# MSP430 Hardware Tools

# User's Guide



Literature Number: SLAU278Y
May 2009–Revised March 2016

# Contents


**Preface** ..... **9**

**1 Get Started Now!** ..... **12**

1.1 Kit Contents, MSP-TS430xx ..... 13
1.2 Kit Contents, MSP-FET430xx ..... 15
1.3 Kit Contents, MSP-FET ..... 15
1.4 Kit Contents, MSP-FET430UIF ..... 15
1.5 Kit Contents, MSP-FET430PIF ..... 15
1.6 Kit Contents, eZ430-F2013 ..... 15
1.7 Kit Contents, eZ430-T2012 ..... 15
1.8 Kit Contents, eZ430-RF2500 ..... 16
1.9 Kit Contents, eZ430-RF2500T ..... 16
1.10 Kit Contents, eZ430-RF2500-SEH ..... 16
1.11 Kit Contents, eZ430-Chronos-xxx ..... 16
1.12 Kit Contents, FET430F6137RF900 ..... 17
1.13 Kit Contents, EM430Fx1x7RF900 ..... 17
1.14 Hardware Installation, MSP-FET ..... 18
1.15 Hardware Installation, MSP-FET430UIF ..... 18
1.16 Hardware Installation, MSP-FET430PIF ..... 19
1.17 Hardware Installation, MSP-TS430xxx, MSP-FET430Uxx, FET430F6137RF900, EM430Fx1x7RF900 ..... 19
1.18 Hardware Installation, eZ430-XXXX, MSP-EXP430G2, MSP-EXP430FR5739, MSPEXP430F5529 ..... 19
1.19 Important MSP430 Documents on the Web ..... 19

**2 Design Considerations for In-Circuit Programming** ..... **20**

2.1 Signal Connections for In-System Programming and Debugging ..... 21
2.2 External Power ..... 25
2.3 Bootloader (BSL) ..... 25

**A Frequently Asked Questions and Known Issues** ..... **26**

A.1 Hardware FAQs ..... 27
A.2 Known Issues ..... 29

**B Hardware** ..... **30**

B.1 MSP-TS430D8 ..... 33
B.2 MSP-TS430PW14 ..... 36
B.3 MSP-TS430L092 ..... 39
B.4 MSP-TS430L092 Active Cable ..... 42
B.5 MSP-TS430PW20 ..... 45
B.6 MSP-TS430PW24 ..... 49
B.7 MSP-TS430RGE24A ..... 52
B.8 MSP-TS430DW28 ..... 55
B.9 MSP-TS430PW28 ..... 58
B.10 MSP-TS430PW28A ..... 61
B.11 MSP-TS430RHB32A ..... 64
B.12 MSP-TS430DA38 ..... 67
B.13 MSP-TS430QFN23x0 ..... 70
B.14 MSP-TS430RSB40 ..... 73
B.15 MSP-TS430RHA40A ..... 76





Copyright © 2009–2016, Texas Instruments Incorporated

B.16 MSP-TS430DL48 ..... 79
B.17 MSP-TS430RGZ48B ..... 82
B.18 MSP-TS430RGZ48C ..... 85
B.19 MSP-TS430PM64 ..... 88
B.20 MSP-TS430PM64A ..... 91
B.21 MSP-TS430PM64D ..... 94
B.22 MSP-TS430PM64F ..... 97
B.23 MSP-TS430RGC64B ..... 100
B.24 MSP-TS430RGC64C ..... 103
B.25 MSP-TS430RGC64USB ..... 107
B.26 MSP-TS430PN80 ..... 111
B.27 MSP-TS430PN80A ..... 114
B.28 MSP-TS430PN80B ..... 117
B.29 MSP-TS430PN80USB ..... 120
B.30 MSP-TS430PZ100 ..... 124
B.31 MSP-TS430PZ100A ..... 127
B.32 MSP-TS430PZ100B ..... 130
B.33 MSP-TS430PZ100C ..... 133
B.34 MSP-TS430PZ100D ..... 136
B.35 MSP-TS430PZ5x100 ..... 139
B.36 MSP-TS430PZ100USB ..... 142
B.37 MSP-TS430PZ100AUSB ..... 146
B.38 MSP-TS430PEU128 ..... 150
B.39 EM430F5137RF900 ..... 153
B.40 EM430F6137RF900 ..... 157
B.41 EM430F6147RF900 ..... 161
B.42 MSP-FET ..... 165
B.42.1 Features ..... 165
B.42.2 Release Notes ..... 165
B.42.3 Schematics ..... 168
B.42.4 Layout ..... 173
B.42.5 LED Signals ..... 173
B.42.6 JTAG Target Connector ..... 174
B.42.7 Specifications ..... 176
B.42.8 MSP-FET Revision History ..... 176
B.43 MSP-FET430UIF ..... 177
B.43.1 MSP-FET430UIF Revision History ..... 182
B.44 MSP-FET430PIF ..... 183

