)

1.7 Kit Contents, eZ430-RF2500-SEH

- One MSP430 development tool CD containing documentation and development software
- One eZ430-RF USB debugging interface
- Two eZ430-RF2500T wireless target boards
- One SEH-01 solar energy harvester board
- One AAA battery pack with expansion board (batteries included)

1.8 Kit Contents, eZ430-Chronos-xxx

'433, '868, '915

- One QUICK START GUIDE document
- One eZ430-Chronos CD-ROM
- One ez430-Chronos emulator
- One screwdriver
- Two spare screws

  eZ430-Chronos-433:
  - One 433-MHz eZ430-Chronos watch (battery included)
  - One 433-MHz eZ430-Chronos access point

  eZ430-Chronos-868:
  - One 868-MHz eZ430-Chronos watch (battery included)
  - One 868-MHz eZ430-Chronos access point

  eZ430-Chronos-915:
  - One 915-MHz eZ430-Chronos watch (battery included)
  - One 915-MHz eZ430-Chronos access point

1.9 Kit Contents, MSP-FET430UIF

- One READ ME FIRST document
- One MSP430 CD-ROM
- One MSP-FET430UIF interface module
- One USB cable
- One 14-conductor cable

1.10 Kit Contents, MSP-FET430Uxx

'U14, 'U28, 'U38, 'U23x0, 'U48, 'U64, 'U64A, 'U80, 'U80USB, 'U100, 'U100A, 'U5x100

- One READ ME FIRST document
- One MSP430 CD-ROM
- One MSP-FETP430UIF USB interface module. This is the unit that has a USB B-connector on one end of the case, and a 2×7-pin male connector on the other end of the case.
- One 32.768-kHz crystal
- One target socket module

  MSP-FET430U14: One MSP-TS430PW14 target socket module. This is the PCB on which is mounted a 14-pin ZIF socket. It fits MSP430F20xx devices in 14-pin PW packages. A 2×7-pin male connector is also present on the PCB.

  MSP-FET430U28: One MSP-TS430DW28 or MSP-TS430PW28 target socket module. This is the PCB on which is mounted a 28-pin ZIF socket. It fits MSP430F11xx(A) devices in 20- and 28-pin DW and PW packages. A 2×7-pin male connector is also present on the PCB.

  MSP-FET430U38: One MSP-TS430DA38 target socket module. This is the PCB on which is mounted a 38-pin ZIF socket. It fits MSP430F22x2 and MSP430F22x4 devices in 38-pin DA packages. A 2×7-pin male connector is also present on the PCB.

  MSP-FET430U23x0: One MSP-TS430QFN23x0 (former name MSP-TS430QFN40) target socket module. This is the PCB on which is mounted a 40-pin ZIF socket. It fits MSP430F23x0 devices in 40-pin RHA packages. A 2×7-pin male connector is also present on the PCB.

  MSP-FET430U48: One MSP-TS430DL48 target socket module. This is the PCB on which is mounted a 48-pin ZIF socket. It fits MSP430F42x0 and MSP430FG42x0 devices in 48-pin DL packages. A 2×7-pin male connector is also present on the PCB.

  MSP-FET430U64: One MSP-TS430PM64 target socket module. This is the PCB on which is mounted a 64-pin ZIF socket. It fits MSP430F13x, MSP430F14x, MSP430F14x1, MSP430F15x, MSP430F16x(1), MSP430F23x, MSP430F24x, MSP430F24xx, MSP430F261x, MSP430F41x, MSP430F42x(A), MSP430FE42x(A), MSP430FE42x2, and MSP430FW42x devices in 64-pin PM packages. A 2×7-pin male connector is also present on the PCB.

  MSP-FET430U64A: One MSP-TS430PM64A target socket module. This is the PCB on which is mounted a 64-pin ZIF socket. It fits MSP430F41x2 devices in 64-pin PM packages. This tool does not support other MSP430 derivatives in the 64-pin PM package. A 2×7-pin male connector is also present on the PCB.

  MSP-FET430U80: One MSP-TS430PN80 target socket module. This is the PCB on which is mounted a 80-pin ZIF socket. It fits MSP430F241x, MSP430F261x, MSP430F43x, MSP430F43x1, MSP430FG43x, MSP430F47x, and MSP430FG47x devices in 80-pin PN packages. A 2×7-pin male connector is also present on the PCB.

  MSP-FET430U80USB: One MSP-TS430PN80USB target socket module. This is the PCB on which is mounted a 80-pin ZIF socket. It fits MSP430F552x devices with USB peripheral in 80-pin PN packages. This tool does not support other MSP430 derivatives in the 80-pin PN package. A 2×7-pin male connector is also present on the PCB.

  MSP-FET430U100: One MSP-TS430PZ100 target socket module. This is the PCB on which is mounted a 100-pin ZIF socket. It fits MSP430F43x, MSP430F43x1, MSP430F44x, MSP430FG461x, and MSP430F47xx devices in 100-pin PZ packages. A 2×7-pin male connector is also present on the PCB.

  MSP-FET430U100A: One MSP-TS430PZ100A target socket module (red PCB). This is the PCB on which is mounted a 100-pin ZIF socket. It fits MSP430F471xx devices in 100-pin PZ packages. This tool does not support other MSP430 derivatives in the 100-pin PZ package. A 2×7-pin male connector is also present on the PCB.

  MSP-FET430U5x100: One MSP-TS430PZ5x100 target socket module. This is the PCB on which is mounted a 100-pin ZIF socket. It fits MSP430F54xx devices in 100-pin PZ packages. This tool does not support other MSP430 derivatives in the 100-pin PZ package. A 2×7-pin male connector is also present on the PCB.
- One USB cable
- One 14-conductor cable
- Four or eight headers

MSP-FET430U14: Four PCB 1×7-pin headers (two male and two female)
MSP-FET430U28: Four PCB 1×14-pin headers (two male and two female)
MSP-FET430U38: Four PCB 1×19-pin headers (two male and two female)
MSP-FET430U23x0: Eight PCB 1×10-pin headers (four male and four female)
MSP-FET430U48: Four PCB 2×24-pin headers (two male and two female)
MSP-FET430U64: Eight PCB 1×16-pin headers (four male and four female)
MSP-FET430U64A: Eight PCB 1×16-pin headers (four male and four female)
MSP-FET430U80: Eight PCB 1×20-pin headers (four male and four female)
MSP-FET430U80USB: Eight PCB 1×20-pin headers (four male and four female)
MSP-FET430U100: Eight PCB 1×25-pin headers (four male and four female)
MSP-FET430U100A: Eight PCB 1×25-pin headers (four male and four female)
MSP-FET430U5x100: Eight PCB 1×25-pin headers (four male and four female)

- One small box containing two or four MSP430 device samples
  MSP-FET430U14: MSP430F2013IPW
  MSP-FET430U28: MSP430F123IDW and/or MSP430F1232IDW or MSP430F2132IPW
  MSP-FET430U38: MSP430F2274IDA
  MSP-FET430U23x0: MSP430F2370IRHA
  MSP-FET430U48: MSP430F4270IDL
  MSP-FET430U64: MSP430F417IPM and MSP430F169IPM
  MSP-FET430U64A: MSP430F4152IPM
  MSP-FET430U80: MSP430FG439IPN
  MSP-FET430U80USB: MSP430F5529IPN
  MSP-FET430U100: MSP430FG4619IPZ
  MSP-FET430U100A: MSP430F47197IPZ
  MSP-FET430U5x100: MSP430F5438IPZ
  Consult the device data sheets for device specifications. Device errata can be found in the respective device product folder on the web provided as a PDF document. Depending on the device, errata may also be found in the device bug database at www.ti.com/sc/cgi-bin/buglist.cgi.

1.11 Kit Contents, FET430F6137RF900

- One READ ME FIRST document
- One legal notice
- One MSP430 CD-ROM
- One MSP-FET430UIF interface module
- Two EM430F6137RF900 target socket modules. This is the PCB on which is mounted a 64-pin socket. It fits CC430F612x, CC430F613x, and CC430F513x devices in 64-pin RGC packages. A 2×7-pin male connector is also present on the PCB.
- Two CC430EM battery packs
- Four AAA batteries
- Two 868-/915-MHz antennas
- Two 32-kHz crystals
- 18 PCB 2x4-pin headers
- One USB cable

1.12 Kit Contents, MSP-TS430xx

'PW14, 'PW28, 'DA38, 'DL48, 'DW28, 'PM64, 'PM64A, 'PN80, 'PN80USB, 'PZ100, 'PZ100A, 'PZ5x100

- One READ ME FIRST document
- One MSP430 CD-ROM
- One 32.768-kHz crystal
- One target socket module

  MSP-TS430PW14: One MSP-TS430PW14 target socket module. This is the PCB on which is mounted a 14-pin ZIF socket. It fits MSP430F20xx devices in 14-pin PW packages. A 2×7-pin male connector is also present on the PCB.

  MSP-TS430DW28: One MSP-TS430DW28 target socket module. This is the PCB on which is mounted a 28-pin ZIF socket. It fits MSP430F11xx(A) devices in 28-pin DW packages. A 2×7-pin male connector is also present on the PCB.

  MSP-TS430PW28: One MSP-TS430PW28 target socket module. This is the PCB on which is mounted a 28-pin ZIF socket. It fits MSP430F11xx(A) devices in 28-pin PW packages. A 2×7-pin male connector is also present on the PCB.

  MSP-TS430DA38: One MSP-TS430DA38 target socket module. This is the PCB on which is mounted a 38-pin ZIF socket. It fits MSP430F22x2 and MSP430F22x4 devices in 38-pin DA packages. A 2×7-pin male connector is also present on the PCB.

  MSP-TS430DL48: One MSP-TS430DL48 target socket module. This is the PCB on which is mounted a 48-pin ZIF socket. It fits MSP430F42x0 and MSP430FG42x0 devices in 48-pin DL packages. A 2×7-pin male connector is also present on the PCB.

  MSP-TS430PM64: One MSP-TS430PM64 target socket module. This is the PCB on which is mounted a 64-pin ZIF socket. It fits MSP430F13x, MSP430F14x, MSP430F14x1, MSP430F15x, MSP430F16x(1), MSP430F23x, MSP430F24x, MSP430F24xx, MSP430F261x, MSP430F41x, MSP430F42x(A), MSP430FE42x(A), MSP430FE42x2, and MSP430FW42x devices in 64-pin PM packages, except the MSP430F41x2. A 2×7-pin male connector is also present on the PCB.

  MSP-TS430PM64A: One MSP-TS430PM64A target socket module. This is the PCB on which is mounted a 64-pin ZIF socket. It fits MSP430F41x2 devices in 64-pin PM packages. This tool does not support other MSP430 derivatives in the 64-pin PM package. A 2×7-pin male connector is also present on the PCB.

  MSP-TS430PN80: One MSP-TS430PN80 target socket module. This is the PCB on which is mounted an 80-pin ZIF socket. It fits MSP430F241x, MSP430F261x, MSP430F43x, MSP430F43x1, MSP430FG43x, MSP430F47x, and MSP430FG47x devices in 80-pin PN packages. A 2×7-pin male connector is also present on the PCB.

  MSP-TS430PN80USB: One MSP-TS430PN80USB target socket module. This is the PCB on which is mounted an 80-pin ZIF socket. It fits the MSP430F552x and MSP430F551x devices in 80-pin PN packages. This tool does not support other MSP430 devices in the 80-pin PN package.

  MSP-TS430PZ100: One MSP-TS430PZ100 target socket module (red PCB). This is the PCB on which is mounted a 100-pin ZIF socket. It fits MSP430F43x, MSP430F43x1, MSP430F44x, MSP430FG461x, and MSP430F47xx devices in 100-pin PZ packages. A 2×7-pin male connector is also present on the PCB.

  MSP-TS430PZ100A: One MSP-TS430PZ100A target socket module (red PCB). This is the PCB on which is mounted a 100-pin ZIF socket. It fits MSP430F471xx devices in 100-pin PZ packages. A 2×7-pin male connector is also present on the PCB.

  MSP-TS430U5x100: One MSP-TS430PZ5x100 target socket module. This is the PCB on which is mounted a 100-pin ZIF socket. It fits all MSP430F54xx devices in 100-pin PZ packages. A 2×7-pin male connector is also present on the PCB.
- PCB headers

  MSP-TS430PW14: Four PCB 1×7-pin headers (two male and two female)

  MSP-TS430DW28: Eight PCB 1×16-pin headers (four male and four female)

  MSP-TS430PW28: Four PCB 1×14-pin headers (two male and two female)

  MSP-TS430DA38: Four PCB 1×19-pin headers (two male and two female)

  MSP-TS430DL48: Four PCB 2×24-pin headers (two male and two female)

  MSP-TS430PM64: Eight PCB 1×16-pin headers (four male and four female)

MSP-TS430PM64A: Eight PCB 1×16-pin headers (four male and four female)
MSP-TS430PN80: Eight PCB 1×16-pin headers (four male and four female)
MSP-TS430PN80USB: Eight PCB 1×16-pin headers (four male and four female)
MSP-TS430PZ100A: Eight PCB 1×25-pin headers (four male and four female)
MSP-TS430PZ5x100: Eight PCB 1×25-pin headers (four male and four female)

- One small box containing two MSP430 device samples
  MSP-TS430PW14: MSP430F2013IPW
  MSP-TS430DW28: MSP430F1232IDWR
  MSP-TS430PW28: MSP430F2132IPW
  MSP-TS430DA38: MSP430F2274IDA
  MSP-TS430DL48: MSP430F4270IDL
  MSP-TS430PM64: MSP430F417IPM and MSP430F169IPM
  MSP-TS430PM64A: MSP430F4152IPM
  MSP-TS430PN80: MSP430FG439IPN
  MSP-TS430PN80USB: MSP430F5529IPN
  MSP-TS430PZ100A: MSP430F47197IPZ
  MSP-TS430PZ5x100: MSP430F5438IPZ
  Consult the device data sheets for device specifications. Device errata can be found in the respective device product folder on the web provided as a PDF document. Depending on the device, errata may also be found in the device bug database at www.ti.com/sc/cgi-bin/buglist.cgi.

1.13 Kit Contents, EM430F6137RF900

- One READ ME FIRST document
- One legal notice
- One MSP430 CD-ROM
- Two EM430F6137RF900 target socket modules. This is the PCB on which is mounted a 64-pin socket. It fits CC430F612x, CC430F613x, and CC430F513x devices in 64-pin RGC packages. A 2×7-pin male connector is also present on the PCB.
- Two CC430EM battery packs
- Four AAA batteries
- Two 868-/915-MHz antennas
- Two 32-kHz crystals
- 18 PCB 2×4-pin headers

1.14 Hardware Installation, MSP-FET430PIF

Follow these steps to install the hardware for the MSP-FET430PIF tools:

1. Use the 25-conductor cable to connect the FET interface module to the parallel port of the PC. The necessary driver for accessing the PC parallel port is installed automatically during CCE or IAR Embedded Workbench installation. Note that a restart is required after the CCE or IAR Embedded Workbench installation for the driver to become active.
2. Use the 14-conductor cable to connect the parallel-port debug interface module to a target board, such as an MSP-TS430xxx target socket module. Module schematics and PCBs are shown in .

1.15 Hardware Installation, MSP-FET430UIF

Follow these steps to install the hardware for the MSP-FET430UIF tool:

1. Use the USB cable to connect the USB-FET interface module to a USB port on the PC. The USB FET should be recognized, as the USB device driver should have been installed with the IDE (Code Composer Essentials/Studio or IAR Embedded Workbench).. If the install wizard starts, follow the prompts and point the wizard to the driver files.
   The default location for CCE is C:\Program Files\Texas Instruments\MSP430_USB_DRIVERS_v3\.
   The default location for CCS is C:\Program Files\Texas Instruments\ccs4\emulation\drivers\msp430\.
   The default location for IAR Embedded Workbench is <Installation Root>\Embedded Workbench x.x\430\bin\WinXP.
   Detailed driver installation instructions can be found in .
2. After connecting to a PC, the USB FET performs a self-test during which the red LED flashes for approximately two seconds. If the self-test passes successfully, the green LED stays on.
3. Use the 14-conductor cable to connect the USB-FET interface module to a target board, such as an MSP-TS430xxx target socket module.
4. Ensure that the MSP430 device is securely seated in the socket, and that its pin 1 (indicated with a circular indentation on the top surface) aligns with the "1" mark on the PCB.
5. Compared to the parallel-port debug interface, the USB FET has additional features including JTAG security fuse blow and adjustable target V_{CC} (1.8 V to 3.6 V). Supply the module with up to 100 mA.

1.16 Hardware Installation, eZ430-F2013, eZ430-RF2500, eZ430-Chronos

Follow these steps to install the hardware for the eZ430-F2013 and eZ430-RF2500 tools:

1. Connect the eZ430-F2013, eZ430-RF2500 and eZ430-Chronos to a USB port of the PC.
2. The USB FET should be recognized by the PC. The USB device driver should have been installed with the IDE (Code Composer Studio or IAR Embedded Workbench - Code Composer Essentials only supports eZ430-F2013 and eZ430-RF2500). If the install wizard starts, follow the prompts and point the wizard to the driver files.
   The default location for CCE is C:\Program Files\Texas Instruments\MSP430_USB_DRIVERS_v3\.
   The default location for CCS is C:\Program Files\Texas Instruments\ccs4\emulation\drivers\msp430\.
   The default location for IAR Embedded Workbench is <Installation Root>\Embedded Workbench x.x\430\bin\WinXP.
   Detailed driver installation instructions can be found in .

1.17 Hardware Installation, MSP-FET430Uxx, MSP-TS430xxx, FET430F6137RF900, EM430F6137RF900

MSP-FET430Uxx – 'U14, 'U28, 'U38, 'U23x0, 'U48, 'U64, 'U64A, 'U80, 'U80USB, 'U100, 'U100A, 'U5x100

TS430xxx – 'PW14, 'PW28, 'DA38, 'DL48, 'DW28, 'PM64, 'PM64A, 'PN80, 'PN80USB, 'PZ100, 'PZ100A, 'PZ5x100

Follow these steps to install the hardware for the MSP-FET430Uxx and MSP-TS430xxx tools:

1. Connect the MSP-FET430PIF or MSP-FET430UIF debug interface to the appropriate port of the PC. Use the 14-conductor cable to connect the FET interface module to the supplied target socket module.
2. Ensure that the MSP430 device is securely seated in the socket and that its pin 1 (indicated with a circular indentation on the top surface) aligns with the "1" mark on the PCB.
3. Ensure that the two jumpers (LED and VCC) near the 2×7-pin male connector are in place. Illustrations of the target socket modules and their parts are found in .

NOTE: Regarding 'U38, see FAQ Hardware #2 in .

1.18 Important MSP430 Documents on the CD-ROM and Web

The primary sources of MSP430 information are the device-specific data sheet and user's guide. The most up-to-date versions of these documents that are available at the time of production are provided on the CD-ROM included with this tool. The MSP430 web site (www.ti.com/msp430) contains the most recent version of these documents.

PDF documents describing the CCS tools (CCS IDE, the assembler, the C compiler, the linker, and the librarian) are in the msp430\documentation folder. A Code Composer Studio specific Wiki page (FAQ) is available, and the Texas Instruments E2E Community support forums for the MSP430 and Code Composer Studio v4 provide additional help besides the product help and Welcome page.

PDF documents describing the IAR tools (Workbench/C-SPY, the assembler, the C compiler, the linker, and the librarian) are in the common\doc and 430\doc folders. Supplements to the documents (i.e., the latest information) are available in HTML format in the same directories. 430\doc\readme_start.htm provides a convenient starting point for navigating the IAR documentation.

Design Considerations for In-Circuit Programming

This chapter presents signal requirements for in-circuit programming of the MSP430.

Topic **Page**

2.1 Signal Connections for In-System Programming and Debugging

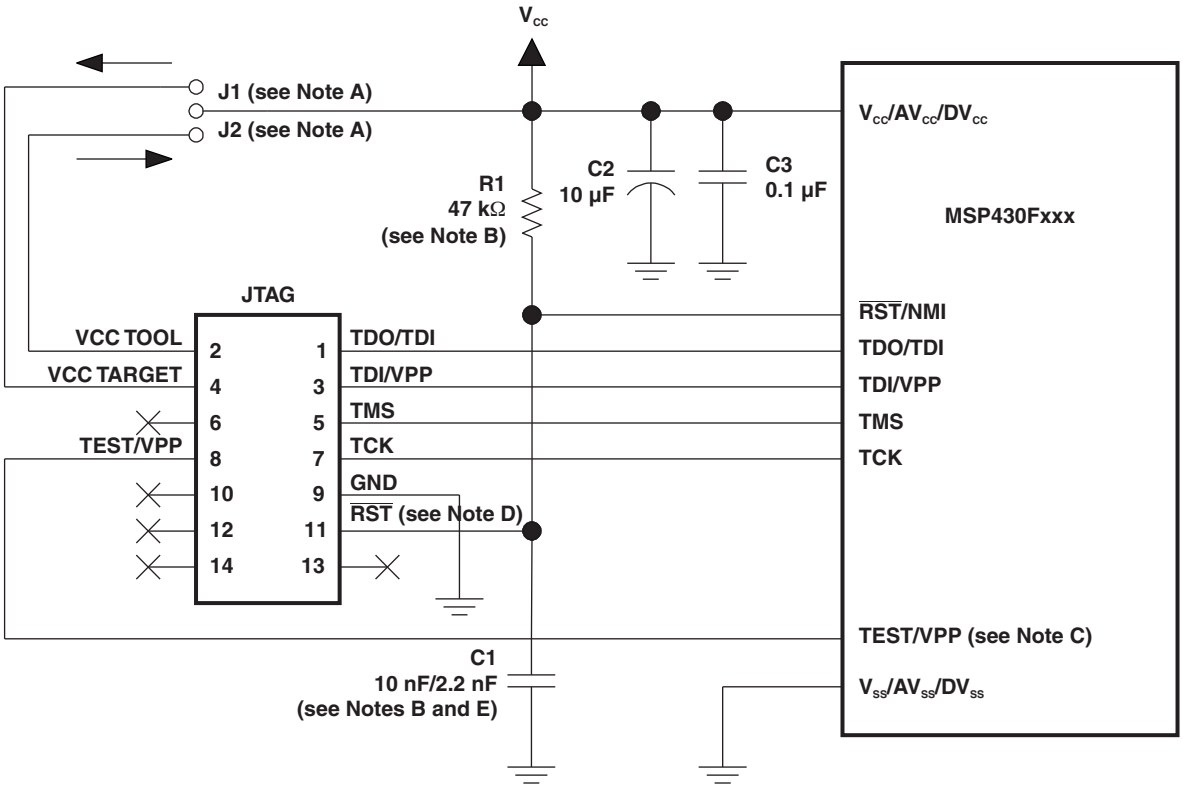
MSP-FET430PIF, MSP-FET430UIF, MSP-GANG430, MSP-PRGS430

With the proper connections, the debugger and an FET hardware JTAG interface (such as the MSP-FET430PIF and MSP-FET430UIF) can be used to program and debug code on the target board. In addition, the connections also support the MSP-GANG430 or MSP-PRGS430 production programmers, thus providing an easy way to program prototype boards, if desired.

Figure 2-1 shows the connections between the 14-pin FET interface module connector and the target device required to support in-system programming and debugging for 4-wire JTAG communication. Figure 2-2 shows the connections for 2-wire JTAG mode (Spy-Bi-Wire). While 4-wire JTAG mode is supported on all MSP430 devices, 2-wire JTAG mode is available on selected devices only. See the *CCE for MSP430 User's Guide* (SLAU157) or *IAR for MSP430 User's Guide* (SLAU138) for information on which interface method can be used on which device.

The connections for the FET interface module and the MSP-GANG430 or MSP-PRGS430 are identical. Both the FET interface module and MSP-GANG430 can supply V_{CC} to the target board (via pin 2). In addition, the FET interface module and MSP-GANG430 have a V_{CC}-sense feature that, if used, requires an alternate connection (pin 4 instead of pin 2). The V_{CC}-sense feature senses the local V_{CC} present on the target board (i.e., a battery or other local power supply) and adjusts the output signals accordingly. If the target board is to be powered by a local V_{CC}, then the connection to pin 4 on the JTAG should be made, and not the connection to pin 2. This utilizes the V_{CC}-sense feature and prevents any contention that might occur if the local on-board V_{CC} were connected to the V_{CC} supplied from the FET interface module or the MSP-GANG430. If the V_{CC}-sense feature is not necessary (i.e., the target board is to be powered from the FET interface module or the GANG430) the V_{CC} connection is made to pin 2 on the JTAG header and no connection is made to pin 4. Figure 2-1 and Figure 2-2 show a jumper block that supports both scenarios of supplying V_{CC} to the target board. If this flexibility is not required, the desired V_{CC} connections may be hard-wired eliminating the jumper block. Pins 2 and 4 must not be connected simultaneously.

Note that in 4-wire JTAG communication mode (see Figure 2-1), the connection of the target RST signal to the JTAG connector is optional when using devices that support only 4-wire JTAG communication mode. However, when using devices that support 2-wire JTAG communication mode in 4-wire JTAG mode, the RST connection must be made. The MSP430 development tools and device programmers perform a target reset by issuing a JTAG command to gain control over the device. However, if this is unsuccessful, the RST signal of the JTAG connector may be used by the development tool or device programmer as an additional way to assert a device reset.



A Make either connection J1 in case a local target power supply is used or connection J2 to power target from the debug/programming adapter.

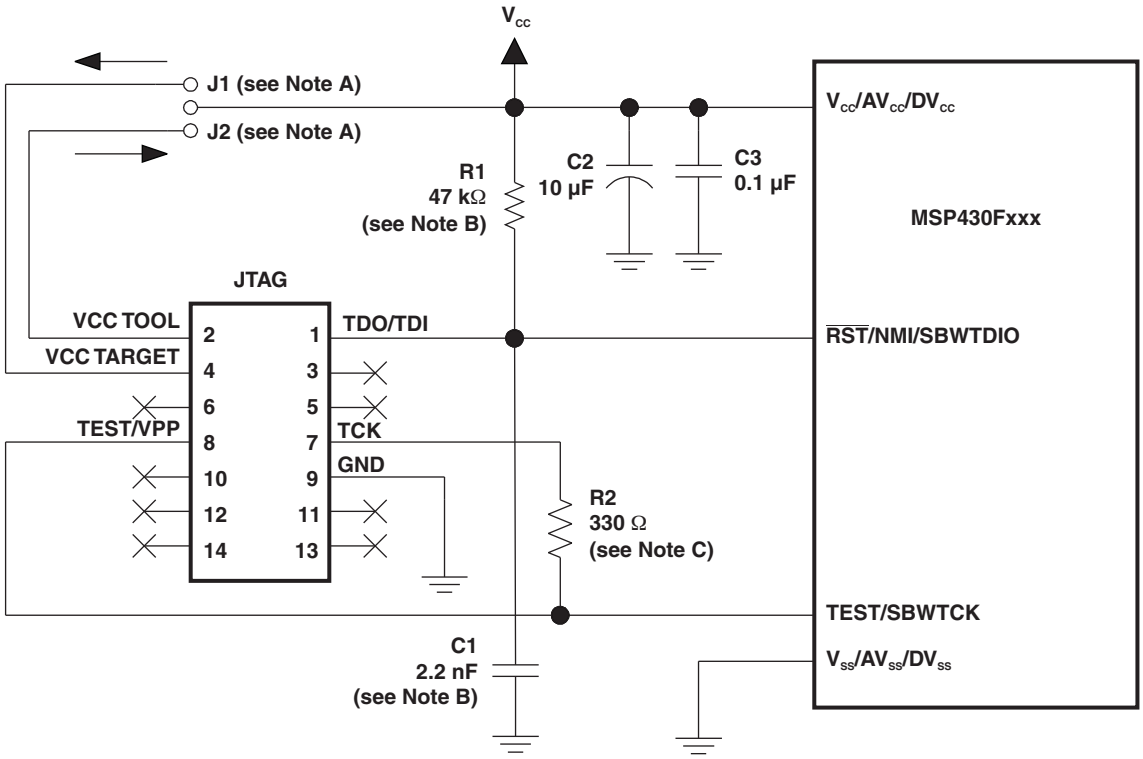
B The $\overline{\text{RST}}$/NMI pin R1/C1 configuration is device family dependent. See the respective MSP430 family user's guide for the recommended configuration.

