MSP430 Hardware Tools

User's Guide

Literature Number: SLAU278I
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Read This First

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™ microcontrollers or the development software systems. For details of these items, see the appropriate TI documents listed in Section 1.19.

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, MSP430G2x01, MSP430G2x11, MSP430G2x21, and MSP430G2x31 devices)
- eZ430-T2012 (three MSP430F2012 based target boards)
- eZ430-RF2500 (USB stick form factor interface with attached MSP430F2274 and CC2500 target, for all MSP430F20xx, MSP430F21x2, MSP430F22xx, MSP430G2x01, MSP430G2x11, MSP430G2x21, and MSP430G2x31 devices)
- eZ430-RF2500T (one MSP430F2274 and CC2500 target board including battery pack)
- eZ430-RF2500-SEH (USB stick form factor interface with attached MSP430F2274 and 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 <1 GHz RF USB access point)

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

- MSP-FET430U8 (for MSP430G2210 and MSP430G2230 devices in 8-pin D packages)
- MSP-FET430U14 (for MSP430F20xx, MSP430F20xx, MSP430G2x01, MSP430G2x11, MSP430G2x21, and MSP430G2x31 devices in 14-pin PW packages)
- MSP-FET430U092 (for MSP430FL092 devices in 14-pin PW packages)
- MSP-FET430U24 (for MSP430AFE2xx devices in 24-pin PW packages)
- MSP-FET430U28 (for MSP430F11xx(A) devices in 20- and 28-pin DW or PW packages)
- MSP-FET430U28A (for MSP430F20xx and MSP430G2xxx devices in 14-, 20-, and 28-pin PW)
- MSP-FET430U38 (for MSP430F22x2 and MSP430F22x4 devices in 38-pin DA packages)
- MSP-FET430U23x0 (for MSP430F23x0 devices in 40-pin RHA packages)
- MSP-FET430U40 (for MSP430F51x1, MSP430F51x2 devices in 40-pin RSB packages)
- MSP-FET430U40A (for MSP430FR572x, MSP430FR573x devices in 40-pin RHA packages)
- MSP-FET430U48 (for MSP430F22x2 and MSP430F22x4 devices in 48-pin DL packages)
- MSP-FET430U48B (for MSP430F534x devices in 48-pin RGZ packages)

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- 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) (red PCB)
- MSP-FET430U64B (for MSP430F530x devices in 64-pin RGC packages) (blue PCB)
- MSP-FET430U64C (for MSP430F522x and MSP430F521x devices in 64-pin RGC packages) (black PCB)
- MSP-FET430U64USB (for MSP430F550x, MSP430F551x, MSP430552x, devices in 64-pin RGC packages)
- MSP-FET430U80 (for MSP430F241x, MSP430F261x, MSP430F43x, MSP430F43x1, MSP430FG43x, MSP430F47x, and MSP430FG47x devices in 80-pin PN packages)
- MSP-FET430U80A (for MSP430F532x 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-FET430U100B (for MSP430F67xx devices in 100-pin PZ packages) (blue PCB)
- MSP-FET430U100C (for MSP430F643x and MSP430F533x devices in 100-pin PZ packages) (black PCB)
- MSP-FET430U5x100 (for MSP430F54xx(A) devices and MSP430BT5190 in 100-pin PZ packages)
- MSP-FET430U100USB (for MSP430F663x and MSP430F563x devices in 100-pin PZ packages)
- FET430F5137RF900 (for CC430F513x devices in 48-pin RGZ packages)
- FET430F6137RF900 (for CC430F612x and CC430F613x devices in 64-pin RGC packages)

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

- MSP-TS430D8 (for MSP430G2210 and MSP430G2230 devices in 8-pin D packages)
- MSP-TS430PW14 (for MSP430F20xx, MSP430G2x01, MSP430G2x11, MSP430G2x21 and MSP430G2x31 devices in 14-pin PW packages)
- MSP-TS430L092 (for MSP430FL092 devices in 14-pin PW packages)
- MSP-TS430PW24 (for MSP430AFE2xx devices in 24-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-TS430PW28A (for MSP430F20xx and MSP430G2xxx devices in 14, 20, and 28-pin PW)
- MSP-TS430DA38 (for MSP430F22x2 and MSP430F22x4 devices in 38-pin DA packages)
- MSP-TS430QFN23x0 (for MSP430F23x0 devices in 40-pin RHA packages)
- MSP-TS430RSB40 (for MSP430F51x1, MSP430F51x2 devices in 40-pin RSB packages)
- MSP-TS430RHA40A ((for MSP430FR572x, MSP430FR573x devices in 40-pin RHA packages)
- MSP-TS430DL48 (for MSP430F22x2 and MSP430F22x4 devices in 48-pin DL packages)
- MSP-TS430RGZ48B (for MSP430F534x devices in 48-pin RGZ 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-TS430RGC64B (for MSP430F530x devices in 64-pin RGC packages)
- MSP-TS430RGC64C (for MSP430F522x and MSP430F521x devices in 64-pin RGC packages)
- MSP-TS430RGC64USB (for MSP430F550x, MSP430F551x, MSP430552x, devices in 64-pin RGC packages)
- MSP-TS430PN80 (for MSP430F241x, MSP430F261x, MSP430F43x, MSP430F43x1, MSP430FG43x, MSP430F47x, and MSP430FG47x devices in 80-pin PN packages)

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- MSP-TS430PN80A (for MSP430F532x 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-FET430PZ100B (for MSP430F67xx devices in 100-pin PZ packages) (blue PCB)
- MSP-TS430PZ100C (for MSP430F643x and MSP430F533x devices in 100-pin PZ packages) (black PCB)
- MSP-TS430PZ5x100 (for MSP430F54xx(A) and the MSP430BT5190 devices in 100-pin PZ packages)
- MSP-TS430PZ100USB (for MSP430F663x and MSP430F563x devices in 100-pin PZ packages)
- EM430F5137RF900 (with integrated CC430F5137 IC in a 48-pin RGZ package)
- EM430F6137RF900 (with integrated CC430F6137 IC in a 64-pin RGC package)
- EM430F6147RF900 (with integrated CC430F6147 IC in a 64-pin RGC package)

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)

Code Composer Studio v5.x Core Edition (CCS Mediawiki)

IAR for MSP430 User's Guide (literature number SLAU138)

IAR Embedded Workbench KickStart (literature number SLAC050)

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)

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Sub-1 GHz RF Spectrum Analyzer Tool (literature number SLAU371)

MSP430F5529 USB Experimenter's Board, MSP-EXP430F5529 (literature number SLAU330)

MSP430F5438 Experimenter Board, MSP-EXP430F5438 (literature number SLAU263)

MSP430 LaunchPad Value Line Development kit, MSP-EXP430G2 (literature number SLAU318)

MSP430 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 and MSP430x6xx Family User's Guide (literature number SLAU208)

CC430 Family User's Guide (literature number SLAU259)

MSP430FR57xx Family User's Guide (literature number SLAU272)

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.

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Get Started Now!

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

Topic **Page**

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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[1]

	eZ430-F2013	eZ430-RF2500	eZ430-RF2480	eZ430-RF2560	MSP-WDSxx Metawatch	eZ430-Chronos	MSP-FET430PIF	MSP-FET430UIF	LaunchPad (MSP-EXP430G2)	MSP-EXP430FR5739	MSP-EXP430F5529
Supports all MSP430 and CC430 flash-based devices (F1xx, F2xx, F4xx, F5xx, F6xx, G2xx, L092, FR57xx)							x	x			
Supports only F20xx, G2x01, G2x11, G2x21, G2x31	x										
Supports MSP430F20xx, F21x2, F22xx, G2x01, G2x11, G2x21, G2x31, G2x53									x		
Supports MSP430F20xx, F21x2, F22xx, G2x01, G2x11, G2x21, G2x31		x	x								
Supports F5438, F5438A				x							
Supports BT5190, F5438A					x						
Supports only F552x											x
Supports FR57xx, F5638, F6638										x	
Supports only CC430F613x						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	x	x	x			x	x	x
4-wire JTAG							x	x			
2-wire JTAG[2]	x	x	x	x	x	x		x	x	x	x
Application UART		x	x	x	x	x			x	x	x
Supported by CCS for Windows	x	x	x	x	x	x	x	x	x	x	x
Supported by CCS for Linux								x			
Supported by IAR	x	x	x	x	x	x	x	x	x	x	x

(1) The MSP-FET430PIF is for legacy device support only. This emulation tool will not support any new devices released after 2011.
(2) The 2-wire JTAG debug interface is also referred to as Spy-Bi-Wire (SBW) interface.

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1.2 Kit Contents, MSP-FET430PIF

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

NOTE: This part is obsolete and is not recommended to use in new design.

1.3 Kit Contents, eZ430-F2013

- One QUICK START GUIDE document
- 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 and 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)

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1.8 Kit Contents, eZ430-Chronos-xxx

'433, '868, '915

- One QUICK START GUIDE document
- 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 MSP-FET430UIF interface module
- One USB cable
- One 14-conductor cable

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1.10 Kit Contents, MSP-FET430xx

'U8, 'U14, 'U092, 'U24, 'U28, 'U28A, 'U38, 'U23x0, 'U40, 'U40A, 'U48, 'U48B, 'U64, 'U64A, 'U64B, 'U64C, 'U64USB, 'U80, 'U80USB, 'U100, 'U100A, 'U100B, 'U100C, 'U5x100, 'U100USB

- One READ ME FIRST document
- One MSP-FET430UIF 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 USB cable
- One 32.768-kHz crystal from Micro Crystal (except MSP-FET430U24)
- A 2×7-pin male JTAG connector is also present on the PCB (see different setup for L092)
- One 14-Pin JTAG conductor cable
- One small box containing two MSP430 device samples (See table for Sample Type)
- One target socket module. To check the devices used for each board and a summary of the board, see Table 1-2. MSP-TS430xx below is the target socket module for each MSP-FET430Uxx kit.

  MSP-FET430U8: One **MSP-TS430D8** target socket module.

  MSP-FET430U14: One **MSP-TS430PW14** target socket module.

  MSP-FET430U092: One **MSP-TS430L092** target socket module with Active Cable.

  MSP-FET430U24: One **MSP-TS430PW24** target socket module.

  MSP-FET430U28: One **MSP-TS430PW28** target socket module.

  MSP-FET430U28A: One **MSP-TS430PW28A** target socket module.

  MSP-FET430U38: One **MSP-TS430DA38** target socket module..

  MSP-FET430U23x0: One **MSP-TS430QFN23x0** (former name MSP-TS430QFN40) target socket module.

  MSP-FET430U40: One **MSP-TS430RSB40** target socket module.

  MSP-FET430U48: One **MSP-TS430DL48** target socket module.

  MSP-FET430U48B: One **MSP-TS430RGZ48B** target socket module.

  MSP-FET430U64: One **MSP-TS430PM64** target socket module.

  MSP-FET430U64A: One **MSP-TS430PM64A** target socket module.

  MSP-FET430U64B: One **MSP-TS430RGC64B** target socket module.

  MSP-FET430U64C: One **MSP-TS430RGC64C** target socket module.

  MSP-FET430U64USB: One **MSP-TS430RGC64USB** target socket module.

  MSP-FET430U80: One **MSP-TS430PN80** target socket module.

  MSP-FET430U80A: One **MSP-TS430PN80A** target socket module.

  MSP-FET430U80USB: One **MSP-TS430PN80USB** target socket module.

  MSP-FET430U100: One **MSP-TS430PZ100** target socket module.

  MSP-FET430U100A: One **MSP-TS430PZ100A** target socket module

  MSP-FET430U100B: One **MSP-TS430PZ100B** target socket module

  MSP-FET430U100C: One **MSP-TS430PZ100C** target socket module

  MSP-FET430U5x100: One **MSP-TS430PZ5x100** target socket module.

  MSP-FET430U100USB: One **MSP-TS430PZ100USB** target socket module.

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.

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1.11 Kit Contents, FET430F6137RF900

- One READ ME FIRST document
- One legal notice
- One MSP-FET430UIF interface module
- Two EM430F6137RF900 target socket modules. This is the PCB on which is soldered a CC430F6137 device in a 64-pin RGC package. A 2×7-pin male connector is also present on the PCB
- Two CC430EM battery packs
- Four AAA batteries
- Two 868- or 915-MHz antennas
- Two 32.768-kHz crystals
- 18 PCB 2x4-pin headers
- One USB cable
- One 14-Pin JTAG conductor cable

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1.12 Kit Contents, Sub-1 GHz RF Spectrum Analyzer Tool (MSP-SA430-SUB1GHZ)

- MSP-SA430-SUB1GHZ Spectrum Analyzer
- Antenna
- USB Cable
- CD with a Microsoft Windows Graphical User Interface (GUI) and Documentation
- Quick start guide

1.13 Kit Contents, MSP-TS430xx

'D8, 'PW14, 'L092, 'PW24, 'DW28, 'PW28, 'PW28A, 'DA38, 'QFN32x0, 'RSB40, 'DL48, 'RGZ48B, 'PM64, 'PM64A, 'RGC64B, 'RGC64C, 'RGC64USB, 'PN80, 'PN80A, 'PN80USB, 'PZ100, 'PZ100A, 'PZ100B, 'PZ100C, 'PZ5x100, 'PZ100USB

- One READ ME FIRST document
- One 32.768-kHz crystal from Micro Crystal (except MSP-TS430PW24)
- One target socket module
- A 2×7-pin male JTAG connector is also present on the PCB (see different setup for L092)
- One small box containing two MSP430 device samples (see Table 1-2 for sample type)

Table 1-2. Individual Kit Contents, MSP-TS430xx

Target Socket Module	Socket Type	Supported Devices	Included Devices	Headers and Comment
MSP-TS430D8	8-pin D (TSSOP ZIF)	MSP430G2210, G2230	1 x MSP430G2210 and 1 x MSP430G2230	Two PCB 1×4-pin headers (two male and two female)
MSP-TS430PW14	14-pin PW (TSSOP ZIF)	MSP430F20xx, G2x01, G2x11, G2x21, G2x31	2 x MSP430F2013IPW	Four PCB 1×7-pin headers (two male and two female)
MSP-TS430L092	14-pin PW (TSSOP ZIF)	MSP-TS430L092	2 x MSP430L092IPW	Four PCB 1×7-pin headers (two male and two female). A "Micro-MaTch" 10-pin female connector is also present on the PCB which connects the kit with an 'Active Cable' PCB; this 'Active Cable' PCB is connected by 14 pin JTAG cable with the FET430UIF
MSP-TS430PW24	24-pin PW (TSSOP ZIF)	MSP430AFE2xx	2 x MSP430AFE253IPW	Four PCB 1×12-pin headers (two male and two female)
MSP-TS430DW28	28-pin DW (SSOP ZIF)	MSP430F11x1, F11x2, F12x F12x2 F21xx. Supports devices in 20- and 28-pin DA packages	2 x MSP430F123IDW	Four PCB 1×12-pin headers (two male and two female)
MSP-TS430PW28	28-pin PW (TSSOP ZIF)	MSP430F11x1, F11x2, F12x, F12x2, F21xx	2 x MSP430F2132IPW	Four PCB 1×12-pin headers (two male and two female)
MSP-TS430PW28A	28-pin PW (TSSOP ZIF)	MSP430F20xx, MSP430G2xxx in 14-, 20-, and 28-pin PW packages	2 x MSP430G2452IPW20	Four PCB 1×12-pin headers (two male and two female)
MSP-TS430DA38	38-pin DA (TSSOP ZIF)	MSP430F22xx	2 x MSP430F2274IDA	Four PCB 1×19-pin headers (two male and two female)
MSP-TS430QFN23x0	40-pin RHA (QFN ZIF)	MSP430F23x0	2 x MSP430F2370IRHA	Eight PCB 1×10-pin headers (four male and four female)
MSP-TS430RSB40	40-pin RSB (QFN ZIF)	MSP430F51x1, F51x2	2 x MSP430F5172IRSB	Eight PCB 1×10-pin headers (four male and four female)
MSP-TS430RHA40A	40-pin RHA (QFN ZIF)	MSP430FR572x, FR573x	2 x MSP430FR5739IRHA	Eight PCB 1×10-pin headers (four male and four female)
MSP-TS430DL48	48-pin DL (TSSOP ZIF)	MSP430F42x0	2 x MSP430F4270IDL	Four PCB 2×12-pin headers (two male and two female)
MSP-TS430RGZ48B	48-pin RGZ (QFN ZIF)	MSP430F534x	2 x MSP430F5342IRGZ	Eight PCB 1×12-pin headers (four male and four female)

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Table 1-2. Individual Kit Contents, MSP-TS430xx (continued)

Target Socket Module	Socket Type	Supported Devices	Included Devices	Headers and Comment
MSP-TS430PM64	64-pin PM (QFP ZIF)	MSP430F13x, F14x, F14x1, F15x, F16x(1), F23x, F24x, F24xx, F261x, F41x, F42x(A), FE42x(A), FE42x2, FW42x	TS Kit: 2 x MSP430F2618IPM; FET Kit: 2 x MSP430F417IPM and 2 x MSP430F169IPM	Eight PCB 1×16-pin headers (four male and four female)
MSP-TS430PM64A	64-pin PM (QFP ZIF)	MSP430F41x2	2 x MSP430F4152IPM	Eight PCB 1×16-pin headers (four male and four female)
MSP-TS430RGC64B	64-pin RGC (QFN ZIF)	MSP430F530x	2 x MSP430F5310IRGC	Eight PCB 1×16-pin headers (four male and four female)
MSP-TS430RGC64C	64-pin RGC (QFN ZIF)	MSP430F522x, F521x	2 x MSP430F5229IRGC	Eight PCB 1×16-pin headers (four male and four female)
MSP-TS430RGC64USB	64-pin RGC (QFN ZIF)	MSP430F550x, F551x, F552x	2 x MSP430F5510IRGC or 2 x MSP430F5528IRGC	Eight PCB 1×16-pin headers (four male and four female)
MSP-TS430PN80	80-pin PN (QFP ZIF)	MSP430F241x, F261x, F43x, F43x1, FG43x, F47x, FG47x	2 x MSP430FG439IPN	Eight PCB 1×20-pin headers (four male and four female)
MSP-TS430PN80A	80-pin PN (QFP ZIF)	MSP430F532x	2 x MSP430F5329IPN	Eight PCB 1×20-pin headers (four male and four female)
MSP-TS430PN80USB	80-pin PN (QFP ZIF)	MSP430F552x, F551x	2 x MSP430F5529IPN	Eight PCB 1×20-pin headers (four male and four female)
MSP-TS430PZ100	100-pin PZ (QFP ZIF)	MSP430F43x, F43x1, F44x, FG461x, F47xx	2 x MSP430FG4619IPZ	Eight PCB 1×25-pin headers (four male and four female)
MSP-TS430PZ100A	100-pin PZ (QFP ZIF)	MSP430F471xx	2 x MSP430F47197IPZ	Eight PCB 1×25-pin headers (four male and four female)
MSP-TS430PZ100B	100-pin PZ (QFP ZIF)	MSP430F67xx	2 x MSP430F6733IPZ	Eight PCB 1×25-pin headers (four male and four female)
MSP-TS430PZ100C	100-pin PZ (QFP ZIF)	MSP430F643x, F533x	2 x MSP430F6438IPZ	Eight PCB 1×25-pin headers (four male and four female)
MSP-TS430PZ5x100	100-pin PZ (QFP ZIF)	MSP430F543x,MSP430BT5190IPZ	2 x MSP430F5438IPZ	Eight PCB 1×25-pin headers (four male and four female)
MSP-TS430PZ100USB	100-pin PZ (QFP ZIF)	MSP430F663x, F563x	2 x MSP430F6638IPZ	Eight PCB 1×25-pin headers (four male and four female)

See 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.