**C Hardware Installation Guide ..... 185**

C.1 Hardware Installation ..... 186

**Revision History ..... 191**



Copyright © 2009–2016, Texas Instruments Incorporated

# List of Figures


2-1. Signal Connections for 4-Wire JTAG Communication ..... 22
2-2. Signal Connections for 2-Wire JTAG Communication (Spy-Bi-Wire) Used by MSP430F2xx, MSP430G2xx, and MSP430F4xx Devices ..... 23
2-3. Signal Connections for 2-Wire JTAG Communication (Spy-Bi-Wire) Used by All MSP430 SBW-Capable Devices That are Not Part of F2xx, G2xx, F4xx Families ..... 24
B-1. MSP-TS430D8 Target Socket Module, Schematic ..... 33
B-2. MSP-TS430D8 Target Socket Module, PCB ..... 34
B-3. MSP-TS430PW14 Target Socket Module, Schematic ..... 36
B-4. MSP-TS430PW14 Target Socket Module, PCB ..... 37
B-5. MSP-TS430L092 Target Socket Module, Schematic ..... 39
B-6. MSP-TS430L092 Target Socket Module, PCB ..... 40
B-7. MSP-TS430L092 Active Cable Target Socket Module, Schematic ..... 42
B-8. MSP-TS430L092 Active Cable Target Socket Module, PCB ..... 43
B-9. UART BSL Signal Select ..... 45
B-10. MSP-TS430PW20 Target Socket Module, Schematic ..... 46
B-11. MSP-TS430PW20 Target Socket Module, PCB ..... 47
B-12. MSP-TS430PW24 Target Socket Module, Schematic ..... 49
B-13. MSP-TS430PW24 Target Socket Module, PCB ..... 50
B-14. MSP-TS430RGE24A Target Socket Module, Schematic ..... 52
B-15. MSP-TS430RGE24A Target Socket Module, PCB ..... 53
B-16. MSP-TS430DW28 Target Socket Module, Schematic ..... 55
B-17. MSP-TS430DW28 Target Socket Module, PCB ..... 56
B-18. MSP-TS430PW28 Target Socket Module, Schematic ..... 58
B-19. MSP-TS430PW28 Target Socket Module, PCB ..... 59
B-20. MSP-TS430PW28A Target Socket Module, Schematic ..... 61
B-21. MSP-TS430PW28A Target Socket Module, PCB (Red) ..... 62
B-22. MSP-TS430RHB32A Target Socket Module, Schematic ..... 64
B-23. MSP-TS430RHB32A Target Socket Module, PCB ..... 65
B-24. MSP-TS430DA38 Target Socket Module, Schematic ..... 67
B-25. MSP-TS430DA38 Target Socket Module, PCB ..... 68
B-26. MSP-TS430QFN23x0 Target Socket Module, Schematic ..... 70
B-27. MSP-TS430QFN23x0 Target Socket Module, PCB ..... 71
B-28. MSP-TS430RSB40 Target Socket Module, Schematic ..... 73
B-29. MSP-TS430RSB40 Target Socket Module, PCB ..... 74
B-30. MSP-TS430RHA40A Target Socket Module, Schematic ..... 76
B-31. MSP-TS430RHA40A Target Socket Module, PCB ..... 77
B-32. MSP-TS430DL48 Target Socket Module, Schematic ..... 79
B-33. MSP-TS430DL48 Target Socket Module, PCB ..... 80
B-34. MSP-TS430RGZ48B Target Socket Module, Schematic ..... 82
B-35. MSP-TS430RGZ48B Target Socket Module, PCB ..... 83
B-36. MSP-TS430RGZ48C Target Socket Module, Schematic ..... 85
B-37. MSP-TS430RGZ48C Target Socket Module, PCB ..... 86
B-38. MSP-TS430PM64 Target Socket Module, Schematic ..... 88
B-39. MSP-TS430PM64 Target Socket Module, PCB ..... 89
B-40. MSP-TS430PM64A Target Socket Module, Schematic ..... 91
B-41. MSP-TS430PM64A Target Socket Module, PCB ..... 92
B-42. MSP-TS430PM64D Target Socket Module, Schematic ..... 94
B-43. MSP-TS430PM64D Target Socket Module, PCB ..... 95