C The TEST pin is available only on MSP430 family members with multiplexed JTAG pins. See the device-specific data sheet to determine if this pin is available.

D The connection to the JTAG connector $\overline{\text{RST}}$ pin is optional when using 4-wire JTAG communication mode capable-only devices and not required for device programming or debugging. However, this connection is required when using 2-wire JTAG communication mode capable devices in 4-wire JTAG mode.

E When using 2-wire JTAG communication capable devices in 4-wire JTAG mode, the upper limit for C1 should not exceed 2.2 nF. This applies to both TI FET interface modules (LPT/USB FET).

Figure 2-1. Signal Connections for 4-Wire JTAG Communication



A Make either connection J1 in case a local target power supply is used or connection J2 to power target from the debug/programming adapter.

B The device $\overline{RST}$/NMI/SBWTDIO pin is used in 2-wire mode for bidirectional communication with the device during JTAG access and that any capacitance attached to this signal may affect the ability to establish a connection with the device. The upper limit for C1 is 2.2 nF when using current TI FET interface modules (USB FET).

C R2 protects the JTAG debug interface TCK signal from the JTAG security fuse blow voltage that is supplied by the TEST/VPP pin during the fuse blow process. If fuse blow functionality is not needed, R2 is not required (populate 0 ?), and do not connect TEST/VPP to TEST/SBWTCK.

Figure 2-2. Signal Connections for 2-Wire JTAG Communication (Spy-Bi-Wire)

2.2 External Power

The PC parallel port can source a limited amount of current. Because of the ultra-low-power requirement of the MSP430, a standalone FET does not exceed the available current. However, if additional circuitry is added to the tool, this current limit could be exceeded. In this case, external power can be supplied to the tool via connections provided on the target socket modules. See the schematics and pictorials of the target socket modules in to locate the external power connectors.

The MSP-FET430UIF can supply targets with up to 100 mA through pin 2 of the 14-pin connector. V_{CC} for the target can be selected between 1.8 V and 5 V in steps of 0.1 V. Alternatively, the target can be supplied externally. In this case, the external voltage should be connected to pin 4 of the 14-pin connector. The MSP-FET430UIF then adjusts the level of the JTAG signals to external V_{CC} automatically. Only pin 2 (MSP-FET430UIF supplies target) or pin 4 (target is externally supplied) must be connected; not both at the same time.

When a target socket module is powered from an external supply, the external supply powers the device on the target socket module and any user circuitry connected to the target socket module, and the FET interface module continues to be powered from the PC via the parallel port. If the externally supplied voltage differs from that of the FET interface module, the target socket module must be modified so that the externally supplied voltage is routed to the FET interface module (so that it may adjust its output voltage levels accordingly). See the target socket module schematics in .

2.3 Bootstrap Loader

The JTAG pins provide access to the flash memory of the MSP430Fxxx devices. On some devices, these pins are shared with the device port pins, and this sharing of pins can complicate a design (or sharing may not be possible). As an alternative to using the JTAG pins, most MSP430Fxxx devices contain a program (a "bootstrap loader") that permits the flash memory to be erased and programmed using a reduced set of signals. The *MSP430 Memory Programming User's Guide* (SLAU265) describes this interface. TI does not produce a BSL tool. However, customers can easily develop their own BSL tools using the information in the application reports, or BSL tools can be purchased from third parties. See the MSP430 web site for the application reports and a list of MSP430 third-party tool developers.

TI suggests that MSP430Fxxx customers design their circuits with the BSL in mind (i.e., TI suggests providing access to these signals via, for example, a header).

See FAQ Hardware #11 for a second alternative to sharing the JTAG and port pins.

Frequently Asked Questions and Known Issues

This appendix presents solutions to frequently asked questions regarding the MSP-FET430 hardware.

Topic **Page**

A.1 Hardware FAQs

1. **The state of the device** (CPU registers, RAM memory, etc.) **is undefined following a reset.** Exceptions to the above statement are that the PC is loaded with the word at 0xFFFE (i.e., the reset vector), the status register is cleared, and the peripheral registers (SFRs) are initialized as documented in the device family user's guides. The CCE/CCS debugger and C-SPY reset the device after programming it.
2. **MSP430F22xx Target Socket Module (MSP-TS430DA38) – Important Information**
   Due to the large capacitive coupling introduced by the device socket between the adjacent signals XIN/P2.6 (socket pin 6) and $\overline{\text{RST}}$/SBWTDIO (socket pin 7), in-system debugging can disturb the LFXT1 low-frequency crystal oscillator operation (ACLK). This behavior applies only to the Spy-Bi-Wire (2-wire) JTAG configuration and only to the period while a debug session is active.
   Workarounds:
   - Use the 4-wire JTAG mode debug configuration instead of the Spy-Bi-Wire (2-wire) JTAG configuration. This can be achieved by placing jumpers JP4 through JP9 accordingly.
   - Use the debugger option "Run Free" that can be selected from the Advanced Run drop-down menu (at top of Debug View). This prevents the debugger from accessing the MSP430 while the application is running. Note that, in this mode, a manual halt is required to see if a breakpoint was hit. See the IDE documentation for more information on this feature.
   - Use an external clock source to drive XIN directly.
3. **With current interface hardware and software, there is a weakness when adapting target boards that are powered externally**. This leads to an accidental fuse check in the MSP430. This is valid for PIF and UIF but is mainly seen on UIF. A solution is being developed.
   Workarounds:
   - Connect $\overline{\text{RST}}$/NMI pin to JTAG header (pin 11), LPT/USB tools are able to pull the RST line, which also resets the device internal fuse logic.
   - Use the debugger option "Release JTAG On Go" that can be selected from the IDE drop-down menu. This prevents the debugger from accessing the MSP430 while the application is running. Note that in this mode, a manual halt is required to see if a breakpoint was hit. See the IDE documentation for more information on this feature.
   - Use an external clock source to drive XIN directly.
4. The 14-conductor **cable** connecting the FET interface module and the target socket module **must not exceed 8 inches (20 centimeters) in length**.
5. The signal assignment on the **14-conductor cable** is **identical** for the **parallel port interface** and the **USB FET**.
6. **To utilize the on-chip ADC voltage references, C6** (10 ?F, 6.3 V, low leakage) **must be installed** on the target socket module.
7. **To utilize the charge pump on the devices with LCD+ Module, C4** (10 ?F, low leakage) **must be installed** on the target socket module.
8. **Crystals/resonators Q1 and Q2** (if applicable) **are not provided on the target socket module.** For MSP430 devices that contain user-selectable loading capacitors, the effective capacitance is the selected capacitance plus 3 pF (pad capacitance) divided by two.
9. **Crystals/resonators have no effect upon the operation of the tool and the CCE/CCS debugger or C-SPY** (as any required clocking/timing is derived from the internal DCO/FLL).
10. **On 20-pin and 28-pin devices with multiplexed port/JTAG pins** (P1.4 to P1.7), to use these pin in their port capacity:
    For CCE/CCS: "Run Free" (in Run pull-down menu at top of Debug View) must be selected.
    For C-SPY: "Release JTAG On Go" must be selected.
11. **As an alternative to sharing the JTAG and port pins** (on 20 and 28 pin devices), **consider using an MSP430 device that is a "superset" of the smaller device.** A very powerful feature of the MSP430 is that the family members are code and architecturally compatible, so code developed on one device (for example, one without shared JTAG and port pins) ports effortlessly to another (assuming an equivalent set of peripherals).

12. **Information memory may not be blank** (erased to 0xFF) when the device is delivered from TI. Customers should erase the information memory before its first use. Main memory of packaged devices is blank when the device is delivered from TI.
13. **The device current increases by approximately 10 ?A when a device in low-power mode is stopped** [using Halt (CCE/CCS) or Esc (C-SPY)] **and then the low-power mode is restored** [using Run (CCE/CCS) or Go (C-SPY)]. This behavior appears to happen on all devices except the MSP430F12x.
14. The following **ZIF sockets** are used in the FET tools and target socket modules:
    - 14-pin device (PW package): Enplas OTS-14-065-01
    - 28-pin device (DW package): Wells-CTI 652 D028
    - 28-pin device (PW package): Enplas OTS-28-0.65-01
    - 38-pin device (DA package): Yamaichi IC189-0382-037
    - 40-pin device (RHA package): Enplas QFN-40B-0.5-01
    - 48-pin device (DL package): Yamaichi IC51-0482-1163
    - 64-pin device (PM package): Yamaichi IC51-0644-807
    - 80-pin device (PN package): Yamaichi IC201-0804-014
    - 100-pin device (PZ package): Yamaichi IC201-1004-008

    Enplas: www.enplas.com

    Wells-CTI: www.wellscti.com

    Yamaichi: www.yamaichi.us

A.2 Known Issues

MSP-FET430PIF *Some PCs do not supply 5 V through the parallel port*

Problem Description

Device identification problems with modern PCs, because the parallel port often does not deliver 5 V as was common with earlier hardware.

1. When connected to a laptop, the test signal is clamped to 2.5 V.
2. When the external V_{CC} becomes less than 3 V, up to 10 mA is flowing in the adapter via pin 4 (sense).

Solution

Measure the voltage level of the parallel port. If it is too low, provide external 5 V to the V_{CC} pads of the interface. The jumper on a the target socket must be switched to external power.

MSP-FET430UIF *Current detection algorithm of the UIF firmware*

Problem Description

If high current is detected, the I_{CC} Monitor algorithm stays in a loop of frequently switching on and off the target power supply. This power switching puts some MSP430 devices such as the MSP430F5438 in a state that requires a power cycle to return the device to JTAG control.

A side issue is that if the UIF firmware has entered this switch on / switch off loop, it is not possible to turn off the power supply to the target by calling MSP430_VCC(0). A power cycle is required to remove the device from this state.

Solution

IAR KickStart and Code Composer Essentials that have the MSP430.dll version 2.04.00.003 and higher do not show this problem. Update the software development tool to this version or higher to update the MSP-FET430UIF firmware.

Hardware

This appendix contains information relating to the FET hardware, including schematics, PCB pictorials, and bills of materials. All other tools, such as the eZ430 series, are described in separate product-specific user's guides.

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B.1 MSP-TS430PW14

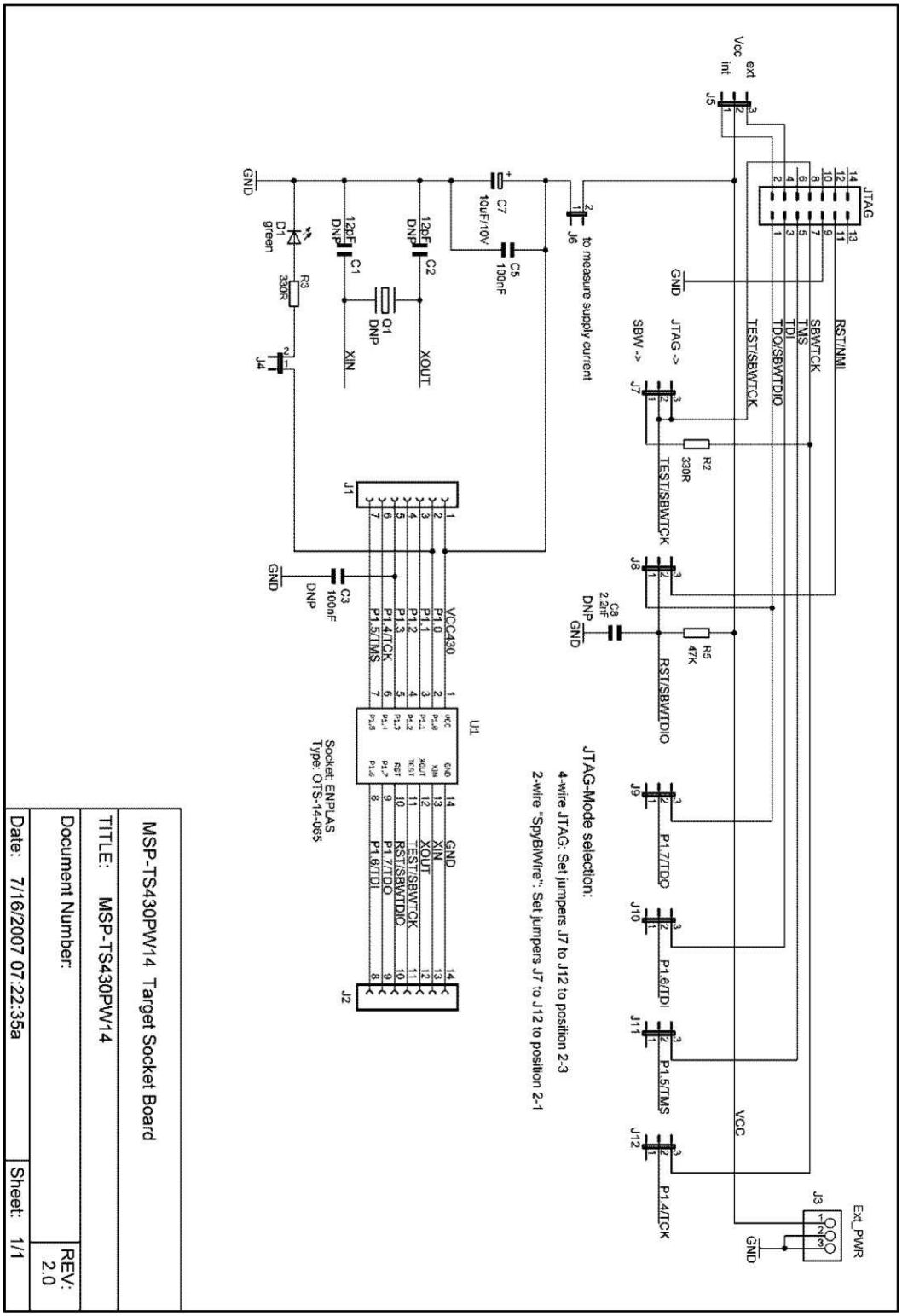


Figure B-1. MSP-TS430PW14 Target Socket Module, Schematic

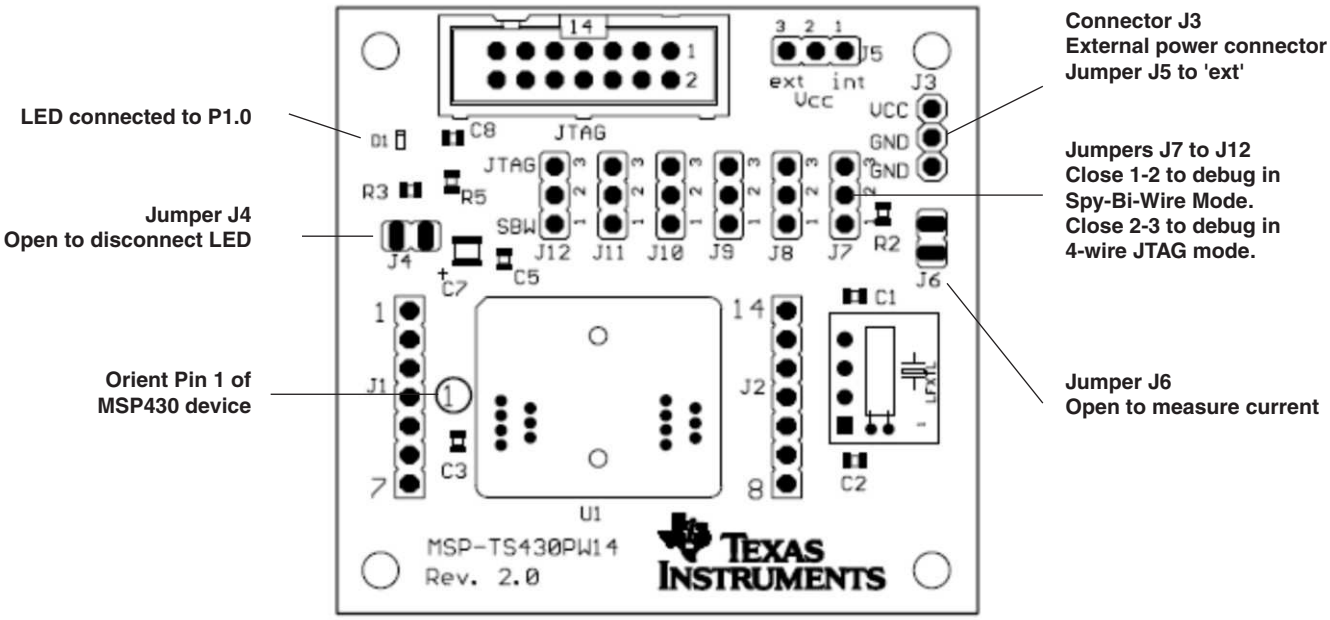


Figure B-2. MSP-TS430PW14 Target Socket Module, PCB

Table B-1. MSP-TS430PW14 Bill of Materials

Position	Ref Des	No. per Board	Description	DigiKey Part No.	Comment
1	C1, C2	0	12pF, SMD0805		DNP
2	C7	1	10uF/10V, Tantal Size B	511-1463-2-ND	
3	C3, C5	1	100nF, SMD0805	478-3351-2-ND	DNP: C3
4	C8	0	2.2nF, SMD0805		DNP
5	D1	1	green LED, SMD0603	475-1056-2-ND	
6	J1, J2	0	7-pin header, TH	"SAM1029-07-NDSAM1213-07-ND"	DNP: Headers and receptacles enclosed with kit. Keep vias free of solder: Header: Receptacle
7	J3, J5, J7, J8, J9, J10, J11, J12	8	3-pin header, male, TH	SAM1035-03-ND	Place jumpers on headers J5, J7, J8, J9, J10, J11, J12; Pos 1-2
8	J4, J6	2	2-pin header, male, TH	SAM1035-02-ND	Place jumper on header
9		9	Jumper	15-38-1024-ND	Place on: J5, J7-J12; Pos 1-2
10	JTAG	1	14-pin connector, male, TH	HRP14H-ND	
12	Q1	0	Crystal		DNP: keep vias free of solder
13	R2, R3	2	330 Ohm, SMD0805	541-330ATR-ND	
15	R5	1	47k Ohm, SMD0805	541-47000ATR-ND	
16	U1	1	Socket: OTS-14-0.65-01		Manuf.: Enplas
17	PCB	1	56 x 53 mm		2 layers
18	Adhesive plastic feet	4	about 6mm width, 2mm height	e.g., 3M Bumpons Part No. SJ-5302	Apply to corners at bottom side
19	MSP430	2	MSP430F2013IPW		DNP: enclosed with kit, supplied by TI

B.2 MSP-TS430DW28

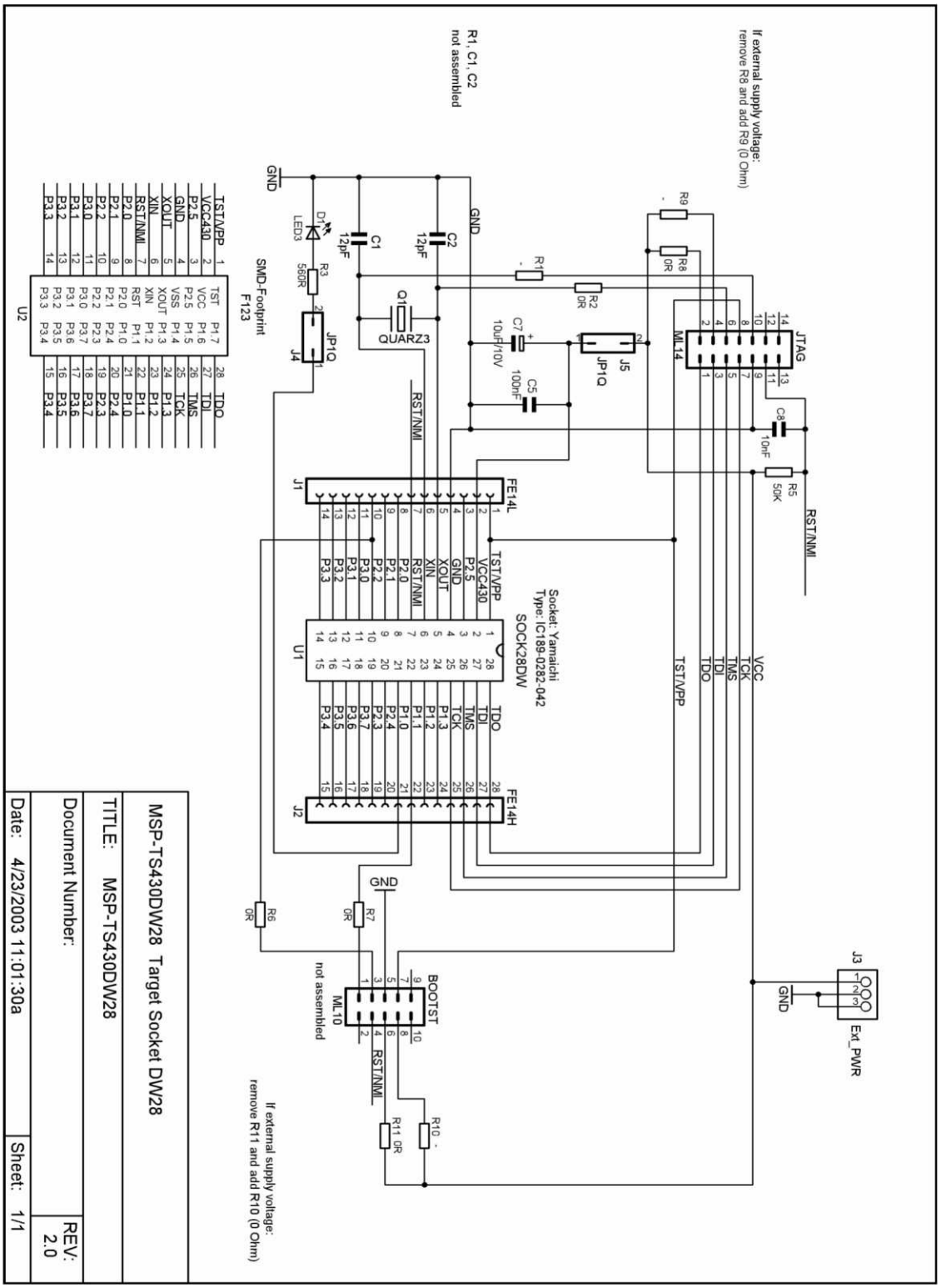


Figure B-3. MSP-TS430DW28 Target Socket Module, Schematic

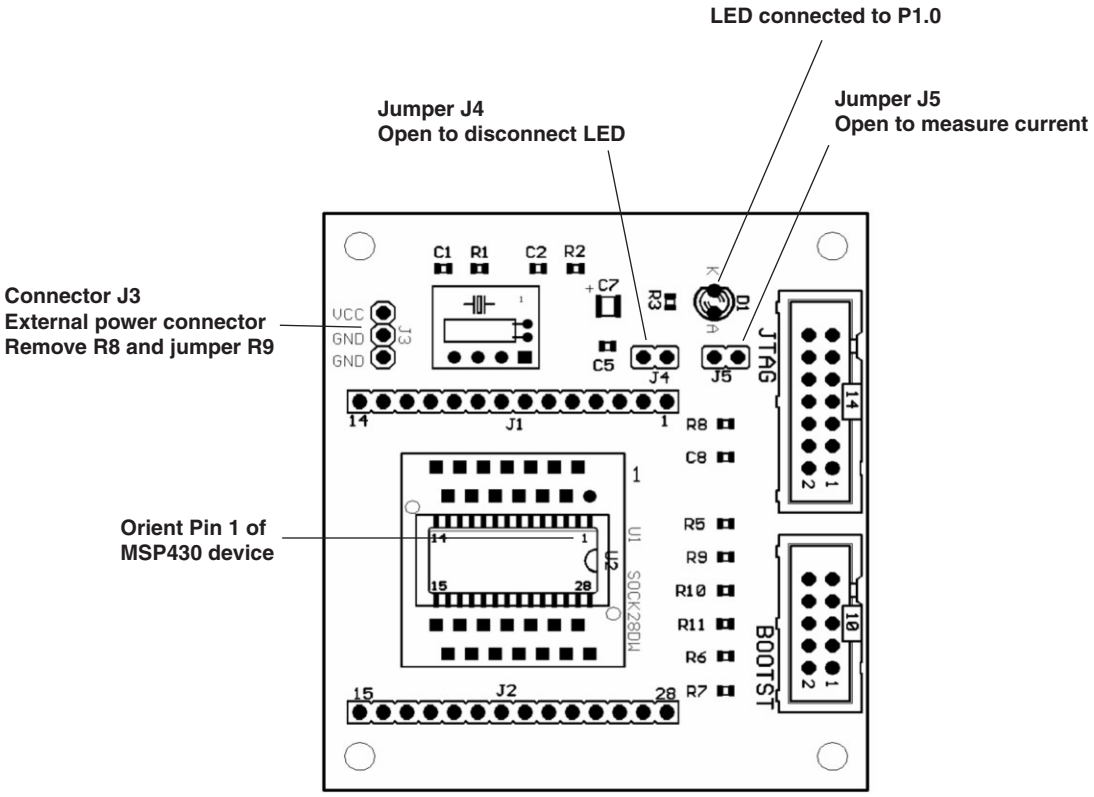


Figure B-4. MSP-TS430DW28 Target Socket Module, PCB

Table B-2. MSP-TS430DW28 Bill of Materials

Position	Ref Des	No. per Board	Description	DigiKey Part No.	Comment
1	C1, C2	0	12pF, SMD0805		DNP: C1, C2, Cover holes while soldering
2	C5	1	100nF, SMD0805		
3	C7	1	10uF/10V Tantal Elko B		
4	C8	1	10nF	SMD0805	
5	D1	1	LED3 T1 3mm yellow	RS: 228-4991	
6	Q1	0	QUARZ3, Crystal		DNP: Cover holes while soldering
7	J1, J2	2	14-pin header, TH male		DNP: Headers and receptacles enclosed with kit.Keep vias free of solder.: Header: Receptacle
7.1		2	14-pin header, TH female		DNP: Headers and receptacles enclosed with kit.Keep vias free of solder.: Header: Receptacle
8	J3	1	3-Pin Connector, male		
9	J4, J5	2	2-Pin Connector, male		With jumper
10	BOOTST	0	ML10, 10-Pin Conn., m	RS: 482-115	DNP, Cover holes while soldering
11	JTAG	1	ML14, 14-Pin Conn., m	RS: 482-121	
12	R1, R2, R6, R7, R8,R9, R10, R11	4	0R, SMD0805		DNP: R1, R2, R9, R10
13	R3	1	560R, SMD0805		
14	R5	1	47K, SMD0805		
15	U1	1	SOP28DW socket	Yamaichi: IC189-0282-042	
16	U2	0	TSSOP		DNP