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1.14 Kit Contents, EM430Fx1x7RF900

- One READ ME FIRST document
- One legal notice
- Two target socket module

  MSP-EM430F5137RF900: Two EM430F5137RF900 target socket modules. This is the PCB on which is soldered a CC430F5137 device in a 48-pin RGZ package. A 2×7-pin male connector is also present on the PCB

  MSP-EM430F6137RF900: Two EM430F6137RF900 target socket modules. This is the PCB on which is soldered a CC430F6137 device in a 64-pin RGC package. A 2×7-pin male connector is also present on the PCB

  MSP-EM430F6147RF900: Two EM430F6147RF900 target socket modules. This is the PCB on which is soldered a CC430F6147 device in a 64-pin RGC package. A 2×7-pin male connector is also present on the PCB
- Two CC430EM battery packs
- Four AAA batteries
- Two 868- or 915-MHz antennas
- Two 32.768-kHz crystals
- 18 PCB 2×4-pin headers

1.15 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 CCS or IAR Embedded Workbench installation. Note that a restart is required after the CCS 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 Appendix B.

1.16 Hardware Installation, MSP-FET430UIF

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

1. Install the IDE (CCS or IAR) you plan to use before connecting USB-FET interface to PC. The IDE installation installs drivers automatically.
2. 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 is installed automatically. If the driver has not been installed yet, the install wizard starts. Follow the prompts and point the wizard to the driver files.

   The default location for CCS is c:\ti\ccsv5\ccs_base\emulation\drivers\msp430\USB_CDC or c:\ti\ccsv5\ccs_base\emulation\drivers\msp430\USB_FET_XP_XX, depending of firmware version of the tool.

   The default location for IAR Embedded Workbench is <Installation Root>\Embedded Workbench x.x\430\drivers\TIUSBFET\eZ430-UART or <Installation Root>\Embedded Workbench x.x\430\drivers\<Win_OS>, depending of firmware version of the tool.

   The USB driver is installed automatically. Detailed driver installation instructions can be found in Appendix C.
3. After connecting to a PC, the USB FET performs a self-test during which the red LED may flash for approximately two seconds. If the self-test passes successfully, the green LED stays on.
4. Use the 14-conductor cable to connect the USB-FET interface module to a target board, such as an MSP-TS430xxx target socket module.
5. 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.
6. 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 60 mA.

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1.17 Hardware Installation, eZ430-XXXX, MSP-EXP430G2, MSP-EXP430FR5739, MSP-EXP430F5529

To install eZ430-XXXX, MSP-EXP430G2, MSP-EXP430FR5739, MSP-EXP430F5529 tools follow instructions 1 and 2 of Section 1.16

1.18 Hardware Installation, MSP-FET430Uxx, MSP-TS430xxx, FET430F6137RF900, EM430Fx137RF900

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

1. Follow instructions 1 and 2 of Section 1.16
2. 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.
3. 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.
4. 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 Appendix B.

1.19 Important MSP430 Documents on the Web

The primary sources of MSP430 information are the device-specific data sheet and user's guide. 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 v5 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 (that is, the latest information) are available in HTML format in the same directories. A IAR specific Wiki Page is also available.

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Design Considerations for In-Circuit Programming

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

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2.1 Signal Connections for In-System Programming and Debugging

MSP-FET430PIF, MSP-FET430UIF, MSP-GANG, 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). The 4-wire JTAG mode is supported on most MSP430 devices except of small pin count devices e.g. MSP430G2230. The 2-wire JTAG mode is available on selected devices only. See the *CCS User's Guide for MSP430* (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-GANG, 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, MSP-GANG 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 (that is, 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, MSP-GANG or the MSP-GANG430. If the V_{CC}-sense feature is not necessary (that is, if the target board is to be powered from the FET interface module, MSP-GANG or MSP-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.

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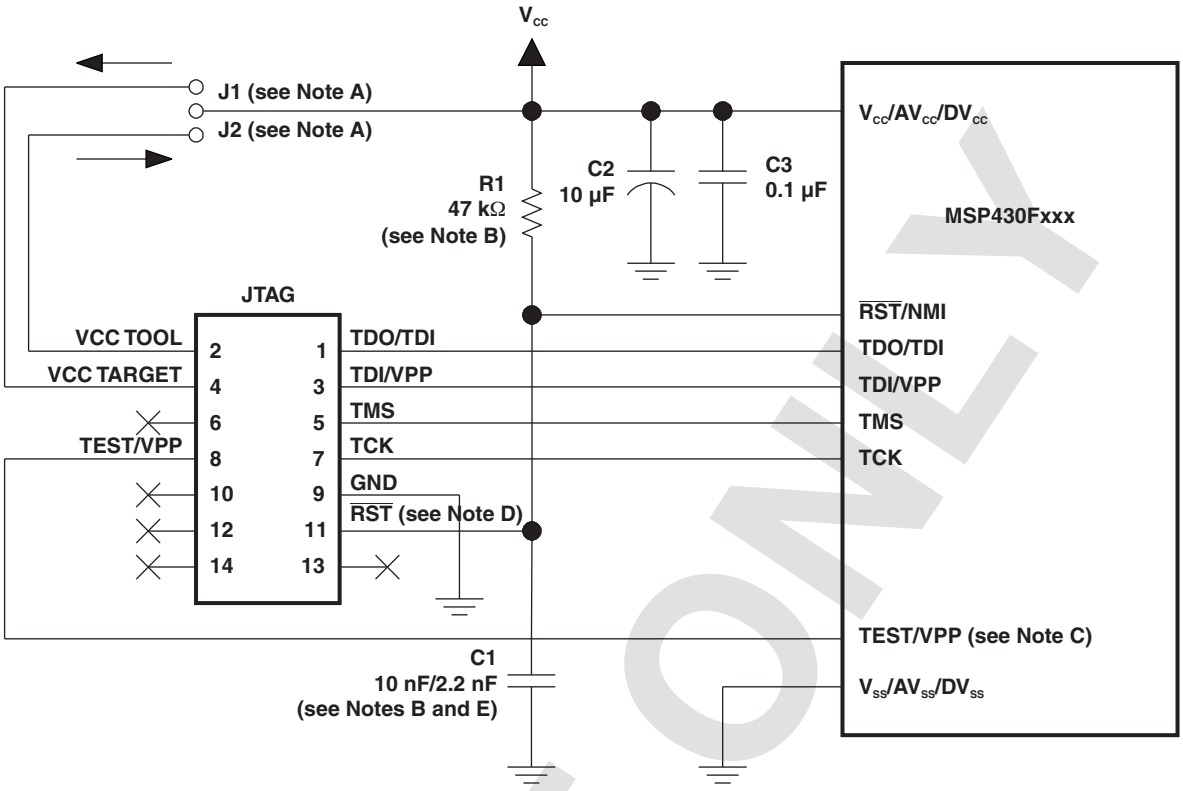

A Make either connection J1 in case a local target power supply is used or connection J2 to power target from the debug or programming adapter.

B The $\overline{\text{RST}}$/NMI pin R1 and 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 and USB FET).

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

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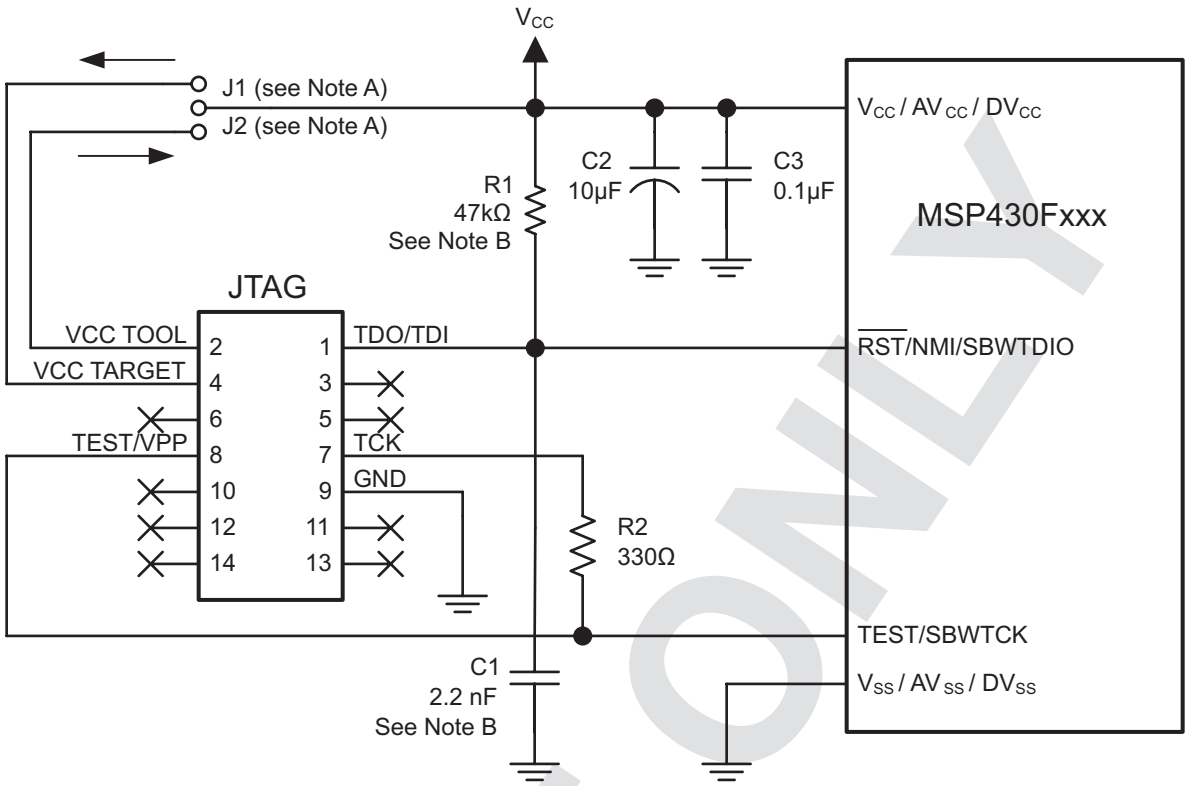

A Make connection J1 if a local target power supply is used, or make connection J2 if the target is powered from the debug or programming adapter.

B The device $\overline{\text{RST}}$/NMI/SBWTDIO pin is used in 2-wire mode for bidirectional communication with the device during JTAG access, and any capacitance that is 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 tools.

Figure 2-2. Signal Connections for 2-Wire JTAG Communication (Spy-Bi-Wire) Used by MSP430F2xx and MSP430F4xx Devices

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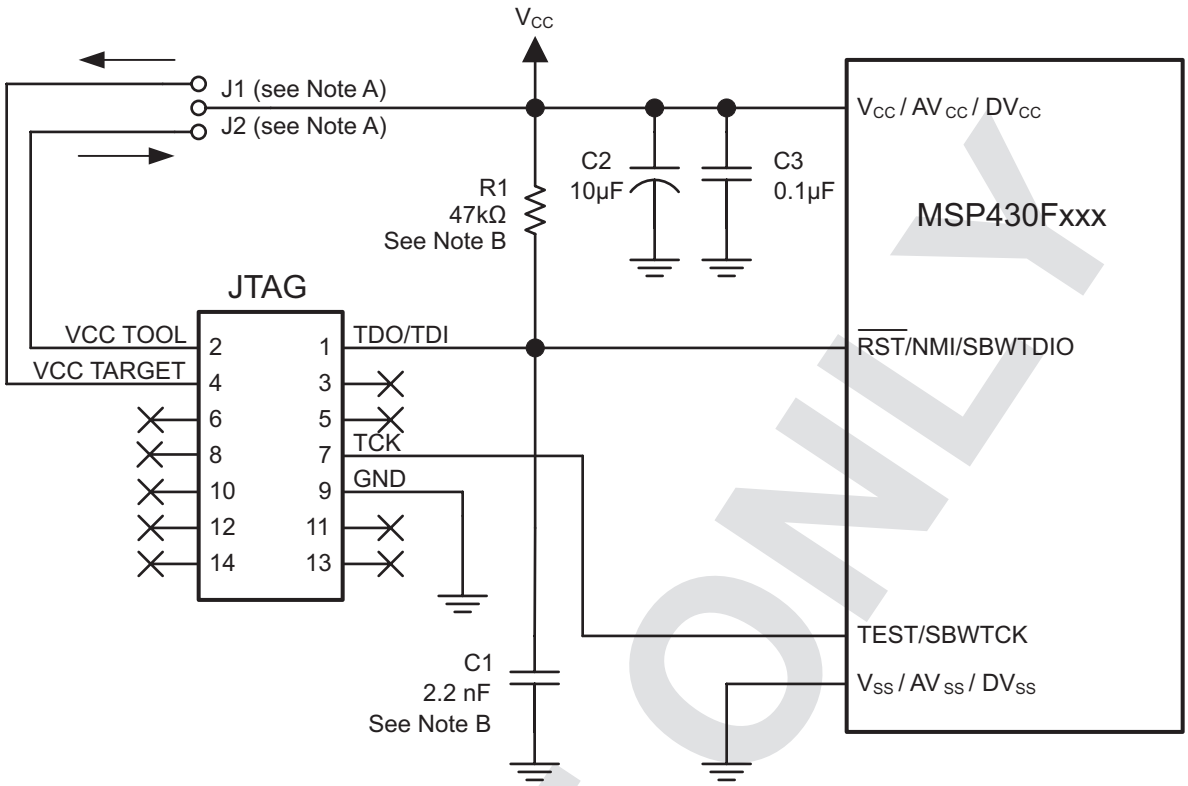

A Make connection J1 if a local target power supply is used, or make connection J2 if the target is powered from the debug or programming adapter.

B The device $\overline{\text{RST}}$/NMI/SBWTDIO pin is used in 2-wire mode for bidirectional communication with the device during JTAG access, and any capacitance that is 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 tools.

Figure 2-3. Signal Connections for 2-Wire JTAG Communication (Spy-Bi-Wire) Used by MSP430F5xx and MSP430F6xx Devices

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2.2 External Power

The MSP-FET430UIF can supply targets with up to 60 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 Appendix B.

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 Appendix B to locate the external power connectors. Note that the MSP-FET430PIF is not recommended for new design.

2.3 Bootstrap Loader (BSL)

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 Programming Via the Bootstrap Loader User's Guide* (SLAU319) describes this interface. See the MSP430 web site for the application reports and a list of MSP430 BSL tool developers.

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

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

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Frequently Asked Questions and Known Issues

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

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A.1 Hardware FAQs

1. **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.
2. **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 and 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.
3. The 14-conductor **cable** connecting the FET interface module and the target socket module **must not exceed 8 inches (20 centimeters) in length**.
4. The signal assignment on the **14-conductor cable** is **identical** for the **parallel port interface** and the **USB FET**.
5. **To utilize the on-chip ADC voltage references, the capacitor must be installed** on the target socket module. See schematic of the target socket module to populate the capacitor according to the data sheet of the device.
6. **To utilize the charge pump on the devices with LCD+ Module, the capacitor must be installed** on the target socket module. See schematic of the target socket module to populate the capacitor according to the data sheet of the device.
7. **Crystals or resonators Q1 and Q2** (if applicable) **are not provided on the target socket module.** For MSP430 devices that contain user-selectable loading capacitors, see device and crystal data sheets for the value of capacitance.
8. **Crystals or resonators have no effect upon the operation of the tool and the CCS debugger or C-SPY** (as any required clocking and timing is derived from the internal DCO and FLL).
9. **On devices with multiplexed port or JTAG pins**, to use these pin in their port capability:
   For CCS: "Run Free" (in Run pulldown menu at top of Debug View) must be selected.
   For C-SPY: "Release JTAG On Go" must be selected.
10. **As an alternative to sharing the JTAG and port pins** (on low pin count 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).

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11. **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.
12. **The device current is bigger then expected.** The device current measurement may not be accurate with connected debugger to the device. For accurate measurement disconnect the debugger.
13. The following **ZIF sockets** are used in the FET tools and target socket modules:
    - 8-pin device (D package): Yamaichi IC369-0082
    - 14-pin device (PW package): Enplas OTS-14-065-01
    - 14-pin package for 'L092 (PW package): Yamaichi IC189-0142-146
    - 24-pin package (PW package): Enplas OTS-24(28)-0.65-02
    - 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
    - 40-pin device (RSB package): Enplas QFN-40B-0.4
    - 48-pin device (RGZ package): Yamaichi QFN11T048-008 A101121-001
    - 48-pin device (DL package): Yamaichi IC51-0482-1163
    - 64-pin device (PM package): Yamaichi IC51-0644-807
    - 64-pin device (RGC package): Yamaichi QFN11T064-006
    - 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

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A.2 Known Issues

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 and 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.

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.

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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-TS430D8