Copyright © 2009–2016, Texas Instruments Incorporated

B-44. MSP-TS430PM64F Target Socket Module, Schematic ..... 97
B-45. MSP-TS430PM64F Target Socket Module, PCB ..... 98
B-46. MSP-TS430RGC64B Target Socket Module, Schematic ..... 100
B-47. MSP-TS430RGC64B Target Socket Module, PCB ..... 101
B-48. MSP-TS430RGC64C Target Socket Module, Schematic ..... 104
B-49. MSP-TS430RGC64C Target Socket Module, PCB ..... 105
B-50. MSP-TS430RGC64USB Target Socket Module, Schematic ..... 107
B-51. MSP-TS430RGC64USB Target Socket Module, PCB ..... 108
B-52. MSP-TS430PN80 Target Socket Module, Schematic ..... 111
B-53. MSP-TS430PN80 Target Socket Module, PCB ..... 112
B-54. MSP-TS430PN80A Target Socket Module, Schematic ..... 114
B-55. MSP-TS430PN80A Target Socket Module, PCB ..... 115
B-56. MSP-TS430PN80B Target Socket Module, Schematic ..... 117
B-57. MSP-TS430PN80B Target Socket Module, PCB ..... 118
B-58. MSP-TS430PN80USB Target Socket Module, Schematic ..... 120
B-59. MSP-TS430PN80USB Target Socket Module, PCB ..... 121
B-60. MSP-TS430PZ100 Target Socket Module, Schematic ..... 124
B-61. MSP-TS430PZ100 Target Socket Module, PCB ..... 125
B-62. MSP-TS430PZ100A Target Socket Module, Schematic ..... 127
B-63. MSP-TS430PZ100A Target Socket Module, PCB ..... 128
B-64. MSP-TS430PZ100B Target Socket Module, Schematic ..... 130
B-65. MSP-TS430PZ100B Target Socket Module, PCB ..... 131
B-66. MSP-TS430PZ100C Target Socket Module, Schematic ..... 133
B-67. MSP-TS430PZ100C Target Socket Module, PCB ..... 134
B-68. MSP-TS430PZ100D Target Socket Module, Schematic ..... 136
B-69. MSP-TS430PZ100D Target Socket Module, PCB ..... 137
B-70. MSP-TS430PZ5x100 Target Socket Module, Schematic ..... 139
B-71. MSP-TS430PZ5x100 Target Socket Module, PCB ..... 140
B-72. MSP-TS430PZ100USB Target Socket Module, Schematic ..... 142
B-73. MSP-TS430PZ100USB Target Socket Module, PCB ..... 143
B-74. MSP-TS430PZ100AUSB Target Socket Module, Schematic ..... 146
B-75. MSP-TS430PZ100AUSB Target Socket Module, PCB ..... 147
B-76. MSP-TS430PEU128 Target Socket Module, Schematic ..... 150
B-77. MSP-TS430PEU128 Target Socket Module, PCB ..... 151
B-78. EM430F5137RF900 Target Board, Schematic ..... 153
B-79. EM430F5137RF900 Target board, PCB ..... 154
B-80. EM430F6137RF900 Target Board, Schematic ..... 157
B-81. EM430F6137RF900 Target Board, PCB ..... 158
B-82. EM430F6147RF900 Target Board, Schematic ..... 161
B-83. EM430F6147RF900 Target Board, PCB ..... 162
B-84. MSP-FET Top View ..... 166
B-85. MSP-FET Bottom View ..... 166
B-86. MSP-FET USB Debugger, Schematic (1 of 5) ..... 168
B-87. MSP-FET USB Debugger, Schematic (2 of 5) ..... 169
B-88. MSP-FET USB Debugger, Schematic (3 of 5) ..... 170
B-89. MSP-FET USB Debugger, Schematic (4 of 5) ..... 171
B-90. MSP-FET USB Debugger, Schematic (5 of 5) ..... 172
B-91. MSP-FET USB Debugger, PCB (Top) ..... 173
B-92. MSP-FET USB Debugger, PCB (Bottom) ..... 173


Copyright © 2009–2016, Texas Instruments Incorporated

B-93. JTAG Connector Pinout ..... 174
B-94. Pin States After Power-Up ..... 175
B-95. MSP-FET430UIF USB Interface, Schematic (1 of 4) ..... 177
B-96. MSP-FET430UIF USB Interface, Schematic (2 of 4) ..... 178
B-97. MSP-FET430UIF USB Interface, Schematic (3 of 4) ..... 179
B-98. MSP-FET430UIF USB Interface, Schematic (4 of 4) ..... 180
B-99. MSP-FET430UIF USB Interface, PCB ..... 181
B-100. MSP-FET430PIF FET Interface Module, Schematic ..... 183
B-101. MSP-FET430PIF FET Interface Module, PCB ..... 184
C-1. Windows XP Hardware Wizard ..... 186
C-2. Windows XP Driver Location Selection Folder ..... 187
C-3. Device Manager Using USB Debug Interface using VID/PID 0x2047/0x0010 ..... 188
C-4. Device Manager Using USB Debug Interface with VID/PID 0x0451/0xF430 ..... 189
C-5. Device Manager Using USB Debug Interface With VID/PID 0x0451/0xF432 ..... 190


Copyright © 2009–2016, Texas Instruments Incorporated

# List of Tables


1-1. Individual Kit Contents, MSP-TS430xx ..... 13
B-1. MSP-TS430D8 Bill of Materials ..... 35
B-2. MSP-TS430PW14 Bill of Materials ..... 38
B-3. MSP-TS430L092 Bill of Materials ..... 41
B-4. MSP-TS430L092 JP1 Settings ..... 43
B-5. MSP-TS430L092 Active Cable Bill of Materials ..... 44
B-6. MSP-TS430PW20 Bill of Materials ..... 48
B-7. MSP-TS430PW24 Bill of Materials ..... 51
B-8. MSP-TS430RGE24A Bill of Materials (BOM) ..... 54
B-9. MSP-TS430DW28 Bill of Materials ..... 57
B-10. MSP-TS430PW28 Bill of Materials ..... 60
B-11. MSP-TS430PW28A Bill of Materials ..... 63
B-12. MSP-TS430RHB32A Bill of Materials ..... 66
B-13. MSP-TS430DA38 Bill of Materials ..... 69
B-14. MSP-TS430QFN23x0 Bill of Materials ..... 72
B-15. MSP-TS430RSB40 Bill of Materials ..... 75
B-16. MSP-TS430RHA40A Bill of Materials ..... 78
B-17. MSP-TS430DL48 Bill of Materials ..... 81
B-18. MSP-TS430RGZ48B Bill of Materials ..... 84
B-19. MSP-TS430RGZ48C Bill of Materials ..... 87
B-20. MSP-TS430PM64 Bill of Materials ..... 90
B-21. MSP-TS430PM64A Bill of Materials ..... 93
B-22. MSP-TS430PM64D Bill of Materials ..... 96
B-23. MSP-TS430PM64F Bill of Materials (BOM) ..... 99
B-24. MSP-TS430RGC64B Bill of Materials ..... 102
B-25. MSP-TS430RGC64C Bill of Materials ..... 106
B-26. MSP-TS430RGC64USB Bill of Materials ..... 109
B-27. MSP-TS430PN80 Bill of Materials ..... 113
B-28. MSP-TS430PN80A Bill of Materials ..... 116
B-29. MSP-TS430PN80B Bill of Materials ..... 119
B-30. MSP-TS430PN80USB Bill of Materials ..... 122
B-31. MSP-TS430PZ100 Bill of Materials ..... 126
B-32. MSP-TS430PZ100A Bill of Materials ..... 129
B-33. MSP-TS430PZ100B Bill of Materials ..... 132
B-34. MSP-TS430PZ100C Bill of Materials ..... 135
B-35. MSP-TS430PZ100D Bill of Materials ..... 138
B-36. MSP-TS430PZ5x100 Bill of Materials ..... 141
B-37. MSP-TS430PZ100USB Bill of Materials ..... 144
B-38. MSP-TS430PZ100AUSB Bill of Materials ..... 148
B-39. MSP-TS430PEU128 Bill of Materials ..... 152
B-40. EM430F5137RF900 Bill of Materials ..... 155
B-41. EM430F6137RF900 Bill of Materials ..... 159
B-42. EM430F6147RF900 Bill of Materials ..... 163
B-43. UART Backchannel Implementation ..... 165
B-44. UART Backchannel Activation Commands ..... 166
B-45. MSP Target BSL Activation Commands ..... 167
B-46. MSP-FET LED Signals ..... 173