B.3 MSP-TS430PW28

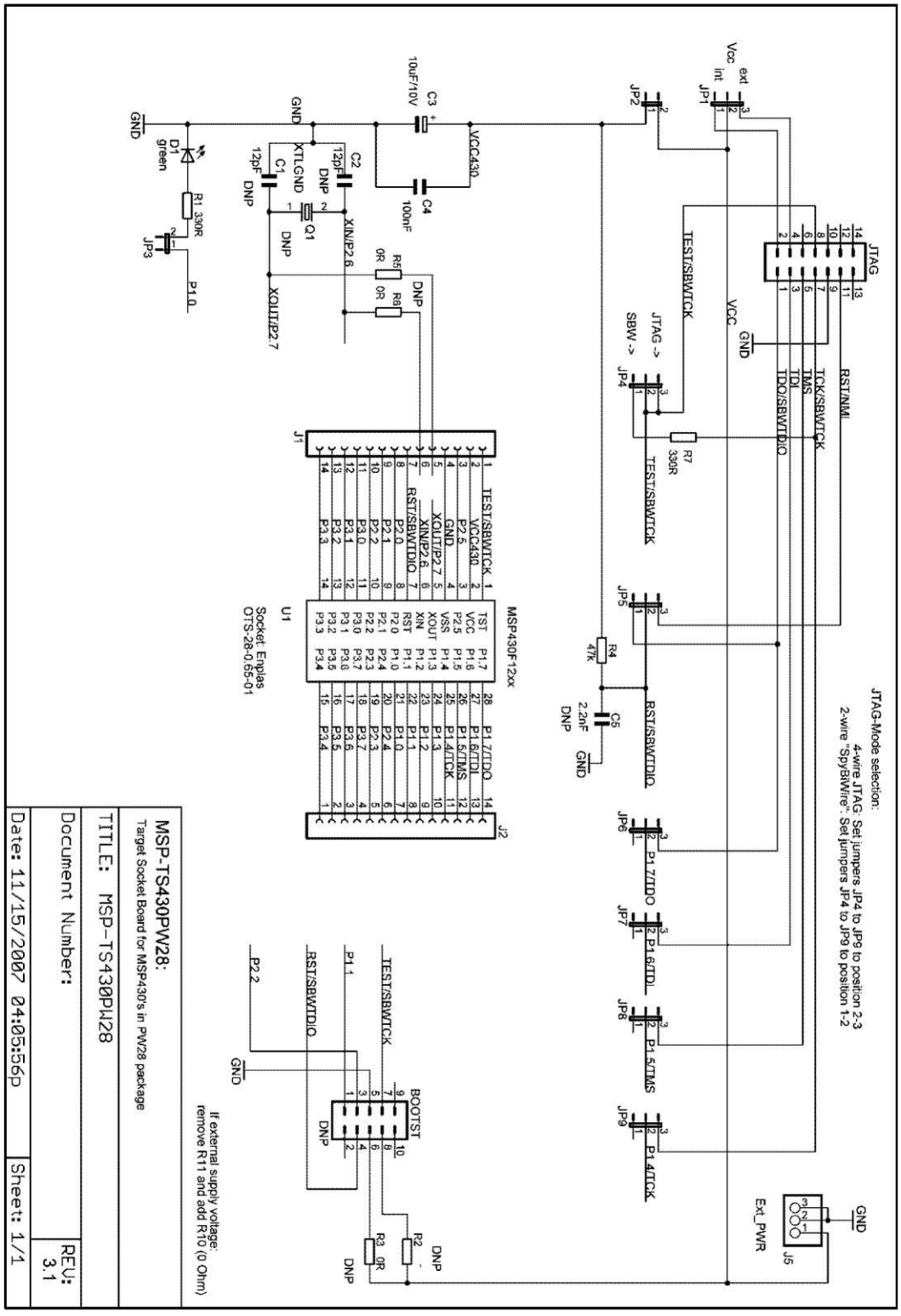


Figure B-5. MSP-TS430PW28 Target Socket Module, Schematic

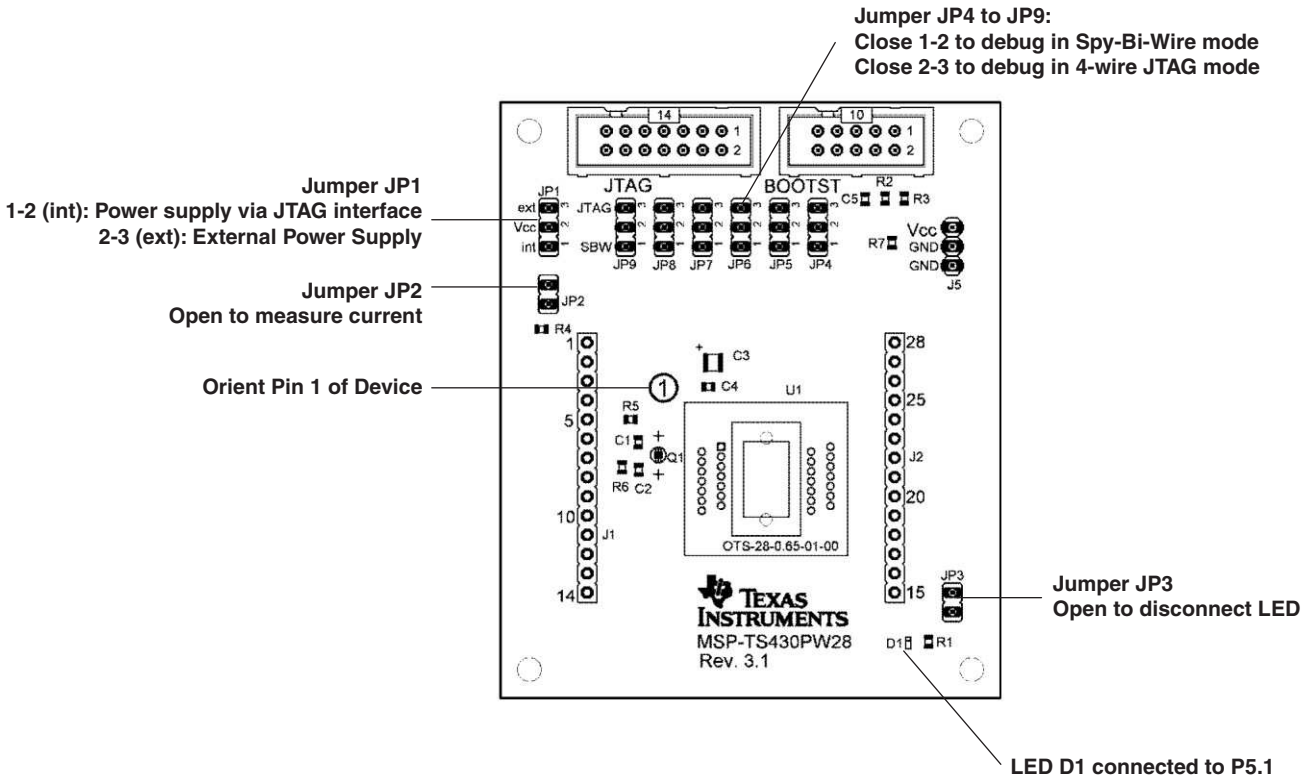


Figure B-6. MSP-TS430PW28 Target Socket Module, PCB

Table B-3. MSP-TS430PW28 Bill of Materials(1)

Pos.	Ref Des	No. per Board	Description	DigiKey Part No.	Comment
1	C1, C2	0	12pF, SMD0805		DNP: C1, C2 , Cover holes while soldering
2	C3	1	10uF/10V Tantal Elko B		
3	C4	1	100nF, SMD0805		
4	C5	0	2.2nF, SMD0805		DNP
5	D1	1	LED green SMD0603		
6	Q1	0	QUARZ3, Crystal		DNP: Cover holes and neighboring holes while soldering
7	J1, J2	2	14-pin header, TH male		DNP: Headers and receptacles enclosed with kit.Keep vias free of solder.: Header: Receptacle
7.1		2	14-pin header, TH female		DNP: headers and receptacles enclosed with kit.Keep vias free of solder.: Header: Receptacle
8	J5, IP1	1	3-Pin Connector , male		
8a	JP1, JP4, JP5, JP6, JP7, JP8, JP9	7	3-Pin Connector , male		Jumper on Pos 1-2
9	JP2, JP3	2	2-Pin Connector , male		with Jumper
10	BOOTST	0	ML10, 10-Pin Conn. , m	RS: 482-115	DNP: Cover holes while soldering
11	JTAG	1	ML14, 14-Pin Conn. , m	RS: 482-121	
12	R1, R7	2	330R, SMD0805		
12	R2, R3, R5, R6	0	0R, SMD0805		DNP
14	R4	1	47K, SMD0805		
15	U1	1	SOP28PW socket	Enplas: OTS-28-0.65-01	

(1) PCB 66 x 79 mm, two layers; Rubber stand off, four pieces

B.4 MSP-TS430DA38

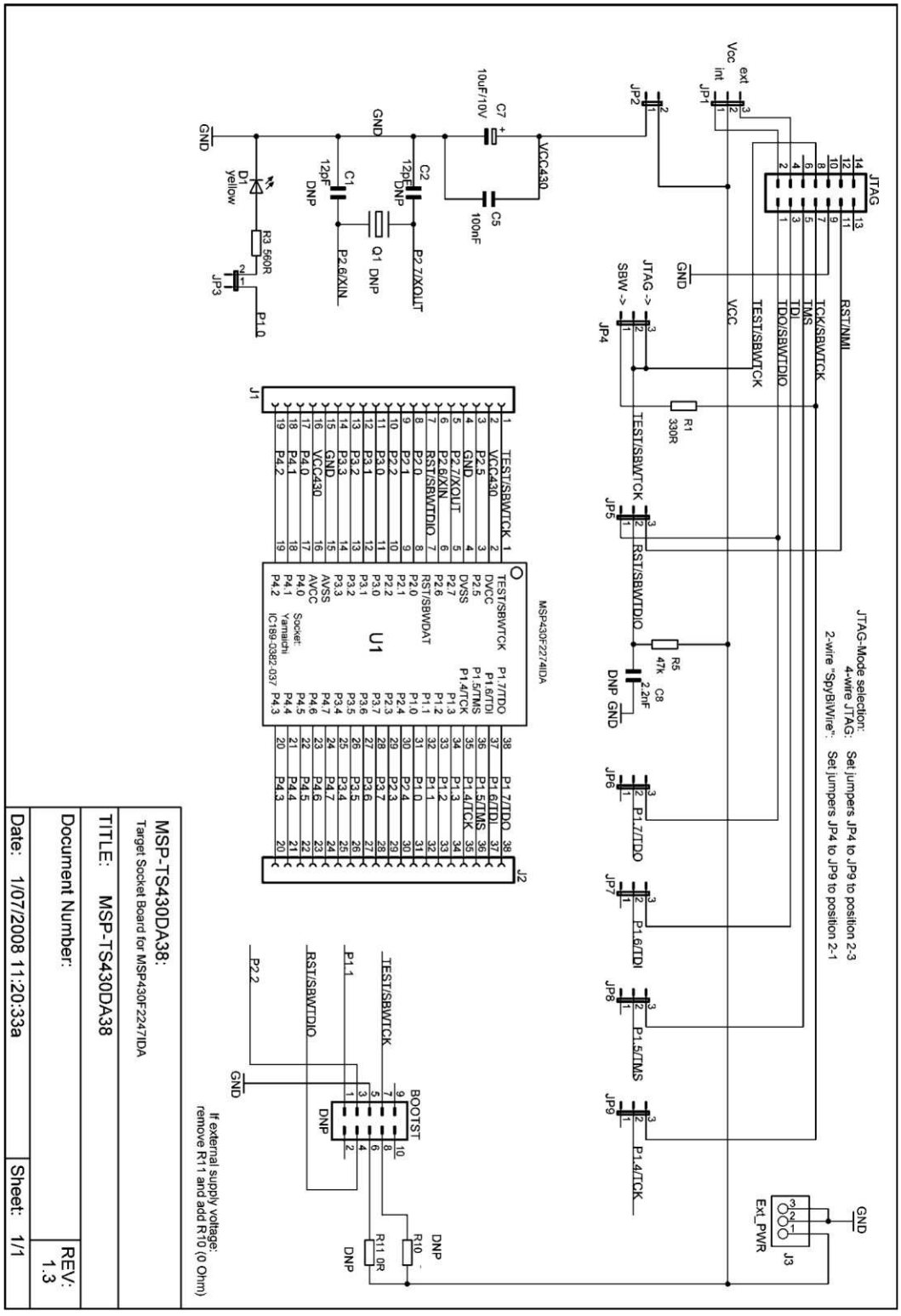


Figure B-7. MSP-TS430DA38 Target Socket Module, Schematic

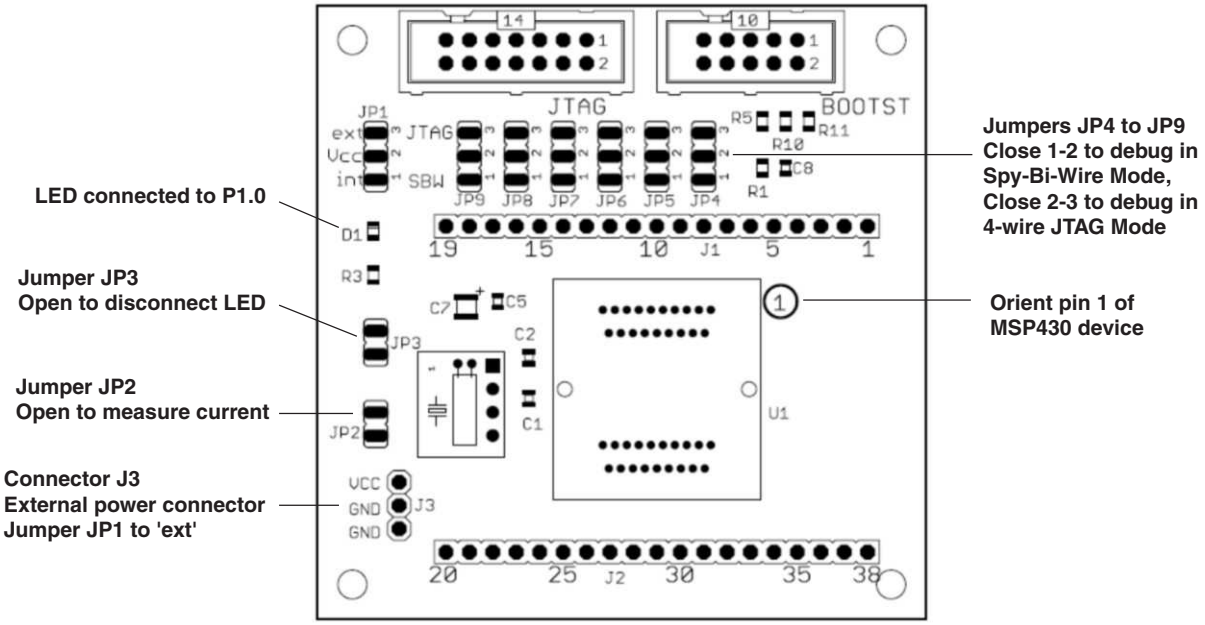


Figure B-8. MSP-TS430DA38 Target Socket Module, PCB

Table B-4. MSP-TS430DA38 Bill of Materials

Pos.	Ref Des	No. per Board	Description	DigiKey Part No.	Comment
1	C1, C2	0	12pF, SMD0805		DNP
2	C7	1	10uF/10V, Tantal Size B	511-1463-2-ND	
3	C5	1	100nF, SMD0805	478-3351-2-ND	
4	C8	0	2.2nF, SMD0805		DNP
5	D1	1	green LED, SMD0603	475-1056-2-ND	
6	J1, J2	0	19-pin header, TH	"SAM1029-19-NDSAM1213-19-ND"	DNP: headers and receptacles enclosed with kit.Keep vias free of solder.: Header: Receptacle
7	"J3, JP1, JP4, JP5, JP6, JP7, JP8, JP9"	8	3-pin header, male, TH	SAM1035-03-ND	Place jumpers on headers JP1, JP4,JP5, JP6, JP7, JP8, JP9; Pos 1-2
8	JP2, JP3	2	2-pin header, male, TH	SAM1035-02-ND	Place jumper on header
9		9	Jumper	15-38-1024-ND	Place on: JP1 - JP9; Pos 1-2
10	JTAG	1	14-pin connector, male, TH	HRP14H-ND	
11	BOOTST	0	10-pin connector, male, TH		DNP: Keep vias free of solder
12	Q1	0	Crystal		DNP: Keep vias free of solder
13	R1, R3	2	330 Ohm, SMD0805	541-330ATR-ND	
14	R10, R11	0	0 Ohm, SMD0805	541-000ATR-ND	DNP
15	R5	1	47k Ohm, SMD0805	541-47000ATR-ND	
16	U1	1	Socket: IC189-0382--037		Manuf.: Yamaichi
17	PCB	1	67 x 66 mm		2 layers
18	Adhesive Plastic feet	4	~6mm width, 2mm height	e.g., 3M Bumpons Part No. SJ-5302	Apply to corners at bottom side
19	MSP430	2	MSP430F2274IDA		DNP: enclosed with kit supplied by TI

B.5 MSP-TS430QFN23x0

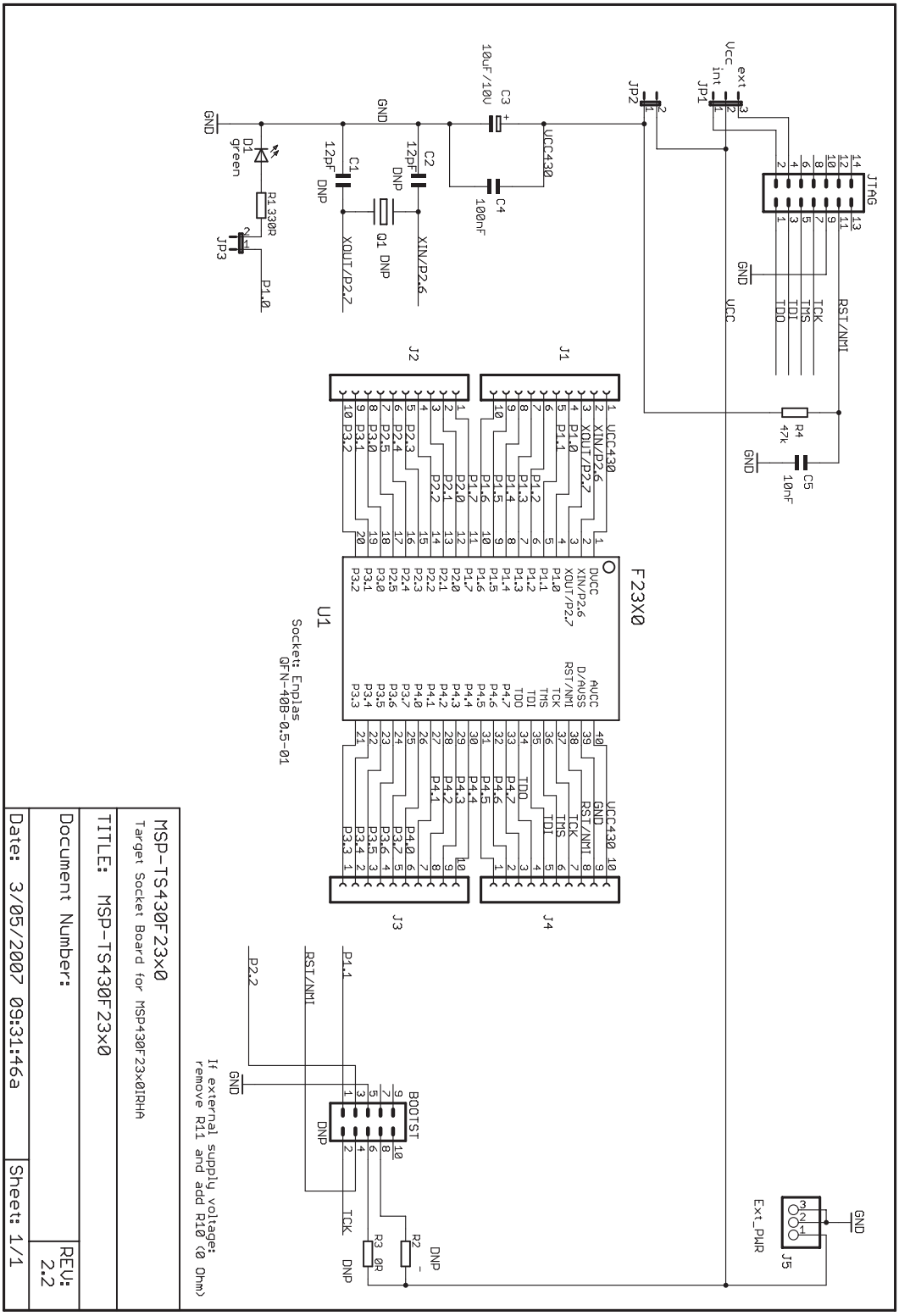


Figure B-9. MSP-TS430QFN23x0 Target Socket Module, Schematic

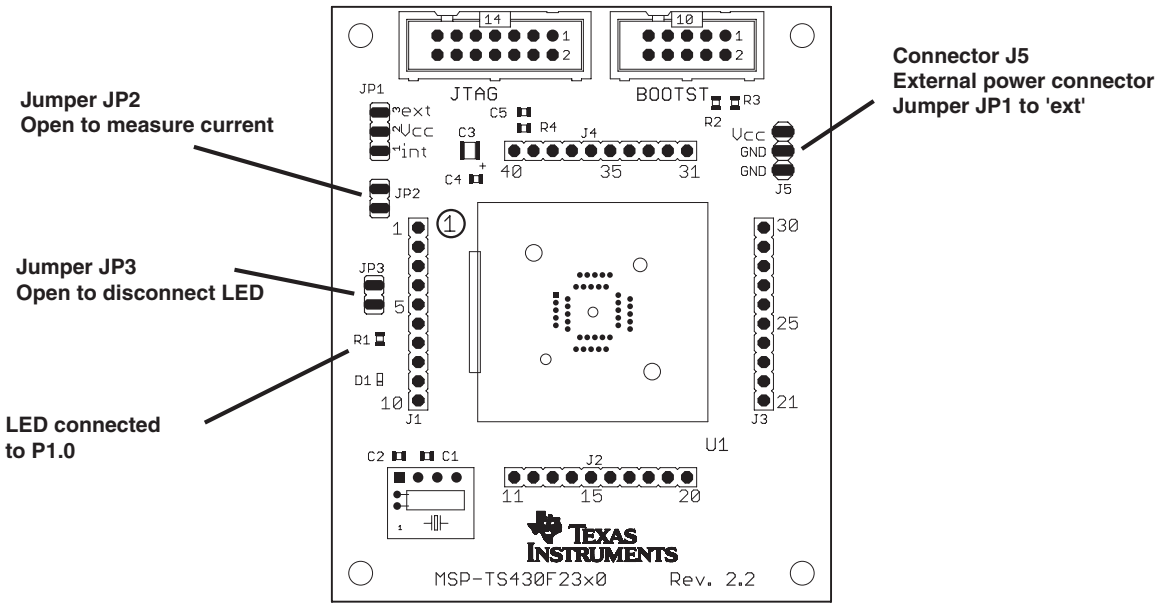


Figure B-10. MSP-TS430QFN23x0 Target Socket Module, PCB

Table B-5. MSP-TS430QFN23x0 Bill of Materials

Pos.	Ref Des	No. per Board	Description	DigiKey Part No.	Comment
1	C1, C2	0	12pF, SMD0805		DNP
2	C3	1	10uF/10V, Tantal Size B	511-1463-2-ND	
3	C4	1	100nF, SMD0805	478-3351-2-ND	
4	C5	1	10nF, SMD0805	478-1383-2-ND	
5	D1	1	green LED, SMD0603	475-1056-2-ND	
6	J1, J2, J3, J4	0	10-pin header, TH	SAM1034-10-NDSAM1212-10-ND	DNP: headers and receptacles enclosed with kit.Keep vias free of solder.: Header: Receptacle
7	J5, JP1	2	3-pin header, male, TH	SAM1035-03-ND	Place jumper on header JP1; Pos 1-2.
8	JP2, JP3	2	2-pin header, male, TH	SAM1035-02-ND	Place jumper on header
9		3	Jumper	15-38-1024-ND	Place on: JP1, JP2, JP3
10	JTAG	1	14-pin connector, male, TH	HRP14H-ND	
11	BOOTST	0	10-pin connector, male, TH		DNP: Keep vias free of solder
12	Q1	0	Crystal		DNP: Keep vias free of solder
13	R1	1	330 Ohm, SMD0805	541-330ATR-ND	
14	R2, R3	0	0 Ohm, SMD0805	541-000ATR-ND	DNP
15	R4	1	47k Ohm, SMD0805	541-47000ATR-ND	
16	U1	1	Socket: QFN-40B-0.5-01		Manuf.: Enplas
17	PCB	1	79 x 66 mm		2 layers
18	Adhesive Plastic feet	4	~6mm width, 2mm height	e.g., 3M Bumpons Part No. SJ-5302	Apply to corners at bottom side
19	MSP430	2	MSP430F2370IRHA		DNP: enclosed with kit supplied by TI