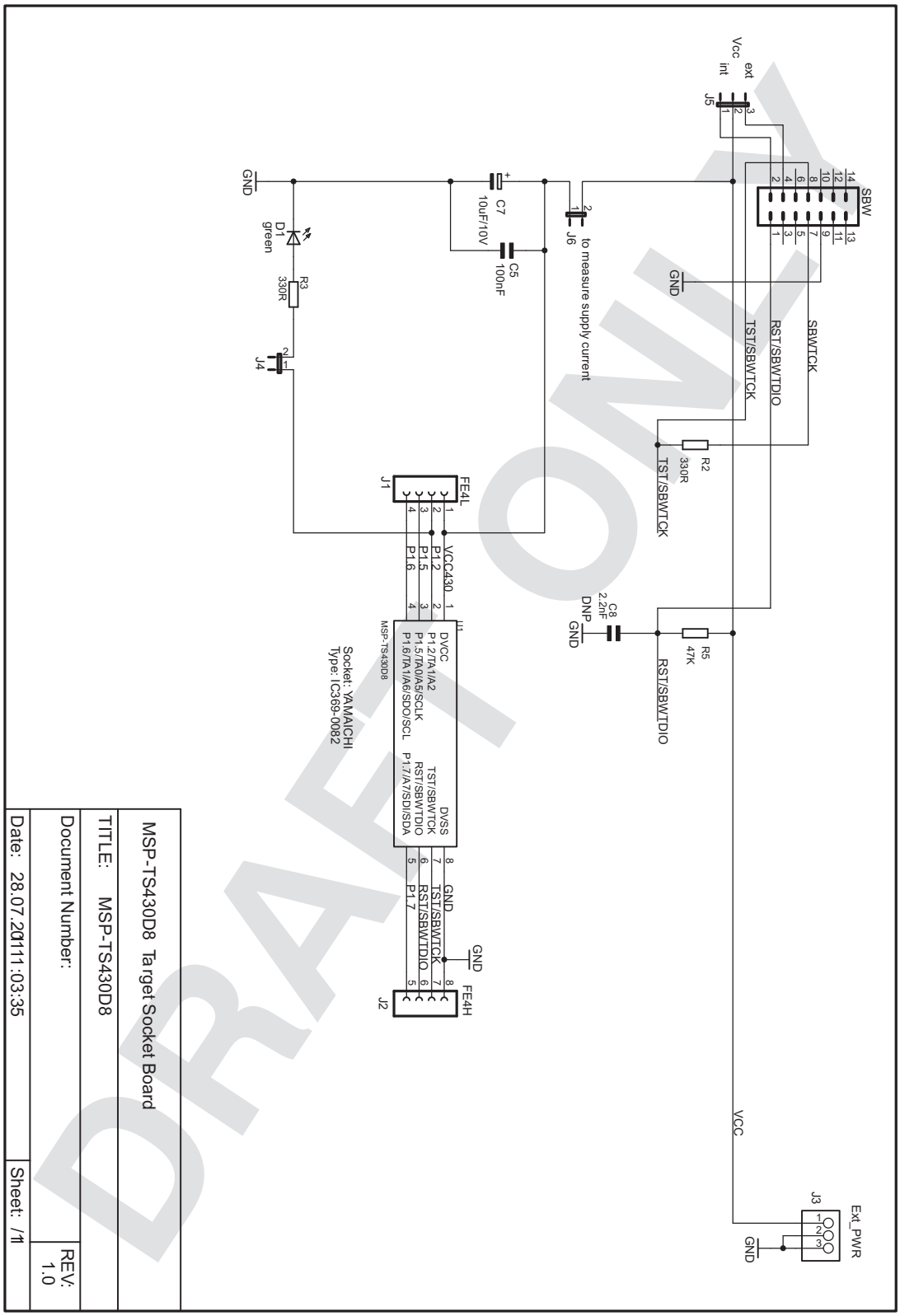

Figure B-1. MSP-TS430D8 Target Socket Module, Schematic

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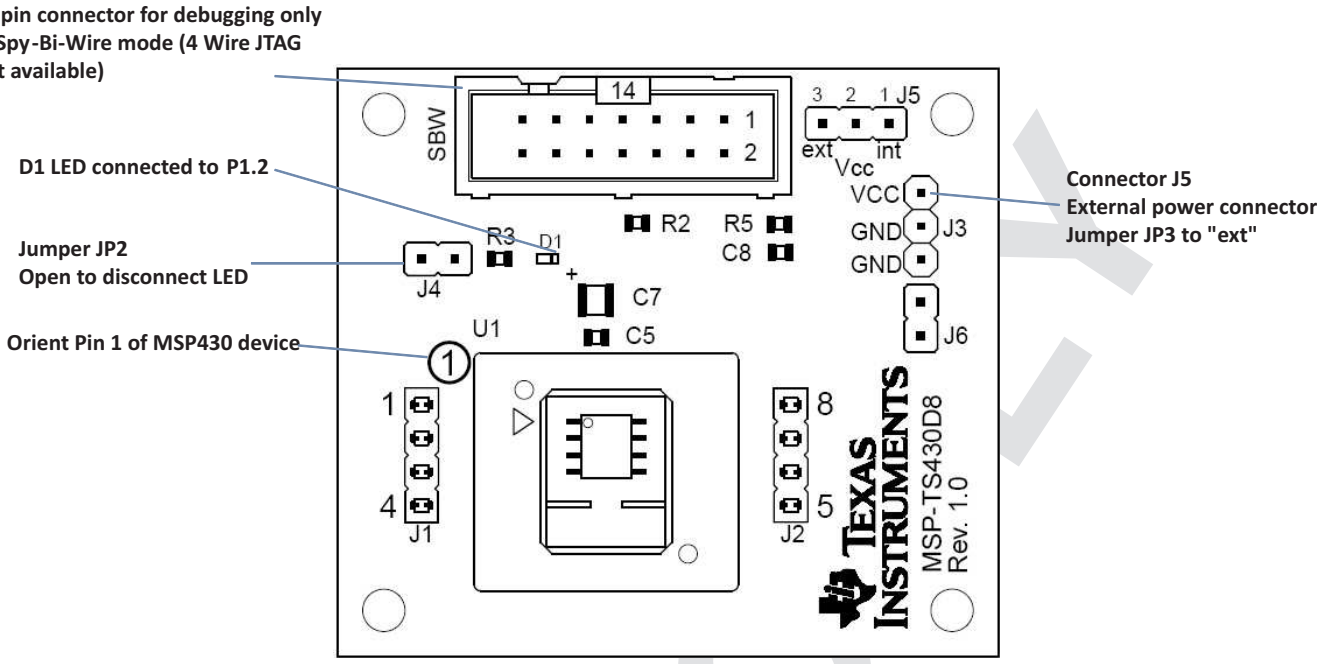

Figure B-2. MSP-TS430D8 Target Socket Module, PCB

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Table B-1. MSP-TS430D8 Bill of Materials

Position	Ref Des	No. per Board	Description	DigiKey Part No.	Comment
1	J4, J6	2	2-pin header, male, TH	SAM1035-02-ND	place jumper on header
2	J5	1	3-pin header, male, TH	SAM1035-03-ND	place jumper on pins 1-2
3	SBW	1	10-pin connector, male, TH	HRP10H-ND	
4	J3	1	3-pin header, male, TH	SAM1035-03-ND	
5	C8	1	2.2nF, CSMD0805	Buerklin 53 D 292	
6	C7	1	10uF/10V, 1210ELKO	478-3875-1-ND	
7	R5	1	47K, 0805	541-47000ATR-ND	
8	C5	1	100nF, CSMD0805	311-1245-2-ND	
9	R2, R3	2	330R, 0805	541-330ATR-ND	
10	J1, J2	2	4-pin header, TH	SAM1029-04-ND	DNP: headers enclosed with kit. Keep vias free of solder.
10,1	J1, J2	1	4-pin socket, TH	SAM1029-04-ND	DNP: receptacles enclosed with kit.
11	U1	1	SO8 Socket: Type IC369-0082		Manuf.: Yamaichi
12	D1	1	red, LED 0603		
13	MSP430	2	MSP430x		"DNP: enclosed with kit. Is supplied by TI"
14	PCB	1	50,0mmx44,5mm	"MSP-TS430D8" Rev. 1.0	

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B.2 MSP-TS430PW14

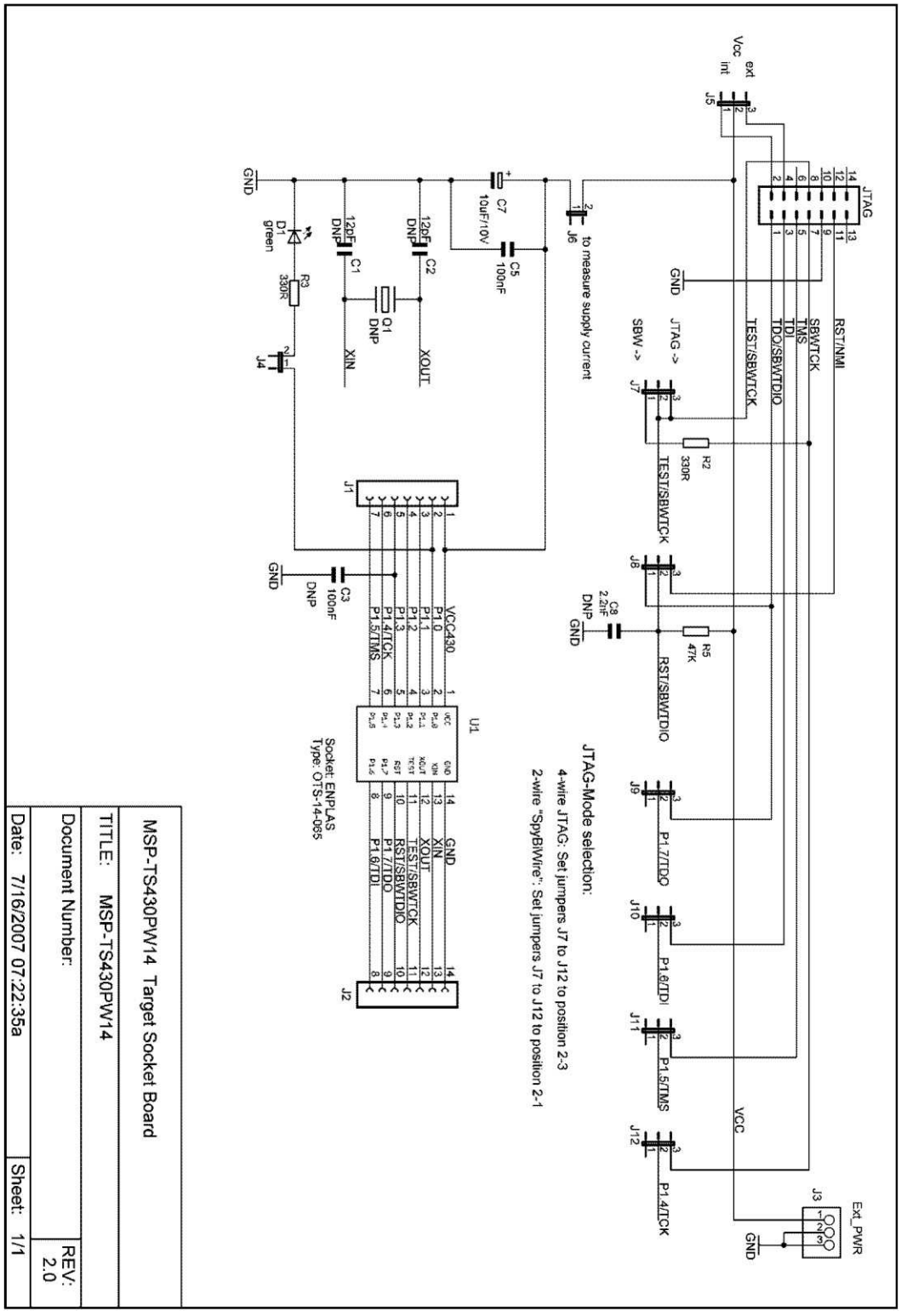

Figure B-3. MSP-TS430PW14 Target Socket Module, Schematic

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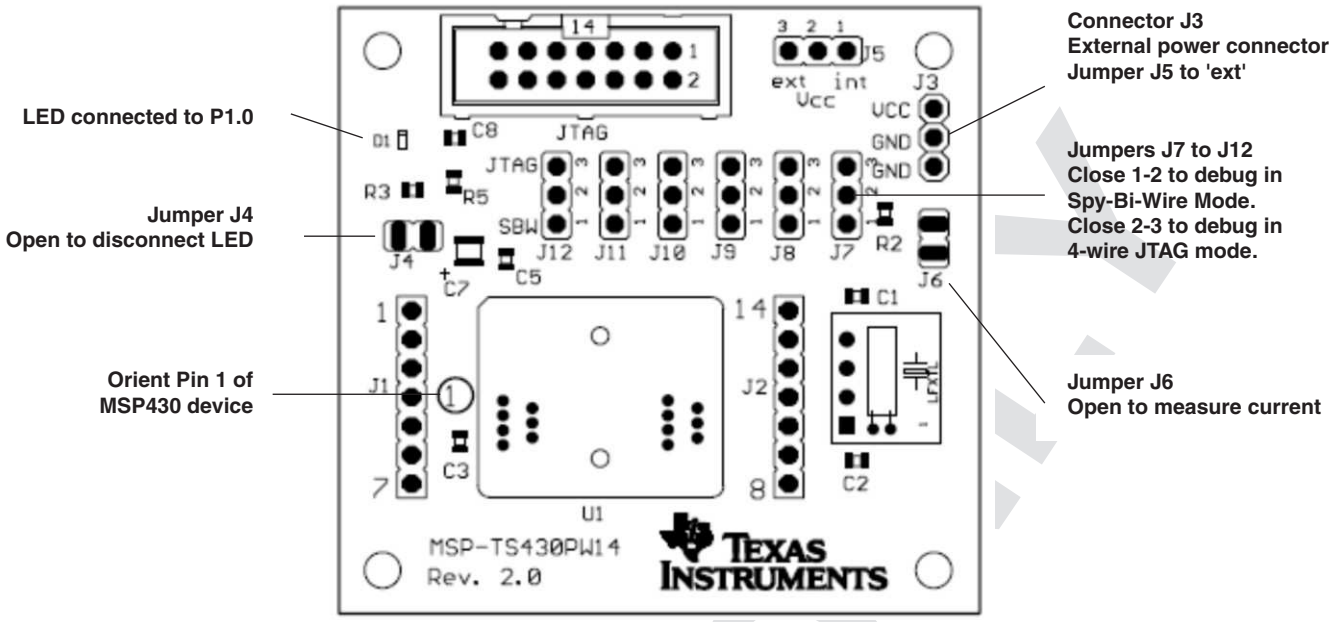

Figure B-4. MSP-TS430PW14 Target Socket Module, PCB

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Table B-2. 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	Micro Crystal MS1V-T1K 32.768kHz, C(Load) = 12.5pF	DNP: keep vias free of solder
13	R2, R3	2	330 Ω, SMD0805	541-330ATR-ND	
15	R5	1	47k Ω, 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	for example, 3M Bumpons Part No. SJ-5302	Apply to corners at bottom side
19	MSP430	2	MSP430F2013IPW		DNP: enclosed with kit, supplied by TI

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B.3 MSP-TS430L092

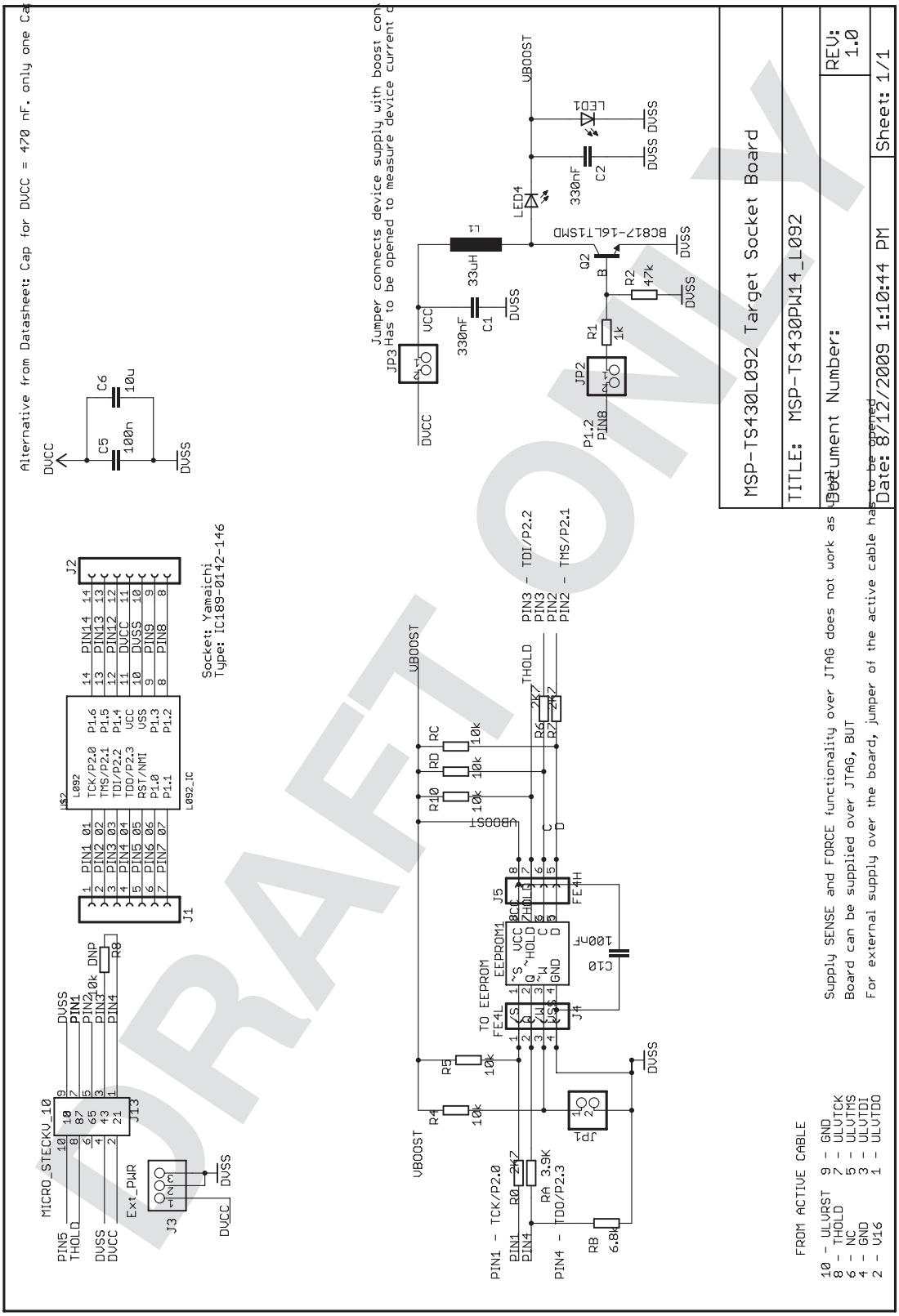

Figure B-5. MSP-TS430L092 Target Socket Module, Schematic

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Settings of the MSP-TS430L092 Target Socket

Figure B-6 shows the PCB layout of the MSP-TS430L092 target socket. The following pinning is recommended:

- JP1 is write enable for the EPROM. If this is not set, the EPROM can only be read.
- JP2 and JP3 connect device supply with boost converter. They can be opened to measure device current consumption. For default operation, they should be closed.

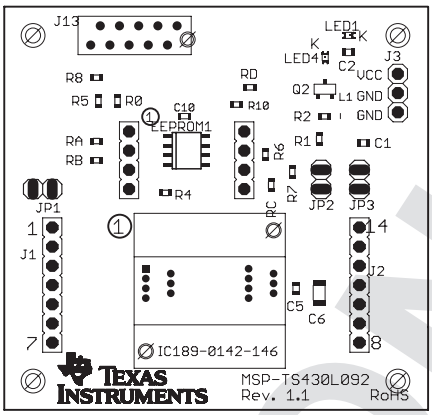

Figure B-6. MSP-TS430L092 Target Socket Module, PCB

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Table B-3. MSP-TS430L092 Bill of Materials

Pos.	Ref Des No.	No. Per Board	Description	DigiKey Part No.	Comment
1	C1, C2	2	330nF, SMD0603		
2	C5	1	100n, SMD0603		
3	C6	1	10u, SMD0805		
4	C10	1	100n, SMD0603		
5	EEPROM1	1	M95512 SO08 (SO8)	ST Micro M95160R	Digikey: 497-8688-1-ND
7	J1, J2	2	7-pin header, TH	SAM1213-07-ND SAM1035-07-ND	DNP: headers and receptacles enclosed with kit. Keep vias free of solder. : Header : Receptacle
8	J3	1	3-pin header, male, TH	SAM1035-03-ND	
9	J4, J5	2	FE4L, FE4H	4 pol. Stiftreihe	DNP; Keep vias free of solder.
11	J13	1	MICRO_STECKV_10		Reichelt: MicroMaTch-Connector: MM FL 10G
12	JP1, JP2,JP3	3	2-pin header, male, TH	SAM1035-02-ND	place jumper on header
15	L1	1	33uH, SMD0806	LQH2MCN330K02L	Farnell: 151-5557
16	LED1, LED4	2	LEDCHIPLED_0603		Farnell: 1686065
17	Q2	1	BC817-16LT1SMD	BC817-16LT1SMD	SOT23-BEC
18	R0, R6, R7	3	2K7, SMD0603		
19	R1	1	1k, SMD0603		
20	R2	1	47k, SMD0603		
21	R4,R5, R8, R10, RC, RD	6	10k, SMD0603		
22	RA	1	3.9k, SMD0603		
23	RB	1	6.8k, SMD0603		
24	U1	1	14 Pin Socket - IC189-0142-146	Manuf. Yamaichi	
22	MSP430	2	MSP430L092PWR	DNP: enclosed with kit. Is supplied by TI	

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B.4 MSP-TS430L092 Active Cable