Copyright © 2009–2016, Texas Instruments Incorporated

B-47. JTAG Connector Pin State by Operating Mode ..... 174
B-48. Specifications..... 176
B-49. MSP-FET Revision History ..... 176
C-1. USB VIDs and PIDs Used in MSP430 Tools..... 186


Copyright © 2009–2016, Texas Instruments Incorporated

# Read This First

## About This Manual

This manual describes the hardware of the TI 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 section 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)
- MSP-FET (successor to MSP-FET430UIF, debug interface with USB connection, for all MSP430 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)

Stand-alone target-socket modules (without debug interface) named as MSP-TS430TSxx.

Tools named as MSP-FET430**U**xx contain the USB debug interface (MSP-FET430UIF) and the respective target socket module MSP-TS430TSxx, where 'xx' is the same for both names. The following tools contain also the USB debug interface (MSP-FET430UIF):

- FET430F5137RF900 (for CC430F513x devices in 48-pin RGZ packages) (green PCB)
- FET430F6137RF900 (for CC430F612x and CC430F613x devices in 64-pin RGC packages) (green PCB)

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, and so on), visit the TI MSP430 website at www.ti.com/msp430 or contact your local TI sales office.


Copyright © 2009–2016, Texas Instruments Incorporated

## 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:**

*MSP Debuggers User's Guide* (SLAU647)

*Code Composer Studio for MSP430 User's Guide* (SLAU157)

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

*IAR Embedded Workbench for MSP430(tm) User's Guide* (SLAU138)

*IAR Embedded Workbench KickStart* installer (SLAC050)

*eZ430-F2013 Development Tool User's Guide* (SLAU176)

*eZ430-RF2480 Demonstration Kit User's Guide* (SWRU151)

*eZ430-RF2500 Development Tool User's Guide* (SLAU227)

*eZ430-RF2500-SEH Development Tool User's Guide* (SLAU273)

*eZ430-Chronos Development Tool User's Guide* (SLAU292)

*Spectrum Analyzer (MSP-SA430-SUB1GHZ) User's Guide* (SLAU371)

*MSP-EXP430F5529 Experimenter Board User's Guide* (SLAU330)

*MSP-EXP430F5438 Experimenter Board User's Guide* (SLAU263)

*MSP-EXP430G2 LaunchPad Experimenter Board User's Guide* (SLAU318)

*MSP Gang Programmer (MSP-GANG) User's Guide* (SLAU358)

*MSP430 Gang Programmer (MSP-GANG430) User's Guide* (SLAU101)

**MSP430 device user's guides:**

*MSP430x1xx Family User's Guide* (SLAU049)

*MSP430x2xx Family User's Guide* (SLAU144)

*MSP430x3xx Family User's Guide* (SLAU012)

*MSP430x4xx Family User's Guide* (SLAU056)

*MSP430x5xx and MSP430x6xx Family User's Guide* (SLAU208)



Copyright © 2009–2016, Texas Instruments Incorporated

*CC430 Family User's Guide* (SLAU259)

*MSP430FR57xx Family User's Guide* (SLAU272)

*MSP430FR58xx and MSP430FR59xx Family User's Guide* (SLAU367)

## 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 website 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 website.


Copyright © 2009–2016, Texas Instruments Incorporated

# Get Started Now!

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

**Topic** **Page**


1.1 Kit Contents, MSP-TS430xx ..... 13
1.2 Kit Contents, MSP-FET430xx ..... 15
1.3 Kit Contents, MSP-FET ..... 15
1.4 Kit Contents, MSP-FET430UIF ..... 15
1.5 Kit Contents, MSP-FET430PIF ..... 15
1.6 Kit Contents, eZ430-F2013 ..... 15
1.7 Kit Contents, eZ430-T2012 ..... 15
1.8 Kit Contents, eZ430-RF2500 ..... 16
1.9 Kit Contents, eZ430-RF2500T ..... 16
1.10 Kit Contents, eZ430-RF2500-SEH ..... 16
1.11 Kit Contents, eZ430-Chronos-xxx ..... 16
1.12 Kit Contents, FET430F6137RF900 ..... 17
1.13 Kit Contents, EM430Fx1x7RF900 ..... 17
1.14 Hardware Installation, MSP-FET ..... 18
1.15 Hardware Installation, MSP-FET430UIF ..... 18
1.16 Hardware Installation, MSP-FET430PIF ..... 19
1.17 Hardware Installation, MSP-TS430xxx, MSP-FET430Uxx, FET430F6137RF900, EM430Fx1x7RF900 ..... 19
1.18 Hardware Installation, eZ430-XXXX, MSP-EXP430G2, MSP-EXP430FR5739, MSPEXP430F5529 ..... 19
1.19 Important MSP430 Documents on the Web ..... 19