B.6 MSP-TS430DL48

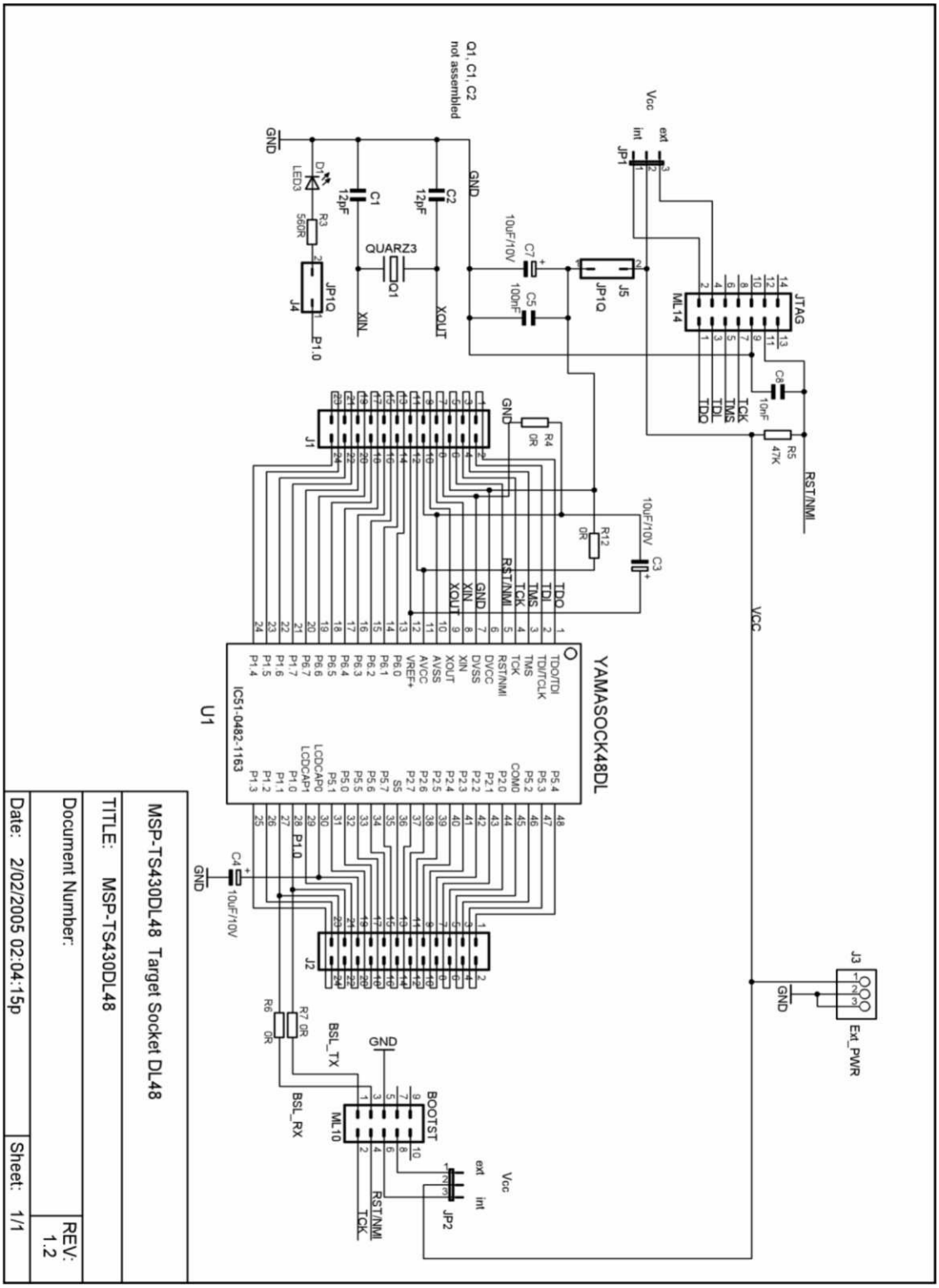


Figure B-11. MSP-TS430DL48 Target Socket Module, Schematic

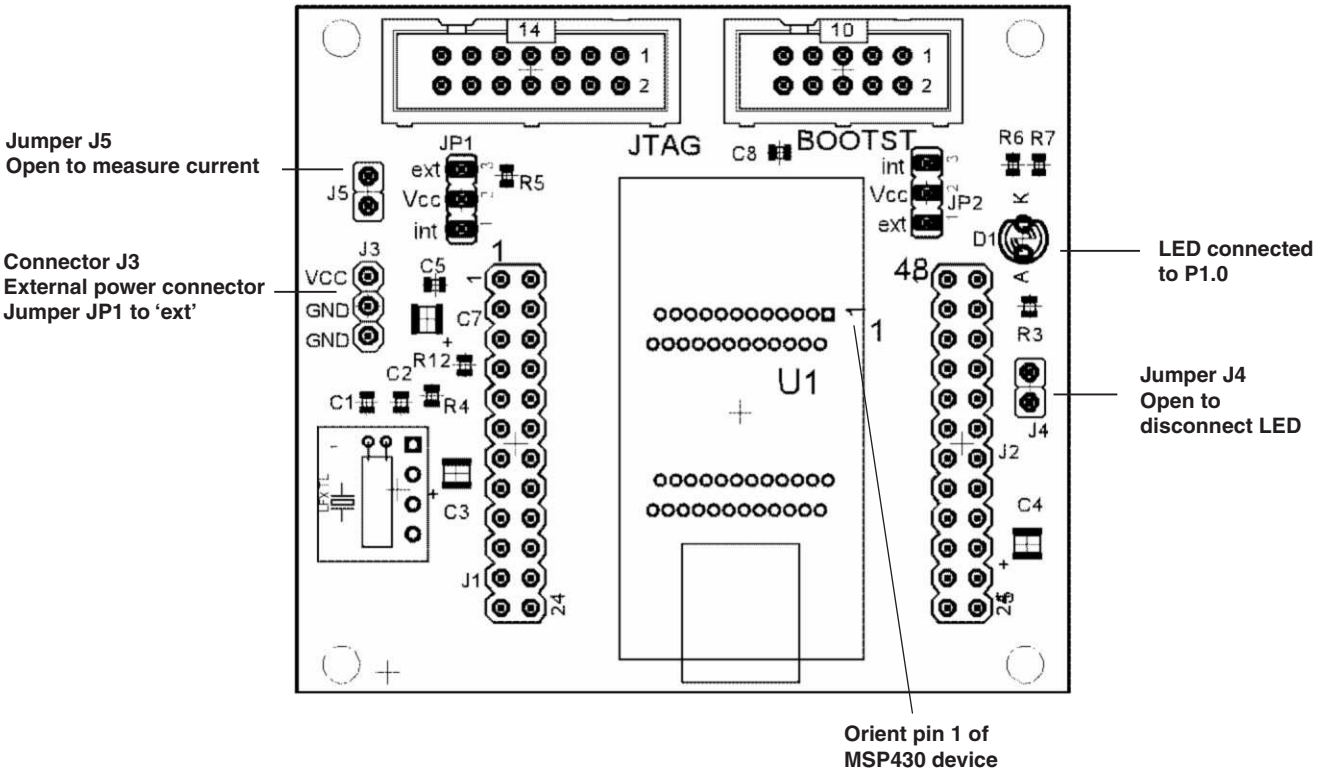
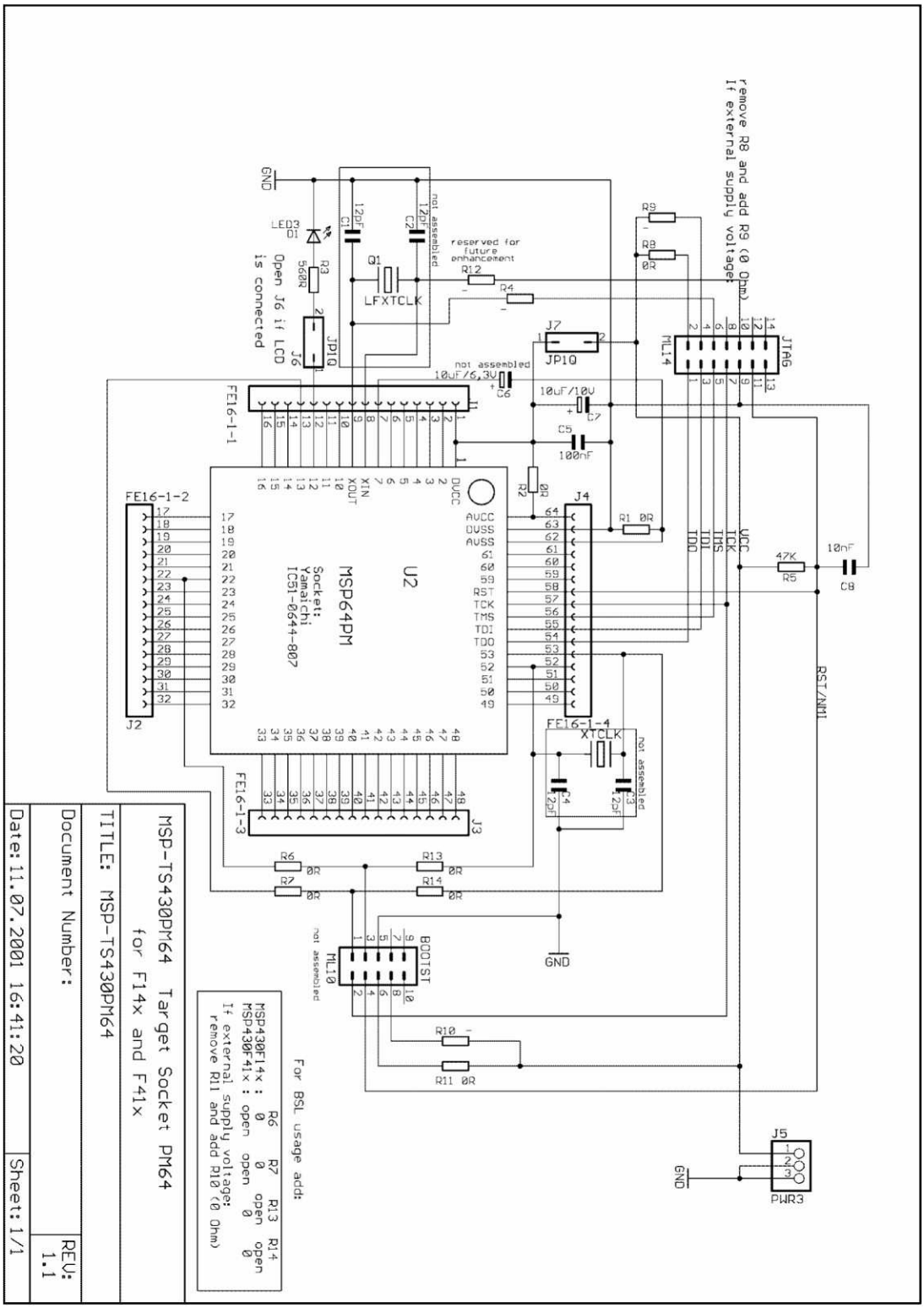


Figure B-12. MSP-TS430DL48 Target Socket Module, PCB

Table B-6. MSP-TS430DL48 Bill of Materials

Pos.	Ref Des	No. per Board	Description	DigiKey Part No.	Comment
1	C1, C2	0	12pF, SMD0805		DNP
2	C4, C7	2	10uF/10V, Tantal Size B	511-1463-2-ND	
3	C3, C5	2	100nF, SMD0805	478-3351-2-ND	
4	C8	1	10nF, SMD0805	478-1383-2-ND	
5	D1	1	yellow LED, TH, 3mm, T1	511-1251-ND	
6	J1, J2	0	24-pin header, TH	SAM1034-12-NDSAM1212-12-ND	DNP: Headers and receptacles enclosed with kit.Keep vias free of solder.: Header: Receptacle
7	J3, JP1, JP2	2	3-pin header, male, TH	SAM1035-03-ND	Place jumper on header JP1; Pos 1-2. DNP: JP2
8	J4, J5	2	2-pin header, male, TH	SAM1035-02-ND	Place jumper on header
9		3	Jumper	15-38-1024-ND	Place on: JP1, J4, J5
10	JTAG	1	14-pin connector, male, TH	HRP14H-ND	
11	BOOTST	0	10-pin connector, male, TH		DNP: Keep vias free of solder
12	Q1	0	Crystal		DNP: Keep vias free of solder
13	R3	1	560 Ohm, SMD0805	541-560ATR-ND	
14	R4, R6, R7, R12	2	0 Ohm, SMD0805	541-000ATR-ND	DNP: R6, R7
15	R5	1	47k Ohm, SMD0805	541-47000ATR-ND	
16	U1	1	Socket: IC51-1387 KS-15186		Manuf.: Yamaichi
17	PCB	1	58 x 66 mm		2 layers
18	Adhesive Plastic feet	4	~6mm width, 2mm height	e.g., 3M Bumpons Part No. SJ-5302	Apply to corners at bottom side
19	MSP430	2	MSP430F4270IDL		DNP: Enclosed with kit supplied by TI

B.7 MSP-TS430PM64



NOTE: Connections between the JTAG header and pins XOUT and XIN are no longer required and should not be made.

Figure B-13. MSP-TS430PM64 Target Socket Module, Schematic

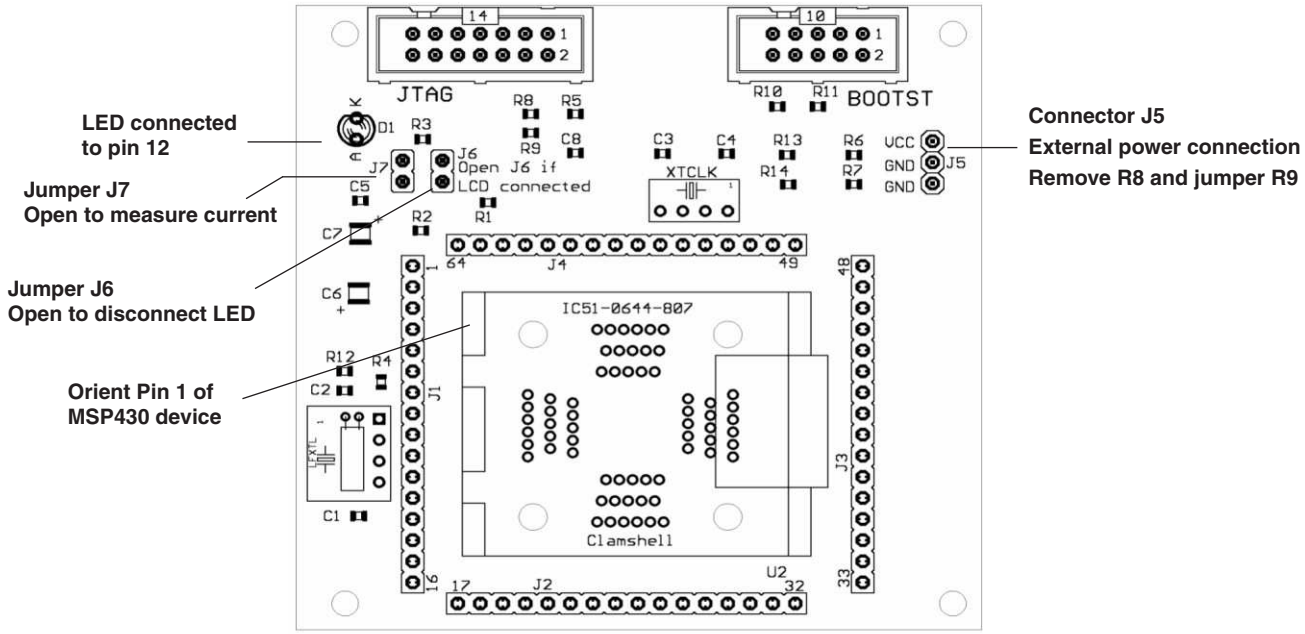


Figure B-14. MSP-TS430PM64 Target Socket Module, PCB

Table B-7. MSP-TS430PM64 Bill of Materials

Pos.	Ref Des	No. per Board	Description	DigiKey Part No.	Comment
1	C1, C2	0	12pF, SMD0805		DNP
1.1	C3, C4	0	47pF, SMD0805		DNP: Only recommendation. Check your crystal spec.
2	C6, C7	1	10uF/10V, Tantal Size B	511-1463-2-ND	DNP: C6
3	C5	1	100nF, SMD0805	478-3351-2-ND	
4	C8	1	10nF, SMD0805	478-1383-2-ND	
5	C9	1	470nF, SMD0805	478-1403-2-ND	
6	D1	1	green LED, SMD0805	P516TR-ND	
7	J1, J2, J3, J4	0	16-pin header, TH	SAM1029-16-NDSAM1213-16-ND	DNP: Headers and receptacles enclosed with kit.Keep vias free of solder.: Header: Receptacle
8	J5	1	3-pin header, male, TH	SAM1035-03-ND	
9	J6, J7	2	2-pin header, male, TH	SAM1035-02-ND	Place jumper on header
11		2	Jumper	15-38-1024-ND	Place on: J6, J7
12	JTAG	1	14-pin connector, male, TH	HRP14H-ND	
13	BOOTST	0	10-pin connector, male, TH		DNP: Keep vias free of solder
14	Q1, Q2	0	Crystal		DNP: Keep vias free of solder
15	R3	1	330 Ohm, SMD0805	541-330ATR-ND	
16	R1, R2, R4, R6, R7, R8, R9, R10, R11, R12, R13, R14	3	0 Ohm, SMD0805	541-000ATR-ND	DNP: R4, R6, R7, R9, R10, R11, R12, R13, R14
17	R5	1	47k Ohm, SMD0805	541-47000ATR-ND	
18	U1	1	Socket: IC51-0644-807		Manuf.: Yamaichi
19	PCB	1	78 x 75 mm		2 layers
20	Rubber standoff	4		select appropriate	Apply to corners at bottom side
21	MSP430	22	MSP430F2619IPM MSP430F417IPM		DNP: Enclosed with kit supplied by TI

B.8 MSP-TS430PM64A

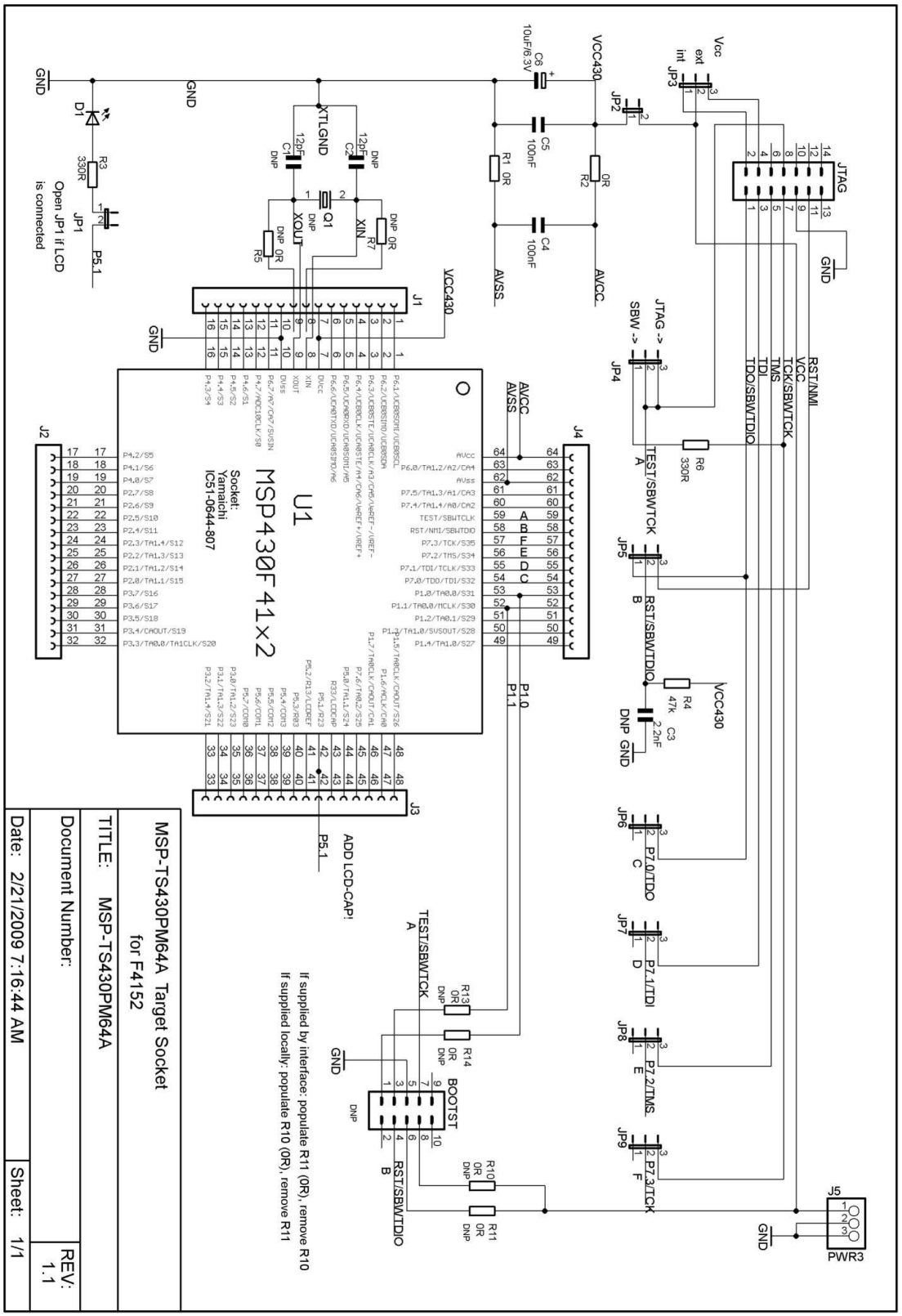


Figure B-15. MSP-TS430PM64A Target Socket Module, Schematic

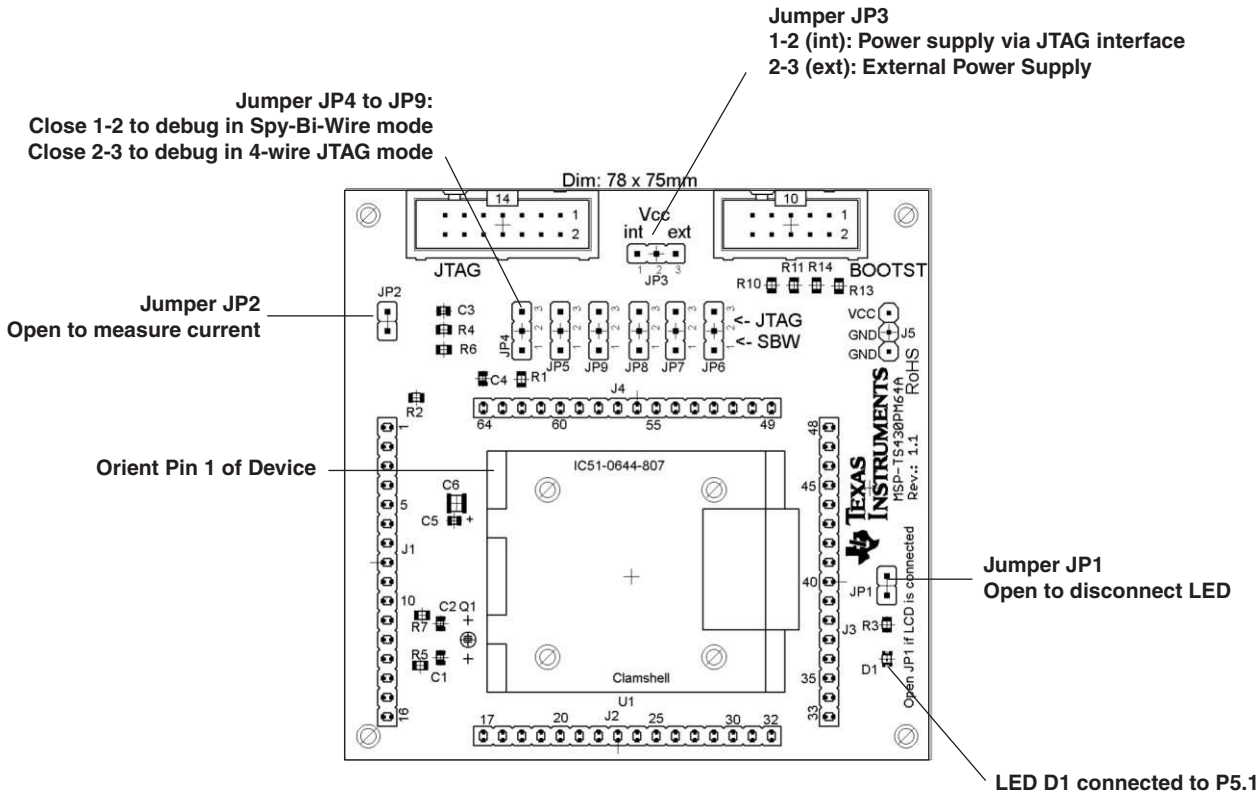
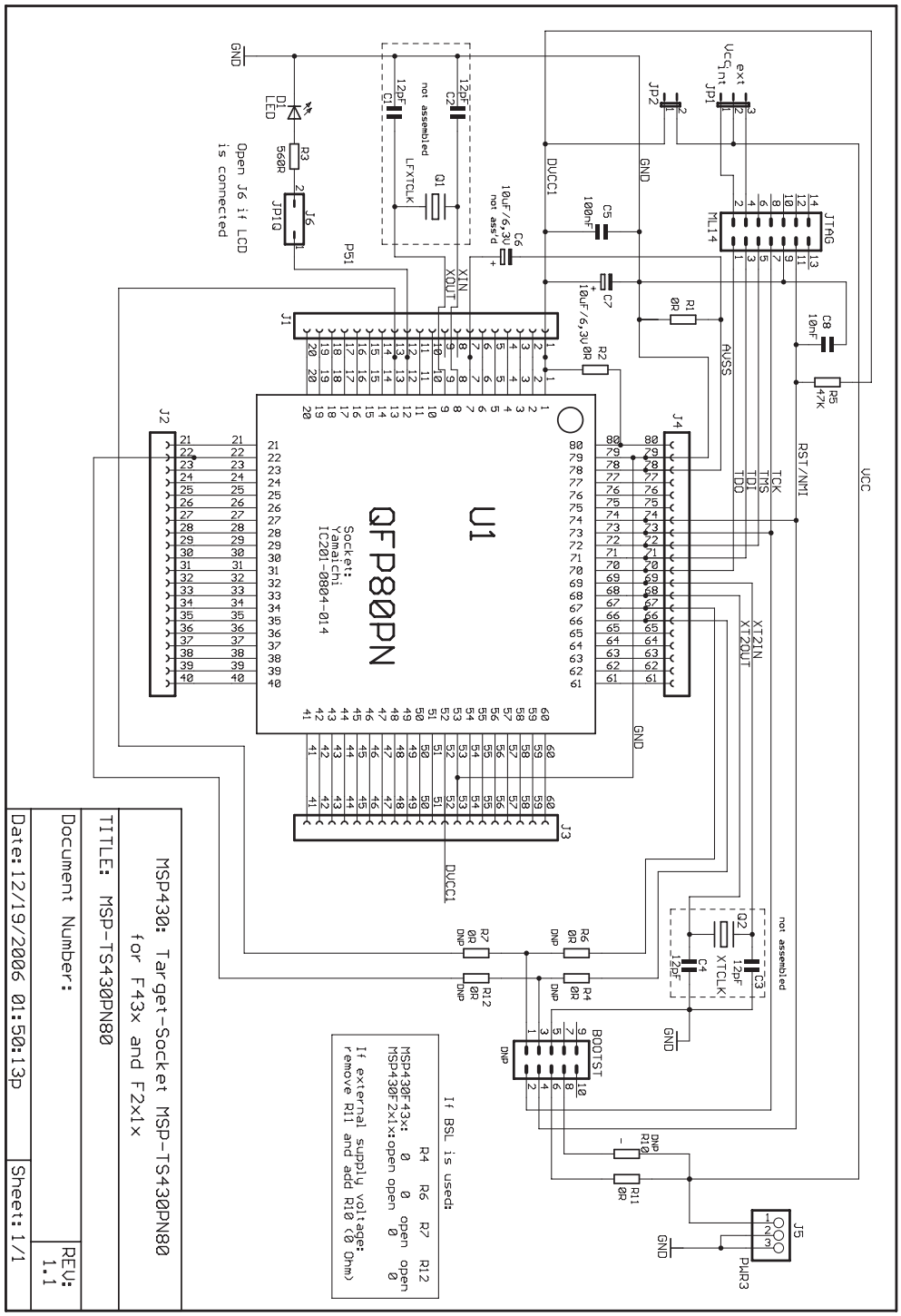


Figure B-16. MSP-TS430PM64A Target Socket Module, PCB

Table B-8. MSP-TS430PM64A Bill of Materials

Pos.	Ref Des	No. per Board	Description	DigiKey Part No.	Comment
1	C1, C2,	0	12pF, SMD0805		DNP
2	C3	0	2.2nF, SMD0805		DNP
3	C6,	1	10uF/10V, Tantal Size B	511-1463-2-ND	
4	C4, C5	2	100nF, SMD0805	478-3351-2-ND	
5	D1	1	green LED, SMD0805	P516TR-ND	
6	J1, J2, J3, J4	0	16-pin header, TH	SAM1029-16-NDSAM1213-16-ND	DNP: Headers and receptacles enclosed with kit. Keep vias free of solder.: Header: Receptacle
7	J5, JP3, JP4, JP5, JP6, JP7, JP8, JP9	8	3-pin header, male, TH	SAM1035-03-ND	
8	JP1, JP2	2	2-pin header, male, TH	SAM1035-02-ND	Place jumper on header
9		2	Jumper	15-38-1024-ND	Place on: J6, J7
10	JTAG	1	14-pin connector, male, TH	HRP14H-ND	
11	BOOTST	0	10-pin connector, male, TH		DNP: Keep vias free of solder
12	Q1, Q2	0	Crystal		DNP: Keep vias free of solder
13	R3, R6	2	330 Ohm, SMD0805	541-330ATR-ND	
14	R1, R2, R5, R7, R9, R10, R11, R13, R14	2	0 Ohm, SMD0805	541-000ATR-ND	DNP: R5, R7, R9, R10, R11, R13, R14
15	R4	1	47k Ohm, SMD0805	541-47000ATR-ND	
16	U1	1	Socket: IC51-0644-807		Manuf.: Yamaichi
17	PCB	1	78 x 75 mm		4 layers
18	Rubber stand off	4		select appropriate	Apply to corners at bottom side
19	MSP430	2	MSP430F4152IPM		DNP: Enclosed with kit supplied by TI

B.9 MSP-TS430PN80



NOTE: For MSP430F(G)47x derivatives:
Connect pins 7 and 10 (GND) externally to DV_{SS} (see data sheet).
Connect load capacitance on V_{ref} pin 60 when SD16 is used (see data sheet).