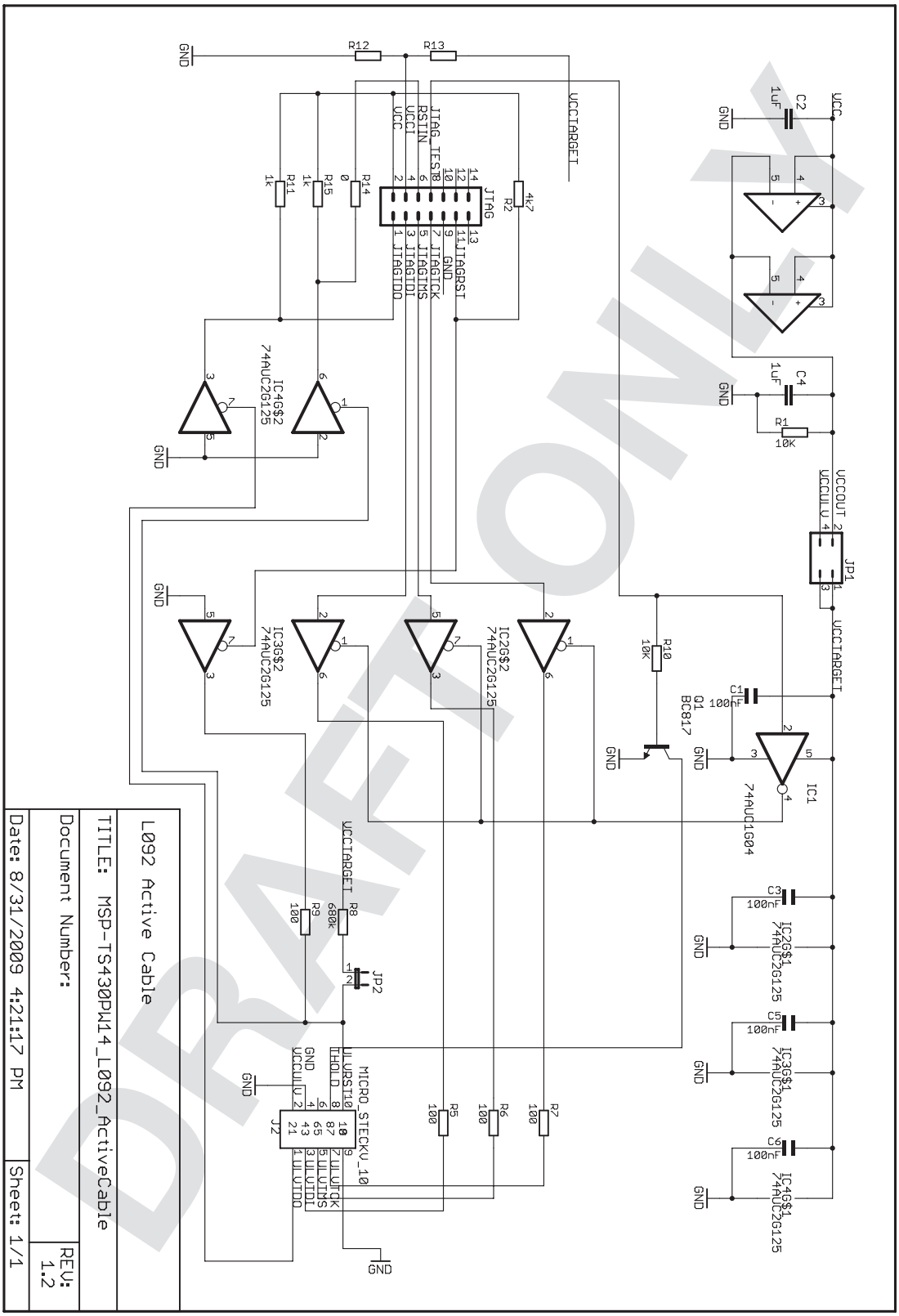

Figure B-7. MSP-TS430L092 Active Cable Target Socket Module, Schematic

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Figure B-8 shows the PCB layout for the Active Cable. The following pinning is possible:

- JP1 has two jumpers (Jumper 1 and Jumper 2) that can be set as shown in Table B-4.

Table B-4. MSP-TS430L092 JP1 Settings

Jumper 1	Jumper 2	Description
Off	Off	The active cable has no power and does not function.
Off	On	The active cable receives power from target socket. For this option, the target socket must have its own power supply.
On	Off	The active cable receives power from the JTAG connector.
On	On	The JTAG connector powers the active cable and the target socket. For this option, the target socket must not have its own power source, as this would cause a not defined state.

- JP2 is for reset. For the standard MSP-TS430L092, this jumper must be set. It sets the reset pin to high and can also control it. Without this jumper on the MSP-TS430L092, reset is set to zero.

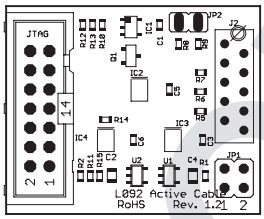

Figure B-8. MSP-TS430L092 Active Cable Target Socket Module, PCB

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Table B-5. MSP-TS430L092 Active Cable Bill of Materials

Pos.	Ref Des	No. Per Board	Description	DigiKey Part No.	Comment
1	C1, C3, C5, C6	4	100nF, SMD0603		
2	C2, C4	2	1uF, SMD0805		
3	R1, R10	2	10K, SMD0603		
4	R2	1	4K7, SMD0603		
5	R5, R6, R7, R9	4	100, SMD0603		
6	R8	1	680k, SMD0603		
7	R11, R15	2	1K, SMD0603		
8	R12	0	SMD0603		DNP
9	R13	0	SMD0603		DNP
10	R14	1	0, SMD0603		
11	IC1	1	SN74AUC1G04DBVR		Manu: TI
12	IC2, IC3, IC4	3	SN74AUC2G125DCTR		Manu: TI
13	J2	1	MICRO_STECKV_10	Reichelt: MicroMaTch-Connector: MM FL 10G	
14	JP1	1	2x2 Header	JP2Q	Put jumper on Position 1 and 2. Do not mix direction.
15	JP2	1	2-pin header, male, TH	SAM1035-02-ND	place jumper on header
16	JTAG	1	14-pin connector, male, TH	HRP14H-ND	
17	Q1	1	BC817-25LT1SMD, SOT23-BEC	Digi-Key: BC817-25LT1GOSCT-ND	
18	U1, U2	2	TLVH431IDBVR	SOT23-5	Manu: TI

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B.5 MSP-TS430PW24

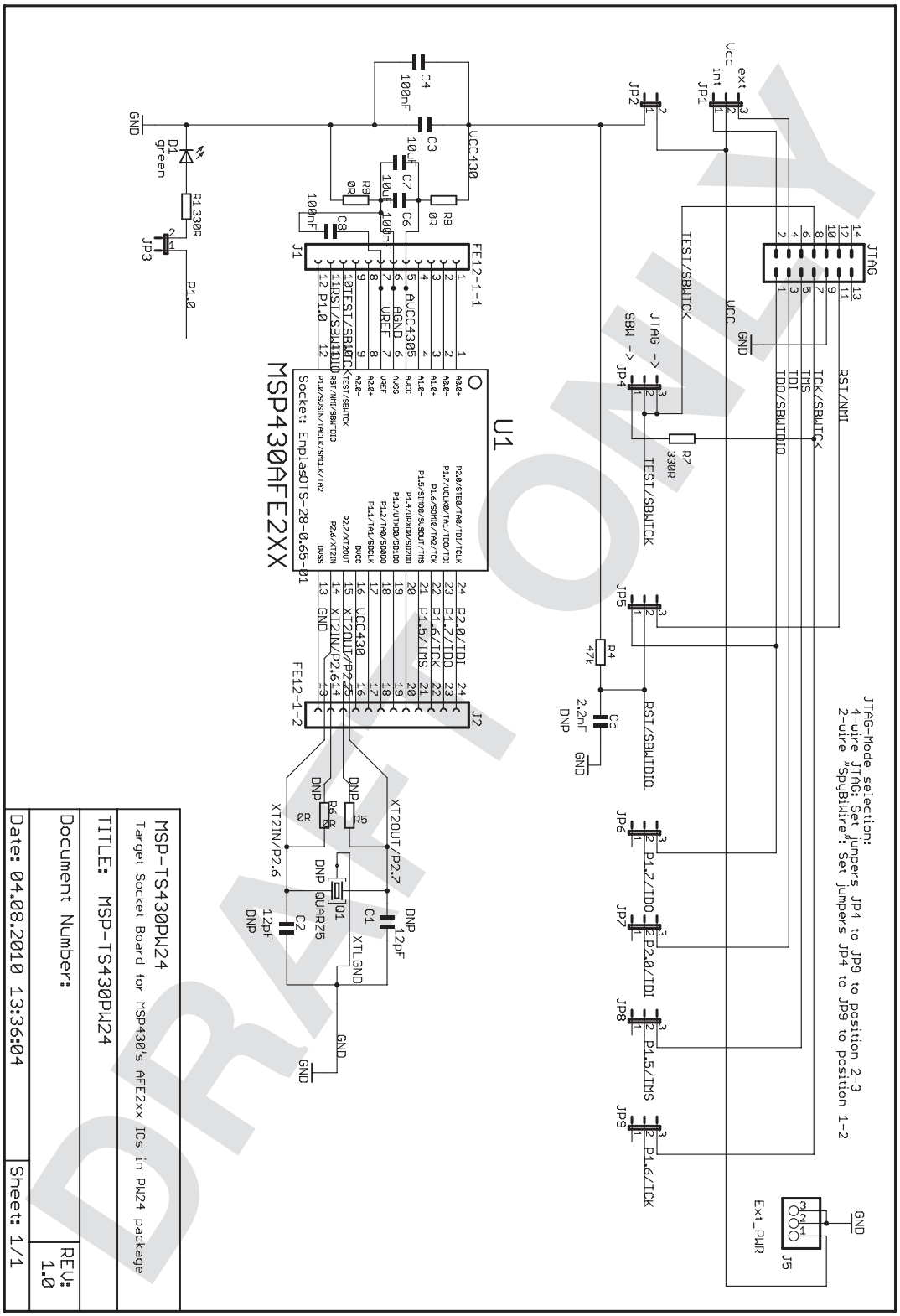

Figure B-9. MSP-TS430PW24 Target Socket Module, Schematic

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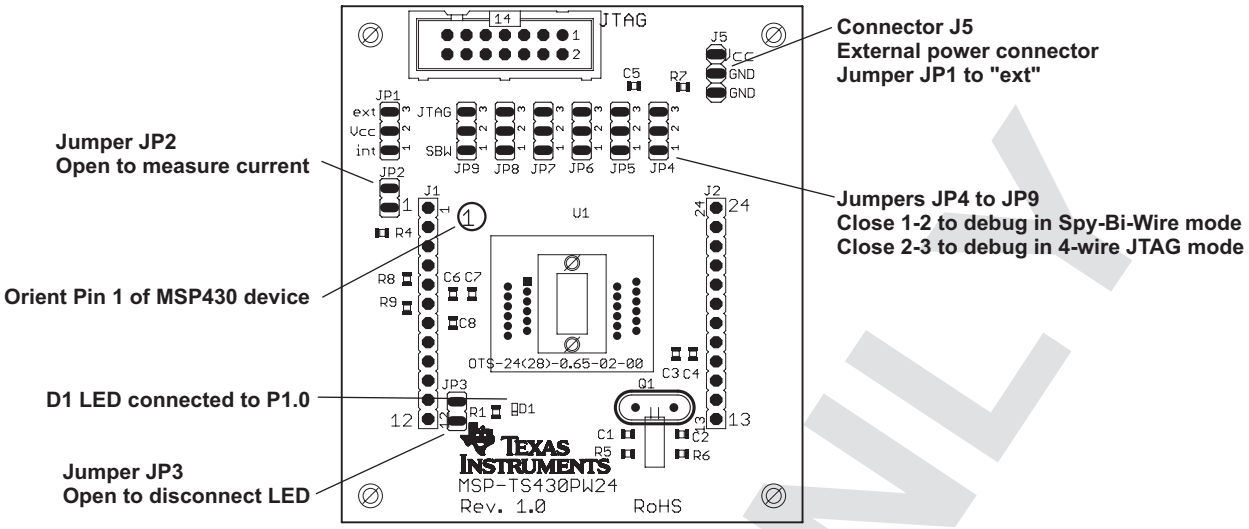

Figure B-10. MSP-TS430PW24 Target Socket Module, PCB

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Table B-6. MSP-TS430PW24 Bill of Materials

Position	Ref Des	No. per Board	Description	DigiKey Part No.	Comment
1	C1, C2	0	12pF, SMD0805		DNP
2	C5	1	2.2nF, SMD0805		
3	C3, C7	2	10uF/10V, SMD0805		
4	C4, C6, C8	3	100nF, SMD0805	478-3351-2-ND	
5	D1	1	green LED, SMD0805	P516TR-ND	
6	J1, J2	0	12-pin header, TH	"SAM1029-07-NDSAM1213-07-ND"	DNP: Headers and receptacles enclosed with kit. Keep vias free of solder. (Header & Receptacle)
7	J5, JP1, JP4, JP5, JP6, JP7, JP8, JP9	8	3-pin header, male, TH	SAM1035-03-ND	Place jumper on 1-2 of JP4-JP9 Place on 1-2 on JP1
8	JP2, JP3	2	2-pin header, male, TH	SAM1035-02-ND	Place jumper on header
9		9	Jumper	15-38-1024-ND	see Pos 7 an 8
10	JTAG	1	14-pin connector, male, TH	HRP14H-ND	
11	Q1	0	Crystal		DNP: keep vias free of solder
12	R1, R7	2	330 Ω, SMD0805	541-330ATR-ND	
13	R5, R6, R8, R9,	2	0 Ohm, SMD0805	541-000ATR-ND	DNP R5, R6
14	R4	1	47k Ohm, SMD0805	541-47000ATR-ND	
15	U1	1	Socket: OTS 24(28)-065-02-00		Manuf.: Enplas
16	PCB	1	68.5 x 61 mm		2 layers
17	Adhesive plastic feet	4	about 6mm width, 2mm height	for example, 3M Bumpons Part No. SJ-5302	Apply to corners at bottom side
18	MSP430	2	MSP430AFE2xx		DNP: enclosed with kit, supplied by TI

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B.6 MSP-TS430DW28

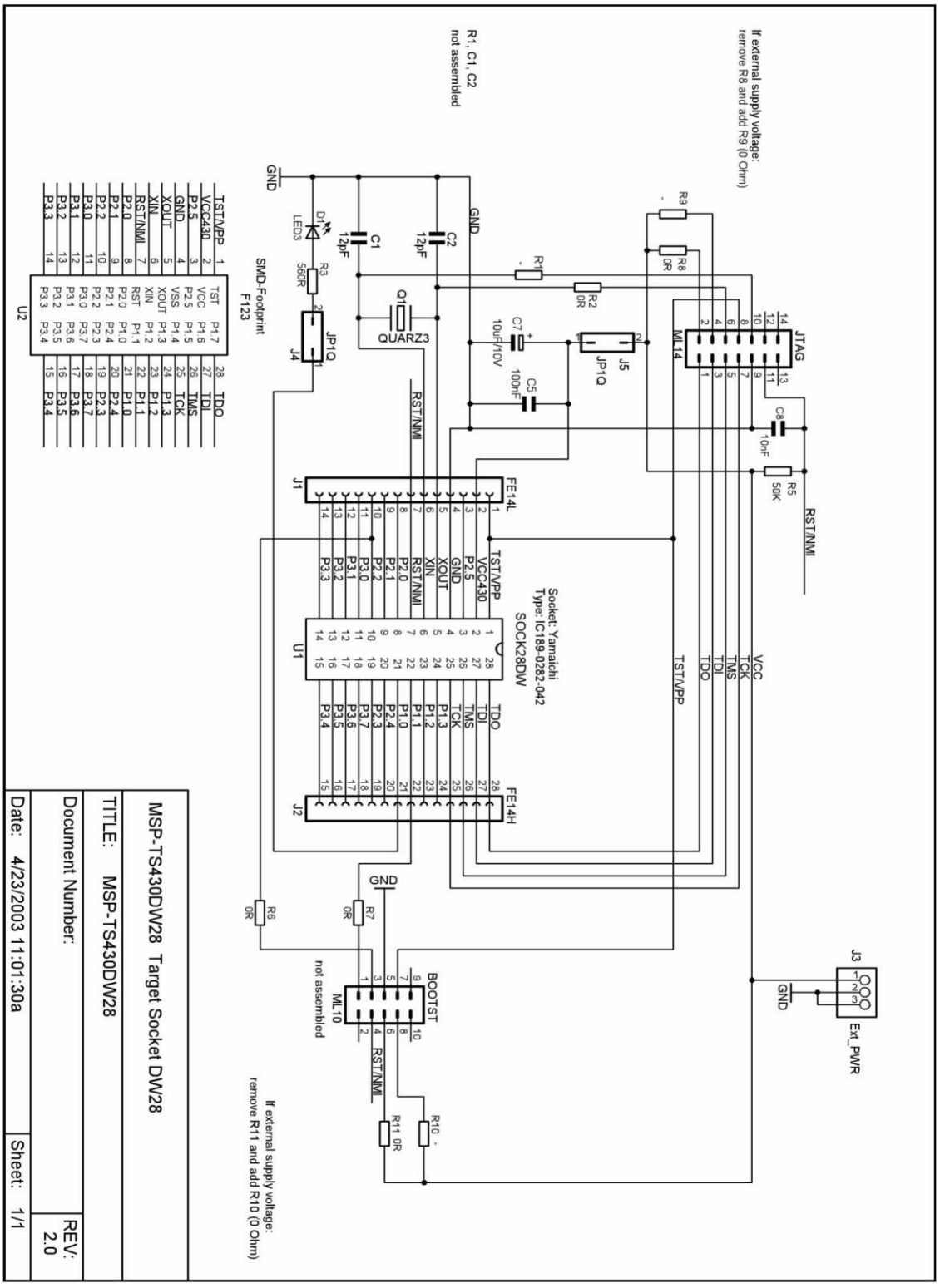

Figure B-11. MSP-TS430DW28 Target Socket Module, Schematic

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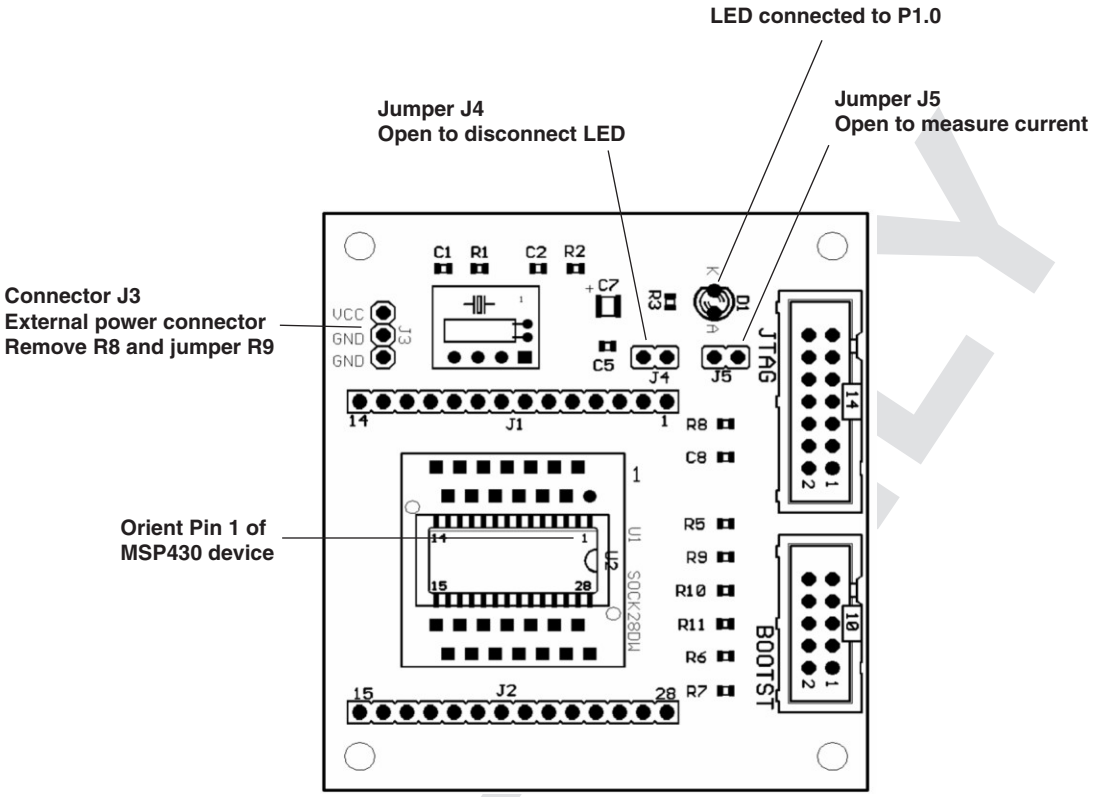