Copyright © 2009–2016, Texas Instruments Incorporated

## 1.1 Kit Contents, MSP-TS430xx

- 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)
- MSP430 device samples (see Table 1-1 for sample type)

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

| Part Number | Socket Type | Supported Devices | Included Devices | Headers and Comment |
|---|---|---|---|---|
| MSP-TS430D8 (green PCB) | 8-pin D (TSSOP ZIF) | MSP430G2210, MSP430G2230 | 1 x MSP430G2210ID and 1 x MSP430G2230ID | Two PCB 1×4-pin headers (two male and two female) |
| MSP-TS430PW14 (green PCB) | 14-pin PW (TSSOP ZIF) | MSP430F20xx, MSP430G2x01, MSP430G2x11, MSP430G2x21, MSP430G2x31 | 2 x MSP430F2013IPW | Four PCB 1×7-pin headers (two male and two female) |
| MSP-TS430L092 (green PCB) | 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-TS430PW20 (green PCB) | 20-pin PW (TSSOP ZIF) | MSP430FR2311IPW20, MSP430FR2311IPW16 | None. Free samples can be ordered in the TI Store. | Four PCB 1×12-pin headers (two male and two female) |
| MSP-TS430PW24 (green PCB) | 24-pin PW (TSSOP ZIF) | MSP430AFE2xx | 2 x MSP430AFE253IPW | Four PCB 1×12-pin headers (two male and two female) |
| MSP-TS430RGE24A (red PCB) | 24-pin RGE (QFN ZIF) | MSP430FR2433IRGE | None. Free samples can be ordered in the TI Store. | Four PCB 1×6-pin headers (two male and two female) |
| MSP-TS430DW28 (green PCB) | 28-pin DW (SSOP ZIF) | MSP430F11x1, MSP430F11x2, MSP430F12x, MSP430F12x2, MSP430F21xx 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 (green PCB) | 28-pin PW (TSSOP ZIF) | MSP430F11x1, MSP430F11x2, MSP430F12x, MSP430F12x2, MSP430F21xx | 2 x MSP430F2132IPW | Four PCB 1×12-pin headers (two male and two female) |
| MSP-TS430PW28A (red PCB) | 28-pin PW (TSSOP ZIF) | MSP430F20xx, MSP430G2xxx in 14-, 20-, and 28-pin PW packages, MSP430TCH5E in PW package | 2 x MSP430G2452IPW20 | Four PCB 1×12-pin headers (two male and two female) |
| MSP-TS430RHB32A (red PCB) | 32-pin RHB (QFN ZIF) | MSP430i204x | 2 x MSP430i2041TRHB | Eight PCB 1×8-pin headers (four male and four female) |
| MSP-TS430DA38 (green PCB) | 38-pin DA (TSSOP ZIF) | MSP430F22xx, MSP430G2x44, MSP430G2x55 | 2 x MSP430F2274IDA 2 x MSP430G2744IDA 2 x MSP430G2955IDA | Four PCB 1×19-pin headers (two male and two female) |
| MSP-TS430QFN23x0 (green PCB) | 40-pin RHA (QFN ZIF) | MSP430F23x0 | 2 x MSP430F2370IRHA | Eight PCB 1×10-pin headers (four male and four female) |
| MSP-TS430RSB40 (green PCB) | 40-pin RSB (QFN ZIF) | MSP430F51x1, MSP430F51x2 | 2 x MSP430F5172IRSB | Eight PCB 1×10-pin headers (four male and four female) |
| MSP-TS430RHA40A (red PCB) | 40-pin RHA (QFN ZIF) | MSP430FR572x, MSP430FR573x | 2 x MSP430FR5739IRHA | Eight PCB 1×10-pin headers (four male and four female) |
| MSP-TS430DL48 (green PCB) | 48-pin DL (TSSOP ZIF) | MSP430F42x0 | 2 x MSP430F4270IDL | Four PCB 2×12-pin headers (two male and two female) |
| MSP-TS430RGZ48B (blue PCB) | 48-pin RGZ (QFN ZIF) | MSP430F534x | 2 x MSP430F5342IRGZ | Eight PCB 1×12-pin headers (four male and four female) |
| MSP-TS430RGZ48C (black PCB) | 48-pin RGZ (QFN ZIF) | MSP430FR58xx and MSP430FR59xx | 2 x MSP430FR5969IRGZ | Eight PCB 1×12-pin headers (four male and four female) |
| MSP-TS430PM64 (green PCB) | 64-pin PM (QFP ZIF) | MSP430F13x, MSP430F14x, MSP430F14x1, MSP430F15x, MSP430F16x, MSP430F16x1, MSP430F23x, MSP430F24x, MSP430F24xx, MSP430F261x, MSP430F41x, MSP430F42x, MSP430F42xA, MSP430FE42x, MSP430FE42xA, MSP430FE42x2, MSP430FW42x | 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) |