Figure B-17. MSP-TS430PN80 Target Socket Module, Schematic

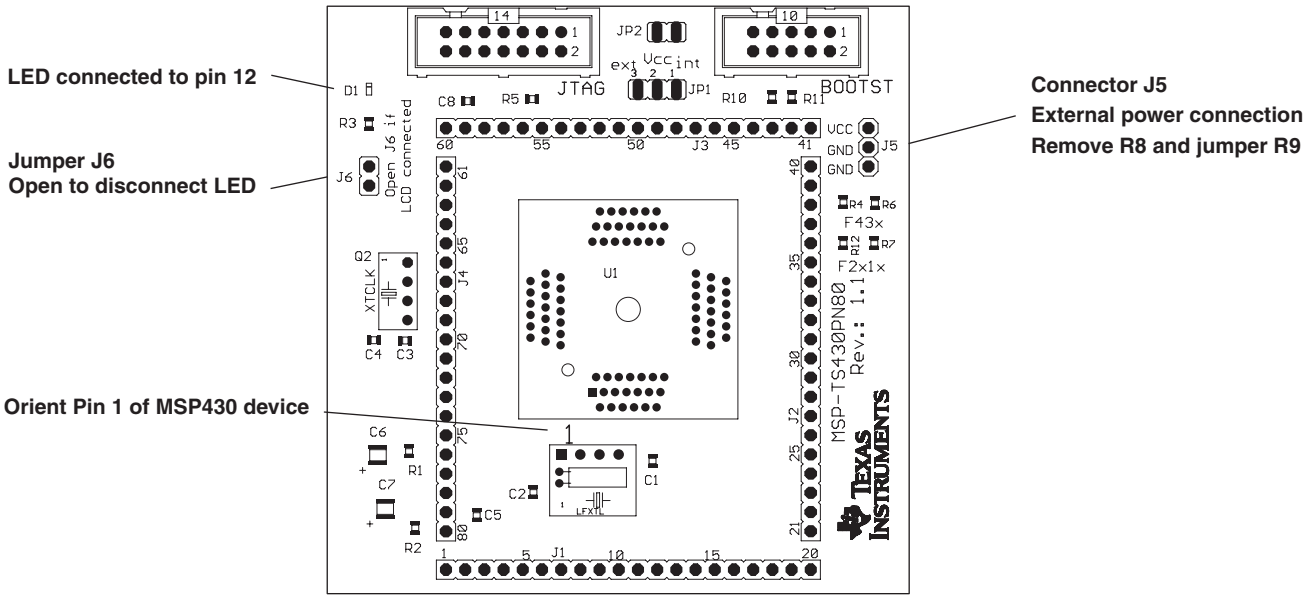
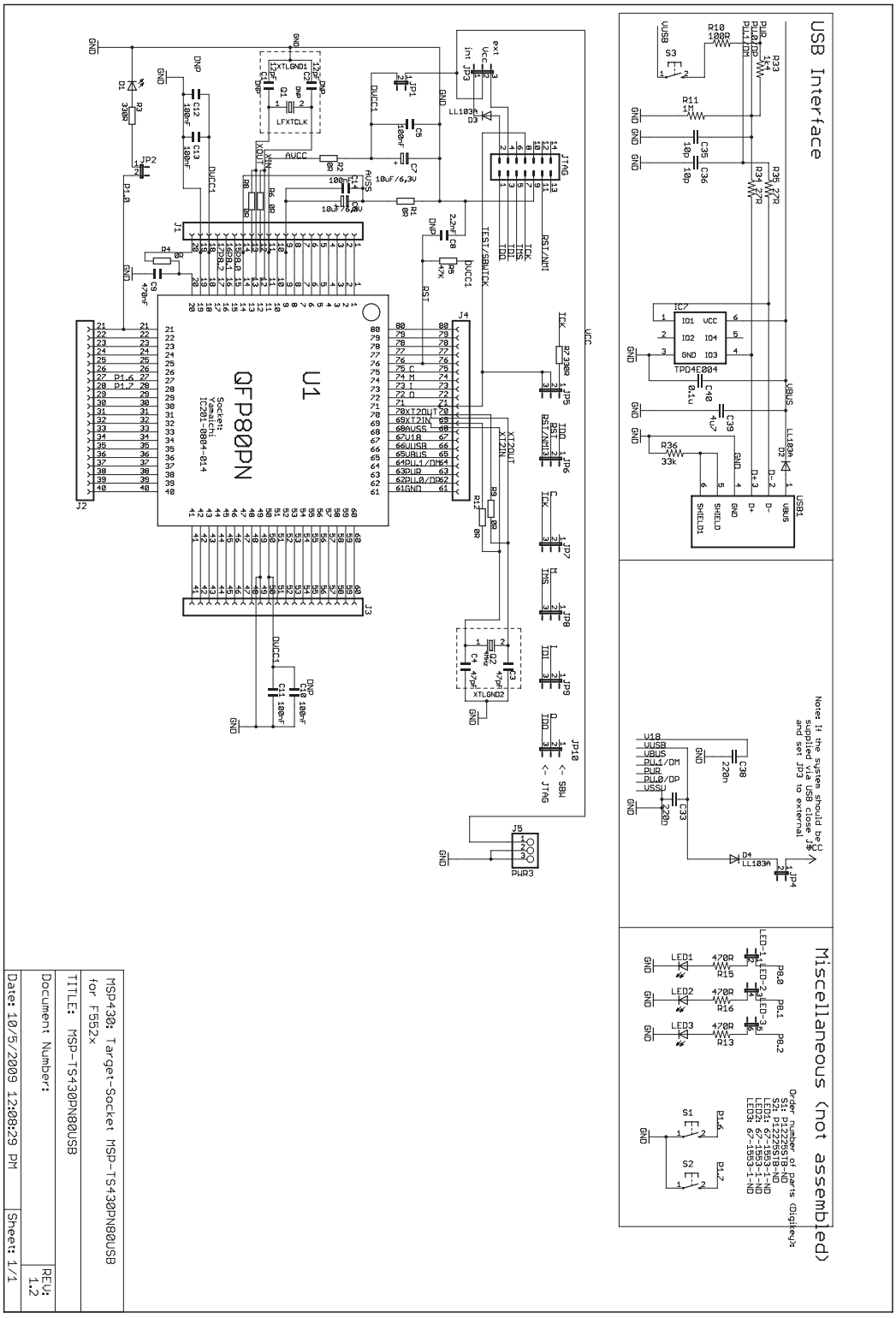


Figure B-18. MSP-TS430PN80 Target Socket Module, PCB

Table B-9. MSP-TS430PN80 Bill of Materials

Pos.	Ref Des	No. per Board	Description	DigiKey Part No.	Comment
1	C1, C2	0	12pF, SMD0805		DNP: C1, C2
1.1	C3, C4	0	47pF, SMD0805		DNP: Only recommendation. Check your crystal spec.
2	C6, C7	1	10uF/10V, Tantal Size B	511-1463-2-ND	
3	C5	1	100nF, SMD0805	478-3351-2-ND	
4	C8	1	10nF, SMD0805	478-1383-2-ND	
5	D1	1	green LED, SMD0603	475-1056-2-ND	
6	J1, J2, J3, J4	0	25-pin header, TH	SAM1029-20-NDSAM1213-20-ND	DNP: Headers and receptacles enclosed with kit.Keep vias free of solder.: Header: Receptacle
7	J5, JP1	2	3-pin header, male, TH	SAM1035-03-ND	
8	J6, JP2	2	2-pin header, male, TH	SAM1035-02-ND	Place jumper on header
9		3	Jumper	15-38-1024-ND	Place on: J6, JP2, JP1/Pos1-2
10	JTAG	1	14-pin connector, male, TH	HRP14H-ND	
11	BOOTST	0	10-pin connector, male, TH		DNP: Keep vias free of solder
12	Q1, Q2	0	Crystal		DNP: Keep vias free of solder
13	R3	1	560 Ohm, SMD0805	541-560ATR-ND	
14	R1, R2, R4, R6, R7, R10, R11, R12	2	0 Ohm, SMD0805	541-000ATR-ND	DNP: R4, R6, R7, R10, R11, R12
15	R5	1	47k Ohm, SMD0805	541-47000ATR-ND	
16	U1	1	Socket: IC201-0804-014		Manuf.: Yamaichi
17	PCB	1	77 x 77 mm		2 layers
18	Adhesive Plastic feet	4	~6mm width, 2mm height	e.g., 3M Bumpons Part No. SJ-5302	Apply to corners at bottom side
19	MSP430	2	MSP430FG439IPN		DNP: Enclosed with kit supplied by TI

B.10 MSP-TS430PN80USB



NOTE: R11 should be populated.

Figure B-19. MSP-TS430PN80USB Target Socket Module, Schematic

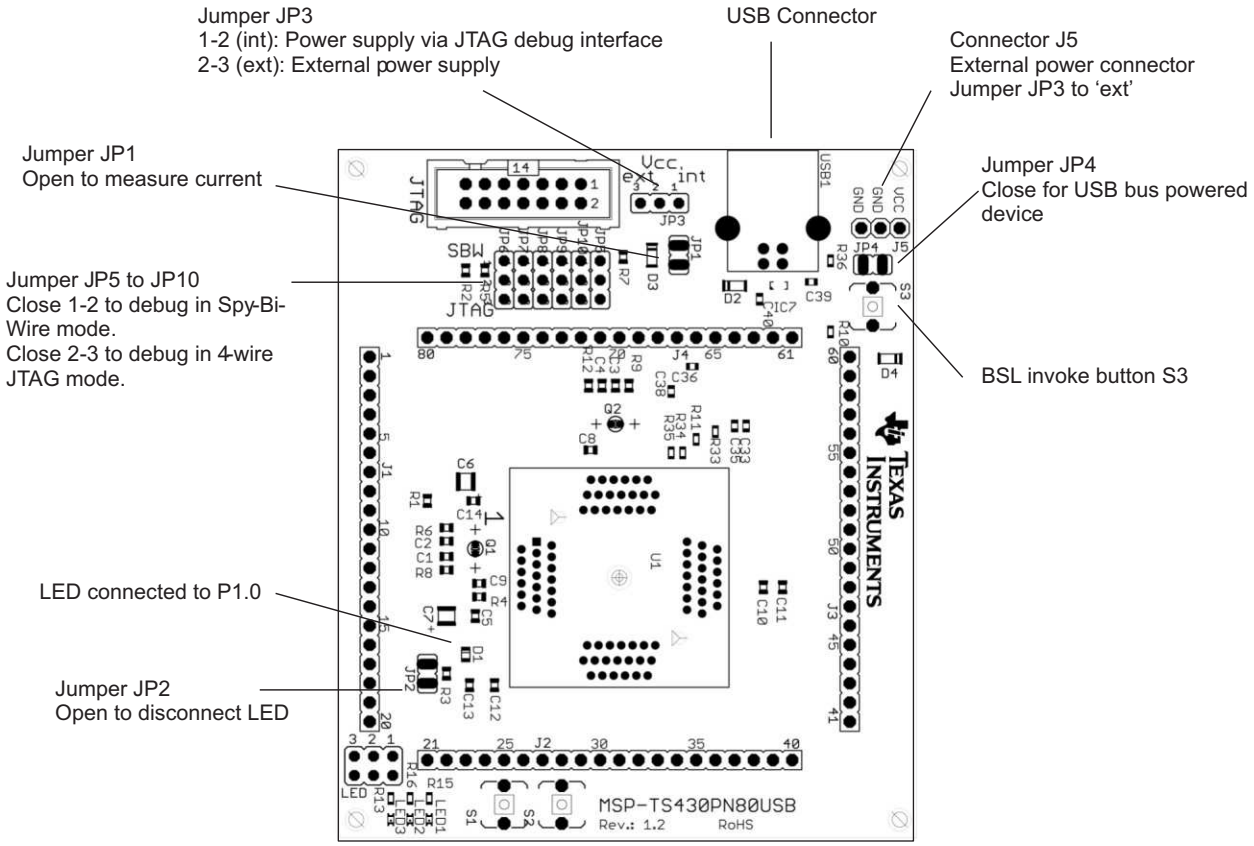


Figure B-20. MSP-TS430PN80USB Target Socket Module, PCB

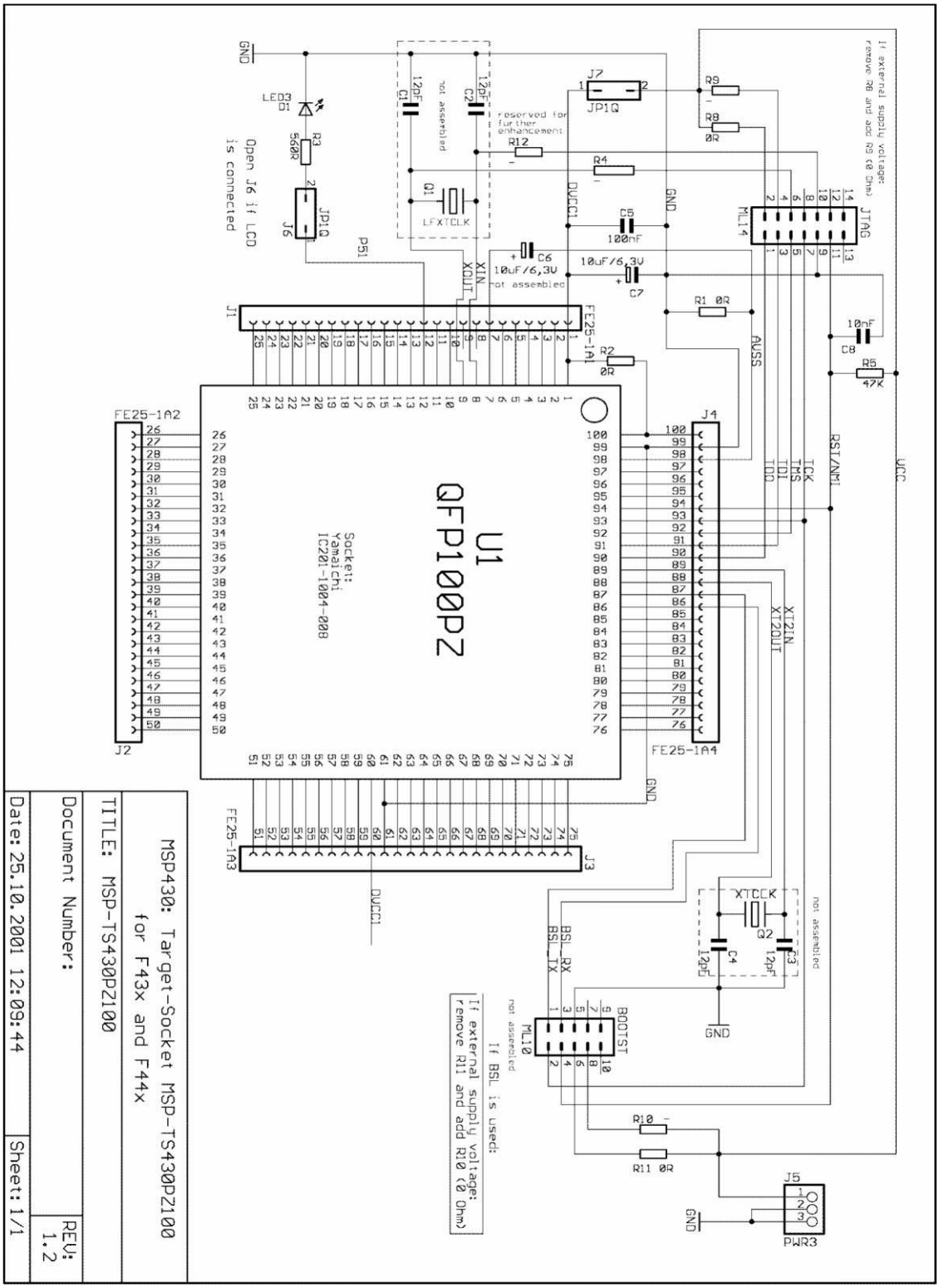
Table B-10. MSP-TS430PN80USB Bill of Materials

Pos.	Ref Des	No. per Board	Description	DigiKey Part No.	Comment
1	C1, C2	0	12pF, SMD0805		DNP: C1, C2
1.1	C3, C4	2	47pF, SMD0805		
2	C6, C7	2	10uF/6.3V, Tantal Size B	511-1463-2-ND	
3	C5, C11, C13, C14	4	100nF, SMD0805	311-1245-2-ND	
3.1	C10, C12	0	100nF, SMD0805	311-1245-2-ND	DNP: C10, C12
4	C8	1	2.2nF, SMD0805		
5	C9	1	470nF, SMD0805	478-1403-2-ND	
6	D1	1	green LED, SMD0805	P516TR-ND	
7	J1, J2, J3, J4	4	20-pin header, TH	SAM1029-20-ND	DNP: headers and receptacles enclosed with kit. Keep vias free of solder.: Header: Receptacle
7.1		4	20-pin header, TH	SAM1213-20-ND	DNP: headers and receptacles enclosed with kit. Keep vias free of solder.: Header: Receptacle
8	J5	1	3-pin header, male, TH	SAM1035-03-ND	
9	JP5, JP6, JP7, JP8,JP9, JP10	6	3-pin header, male, TH	SAM1035-03-ND	Place jumpers on pins 2-3
10	JP1, JP2	2	2-pin header, male, TH	SAM1035-02-ND	Place jumper on header
	JP4	1		SAM1035-02-ND	Place jumper only on one pin
11	JP3	1	3-pin header, male, TH	SAM1035-03-ND	Place jumper on pins 1-2
12		10	Jumper	15-38-1024-ND	Place on: JP1, JP2, JP3, JP4, JP5, JP6, JP7, JP8, JP9, JP10
13	JTAG	1	14-pin connector, male, TH	HRP14H-ND	
14	Q1	0	Crystal	"Q2: 4MHzBuerklin: 78D134"	DNP: Q1 Keep vias free of solder
15	Q2	1	Crystal	"Q2: 4MHzBuerklin: 78D134"	
16	R3, R7	2	330 Ohm, SMD0805	541-330ATR-ND	
17	R1, R2, R4, R6, R8, R9, R12	3	0 Ohm, SMD0805	541-000ATR-ND	DNP: R6, R8, R9, R12
18	R10	1	100 Ohm, SMD0805	Buerklin: 07E500	
18	R11	0	1M Ohm, SMD0805		DNP
18	R5	1	47k Ohm, SMD0805	541-47000ATR-ND	
19	U1	1	Socket:IC201-0804-014		Manuf.: Yamaichi
20	PCB	1	79 x 77 mm		2 layers
21	Rubber standoff	4		Buerklin: 20H1724	Apply to corners at bottom side
22	MSP430	2	MSP430F5529		DNP: Enclosed with kit supplied by TI
23	Insulating disk to Q2	1	IsolierScheibe zu Q2	http://www.ettinger.de/Art_Detail.cfm?ART_ARTNUM=70.08.121	
27	C33	1	220n	Buerklin: 53D2074	
28	C35	1	10p	Buerklin: 56D102	

Table B-10. MSP-TS430PN80USB Bill of Materials (continued)

Pos.	Ref Des	No. per Board	Description	DigiKey Part No.	Comment
29	C36	1	10p	Buerklin: 56D102	
30	C38	1	220n	Buerklin: 53D2074	
31	C39	1	4u7	Buerklin: 53D2086	
32	C40	1	0.1u	Buerklin: 53D2068	
33	D2, D3, D4	3	LL103A	Buerklin: 24S3406	
34	IC7	1	TPD4E004		Manu: TI
36	LED	0	JP3QE	SAM1032-03-ND	DNP
37	LED1	0	LEDCHIPLED_0603	FARNELL: 852-9833	DNP
38	LED2	0	LEDCHIPLED_0603	FARNELL: 852-9868	DNP
39	LED3	0	LEDCHIPLED_0603	FARNELL: 852-9841	DNP
40	R13, R15, R16	0	470R	Buerklin: 07E564	DNP
41	R33	1	1k4	Buerklin: 07E612	
42	R34	1	27R	Buerklin: 07E444	
43	R35	1	27R	Buerklin: 07E444	
44	R36	1	33k	Buerklin: 07E740	
45	S1	0	PB	P12225STB-ND	DNP
46	S2	0	PB	P12225STB-ND	DNP
46	S3	1	PB	P12225STB-ND	
47	USB1	1	USB_RECEPTACLE	FARNELL: 117-7885	

B.11 MSP-TS430PZ100



NOTE: Connections between the JTAG header and pins XOUT and XIN are no longer required and should not be made.

Figure B-21. MSP-TS430PZ100 Target Socket Module, Schematic

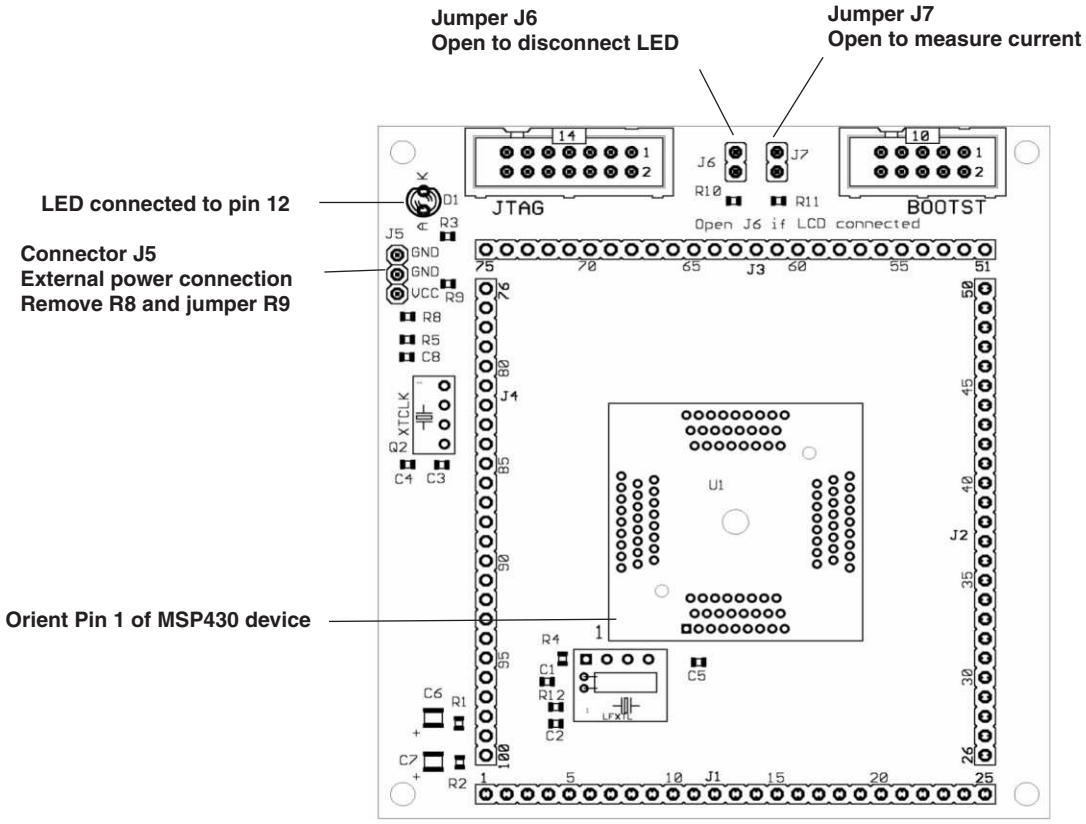


Figure B-22. MSP-TS430PZ100 Target Socket Module, PCB

Table B-11. MSP-TS430PZ100 Bill of Materials

Pos.	Ref Des	No. per Board	Description	DigiKey Part No.	Comment
1	C1, C2,	0	12pF, SMD0805		DNP
1b	C3, C4	0	47pF, SMD0805		DNP: Only recommendation. Check your crystal spec.
2	C6, C7	1	10uF/10V, Tantal Size B	511-1463-2-ND	DNP: C6
3	C5	1	100nF, SMD0805	478-3351-2-ND	
4	C8	1	10nF, SMD0805	478-1383-2-ND	
5	C9	1	470nF, SMD0805	478-1403-2-ND	
6	D1	1	yellow LED, TH, 3mm, T1	511-1251-ND	
7	J1, J2, J3, J4	0	25-pin header, TH	SAM1029-25-NDSAM1213-25-ND	DNP: Headers and receptacles enclosed with kit.Keep vias free of solder.: Header: Receptacle
8	J5	1	3-pin header, male, TH	SAM1035-03-ND	
9	J6, J7	2	2-pin header, male, TH	SAM1035-02-ND	place jumper on header
10		2	Jumper	15-38-1024-ND	Place on: J6, J7
11	JTAG	1	14-pin connector, male, TH	HRP14H-ND	
12	BOOTST	0	10-pin connector, male, TH		DNP: Keep vias free of solder
13	Q1, Q2	0	Crystal		DNP: Keep vias free of solder
14	R3	1	330 Ohm, SMD0805	541-330ATR-ND	
15	R1, R2, R4, R8, R9, R10, R11, R12	3	0 Ohm, SMD0805	541-000ATR-ND	DNP: R4, R9, R10, R12
16	R5	1	47k Ohm, SMD0805	541-47000ATR-ND	
17	U1	1	"Socket: IC201-1004-008or IC357-1004-53N"		Manuf.: Yamaichi
18	PCB	1	82 x 90 mm		2 layers
19	Adhesive Plastic feet	4	~6mm width, 2mm height	e.g., 3M Bumpons Part No. SJ-5302	Apply to corners at bottom side
20	MSP430	2	MSP430FG4619IPZ		DNP: enclosed with kit supplied by TI