Figure B-12. MSP-TS430DW28 Target Socket Module, PCB

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Table B-7. 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	QUARZ, Crystal	Micro Crystal MS1V-T1K 32.768kHz, C(Load) = 12.5pF	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

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B.7 MSP-TS430PW28

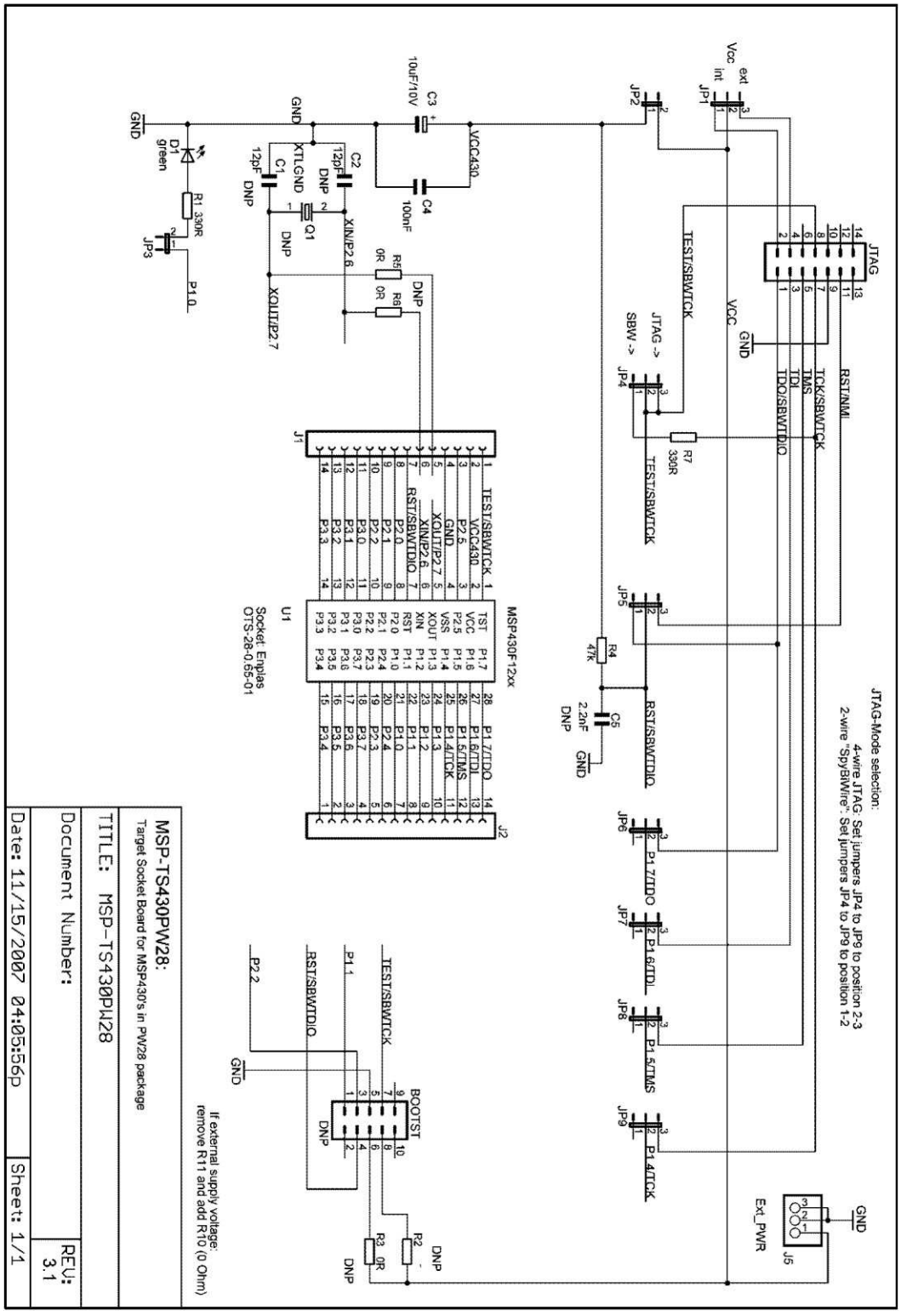

Figure B-13. MSP-TS430PW28 Target Socket Module, Schematic

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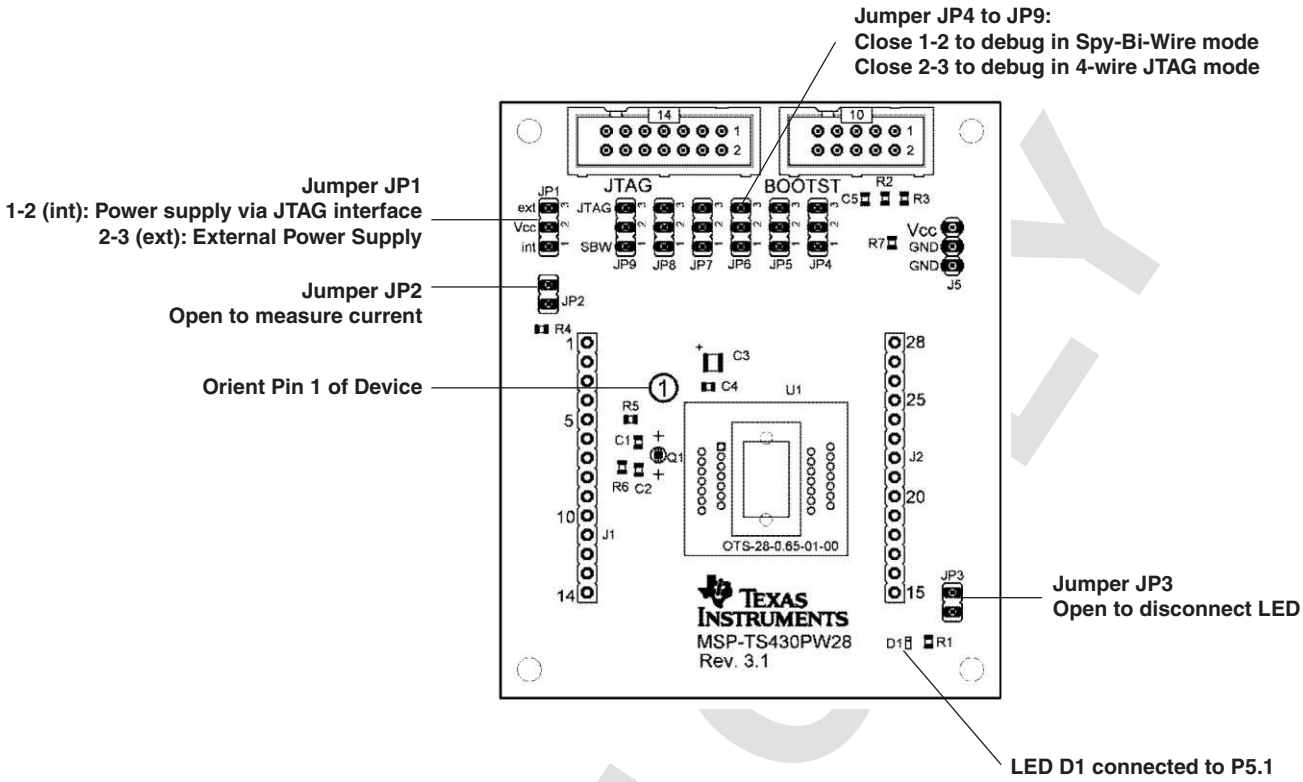

Figure B-14. MSP-TS430PW28 Target Socket Module, PCB

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Table B-8. 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	QUARZ, Crystal	Micro Crystal MS1V-T1K 32.768kHz, C(Load) = 12.5pF	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

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B.8 MSP-TS430PW28A

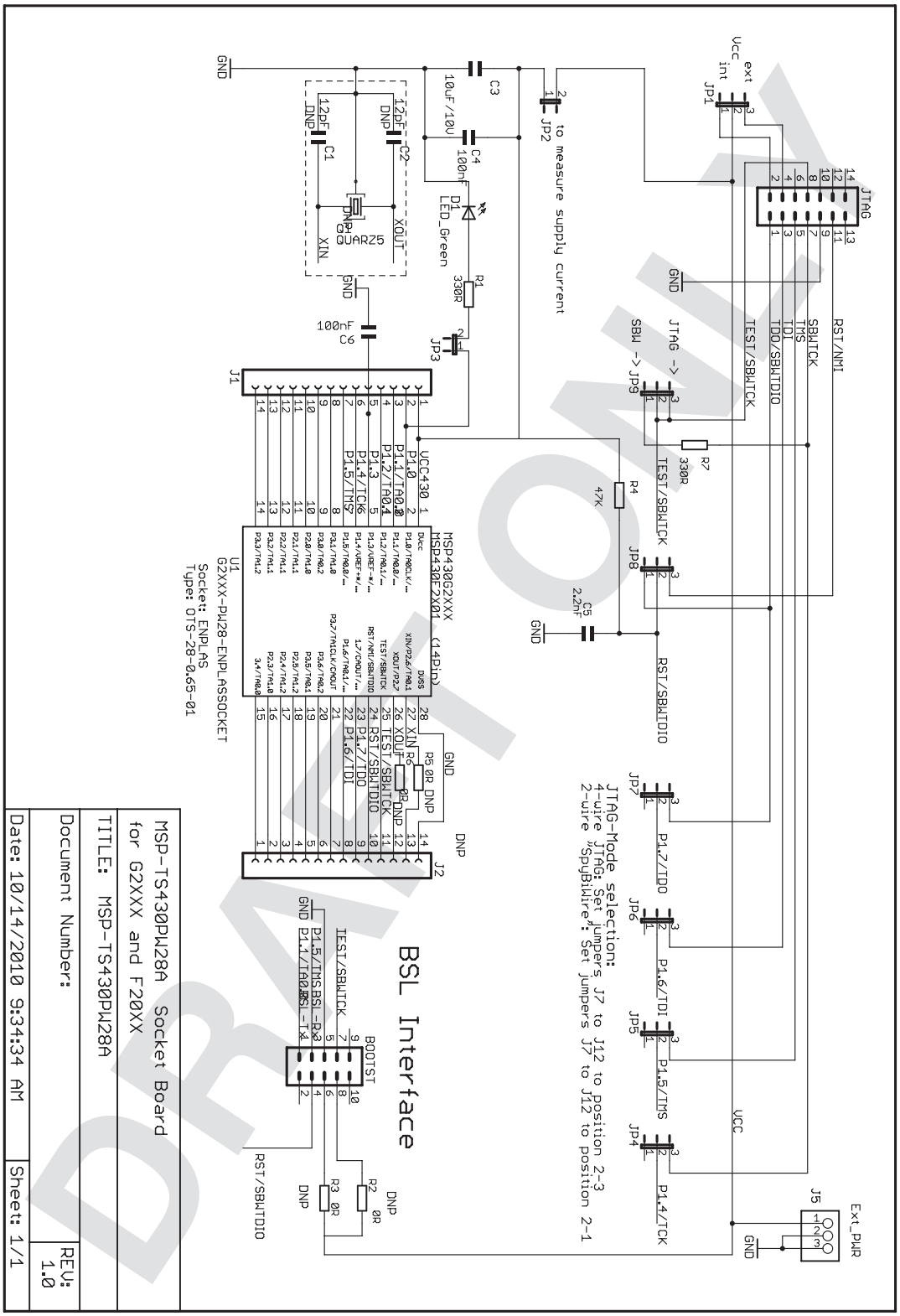

Figure B-15. MSP-TS430PW28A Target Socket Module, Schematic

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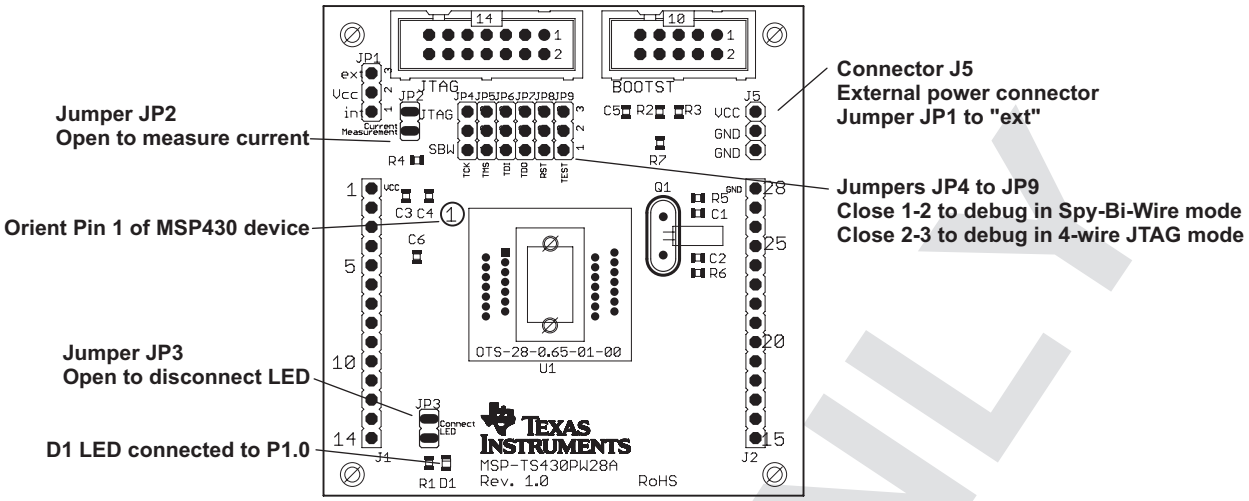

Figure B-16. MSP-TS430PW28A Target Socket Module, PCB (Red)

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Table B-9. MSP-TS430PW28A Bill of Materials

Position	Ref Des	No. per Board	Description	DigiKey Part No.	Comment
1	C1, C2	0	12pF, SMD0805		DNP
2	C5	1	2.2nF, SMD0805		
3	C3	1	10uF/10V, SMD0805		
4	C4, C6,	2	100nF, SMD0805	478-3351-2-ND	
5	D1	1	green LED, SMD0805	P516TR-ND	
6	J1, J2	0	14-pin header, TH		DNP: Headers and receptacles enclosed with kit. Keep vias free of solder: (Header & Receptacle)
7	J5, JP1, JP4, JP5, JP6, JP7, JP8, JP9	8	3-pin header, male, TH	SAM1035-03-ND	Place jumper on 1-2 of JP4-JP9 Place on 1-2 on JP1
8	JP2, JP3	2	2-pin header, male, TH	SAM1035-02-ND	Place jumper on header
9		9	Jumper	15-38-1024-ND	see Pos 7 an 8
10	JTAG	1	14-pin connector, male, TH	HRP14H-ND	
11	BOOTST	0			DNP Keep vias free of solder
12	Q1	0	Crystal	Micro Crystal MS3V 32.768kHz, C(Load) = 12.5pF	DNP: keep vias free of solder
13	R1, R7	2	330 Ω, SMD0805	541-330ATR-ND	
14	R2, R3,R5, R6,	0	0 Ohm, SMD0805	541-000ATR-ND	DNP R2, R3,R5, R6
15	R4	1	47k Ω, SMD0805	541-47000ATR-ND	
16	U1	1	Socket: OTS-28-0.65-01		Manuf.: Enplas
17	PCB	1	63.5 x 64.8 mm		2 layers
18	Adhesive plastic feet	4	about 6mm width, 2mm height	for example, 3M Bumpons Part No. SJ-5302	Apply to corners at bottom side
19	MSP430	2	MSP430G2553IPW28		DNP: enclosed with kit, supplied by TI

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B.9 MSP-TS430DA38

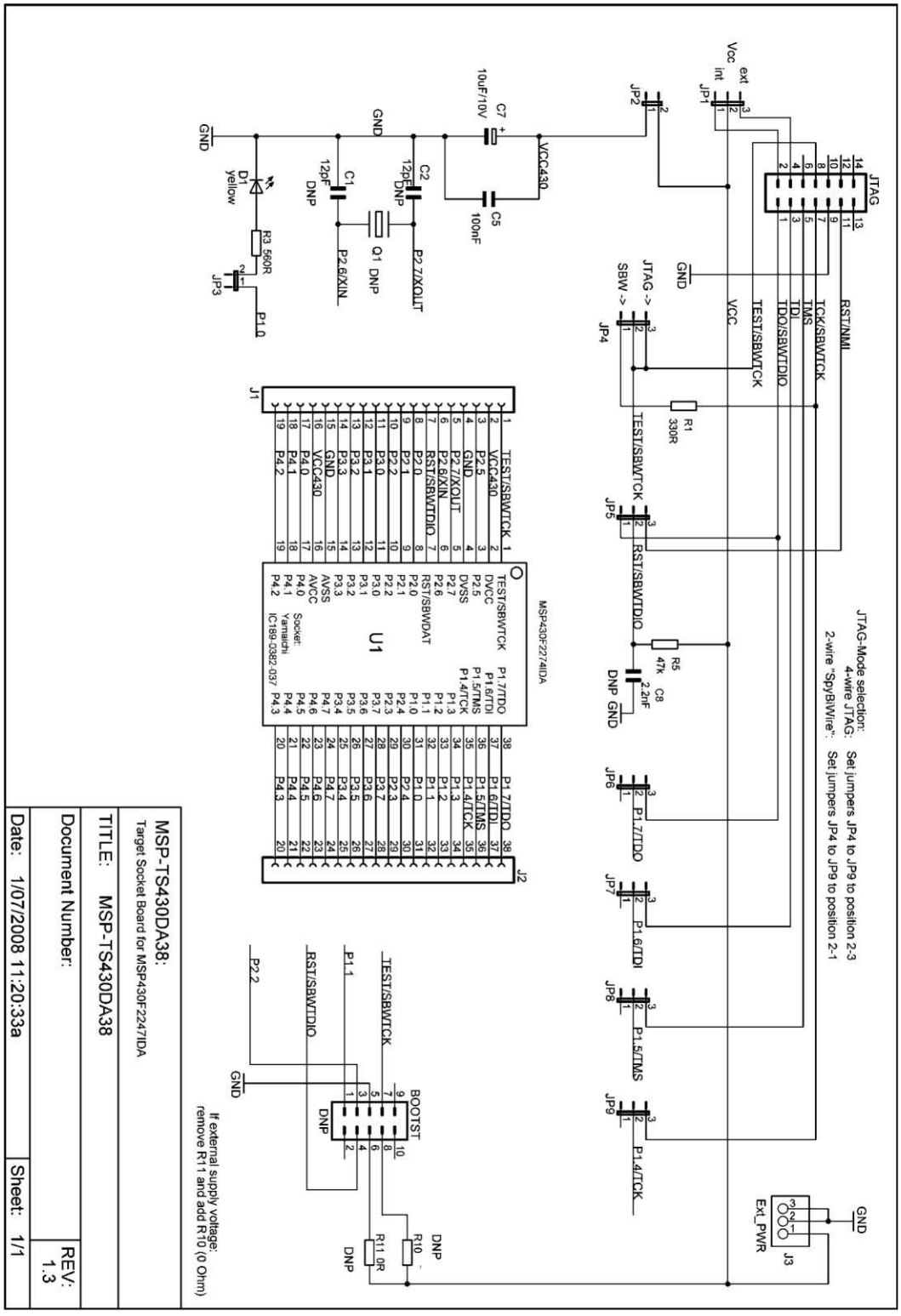

Figure B-17. MSP-TS430DA38 Target Socket Module, Schematic

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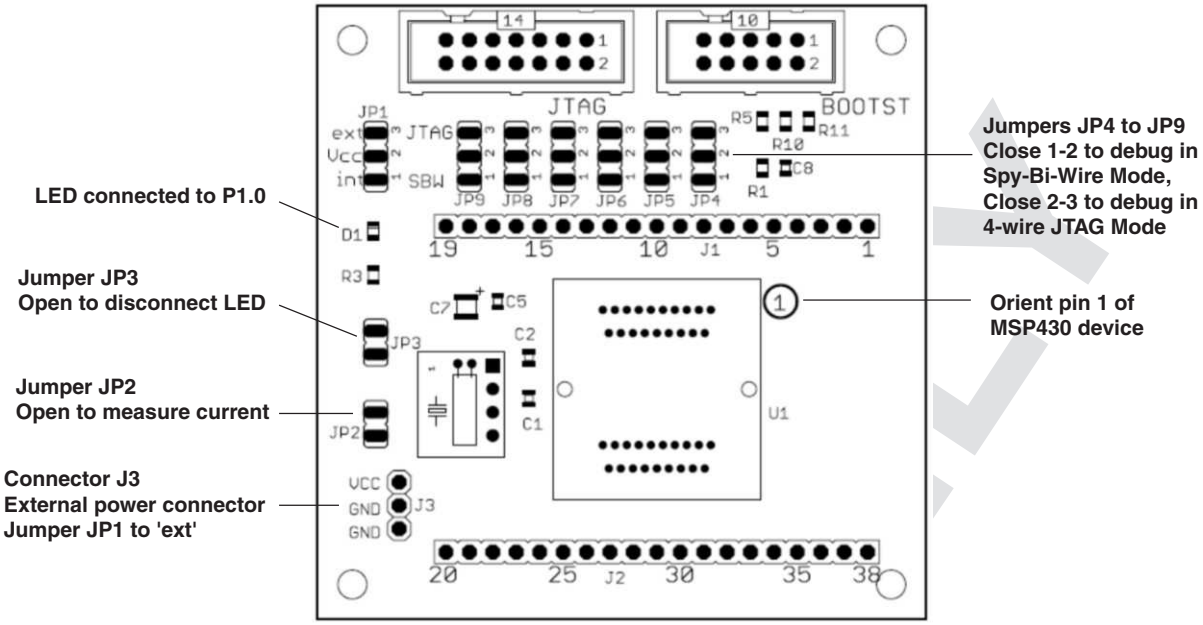