Copyright © 2009–2016, Texas Instruments Incorporated

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

| Part Number | Socket Type | Supported Devices | Included Devices | Headers and Comment |
|---|---|---|---|---|
| MSP-TS430PM64A (red PCB) | 64-pin PM (QFP ZIF) | MSP430F41x2 | 2 x MSP430F4152IPM | Eight PCB 1×16-pin headers (four male and four female) |
| MSP-TS430PM64D (white PCB) | 64-pin PM (QFP ZIF) | MSP430FR413x, MSP430FR203x | 2 x MSP430FR4133IPM | Eight PCB 1×16-pin headers (four male and four female) |
| MSP-TS430PM64F (purple PCB) | 64-pin PM (QFP ZIF) | MSP430FR6972 | None. Free samples can be ordered in the TI Store. | Eight PCB 1×16-pin headers (four male and four female) |
| MSP-TS430RGC64B (blue PCB) | 64-pin RGC (QFN ZIF) | MSP430F530x | 2 x MSP430F5310IRGC | Eight PCB 1×16-pin headers (four male and four female) |
| MSP-TS430RGC64C (black PCB) | 64-pin RGC (QFN ZIF) | MSP430F522x, MSP430F521x, MSP430F523x, MSP430F524x, MSP430F525x | 2 x MSP430F5229IRGC | Eight PCB 1×16-pin headers (four male and four female) |
| MSP-TS430RGC64USB (green PCB) | 64-pin RGC (QFN ZIF) | MSP430F550x, MSP430F551x, MSP430F552x | 2 x MSP430F5510IRGC or 2 x MSP430F5528IRGC | Eight PCB 1×16-pin headers (four male and four female) |
| MSP-TS430PN80 (green PCB) | 80-pin PN (QFP ZIF) | MSP430F241x, MSP430F261x, MSP430F43x, MSP430F43x1, MSP430FG43x, MSP430F47x, MSP430FG47x | 2 x MSP430FG439IPN | Eight PCB 1×20-pin headers (four male and four female) |
| MSP-TS430PN80A (red PCB) | 80-pin PN (QFP ZIF) | MSP430F532x | 2 x MSP430F5329IPN | Eight PCB 1×20-pin headers (four male and four female) |
| MSP-TS430PN80B (blue PCB) | 80-pin PN (QFP ZIF) | MSP430F599x | 2 x MSP430F5994IPN | Eight PCB 1×20-pin headers (four male and four female) |
| MSP-TS430PN80USB (green PCB) | 80-pin PN (QFP ZIF) | MSP430F552x, MSP430F551x | 2 x MSP430F5529IPN | Eight PCB 1×20-pin headers (four male and four female) |
| MSP-TS430PZ100 (green PCB) | 100-pin PZ (QFP ZIF) | MSP430F43x, MSP430F43x1, MSP430F44x, MSP430FG461x, MSP430F47xx | 2 x MSP430FG4619IPZ | Eight PCB 1×25-pin headers (four male and four female) |
| MSP-TS430PZ100A (red PCB) | 100-pin PZ (QFP ZIF) | MSP430F471xx | 2 x MSP430F47197IPZ | Eight PCB 1×25-pin headers (four male and four female) |
| MSP-TS430PZ100B (blue PCB) | 100-pin PZ (QFP ZIF) | MSP430F67xx | 2 x MSP430F6733IPZ | Eight PCB 1×25-pin headers (four male and four female) |
| MSP-TS430PZ100C (black PCB) | 100-pin PZ (QFP ZIF) | MSP430F645x, MSP430F643x, MSP430F535x, MSP430F533x | 2 x MSP430F6438IPZ | Eight PCB 1×25-pin headers (four male and four female) |
| MSP-TS430PZ100D (white PCB) | 100-pin PZ (QFP ZIF) | MSP430FR698x(1), MSP430FR688x(1) | 2 x MSP430FR6989IPZ | Eight PCB 1×25-pin headers (four male and four female) |
| MSP-TS430PZ5x100 (green PCB) | 100-pin PZ (QFP ZIF) | MSP430F543x, MSP430BT5190, MSP430SL5438A | 2 x MSP430F5438IPZ | Eight PCB 1×25-pin headers (four male and four female) |
| MSP-TS430PZ100USB (green PCB) | 100-pin PZ (QFP ZIF) | MSP430F665x, MSP430F663x, MSP430F563x | 2 x MSP430F6638IPZ | Eight PCB 1×25-pin headers (four male and four female) |
| MSP-TS430PZ100AUSB (blue PCB) | 100-pin PZ (QFP ZIF) | MSP430FG662x, MSP430FG642x | None. Free samples can be ordered in the TI Store. | Eight PCB 1×25-pin headers (four male and four female) |
| MSP-TS430PEU128 (green PCB) | 128-pin PEU (QFP ZIF) | MSP430F677x, MSP430F676x, MSP430F674x, MSP430F677x1, MSP430F676x1, MSP430F674x1 | 2 x MSP430F67791IPEU | Four PCB 1x26-pin headers (two male and two female) and four PCB 1x38-pin headers (two male and two 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.


Copyright © 2009–2016, Texas Instruments Incorporated

## 1.2 Kit Contents, MSP-FET430xx

- 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, if the board has an option to use the quartz.
- 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 determine the devices used for each board and a summary of the board, see Table 1-1. The name of MSP-TS430xx board can be derived from the name of the MSP-FET430xx kit; for example, the MSP-FET430U**28A** kit contains the MSP-TS430PW**28A** board.

Refer to 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.