B.12 MSP-TS430PZ100A

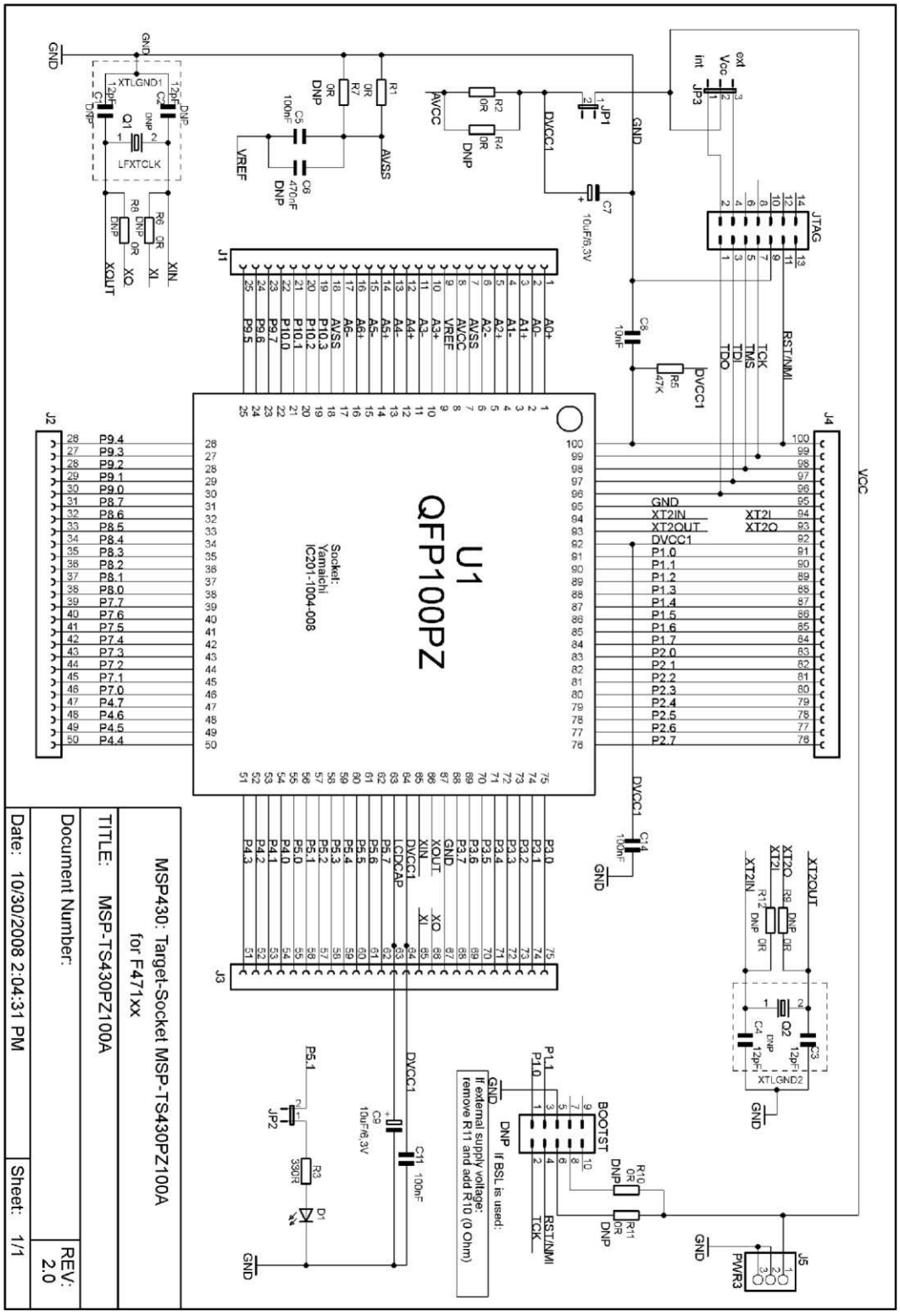


Figure B-23. MSP-TS430PZ100A Target Socket Module, Schematic

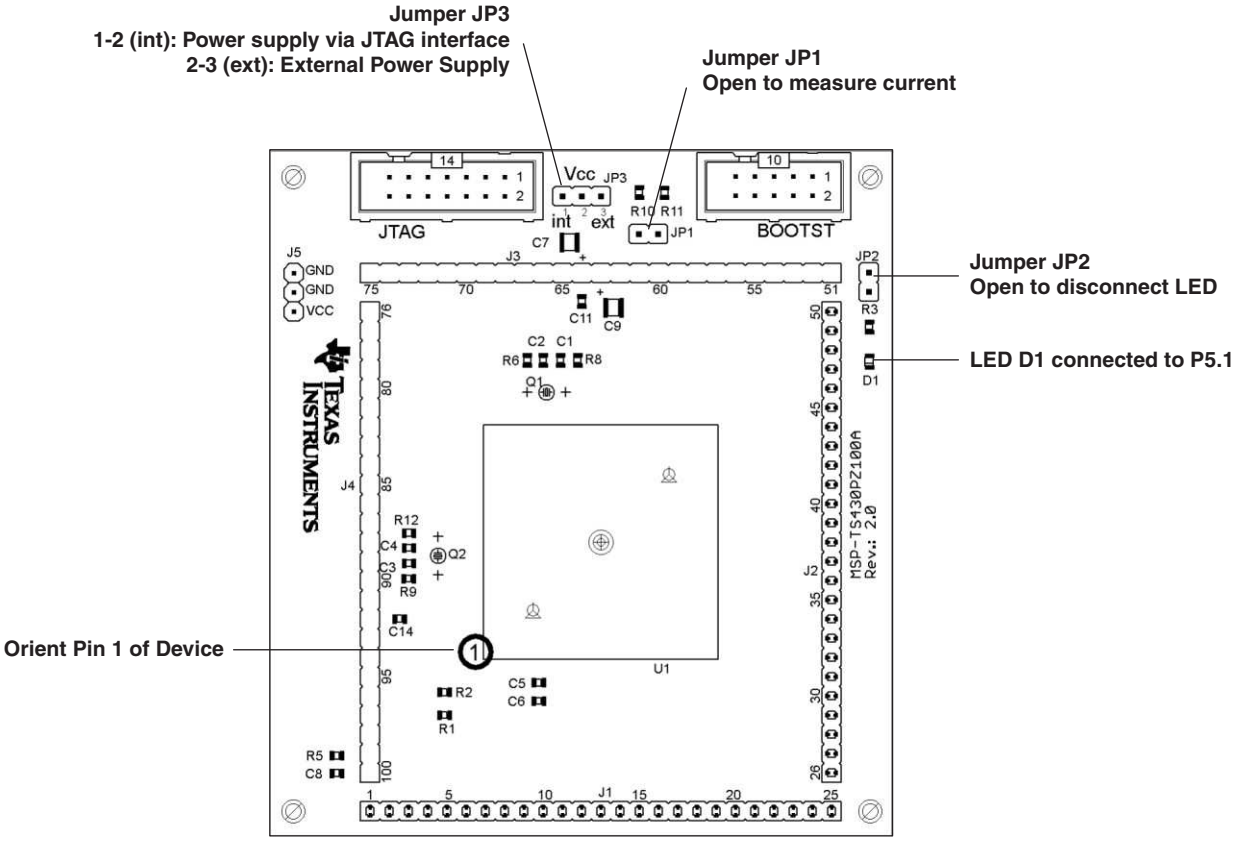


Figure B-24. MSP-TS430PZ100A Target Socket Module, PCB

Table B-12. MSP-TS430PZ100A Bill of Materials

Pos.	Ref Des	No. per Board	Description	DigiKey Part No.	Comment
1	C1, C2	0	12pF, SMD0805		DNP
1b	C3, C4	0	47pF, SMD0805		DNP: Only recommendation. Check your crystal spec.
2	C7, C9	2	10uF/10V, Tantal Size B	511-1463-2-ND	
3	C5, C11, C14	3	100nF, SMD0805	311-1245-2-ND	
4	C8	1	10nF, SMD0805	478-1358-1-ND	
5	C6	0	470nF, SMD0805	478-1403-2-ND	DNP
6	D1	1	green LED, SMD0805	67-1553-1-ND	
7	J1, J2, J3, J4	0	25-pin header, TH	SAM1029-25-NDSAM1213-25-ND	DNP: Headers and receptacles enclosed with kit.Keep vias free of solder.: Header: Receptacle
8	J5	1	3-pin header, male, TH	SAM1035-03-ND	
10	JP1, JP2	2	2-pin header, male, TH	SAM1035-02-ND	pPlace jumper on header
11	JP3	1	3-pin header, male, TH	SAM1035-03-ND	Place jumper on pins 1-2
12		3	Jumper	15-38-1024-ND	Place on: JP1, JP2, JP3
13	JTAG	1	14-pin connector, male, TH	HRP14H-ND	
14	BOOTST	0	10-pin connector, male, TH		DNP: Keep vias free of solder
15	Q1, Q2	0	Crystal		DNP: Keep vias free of solder
16	R3	1	330 Ohm, SMD0805	541-330ATR-ND	
17	R1, R2, R4, R6, R7, R8, R9, R10, R11, R12	2	0 Ohm, SMD0805	541-000ATR-ND	DNP: R4, R6, R7, R8, R9, R10, R11, R12
18	R5	1	47k Ohm, SMD0805	541-47000ATR-ND	
19	U1	1	Socket: IC357-1004-53N		Manuf.: Yamaichi
20	PCB	1	90 x 82 mm		4 layers
21	Rubber standoff	4		Select appropriate	Apply to corners at bottom side
22	MSP430	2	MSP430F5438IPZ		DNP: Enclosed with kit supplied by TI

B.13 MSP-TS430PZ5x100

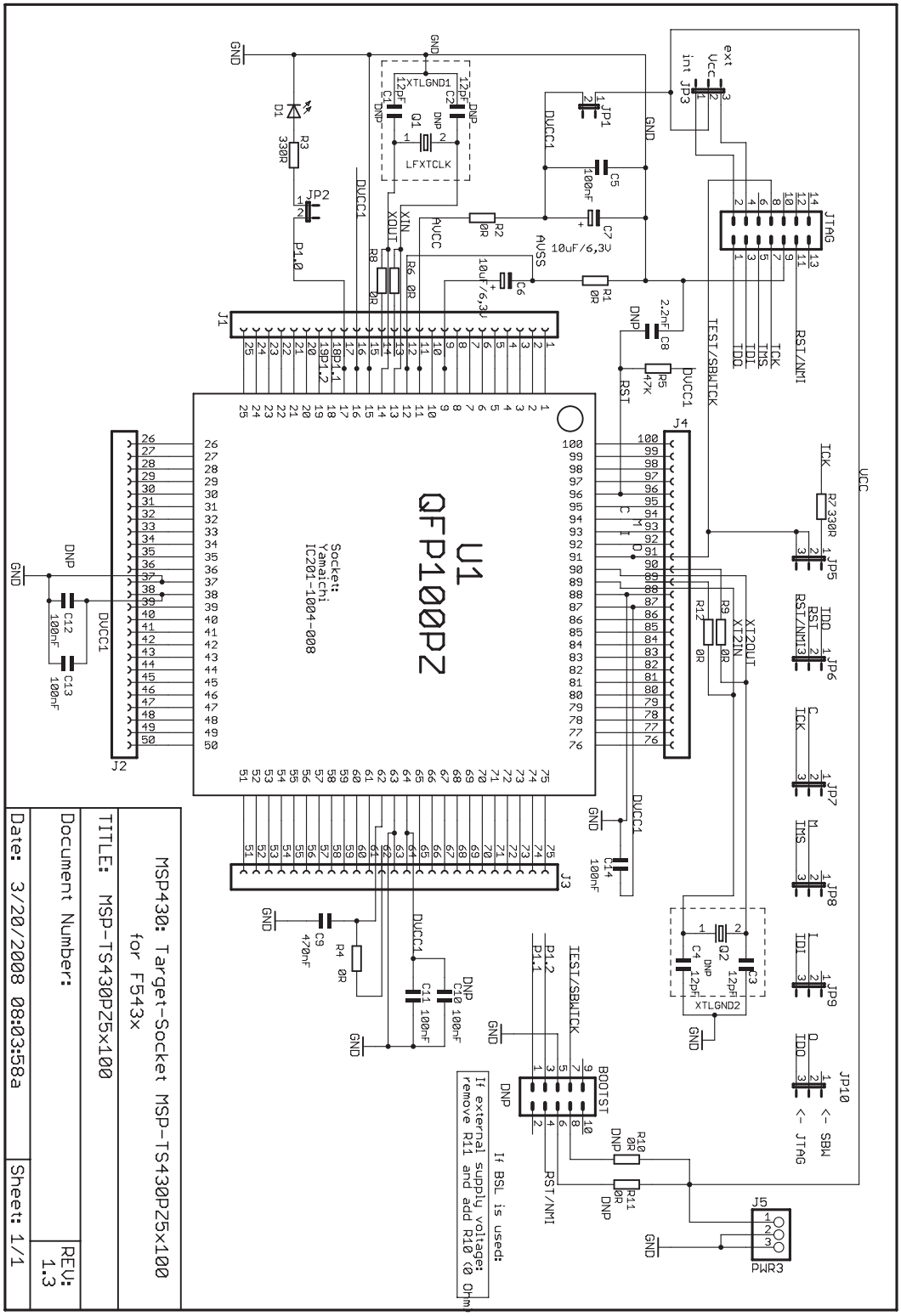


Figure B-25. MSP-TS430PZ5x100 Target Socket Module, Schematic

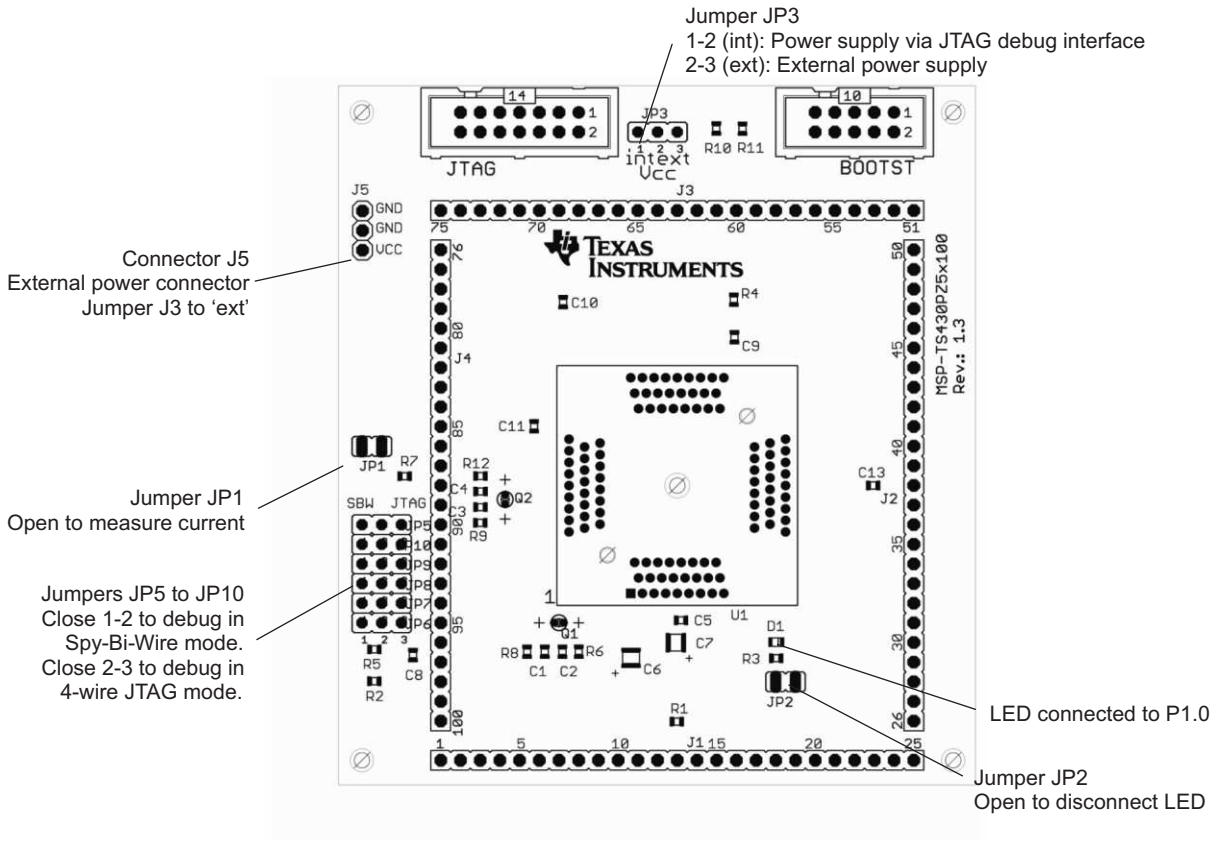


Figure B-26. MSP-TS430PZ5x100 Target Socket Module, PCB

Table B-13. MSP-TS430PZ5x100 Bill of Materials

Pos.	Ref Des	No. per Board	Description	DigiKey Part No.	Comment
1	C1, C2	0	12pF, SMD0805		DNP
1b	C3, C4		47pF, SMD0805		DNP: Only recommendation. Check your crystal spec.
2	C6, C7	2	10uF/10V, Tantal Size B	511-1463-2-ND	
3	C5, C10, C11, C12,C13, C14	4	100nF, SMD0805	311-1245-2-ND	DNP: C12, C14
4	C8	0	2.2nF, SMD0805		DNP
5	C9	1	470nF, SMD0805	478-1403-2-ND	
6	D1	1	green LED, SMD0805	67-1553-1-ND	
7	J1, J2, J3, J4	0	25-pin header, TH	"SAM1029-25-NDSAM1213-25-ND"	DNP: headers and receptacles enclosed with kit. Keep vias free of solder.: Header: Receptacle
8	J5	1	3-pin header, male, TH	SAM1035-03-ND	
9	JP5, JP6, JP7, JP8,JP9, JP10	6	3-pin header, male, TH	SAM1035-03-ND	Place jumpers on pins 2-3
10	JP1, JP2	2	2-pin header, male, TH	SAM1035-02-ND	Place jumper on header
11	JP3	1	3-pin header, male, TH	SAM1035-03-ND	Place jumper on pins 1-2
12		9	Jumper	15-38-1024-ND	Place on JP1, JP2, JP3, JP5, JP6, JP7, JP8, JP9, JP10
13	JTAG	1	14-pin connector, male, TH	HRP14H-ND	
14	BOOTST	0	10-pin connector, male, TH		DNP: Keep vias free of solder
15	Q1, Q2	0	Crystal		DNP: Keep vias free of solder
16	R3, R7	2	330 Ohm, SMD0805	541-330ATR-ND	
17	R1, R2, R4, R6, R8, R9, R10, R11, R12	3	0 Ohm, SMD0805	541-000ATR-ND	DNP: R6, R8, R9, R10, R11, R12
18	R5	1	47k Ohm, SMD0805	541-47000ATR-ND	
19	U1	1	Socket: IC357-1004-53N		Manuf.: Yamaichi
20	PCB	1	90 x 82 mm		2 layers
21	Rubber standoff	4		Select appropriate	Apply to corners at bottom side
22	MSP430	2	MSP430F5438IPZ		DNP: Enclosed with kit supplied by TI

B.14 EM430F6137RF900

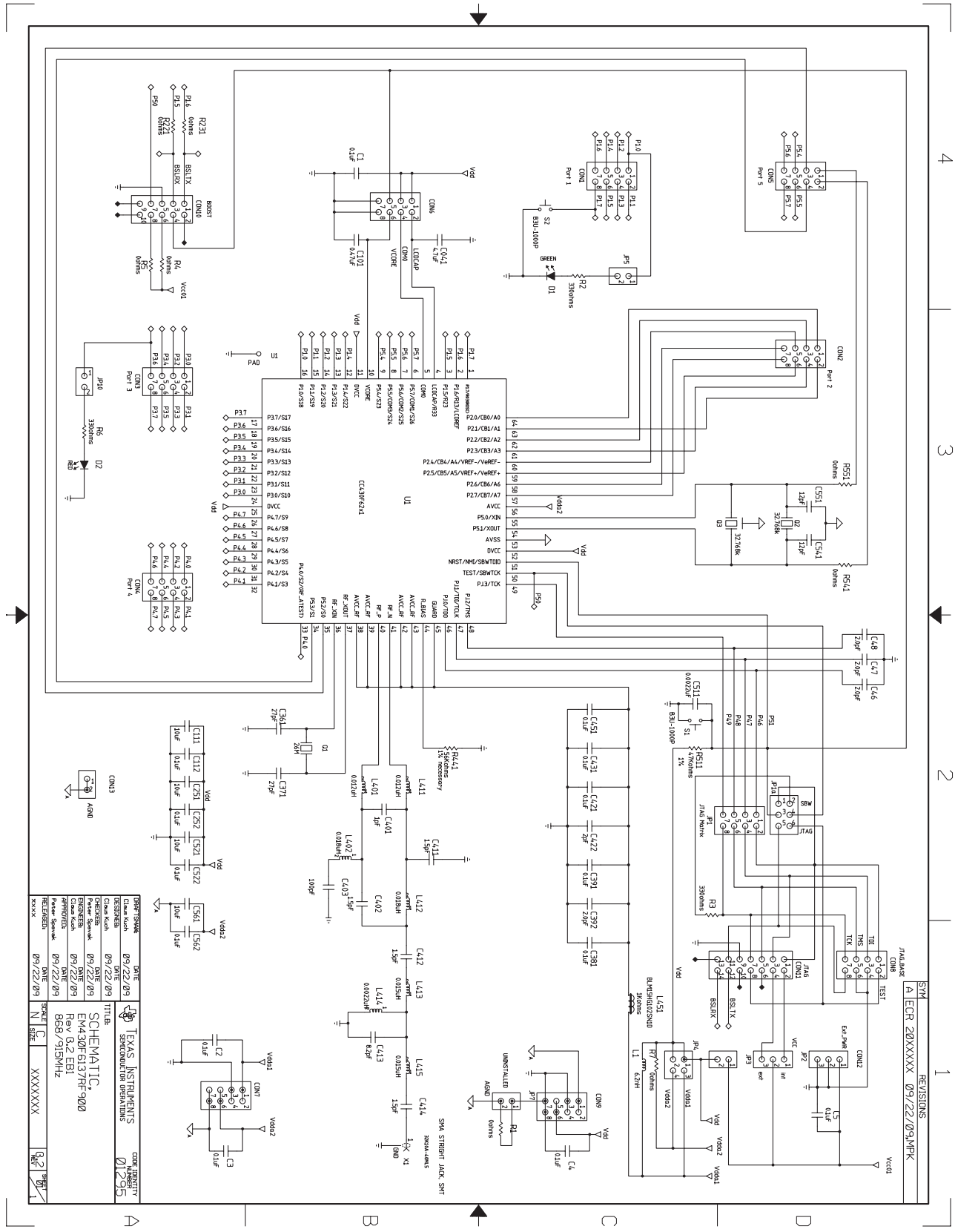


Figure B-27. EM430F6137RF900 Target Socket Module, Schematic

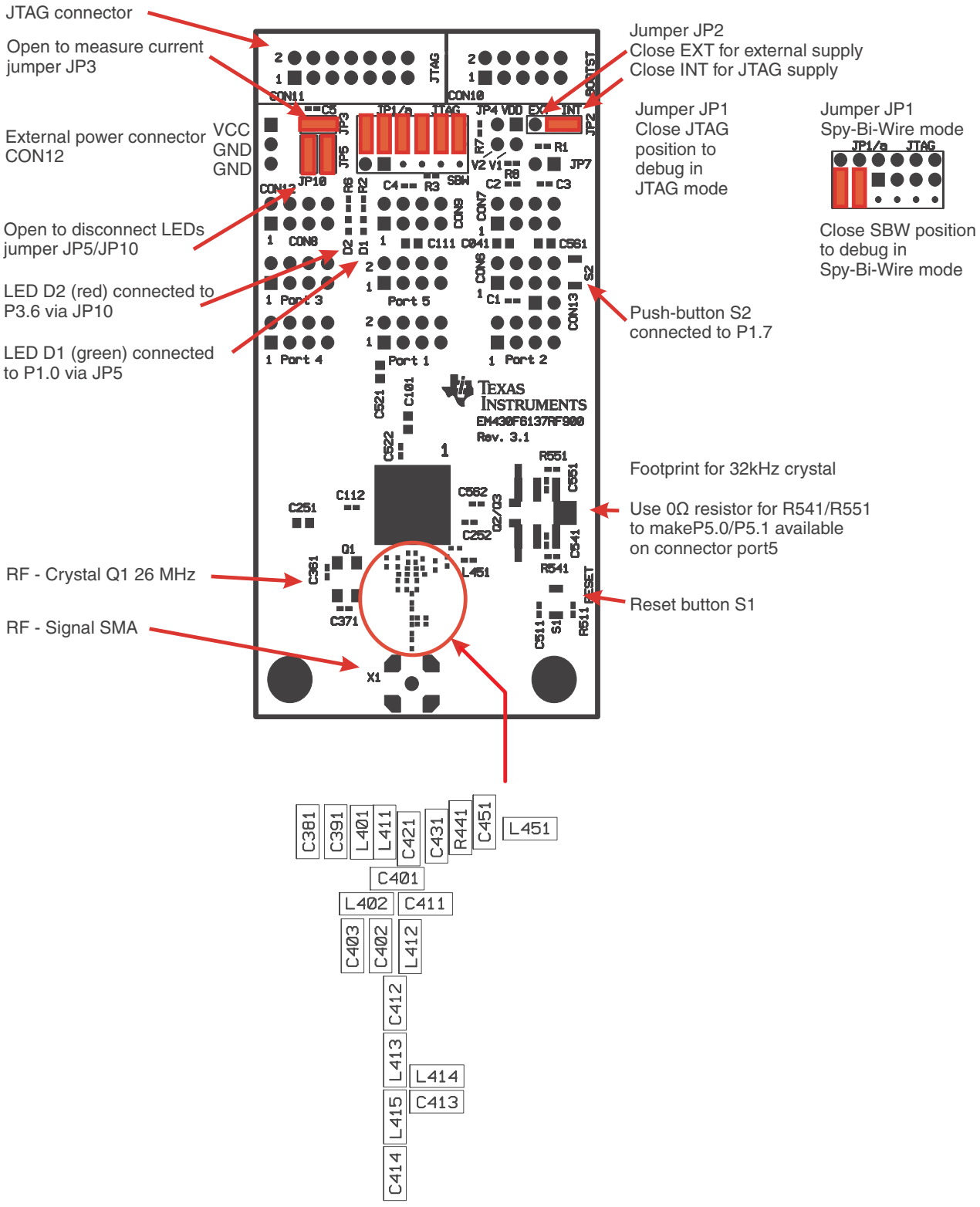


Figure B-28. EM430F6137RF900 Target Socket Module, PCB

Table B-14. EM430F6137RF900 Bill of Materials

Pos.	Ref Des	No. per Board	Description	Part No.	Manufacturer
1	Q1	1	(CUSTOMER SUPPLY) CRYSTAL, SMT, 4P, 26MHz	ASX-531(CS)	AKER ELECTRONIC
2	C1-C5, C112, C252, C381, C391, C421, C431, C451, C522, C562	14	CAPACITOR, SMT, 0402, CER, 16V, 10%, 0.1uF	0402YC104KAT2A	AVX
3	C101	1	CAPACITOR, SMT, 0603, CERAMIC, 0.47uF, 16V, 10%, X5R	0603YD474KAT2A	AVX
4	R511	1	RES0402, 47.0K	CRCW04024702F100	DALE
5	CON11	1	HEADER, THU, MALE, 14P, 2X7, 25.4x9.2x9.45mm, 90deg	09 18 514 6323	HARTING
7	D1	1	LED, SMT, 0603, GREEN, 2.1V	APT1608MGC	KINGBRIGHT
8	D2	1	LED, SMT, 0603, RED, 2.0V	APT1608EC	KINGBRIGHT
10	CON12	1	HEADER, THU, MALE, 3P, 1x3, 9.9x4.9x5.9mm	22-03-5035	MOLEX
11	C361, C371	2	50V, +/-5%, 27pF	GRM36COG270J50	MURATA
12	L451	1	FERRITE, SMT, 0402, 1.0KOHM, 250mA	BLM15HG102SN1D	MURATA
13	C403	1	CAPACITOR, SMT, 0402, CERAMIC, 100pF, 50V, +/-0.25pF, C0G(NP0)	GRM1555C1H101JZ01	MURATA
14	L414	1	INDUCTOR, SMT, 0402, 2.2nH, +/-0.2nH, 1000mA, 250MHz	LQW15AN2N2C10	MURATA
15	L413, L415	2	INDUCTOR, SMT, 0402, 15nH, +/-5%, 460mA, 250MHz	LQW15AN15NJ00	MURATA
16	L402, L412	2	INDUCTOR, SMT, 0402, 18nH, +/-5%, 370mA, 250MHz	LQW15AN18NJ00	MURATA
17	C401	1	CAPACITOR, SMT, 0402, CER, 1pF, 50V, +/-0.25pF, NP0	GJM1555C1H1R0CB01D	MURATA
18	C413	1	CAPACITOR, SMT, 0402, CERAMIC, 8.2pF, 50V, +/-0.25pF, C0G(NP0)	GRM1555C1H8R2CZ01	MURATA
19	C402, C411-C412, C414	4	CAPACITOR, SMT, 0402, CERAMIC, 1.5pF, 50V, +/-0.25pF, C0G(NP0)	GRM1555C1H1R5CZ01	MURATA
20	L401, L411	2	INDUCTOR, SMT, 0402, 12nH, +/-5%, 500mA, 250MHz	LQW15AN12NJ00	MURATA
21	C46-C48, C392, C422	5	CAPACITOR, SMT, 0402, CERAMIC, 2.0pF, 50V, +/-0.25pF, C0G(NP0)	GRM1555C1H2R0CZ01	Murata
22	L1	1	INDUCTOR, SMT, 0402, 6.2nH, +/-0.1nH, 700mA, 250MHz	LQW15AN6N2D00	Murata
23	S1-S2	2	ULTRA-SMALL TACTILE SWITCH, SMT, 2P, SPST-NO, 1.2x3x2.5mm, 0.05A, 12V	B3U-1000P	OMRON
24	R7	1	RESISTOR/JUMPER, SMT, 0402, 0 OHM, 5%, 1/16W	ERJ-2GE0R00X (UN)	PANASONIC
25	R2-R3, R6	3	RESISTOR, SMT, 0402, THICK FILM, 5%, 1/16W, 330	ERJ-2GEJ331	PANASONIC
27	C511	1	CAPACITOR, SMT, 0402, CER, 2200pF, 50V, 10%, X7R	ECJ-0EB1H222K	PANASONIC
28	C111, C251, C521, C561	4	CAPACITOR, SMT, 0603, CERAMIC, 10uF, 6.3V, 20%, X5R	ECJ-1VB0J106M	PANASONIC
28a	C041	1	CAP CERAMIC 4.7UF 6.3V X5R 0603	ECJ-1VB0J475M	PANASONIC
29	R441	1	RESISTOR, SMT, THICK FILM, 56K, 1/16W, 1%	ERJ-2RKF5602	PANASONIC
30	R1	1	RESISTOR/JUMPER, SMT, 0402, 0 OHM, 5%, 1/16W	ERJ-2GE0R00X	PANASONIC
31	X1	1	SMA STRIGHT JACK, SMT	32K10A-40ML5	ROSENBERGER