Figure B-18. MSP-TS430DA38 Target Socket Module, PCB

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Table B-10. 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	Micro Crystal MS1V-T1K 32.768kHz, C(Load) = 12.5pF	DNP: Keep vias free of solder
13	R1, R3	2	330 Ω, SMD0805	541-330ATR-ND	
14	R10, R11	0	0 Ω, SMD0805	541-000ATR-ND	DNP
15	R5	1	47k Ω, 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	for example, 3M Bumpons Part No. SJ-5302	Apply to corners at bottom side
19	MSP430	2	MSP430F2274IDA		DNP: enclosed with kit supplied by TI

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B.10 MSP-TS430QFN23x0

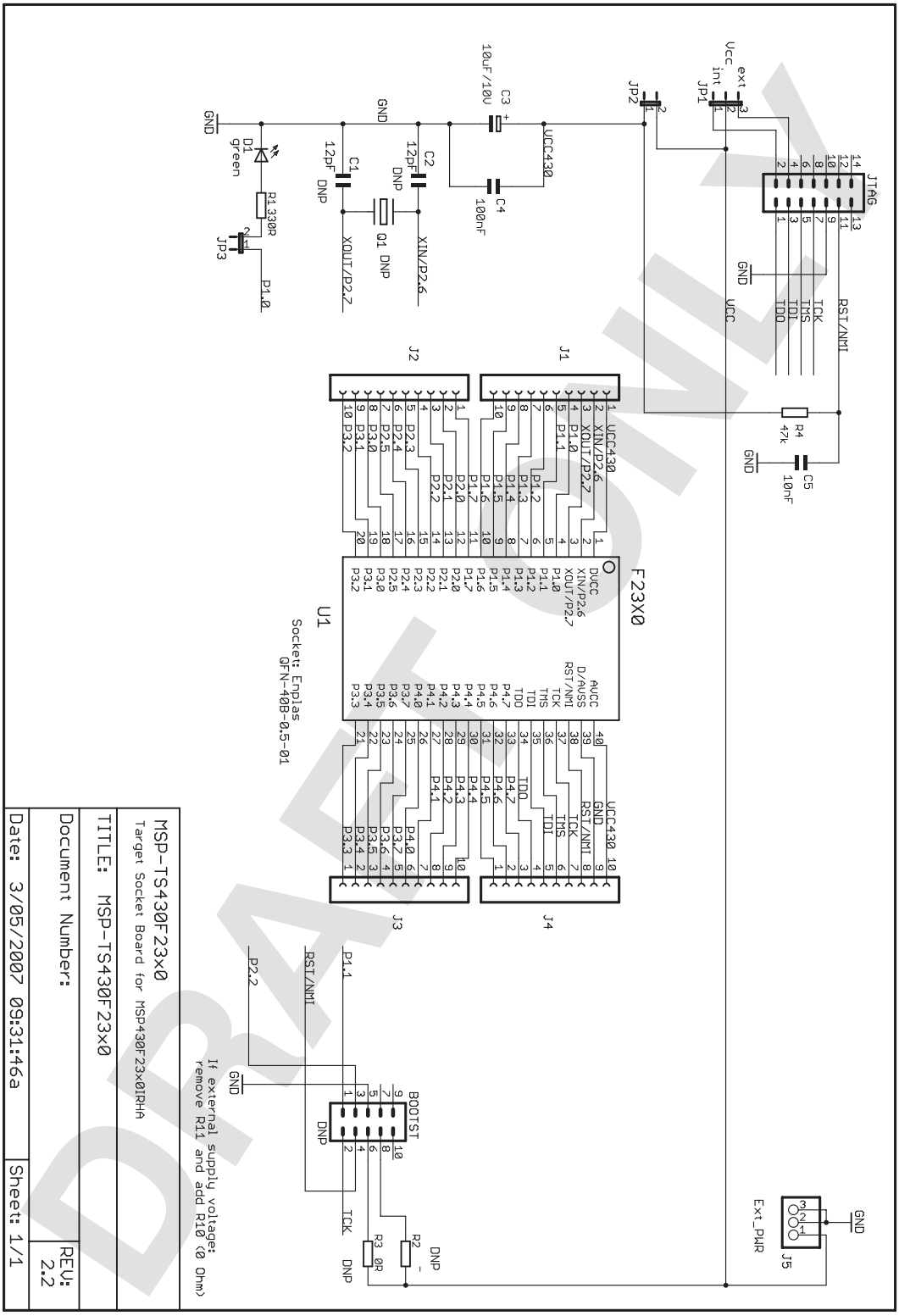

Figure B-19. MSP-TS430QFN23x0 Target Socket Module, Schematic

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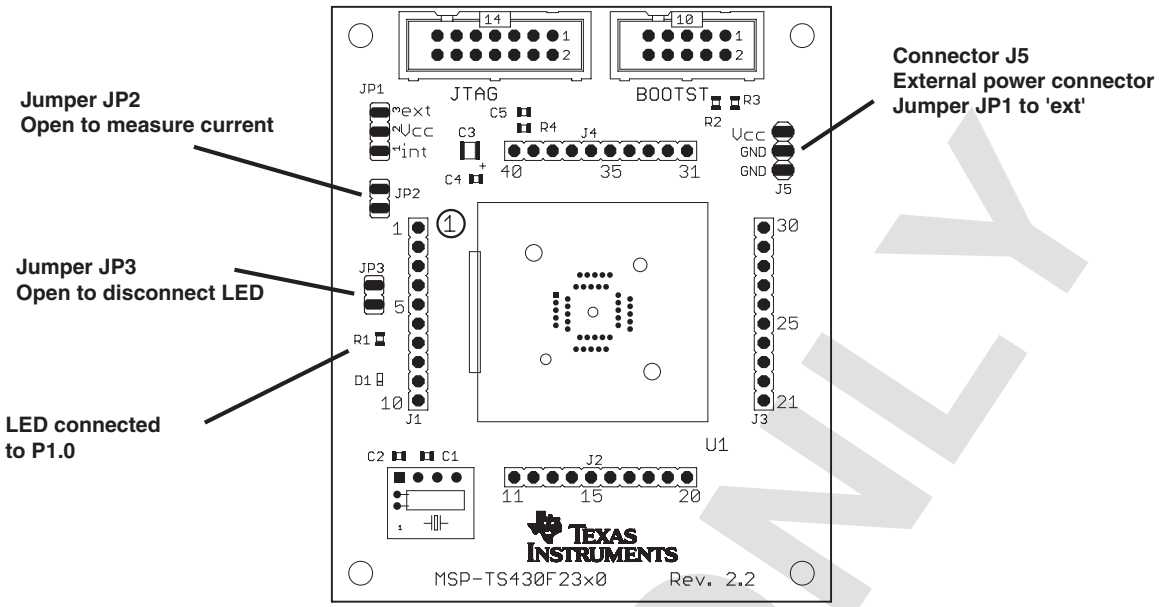

Figure B-20. MSP-TS430QFN23x0 Target Socket Module, PCB

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Table B-11. 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	Micro Crystal MS1V-T1K 32.768kHz, C(Load) = 12.5pF	DNP: Keep vias free of solder
13	R1	1	330 Ω, SMD0805	541-330ATR-ND	
14	R2, R3	0	0 Ω, SMD0805	541-000ATR-ND	DNP
15	R4	1	47k Ω, 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	for example, 3M Bumpons Part No. SJ-5302	Apply to corners at bottom side
19	MSP430	2	MSP430F2370IRHA		DNP: enclosed with kit supplied by TI

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B.11 MSP-TS430RSB40

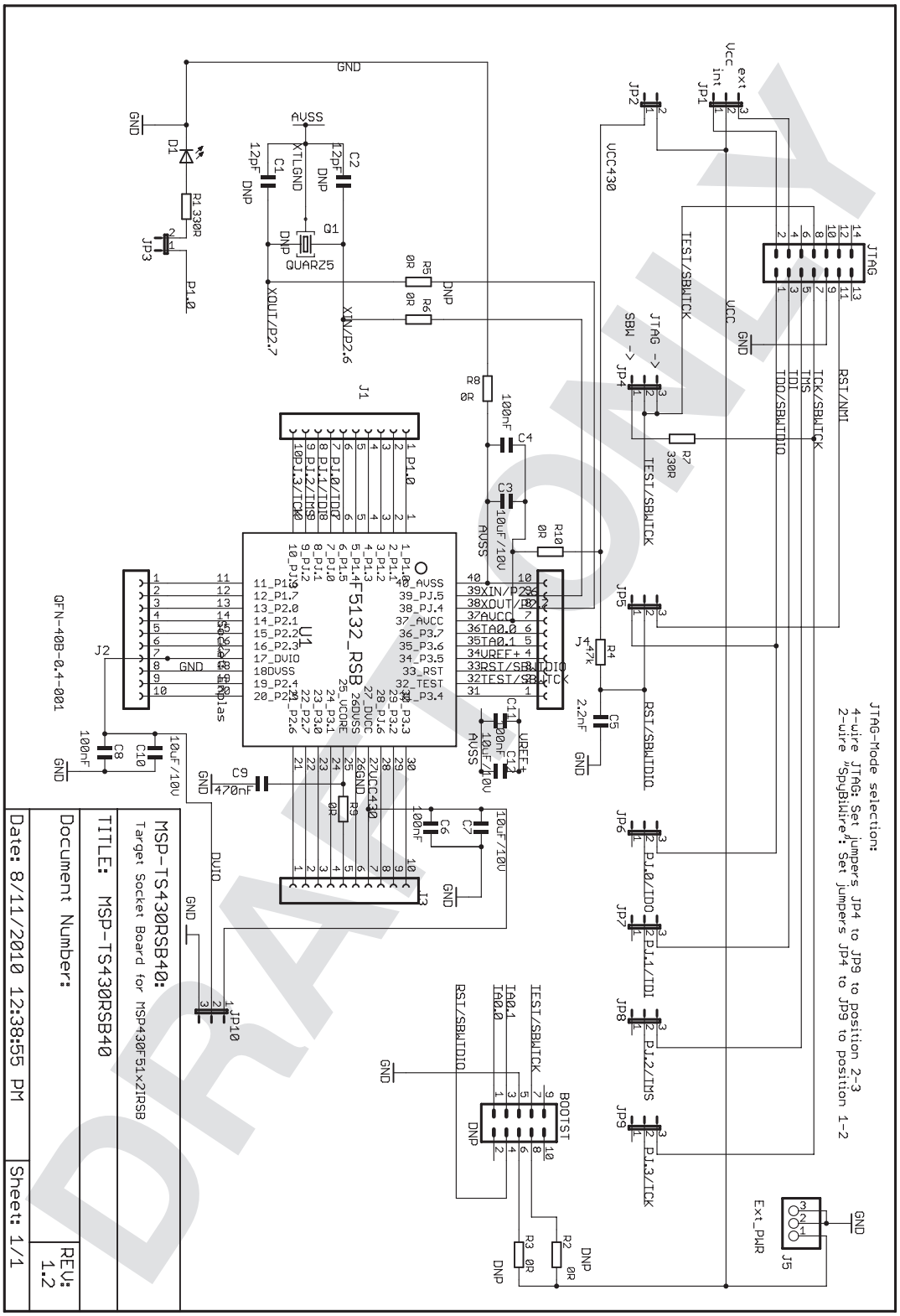

Figure B-21. MSP-TS430RSB40 Target Socket Module, Schematic

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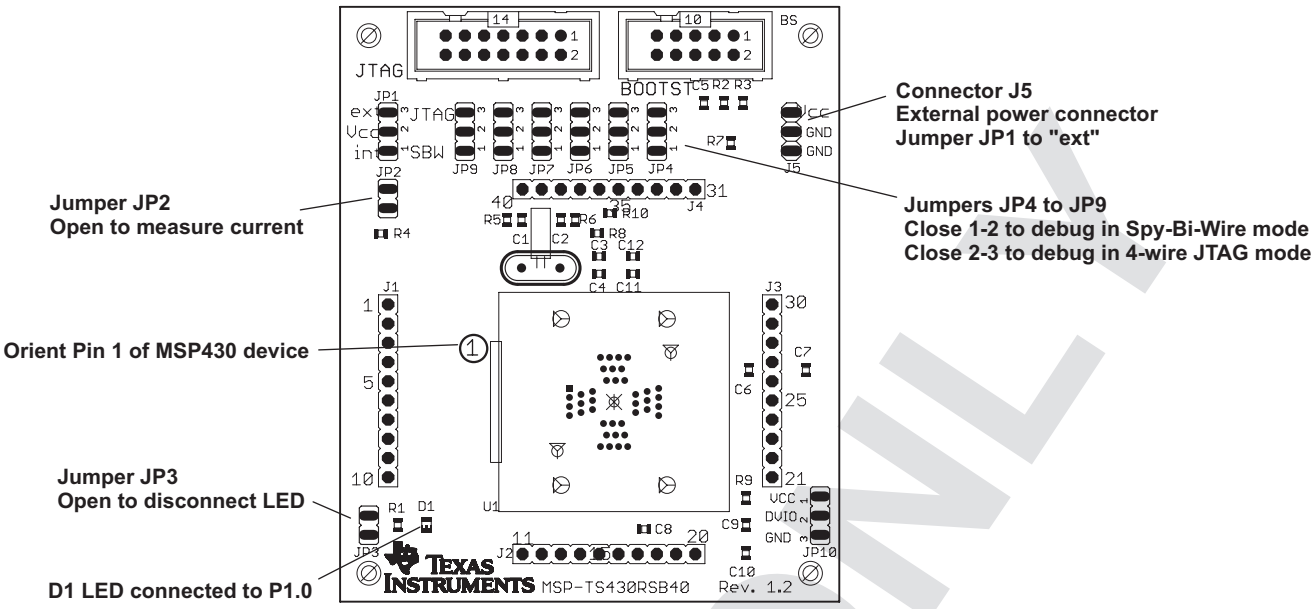

Figure B-22. MSP-TS430RSB40 Target Socket Module, PCB

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Table B-12. MSP-TS430RSB40 Bill of Materials

Pos.	Ref Des	No. Per Board	Description	DigiKey Part No.	Comment
1	C1, C2	0	12pF, SMD0805		DNP: C1, C2
2	C3, C7, C10, C12	3	10uF/10V, SMD 0805	445-1371-1-ND	DNP C12
3	C4, C6, C8, C11	3	100nF, SMD0805	311-1245-2-ND	DNP C11
4	C5	1	2.2nF, SMD0805		
5	C9	1	470nF, SMD0805		
6	D1	1	green LED, SMD0805	P516TR-ND	
7	J1, J2, J3, J4	4	10-pin header, TH		DNP: headers and receptacles enclosed with kit. Keep vias free of solder. : Header : Receptacle
7.1		4	10-pin header, TH		DNP: headers and receptacles enclosed with kit. Keep vias free of solder. : Header : Receptacle
8	JP1, JP4,JP5, JP6, JP7, JP8, JP9, J5, JP10	9	3-pin header, male, TH	SAM1035-03-ND	Jumper: 1-2 on JP1, JP10; 2-3 on JP4-JP9
9	JP2, JP3	2	2-pin header, male, TH	SAM1035-02-ND	place jumper on header
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	U1	1	QFN-40B-0.4_ ENPLAS_SOCKET	Enplas	
13	Q1	0	Crystal	Micro Crystal MS3V-T1R 32.768kHz, C(Load) = 12.5pF	DNP: Q1. Keep vias free of solder
15		10	Jumper	15-38-1024-ND	Place on: JP1, JP2, JP3, JP4, JP5, JP6, JP7, JP8, JP9, JP10
16	R1,R7	2	330R SMD0805		
17	R2, R3, R5, R6, R8, R9, R10	3	0R SMD0805		DNP R2, R3, R5, R6
18	R4	1	47k SMD0805		
19	MSP430	2	MSP430F5132		DNP: enclosed with kit. Is supplied by TI
20	Rubber stand off	4		select appropriate; for example, Buerklin: 20H1724	apply to corners at bottom side