## 1.3 Kit Contents, MSP-FET

- One READ ME FIRST document
- One MSP-FET interface module
- One USB cable
- One 14-conductor cable

## 1.4 Kit Contents, MSP-FET430UIF

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

## 1.5 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.

## 1.6 Kit Contents, eZ430-F2013

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

## 1.7 Kit Contents, eZ430-T2012

- Three MSP430F2012-based target boards


Copyright © 2009–2016, Texas Instruments Incorporated

## 1.8 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)

## 1.9 Kit Contents, eZ430-RF2500T

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

## 1.10 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)

## 1.11 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


Copyright © 2009–2016, Texas Instruments Incorporated

## 1.12 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-MHz or 915-MHz antennas
- Two 32.768-kHz crystals
- 18 PCB 2x4-pin headers
- One USB cable
- One 14-pin JTAG conductor cable

## 1.13 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


Copyright © 2009–2016, Texas Instruments Incorporated

## 1.14 Hardware Installation, MSP-FET

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

1. Install the IDE (CCS or IAR) that you plan to use before connecting MSP-FET to PC. During IDE installation, USB drivers are installed automatically. Make sure to use the latest IDE version, otherwise the USB drivers might not be able to recognize the MSP-FET.
2. Connect the MSP-FET to a USB port on the PC with the provided USB cable.
3. The following procedure applies to operation under Windows:
   (a) After connecting to the PC, the MSP-FET should be recognized automatically, as the USB device driver has been already installed together with the IDE.
   (b) If the driver has not been installed yet, the Found New Hardware wizard starts. Follow the instructions and point the wizard to the driver files.
   (c) The default location for CCS is c:\ti\ccsv6\ccs_base\emulation\drivers\msp430\USB_CDC.
   (d) The default location for IAR Embedded Workbench is <Installation Root>\Embedded Workbench x.x\430\drivers\<Win_OS>.
4. After connecting to a PC, the MSP-FET performs a self-test. If the self-test passes successfully, the green LED stays on. For a complete list of LED signals, please refer to the MSP-FET chapter in this document.
5. Connect the MSP-FET to a target board, such as an MSP-TS430xxx target socket module, with the 14-conductor cable.
6. Make sure 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.

## 1.15 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.


Copyright © 2009–2016, Texas Instruments Incorporated

## 1.16 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.

## 1.17 Hardware Installation, MSP-TS430xxx, MSP-FET430Uxx, FET430F6137RF900, EM430Fx1x7RF900

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

1. Follow steps 1 and 2 of Section 1.15
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.

## 1.18 Hardware Installation, eZ430-XXXX, MSP-EXP430G2, MSP-EXP430FR5739, MSPEXP430F5529

To install the eZ430-XXXX, MSP-EXP430G2, MSP-EXP430FR5739, MSP-EXP430F5529 tools, follow steps 1 and 2 of Section 1.15

## 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 website (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.


Copyright © 2009–2016, Texas Instruments Incorporated

# 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 ..... 21
2.2 External Power ..... 25
2.3 Bootloader (BSL) ..... 25



Copyright © 2009–2016, Texas Instruments Incorporated

## 2.1 Signal Connections for In-System Programming and Debugging

### MSP-FET430PIF, MSP-FET430UIF, MSP-GANG, MSP-GANG430, MSP-PRGS430

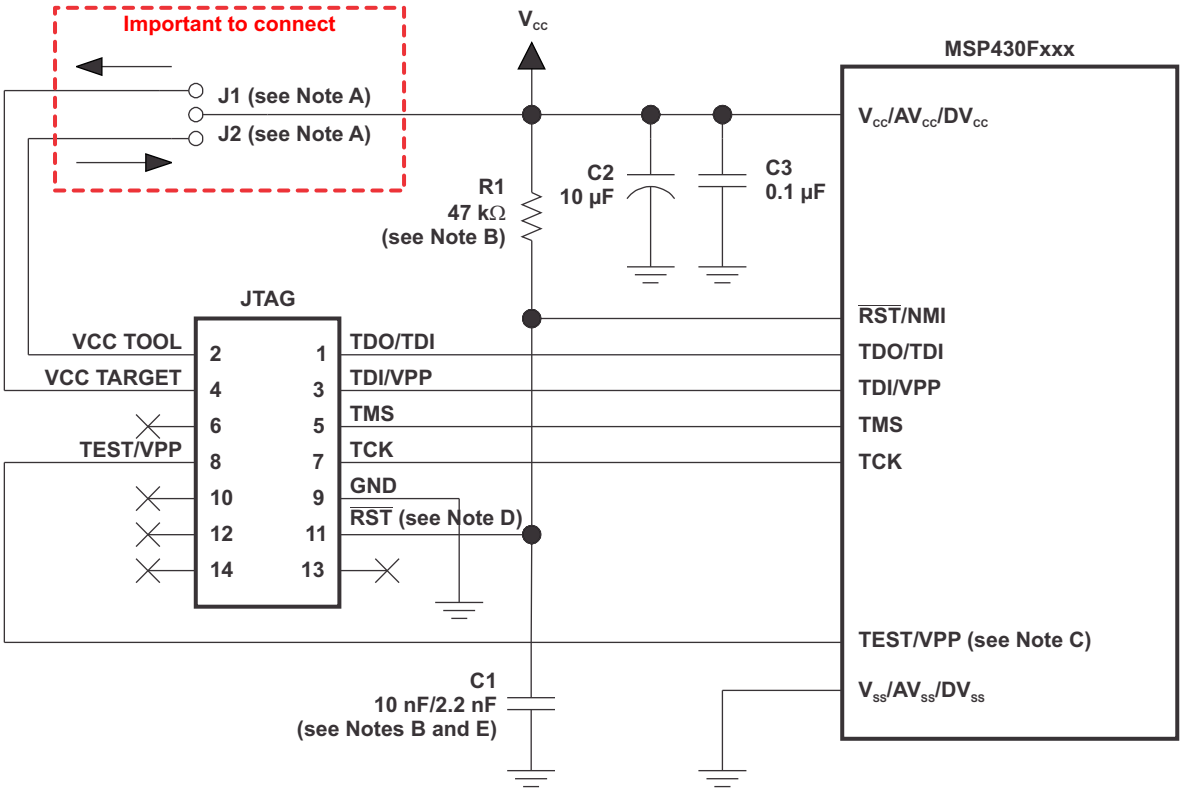
With the proper connections, the debugger and an FET hardware JTAG interface (such as the MSP-FET430PIF and MSP-FET430UIF) can be used to program and debug code on the target board. In addition, the connections also support the MSP-GANG430 or MSP-PRGS430 production programmers, thus providing an easy 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 devices with low pin counts (for example, MSP430G2230). The 2-wire JTAG mode is available on selected devices only. See the *Code Composer Studio for MSP430 User's Guide* (SLAU157) or *IAR Embedded Workbench Version 3+ 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 (through 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 uses 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 to eliminate the jumper block. Pins 2 and 4 must not be connected at the same time.