Table B-14. EM430F6137RF900 Bill of Materials (continued)

Pos.	Ref Des	No. per Board	Description	Part No.	Manufacturer
33	U1	1	DUT, SMT, PQFP, RGC-64, 0.5mmLS, 9.15x9.15x1mm, THRM.PAD	CC430F6137	TI
34	JP1	1	Stiftleiste Wuerth 2x4pin	61300821121	WUERTH
35	JP2	1	Stiftleiste Wuerth 1x3pin	61300311121	WUERTH
36a	JP3, JP5, JP10	3	Stiftleiste Wuerth 1x2pin	61300211121	WUERTH
38	JP1a	1	Stiftleiste Wuerth 2x3pin	61300621121	WUERTH

B.15 MSP-FET430PIF

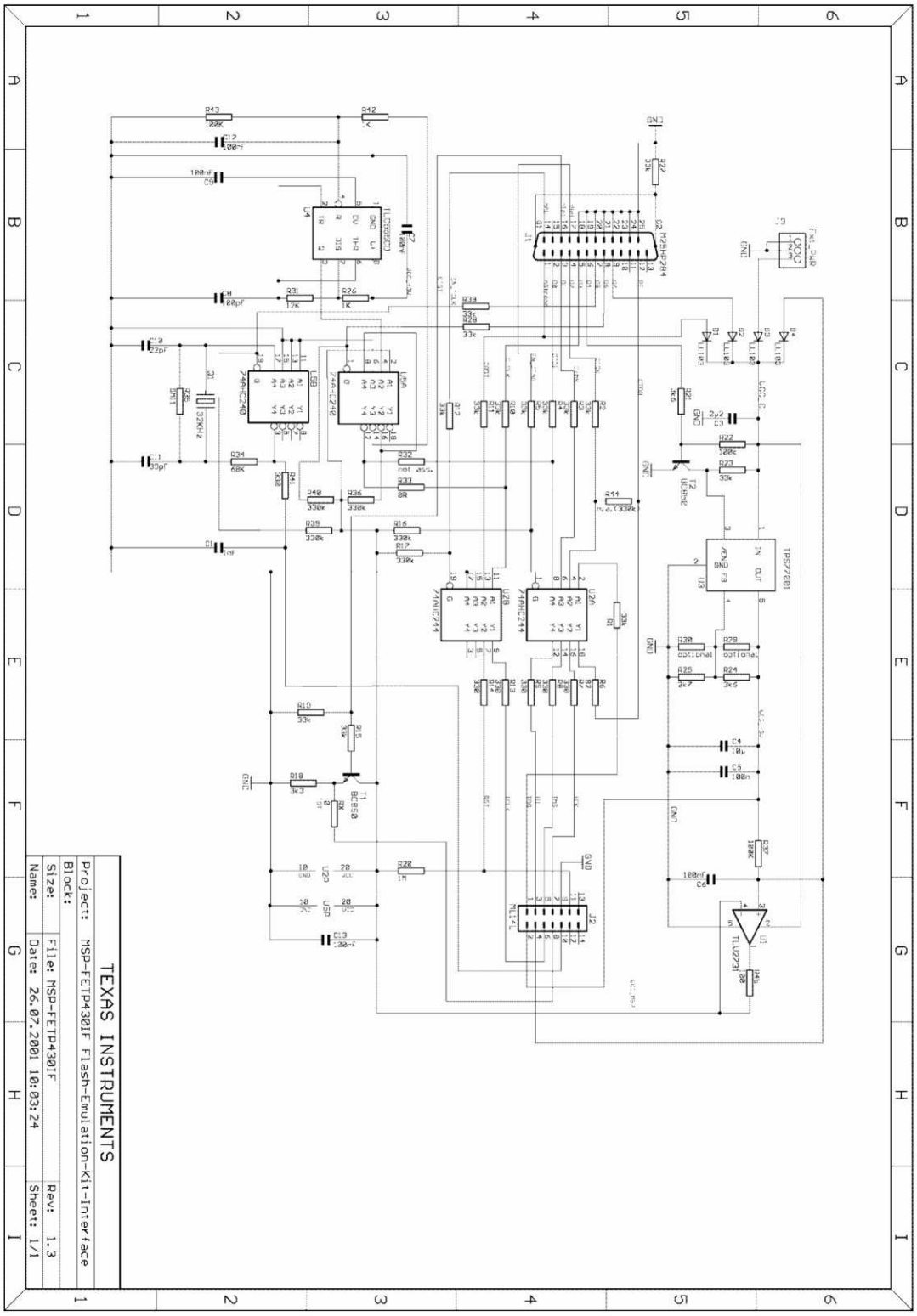


Figure B-29. MSP-FET430PIF FET Interface Module, Schematic

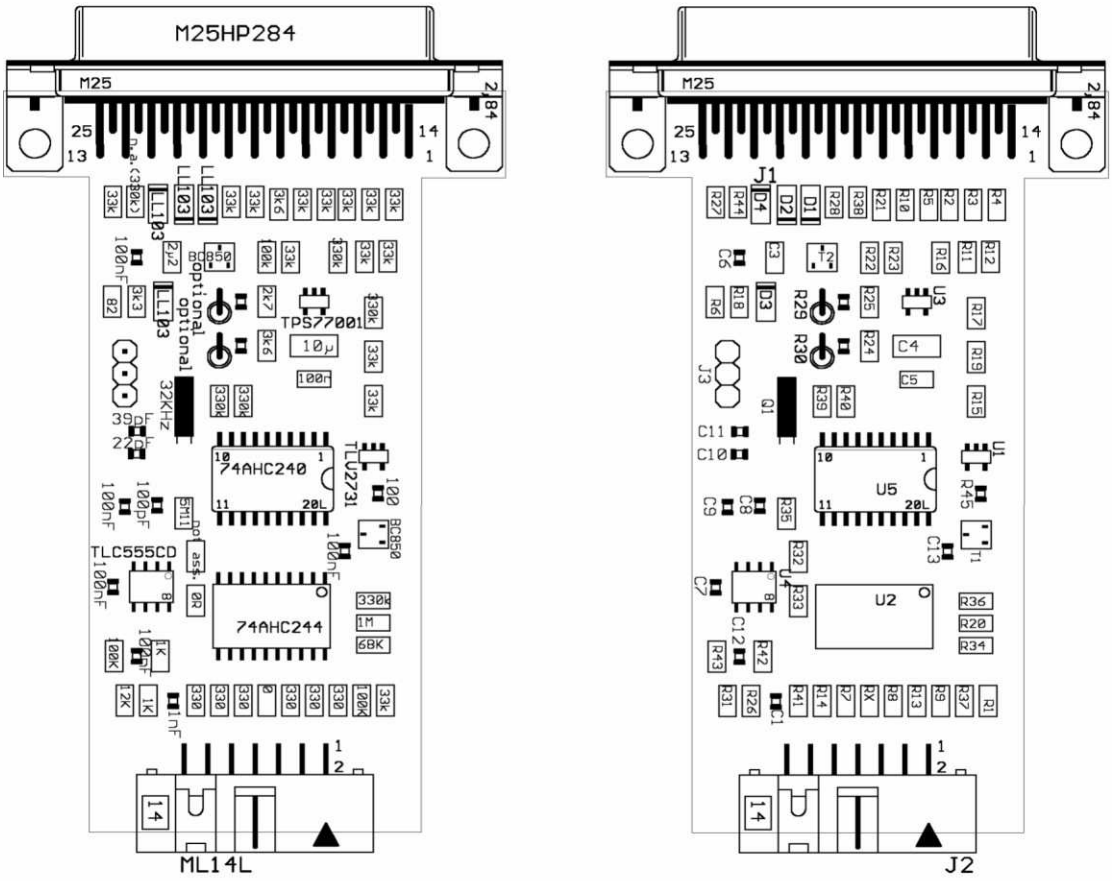


Figure B-30. MSP-FET430PIF FET Interface Module, PCB

B.16 MSP-FET430UIF

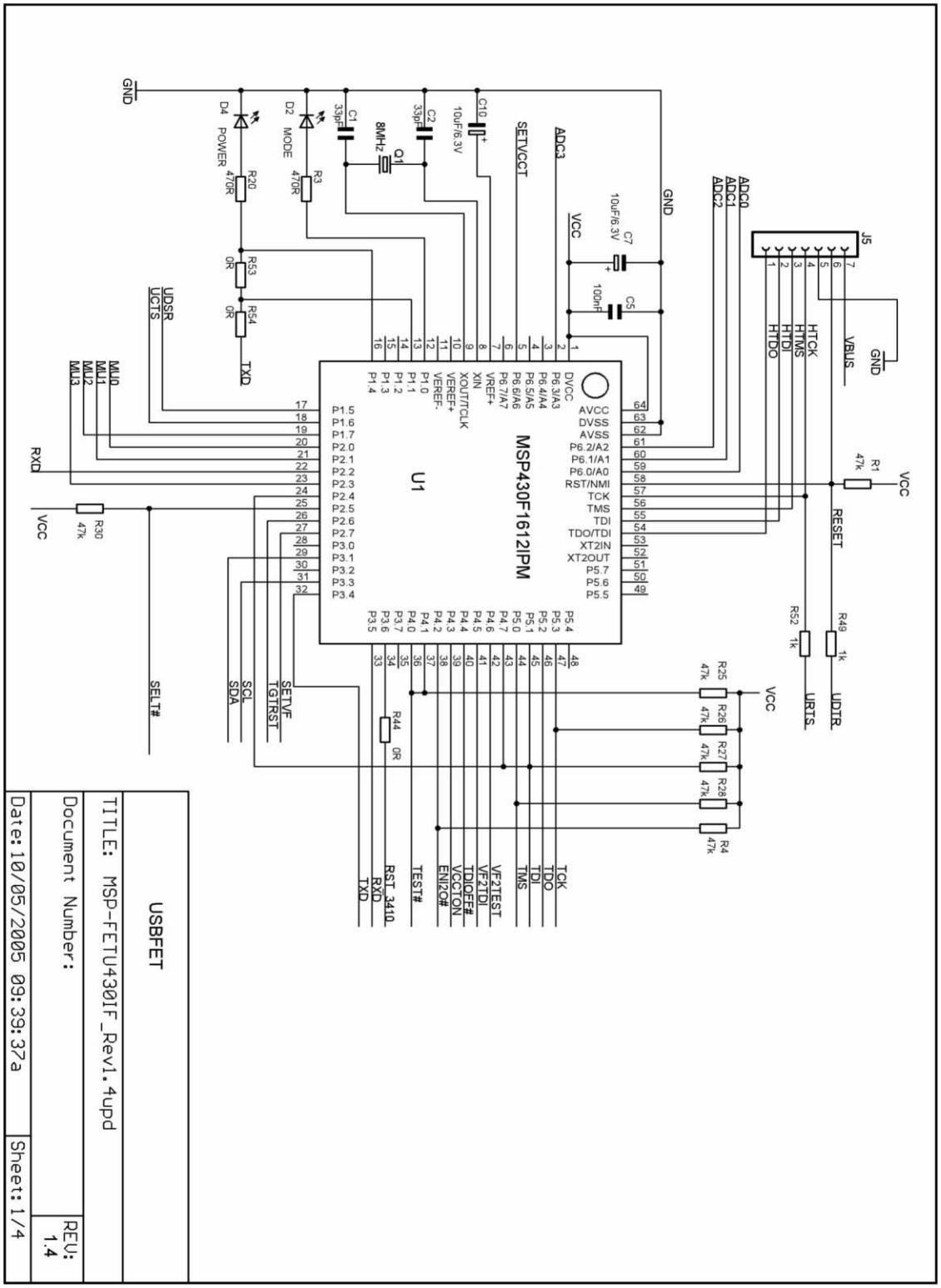


Figure B-31. MSP-FET430UIF USB Interface, Schematic (1 of 4)

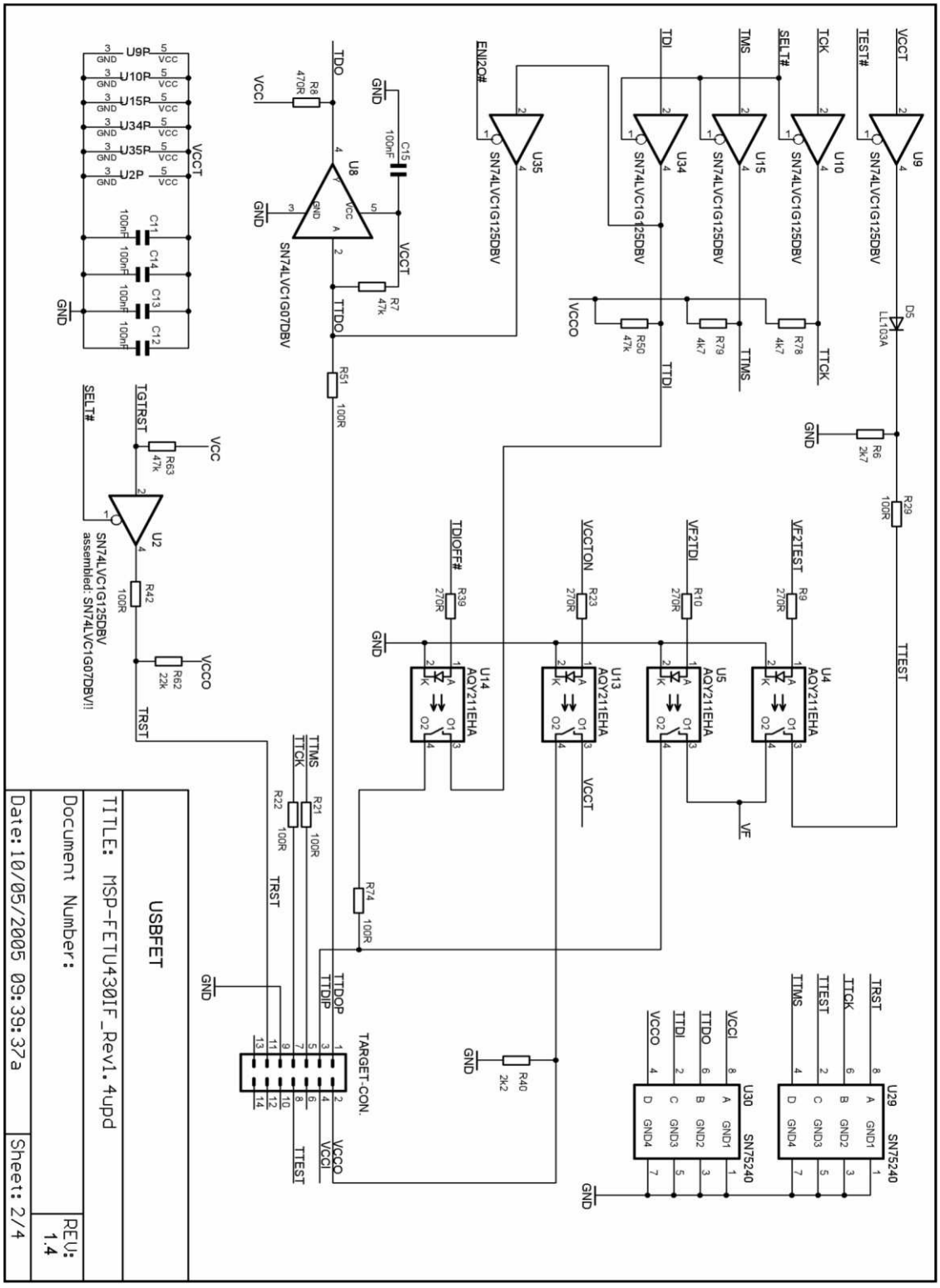


Figure B-32. MSP-FET430UIF USB Interface, Schematic (2 of 4)

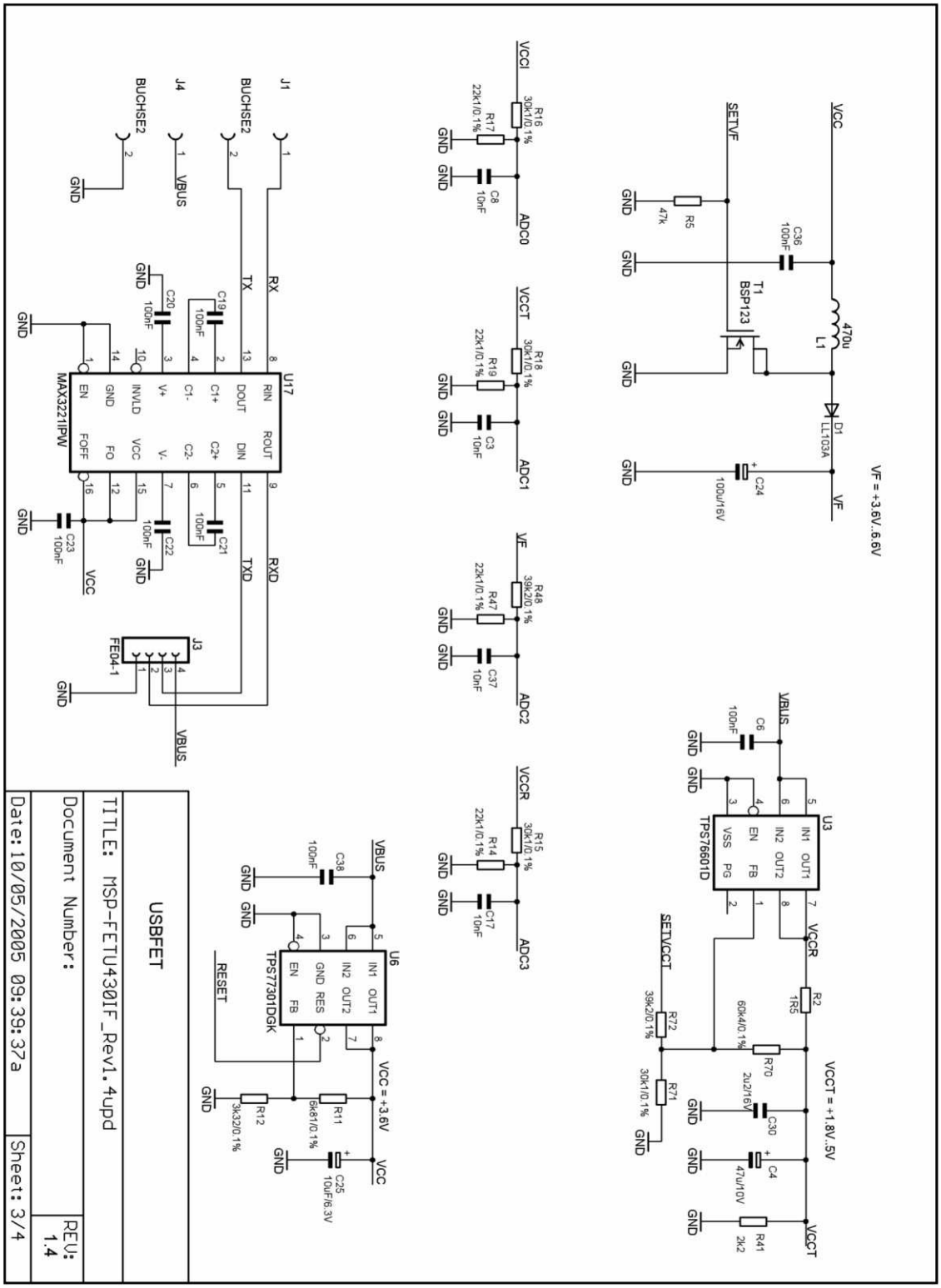


Figure B-33. MSP-FET430UIF USB Interface, Schematic (3 of 4)

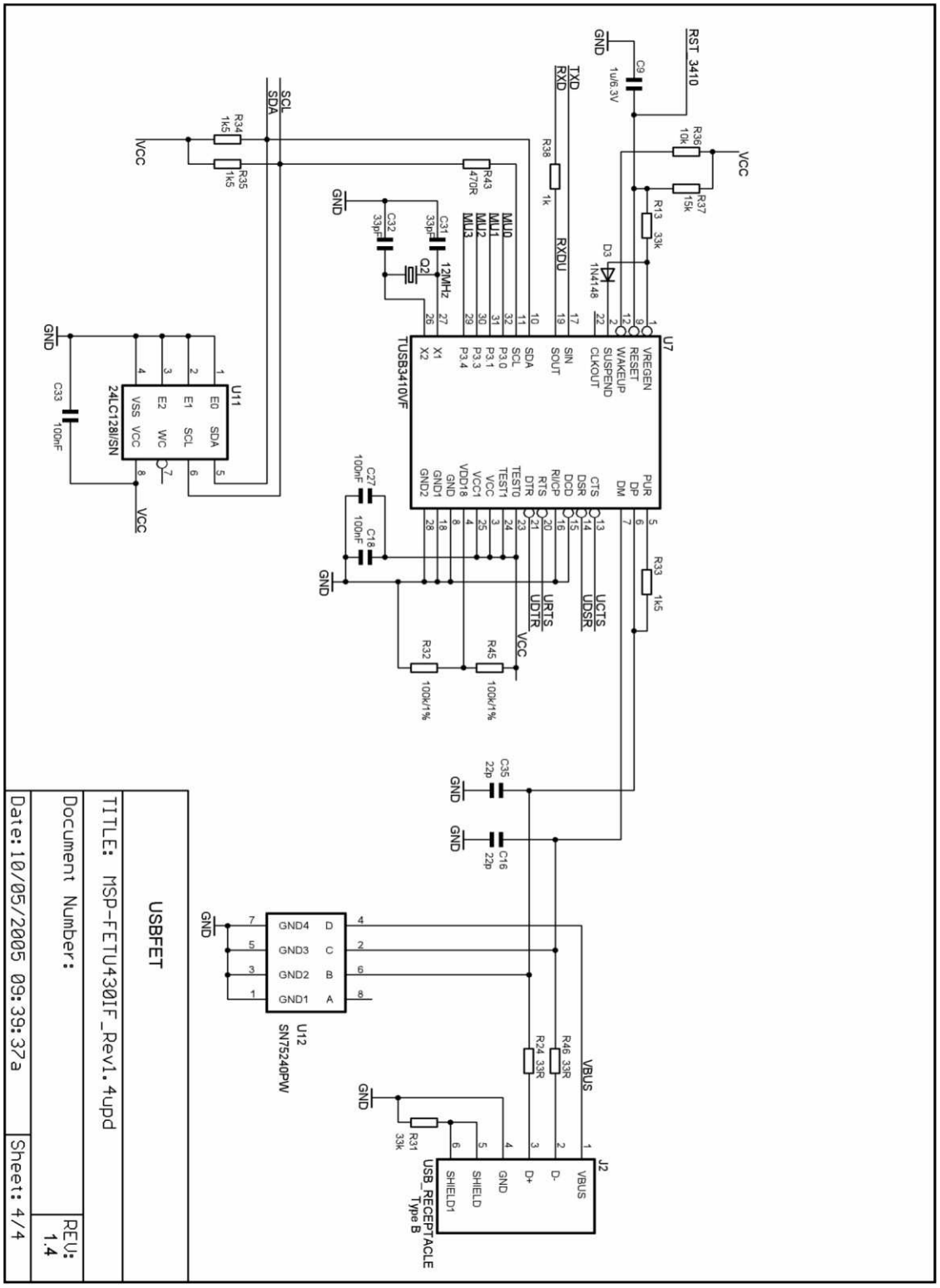


Figure B-34. MSP-FET430UIF USB Interface, Schematic (4 of 4)