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B.12 MSP-TS430RHA40A

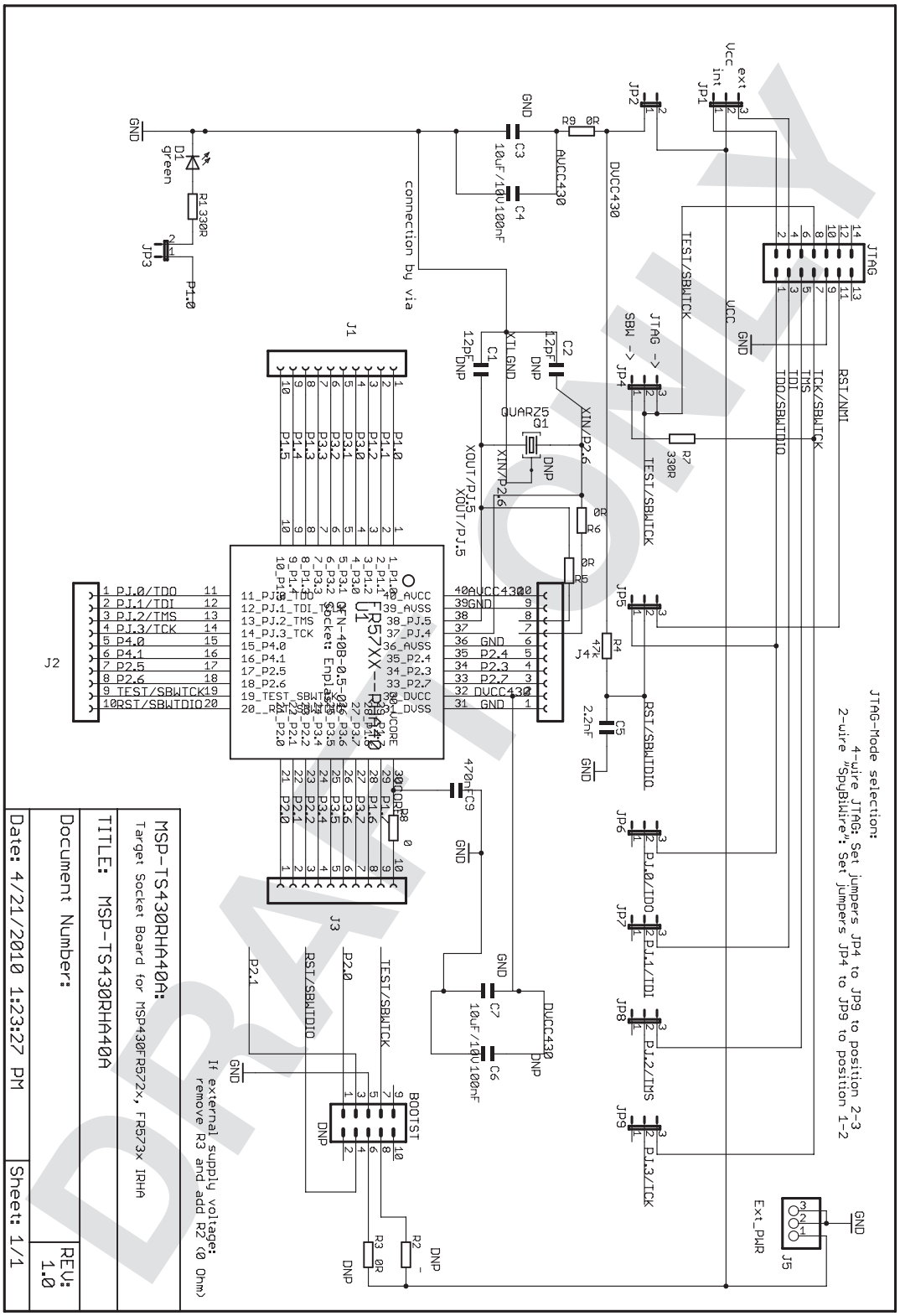

Figure B-23. MSP-TS430RHA40A Target Socket Module, Schematic

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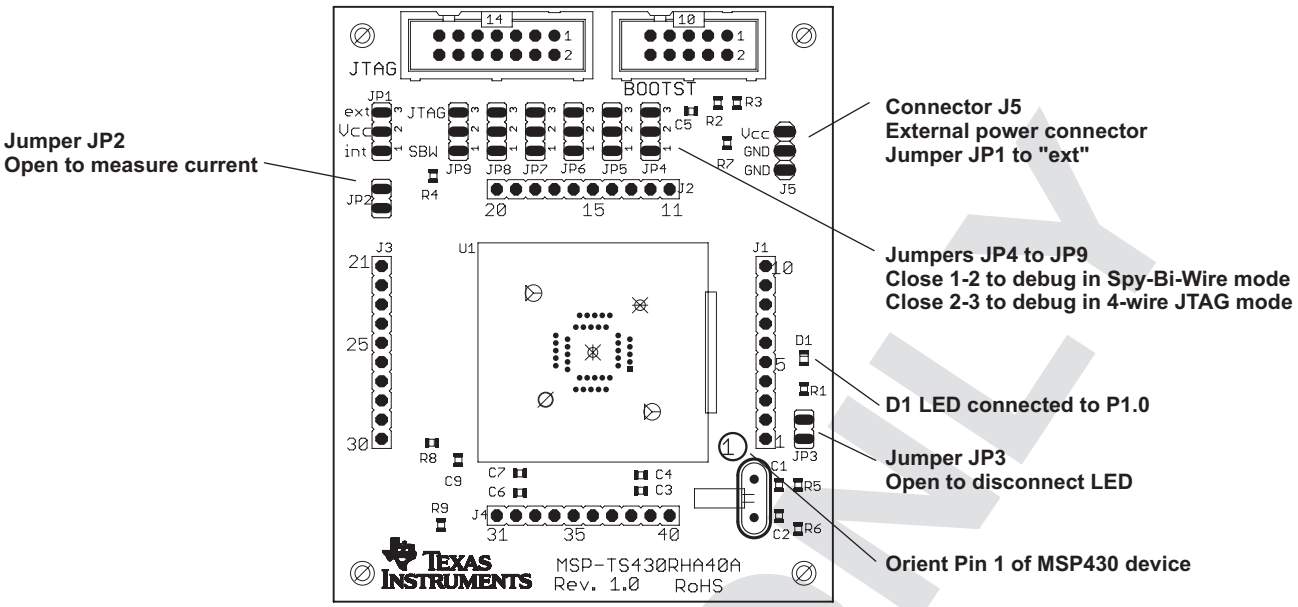

Figure B-24. MSP-TS430RHA40A Target Socket Module, PCB

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Table B-13. MSP-TS430RHA40A Bill of Materials

Position	Ref Des	No. per Board	Description	DigiKey Part No.	Comment
1	C1, C2	0	12pF, SMD0805		DNP: C1, C2
2	C5	0	2.2nF, SMD0805		DNP C12
3	C3, C7	2	10uF/10V, SMD0805 5		DNP C11
4	C4, C6	2	100nF, SMD0805	478-3351-2-ND	
5	C9	1	470nF, SMD0805		
6	D1	1	green LED, SMD0805	P516TR-ND	
7	J1, J2, J3, J4	4	10-pin header, TH		DNP: headers and receptacles enclosed with kit. Keep vias free of solder. : Header : Receptacle
7.1		4	10-pin header, TH		DNP: headers and receptacles enclosed with kit. Keep vias free of solder. : Header : Receptacle
8	J5, JP1, JP4, JP5, JP6, JP7, JP8, JP9	8	3-pin header, male, TH	SAM1035-03-ND	Place jumper on 1-2 of JP4-JP9; Place on 1-2 on JP1
9	JP2, JP3	2	2-pin header, male, TH	SAM1035-02-ND	place jumper on header
10		9	Jumper	15-38-1024-ND	see Pos 8 an 9
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	U1	1	Socket: QFN-40B-0.5-01		Manuf.: Enplas
14	Q1	0	Crystal	Micro Crystal MS3V-T1R 32.768kHz, C(Load) = 12.5pF	DNP: Q1. Keep vias free of solder
15	R1,R7	2	330R SMD0805	541-330ATR-ND	
16	R2, R3, R5, R6, R8, R9,	2	0 Ohm, SMD0805	541-000ATR-ND	DNP:R2, R3, R5, R6
17	R4	1	47k SMD0805		
18	PCB	1	79 x 66 mm		2 layers
19	Rubber stand off	4		select appropriate; for example, Buerklin: 20H1724	apply to corners at bottom side
20	MSP430	2	MSP430N5736IRHA		DNP: enclosed with kit. Is supplied by TI

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B.13 MSP-TS430DL48

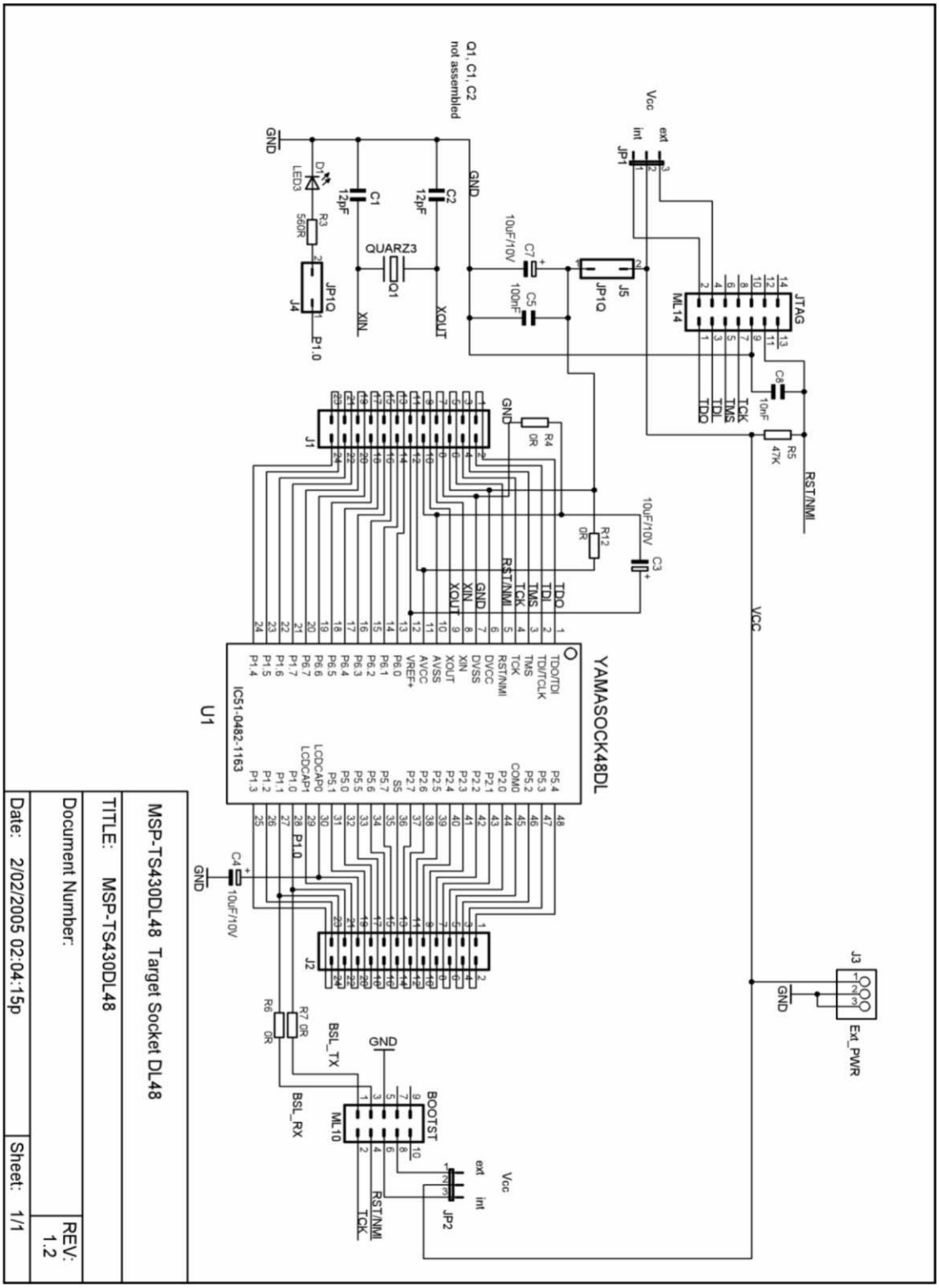

Figure B-25. MSP-TS430DL48 Target Socket Module, Schematic

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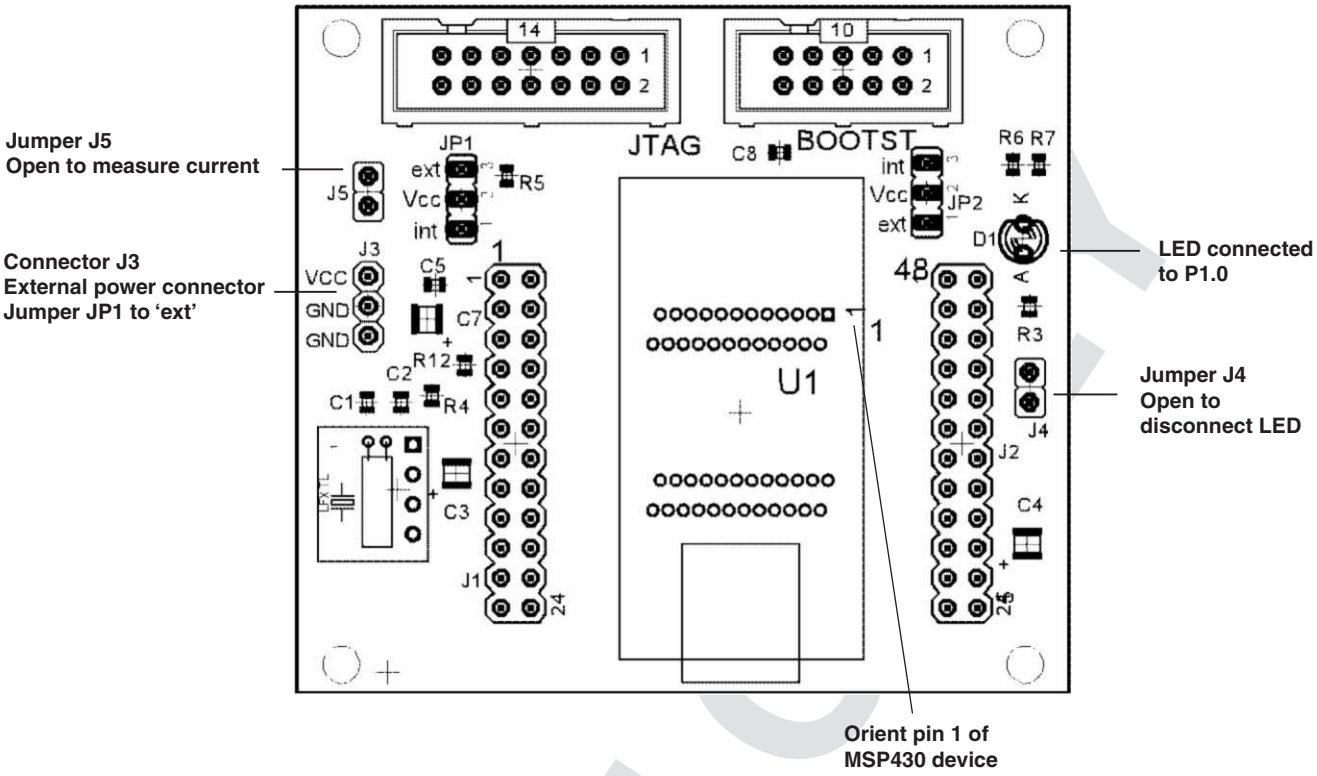

Figure B-26. MSP-TS430DL48 Target Socket Module, PCB

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Table B-14. 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	Micro Crystal MS1V-T1K 32.768kHz, C(Load) = 12.5pF	DNP: Keep vias free of solder
13	R3	1	560 Ω, SMD0805	541-560ATR-ND	
14	R4, R6, R7, R12	2	0 Ω, SMD0805	541-000ATR-ND	DNP: R6, R7
15	R5	1	47k Ω, 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	for example, 3M Bumpons Part No. SJ-5302	Apply to corners at bottom side
19	MSP430	2	MSP430F4270IDL		DNP: Enclosed with kit supplied by TI

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B.14 MSP-TS430RGZ48B

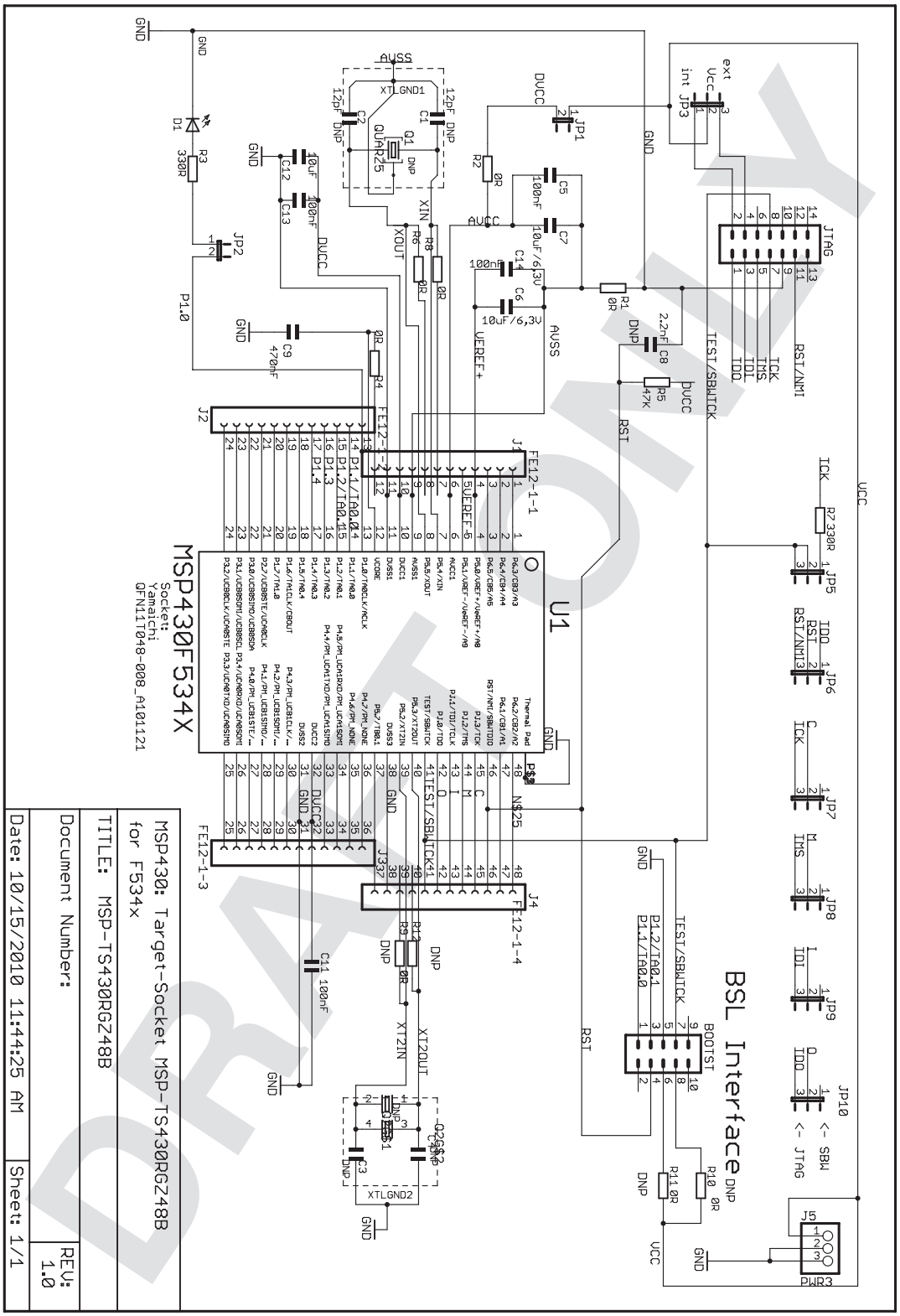

Figure B-27. MSP-TS430RGZ48B Target Socket Module, Schematic

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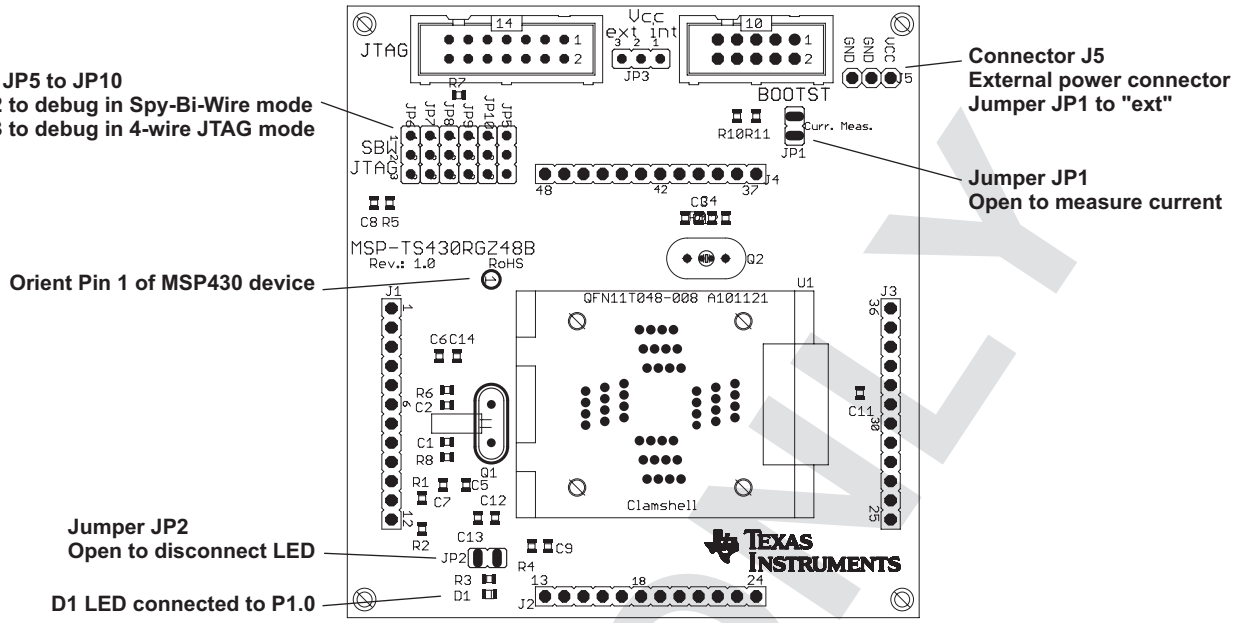

Figure B-28. MSP-TS430RGZ48B Target Socket Module, PCB

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Table B-15. MSP-TS430RGZ48B Bill of Materials

Position	Ref Des	No. per Board	Description	DigiKey Part No.	Comment
1	C1, C2	0	12pF, SMD0805		DNP
2	C3, C4	0	47pF, SMD0805		DNP
3	C6, C7, C12	3	10uF/6.3V, SMD0805		
4	C5, C11, C13, C14	4	100nF, SMD0805	311-1245-2-ND	
5	C8	1	2.2nF, SMD0805		
6	C9	1	470nF, SMD0805	478-1403-2-ND	
7	D1	1	green LED, SMD0805	P516TR-ND	
8	J1, J2, J3, J4	0	12-pin header, TH	SAM1029-12-ND (Header) SAM1213-12-ND (Receptacle)	DNP: Headers and receptacles enclosed with kit. Keep vias free of solder:
9	J5	1	3-pin header, male, TH		
10	JP3, JP5, JP6, JP7, JP8, JP9, JP10	7	3-pin header, male, TH	SAM1035-03-ND	place jumpers on pins 2-3 on JP5, JP6, JP7, JP8, JP9, JP10 place jumpers on pins 1-2 on JP3,
11	JP1, JP2	2	2-pin header, male, TH	SAM1035-02-ND	Place jumper on header
12		9	Jumper	15-38-1024-ND	See Pos. 10and Pos. 11
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	0	Crystal	Micro Crystal MS3V-T1R 32.768kHz, C(Load) = 12.5pF	DNP: Q1 Keep vias free of solder
16	Q2	0	Crystal	Q2: 4MHz Buerklin: 78D134	DNP: Q2 Keep vias free of solder
17	Insulating disk to Q2	0	Insulating disk to Q2	http://www.ettinger.de/Art_Detail.cfm?ART_ARTNUM=70.08.121	
18	R3, R7	2	330 Ω, SMD0805	541-330ATR-ND	
19	R1, R2, R4, R6, R8, R9,R10, R11, R12	3	0 Ohm, SMD0805	541-000ATR-ND	DNP: R6, R8, R9, R10, R11,R12
20	R5	1	47k Ω, SMD0805	541-47000ATR-ND	
21	U1	1	Socket: QFN11T048-008_A101121_RGZ48		Manuf.: Yamaichi
22	PCB	1	81 x 76 mm		2 layers
23	Adhesive plastic feet	4	about 6mm width, 2mm height	for example, 3M Bumpons Part No. SJ-5302	Apply to corners at bottom side
24	MSP430	2	MSP430F5342IRGZ		DNP: enclosed with kit, supplied by TI

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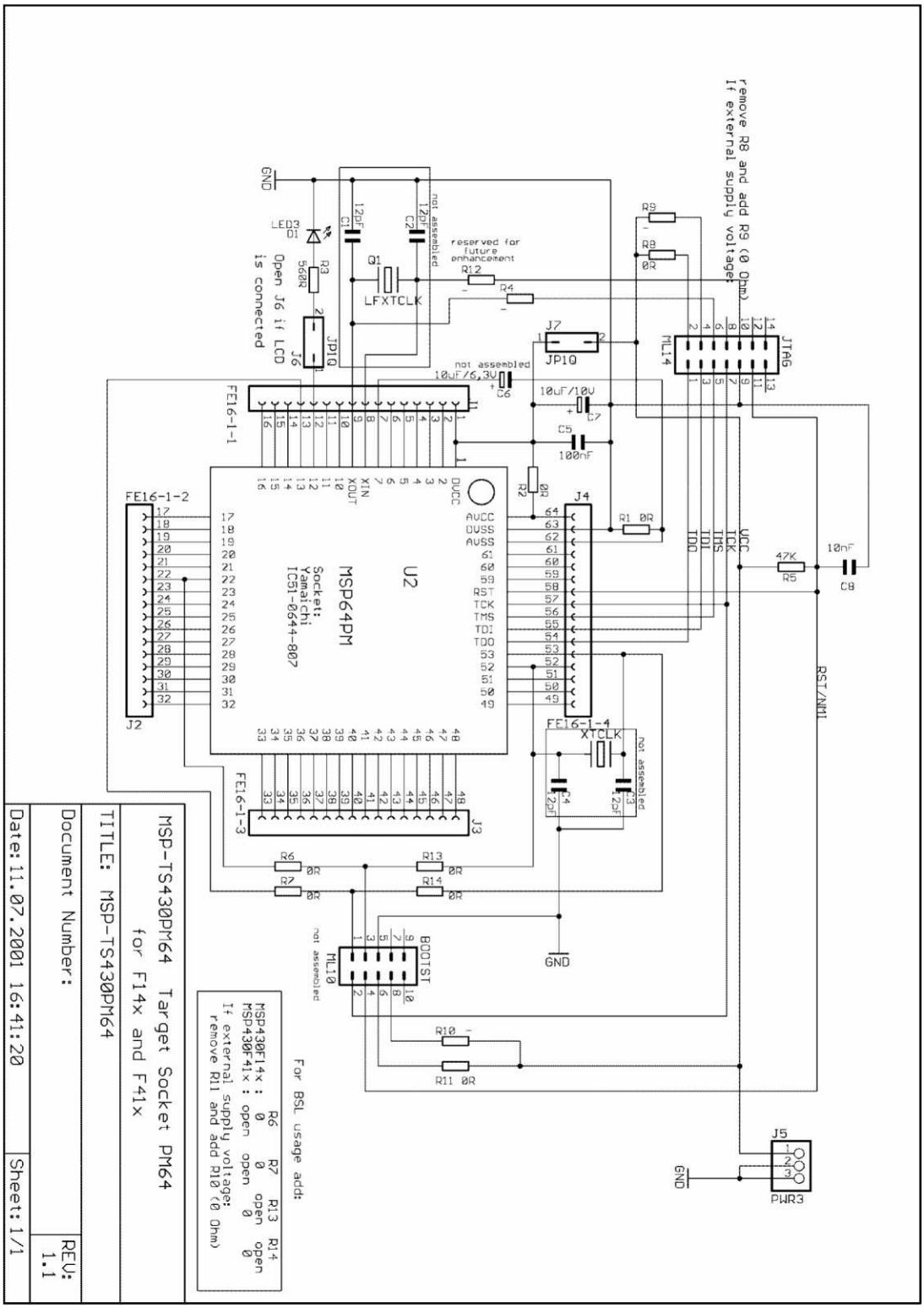
B.15 MSP-TS430PM64



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

Figure B-29. MSP-TS430PM64 Target Socket Module, Schematic

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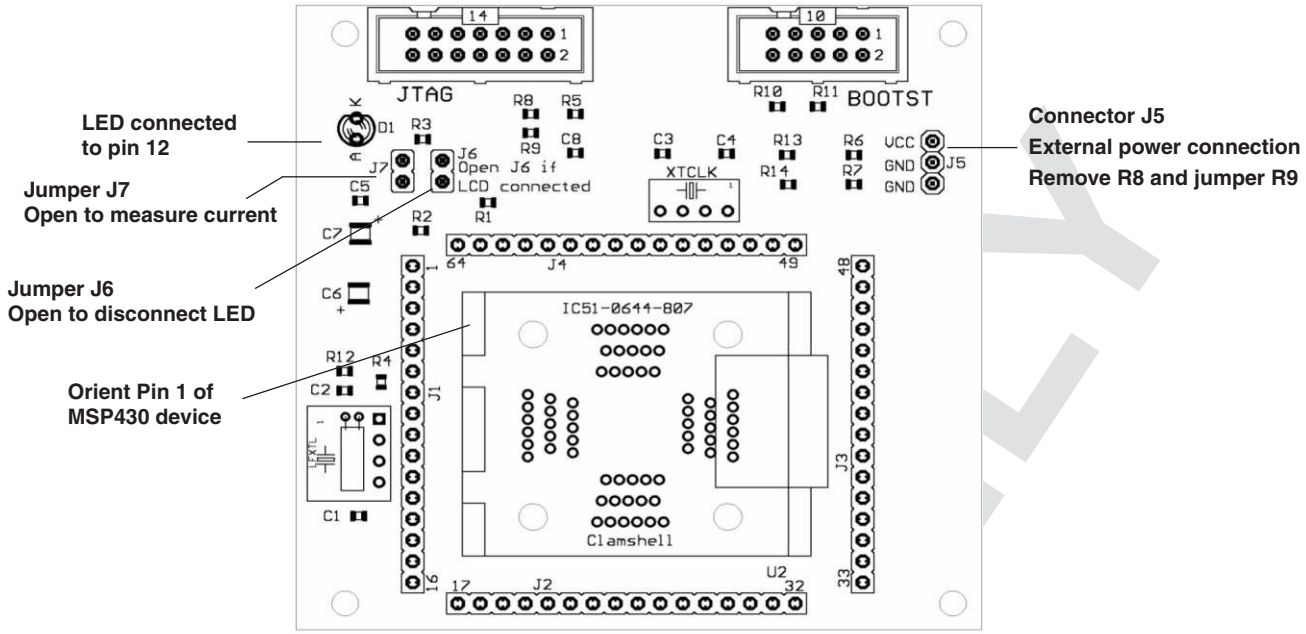

Figure B-30. MSP-TS430PM64 Target Socket Module, PCB

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Table B-16. 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	Q1: Micro Crystal MS1V-T1K 32.768kHz, C(Load) = 12.5pF	DNP: Keep vias free of solder
15	R3	1	330 Ω, SMD0805	541-330ATR-ND	
16	R1, R2, R4, R6, R7, R8, R9, R10, R11, R12, R13, R14	3	0 Ω, SMD0805	541-000ATR-ND	DNP: R4, R6, R7, R9, R10, R11, R12, R13, R14
17	R5	1	47k Ω, 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

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B.16 MSP-TS430PM64A

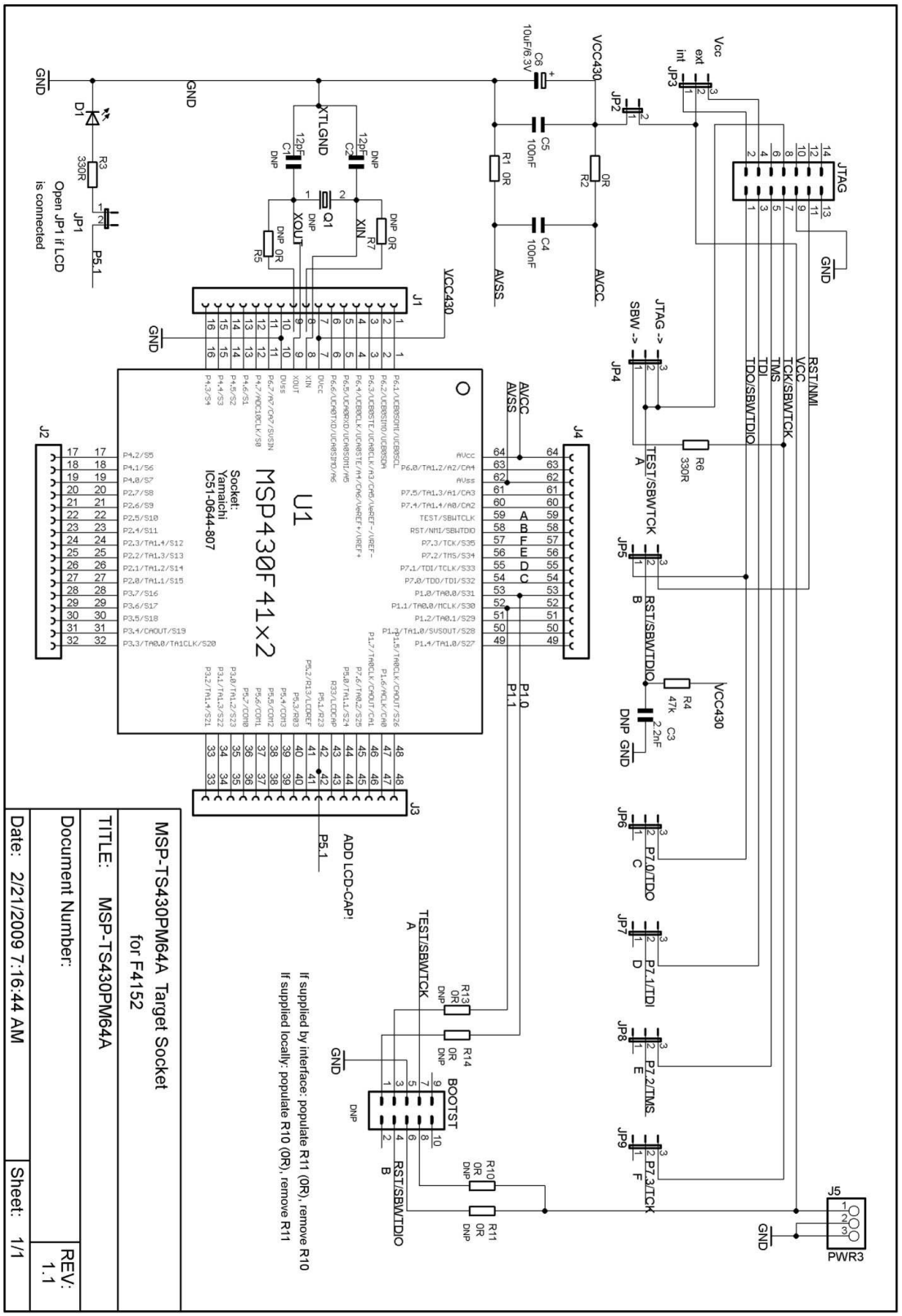

Figure B-31. MSP-TS430PM64A Target Socket Module, Schematic

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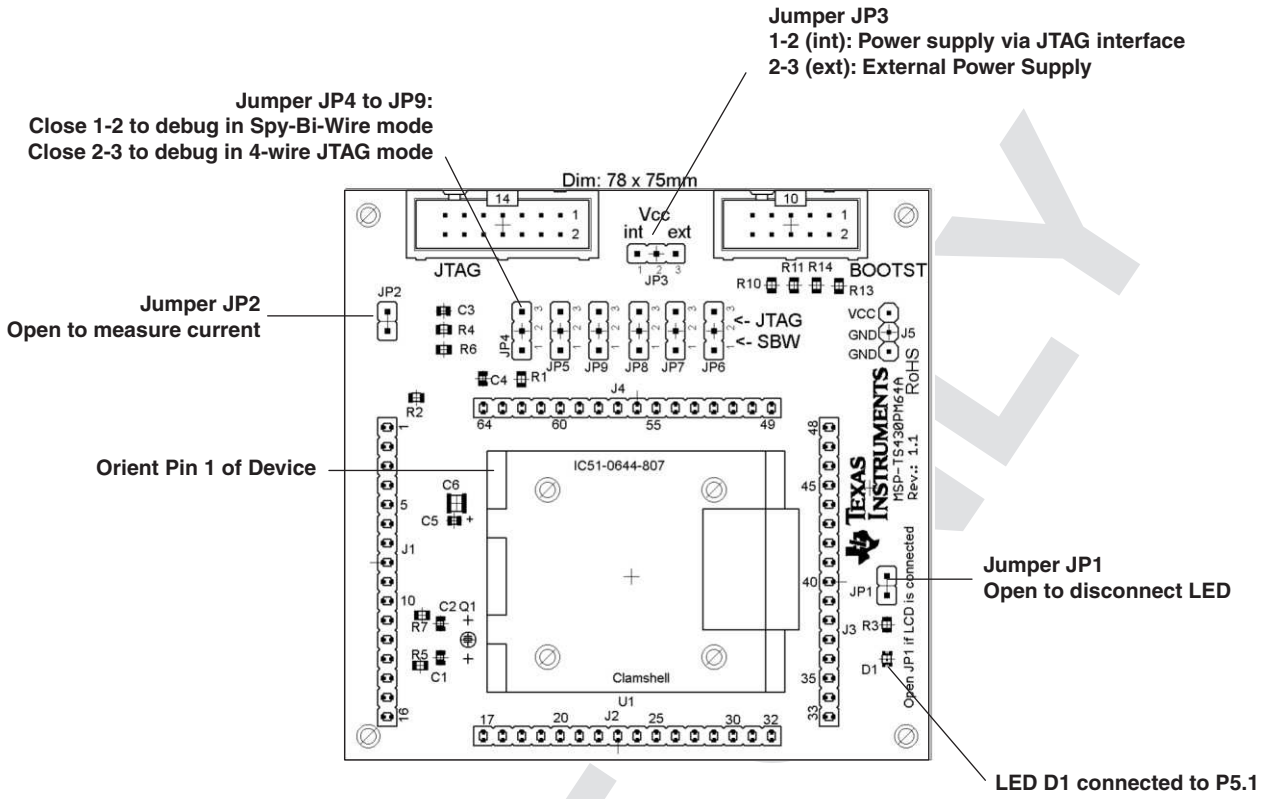

Figure B-32. MSP-TS430PM64A Target Socket Module, PCB

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Table B-17. 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	0	Crystal	Micro Crystal MS1V-T1K 32.768kHz, C(Load) = 12.5pF	DNP: Keep vias free of solder
13	R3, R6	2	330 Ω, SMD0805	541-330ATR-ND	
14	R1, R2, R5, R7, R9, R10, R11, R13, R14	2	0 Ω, SMD0805	541-000ATR-ND	DNP: R5, R7, R9, R10, R11, R13, R14
15	R4	1	47k Ω, 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

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