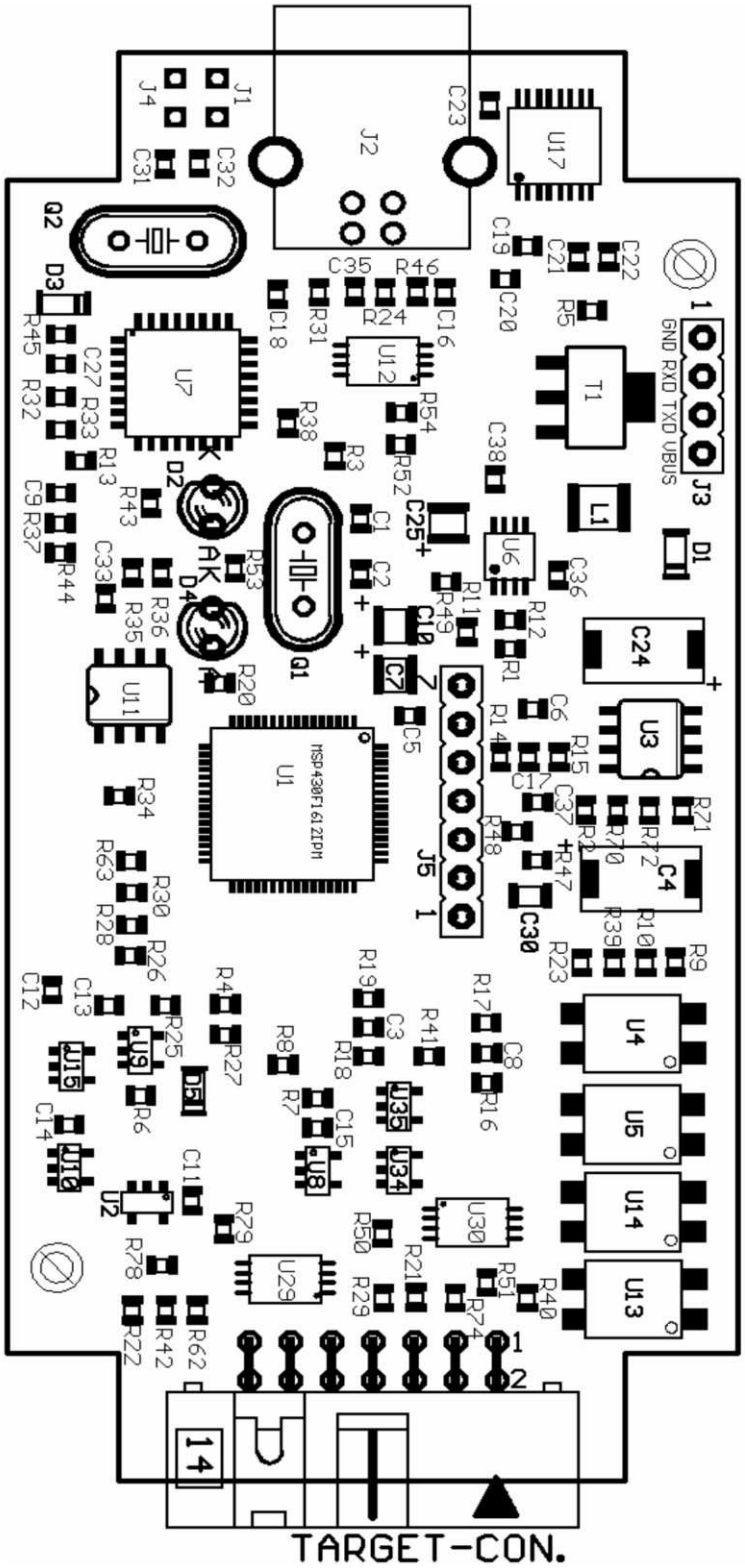


Figure B-35. MSP-FET430UIF USB Interface, PCB

B.16.1 MSP-FET430UIF Revision History

Revision 1.3

- Initial released hardware version

Assembly change on 1.3 (May 2005)

- R29, R51, R42, R21, R22, R74: value changed from 330R to 100R

Changes 1.3 to 1.4 (Aug 2005)

- J5: VBUS and RESET additionally connected
- R29, R51, R42, R21, R22, R74: value changed from 330R to 100R
- U1, U7: F1612 can reset TUSB3410; R44 = 0R added
- TARGET-CON.: pins 6, 10, 12, 13, 14 disconnected from GND
- Firmware-upgrade option through BSL: R49, R52, R53, R54 added; R49, R52 are currently DNP
- Pullups on TCK and TMS: R78, R79 added
- U2: Changed from SN75LVC1G125DBV to SN75LVC1G07DBV

NOTE: Using a locally powered target board with hardware revision 1.4

Using an MSP-FET430UIF interface hardware revision 1.4 with populated R62 in conjunction with a locally powered target board is not possible. In this case, the target device RESET signal is pulled down by the FET tool. It is recommended to remove R62 to eliminate this restriction. This component is located close to the 14-pin connector on the MSP-FET430UIF PCB. See the schematic and PCB drawings in this document for the exact location of this component.

Assembly change on 1.4 (January 2006)

- R62: not populated

Hardware Installation Guide

This section describes the hardware installation process of the following USB debug interfaces on a PC running Windows XP:

- MSP-FET430UIF
- eZ430-F2013
- eZ430-RF2500
- eZ430-Chronos

The installation procedure for other supported versions of Windows is very similar and, therefore, not shown here.

Topic **Page**

C.1 Hardware Installation

1. Connect the USB Debug Interface with a USB cable to a USB port of the PC. (eZ430-F2013, eZ430-RF2500 and eZ430-Chronos can be connected without a cable.)
2. Windows should now recognize the new hardware as an "MSP430 XXX x.xx.xx" (see Figure C-1). The device name may be different from the one shown here.

Figure C-1. Windows XP Hardware Recognition

3. For CCE v3.1 SR1 and CCSv4 the drivers will be installed automatically without user interaction (continue with step 13). For IAR the Hardware Wizard starts automatically and may opens the "Found New Hardware Wizard" window.

NOTE: This Window may not appear. If it does not, the drivers will be installed automatically. Continue with step 13.

4. Click "Next". The Hardware Wizard tries to find the driver in the system. If the driver is found, continue with step 8. If not, press "Back" and continue with step 5.
5. Select "Install from a list or specific location (Advanced)" (see Figure C-2).

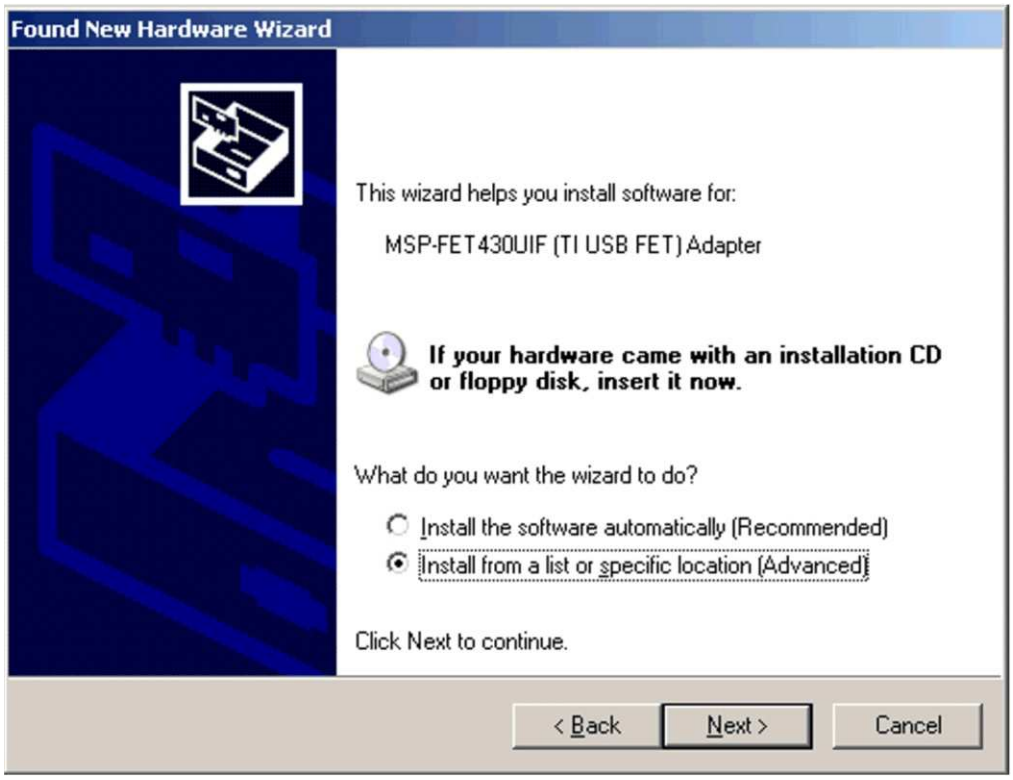


Figure C-2. Windows XP Hardware Wizard

6. Browse to the folder where the driver information files are located (see Figure C-3).

   For CCE, the default folder is:
   C:\Program Files\Texas Instruments\MSP430_USB_DRIVERS_v3.1\

   For CCS, the default folder is:
   C:\Program Files\Texas Instruments\ccs4\emulation\drivers\msp430\

   For IAR Embedded Workbench, the default folder is:
   C:\Program Files\Texas Instruments\IAR Systems\Embedded Workbench 4.0\
   430\drivers\TIUSBFET\WinXP

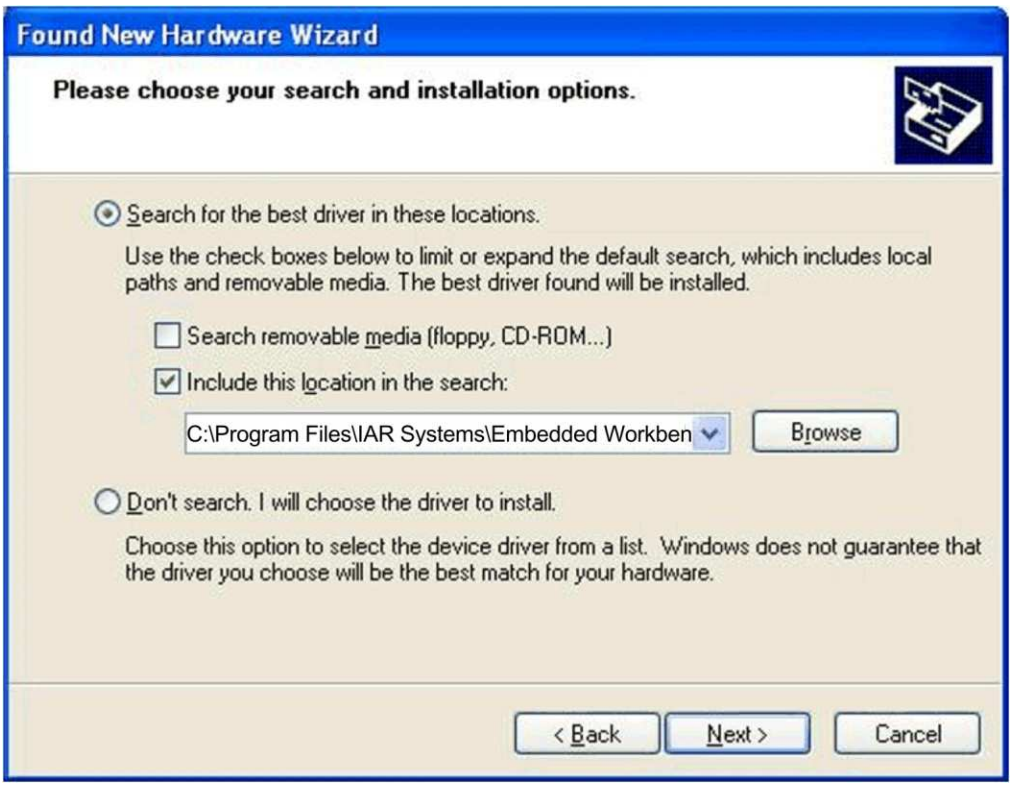


Figure C-3. Windows XP Driver Location Selection Folder

7. The Wizard generates a message that an appropriate driver has been found.

8. Note that Windows may show a warning that the driver is not certified by Microsoft. Ignore this warning and click "Continue Anyway" (see Figure C-4).

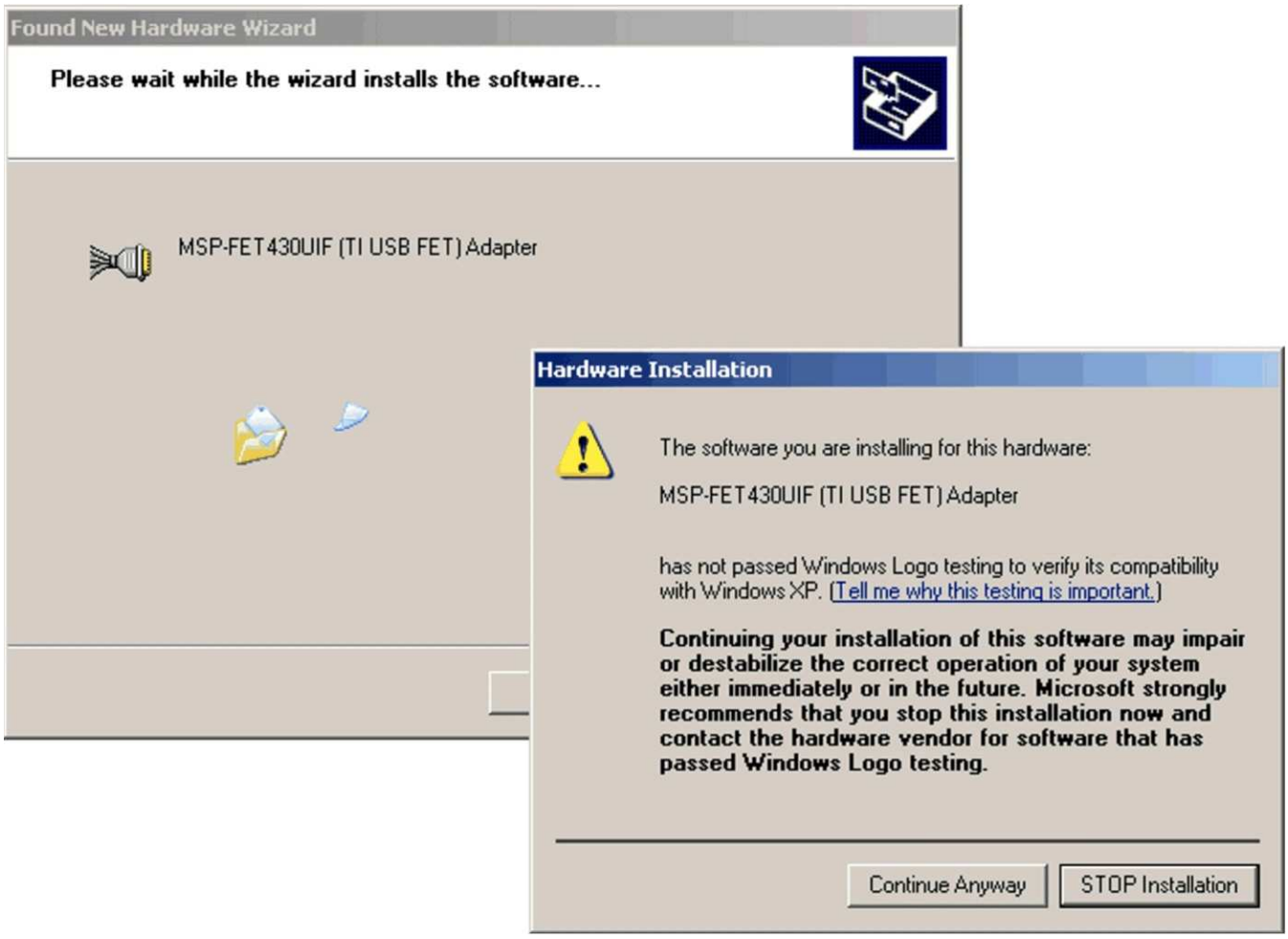


Figure C-4. Windows XP Driver Installation

9. The wizard installs the driver files.
10. The wizard shows a message that it has finished the installation of the software for "MSP-FET430UIF (TI USB FET) Adapter" (or "MSP430 Application UART").
11. **NOTE: This step is for MSP-FET430UIF and eZ430-F2013 only.**
    After closing the hardware wizard, Windows automatically recognizes another new hardware device called "MSP-FET430UIF - Serial Port".
12. **NOTE: This step is for MSP-FET430UIF and eZ430-F2013 only.**
    Depending on the current update version of the operating system, corresponding drivers are installed automatically or the hardware wizard opens again. **If the wizard starts again, repeat the previous steps.**

13. The USB debug interface is installed and ready to use. The Device Manager lists a new entry as shown in Figure C-5, Figure C-6, or Figure C-7.

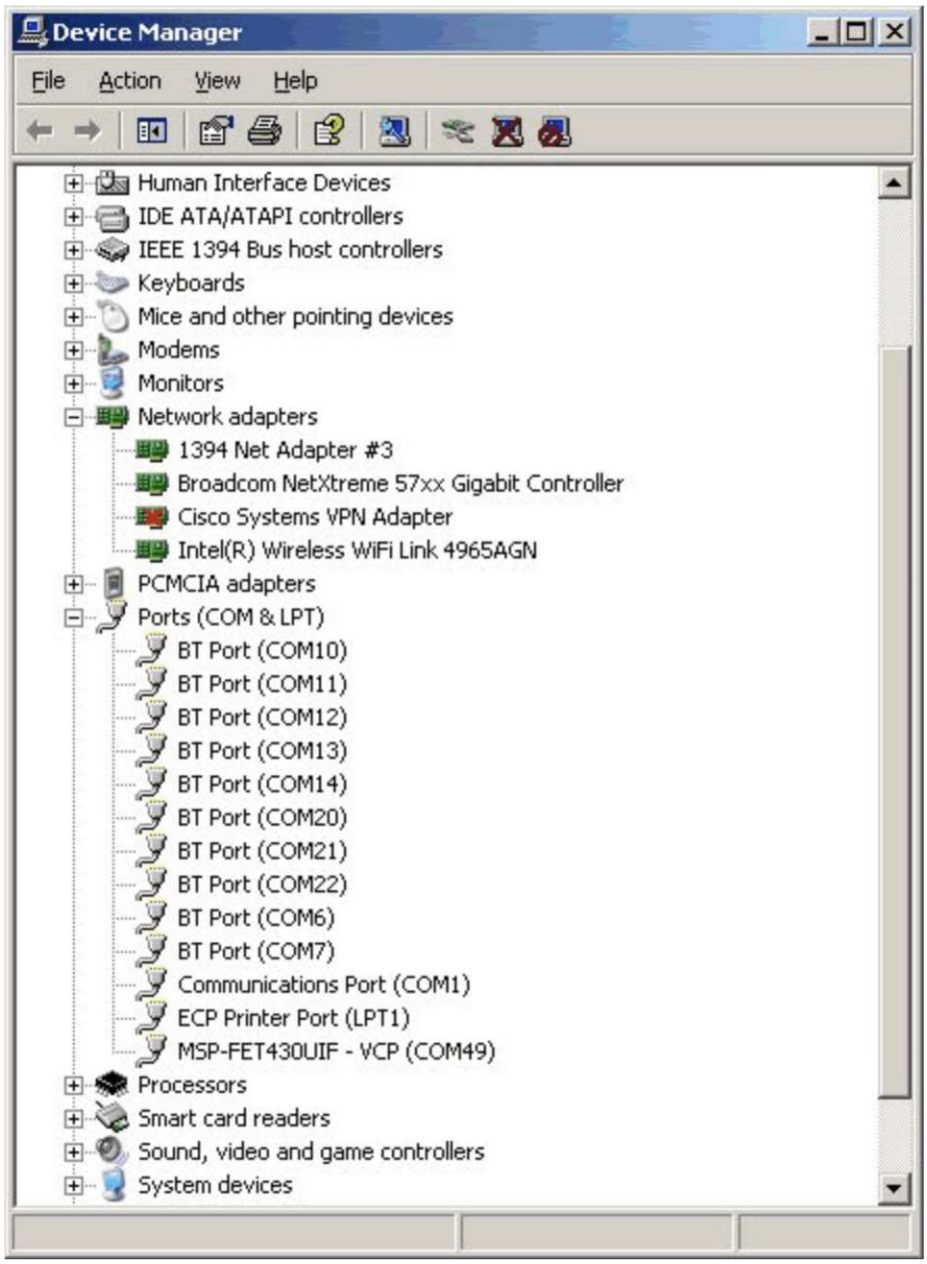


Figure C-5. Device Manager Using MSP-FET430UIF or eZ430-F2013 (CCE and CCS Only)

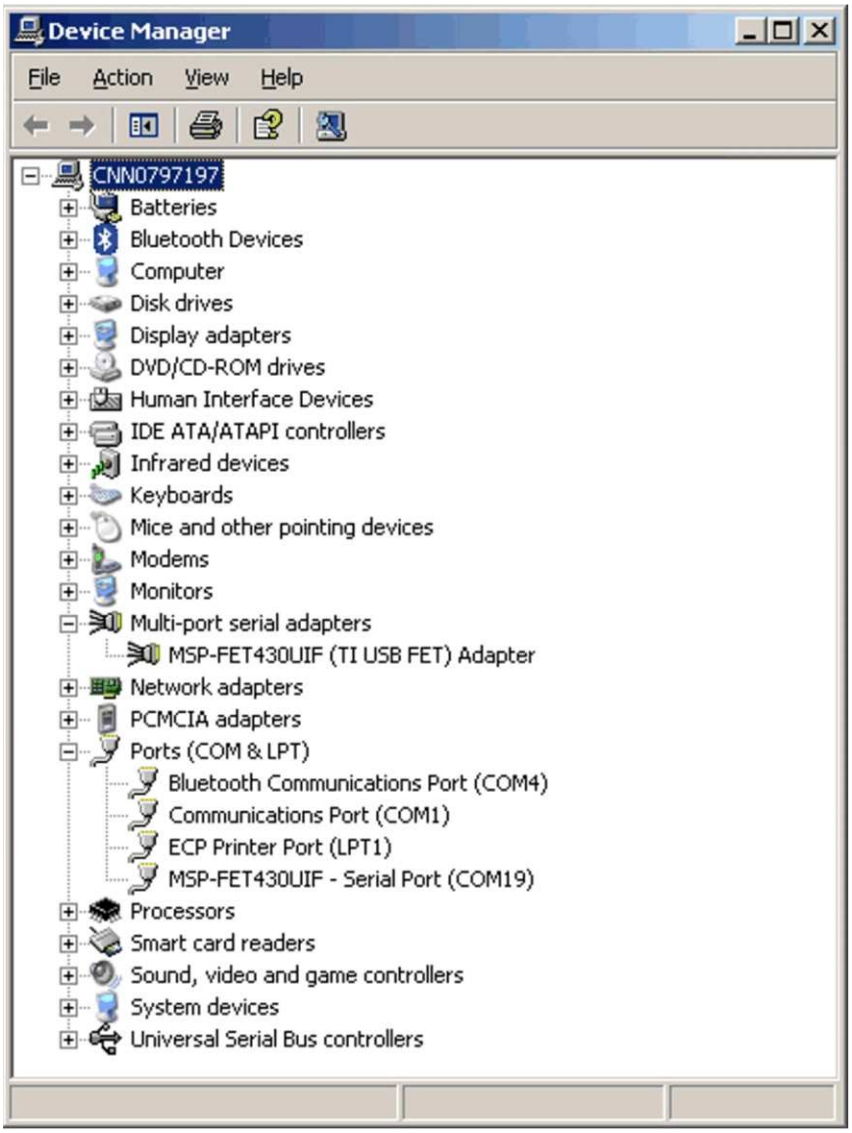


Figure C-6. Device Manager Using MSP-FET430UIF or eZ430-F2013 (IAR Only)

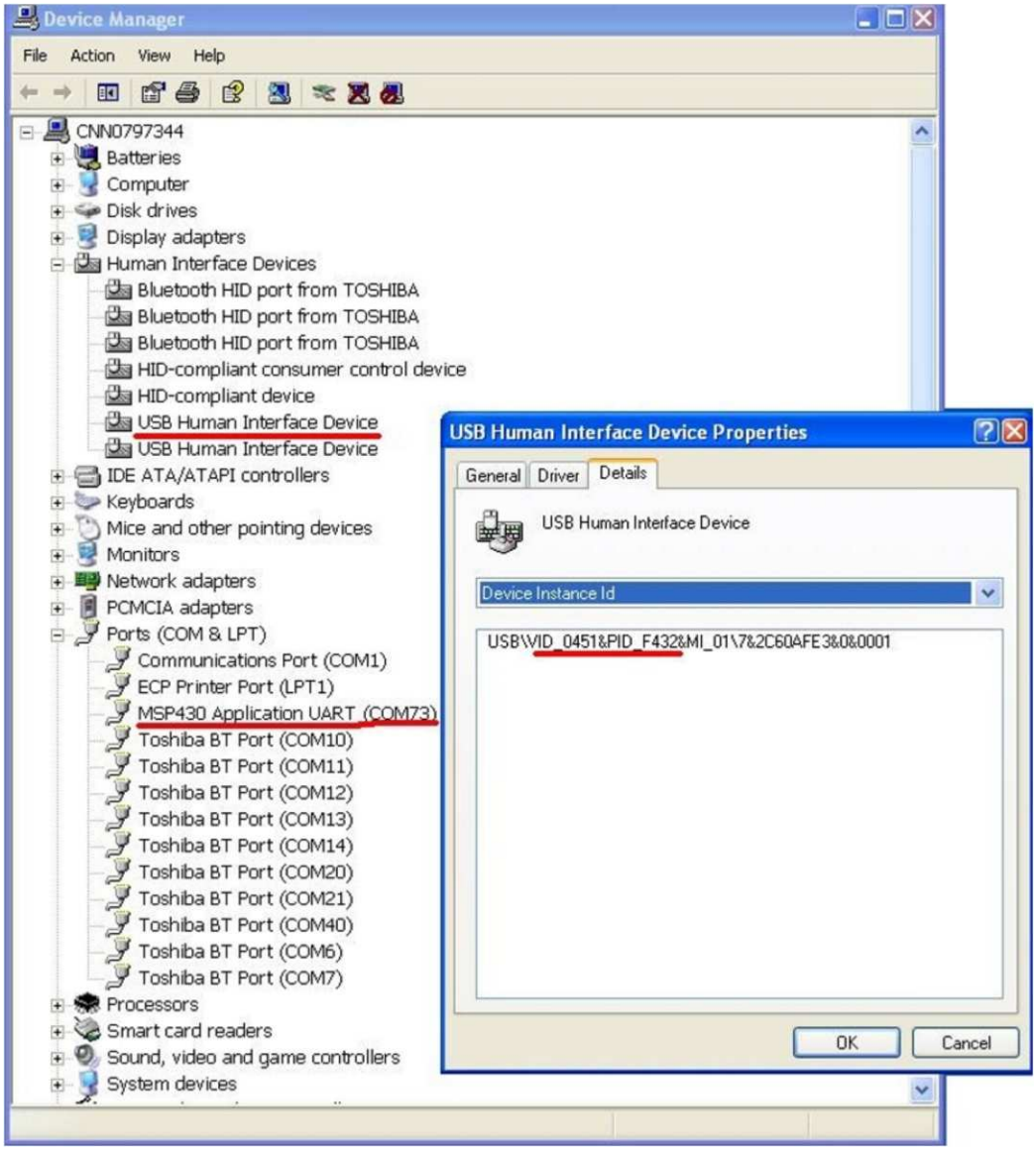


Figure C-7. Device Manager Using eZ430-RF2500 (CCE/CCS and IAR)

Document Revision History

Version	Changes/Comments
SLAU278C	Added bills of materials and udpated some PCBs to Appendix B. Added information about MSP-TS430DA38, MSP-TS430DL48, MSP-TS430PW14, MSP-TS430PW28.
SLAU278B	Added information about MSP-FET430U80USB, MSP-TS430PN80USB, and eZ430-Chronos.
SLAU278A	Updated USB driver installation according to CCE v3.1 SR1 and CCS v4.
SLAU278	Initial release

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

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