The connection to the JTAG connector $\overline{\text{RST}}$ pin of Figure 2-1 is required when programming or debugging a device that supports 2-wire JTAG communication, even when using 4-wire JTAG communication mode on these devices. However, this connection is optional on devices that do not support 2-wire JTAG communication. 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.


Copyright © 2009–2016, Texas Instruments Incorporated




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

B The configuration of R1 and C1 for the $\overline{\text{RST}}$/NMI pin depends on the device family. 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.

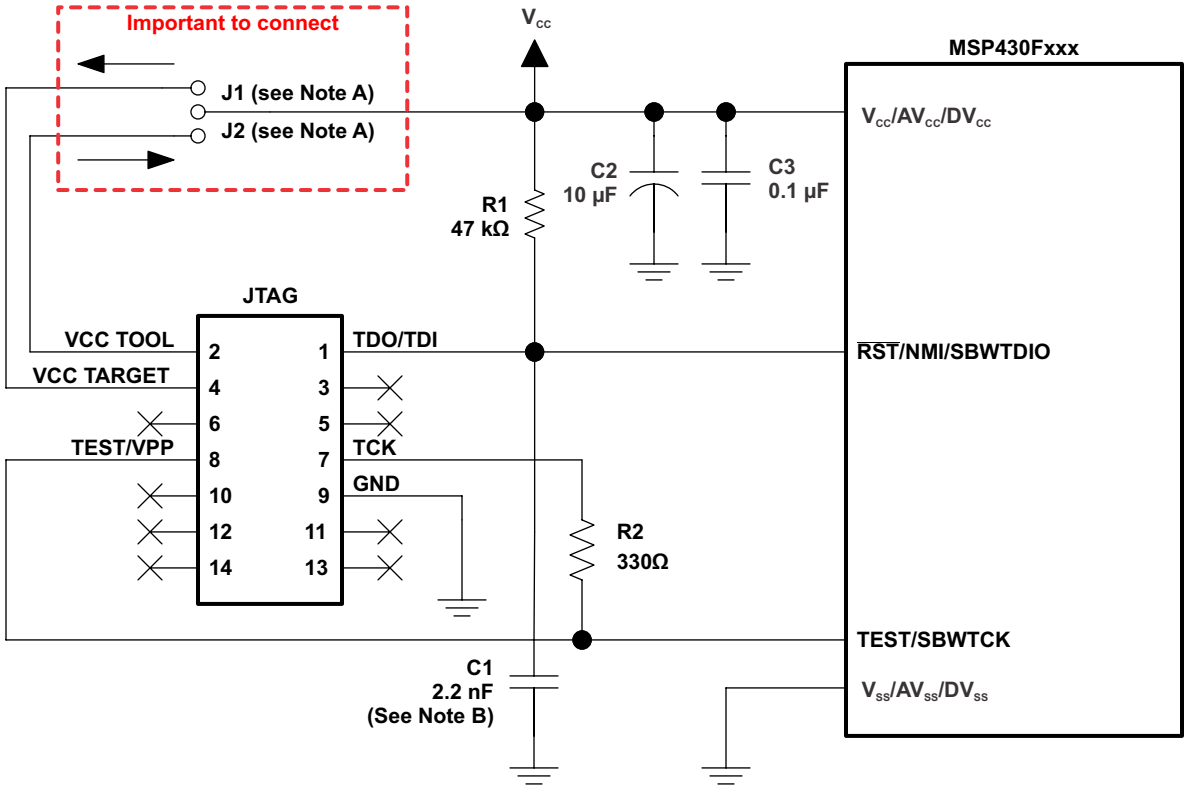
D The connection to the JTAG connector $\overline{\text{RST}}$ pin is required when programming or debugging a device that supports 2-wire JTAG communication, even when using 4-wire JTAG communication mode on these devices. However, this connection is optional on devices that do not support 2-wire JTAG communication.

E When using a device that supports 2-wire JTAG communication 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).
Some EVMs use a value of 1.1 nF to enable high-speed SBW communication.

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



Copyright © 2009–2016, Texas Instruments Incorporated



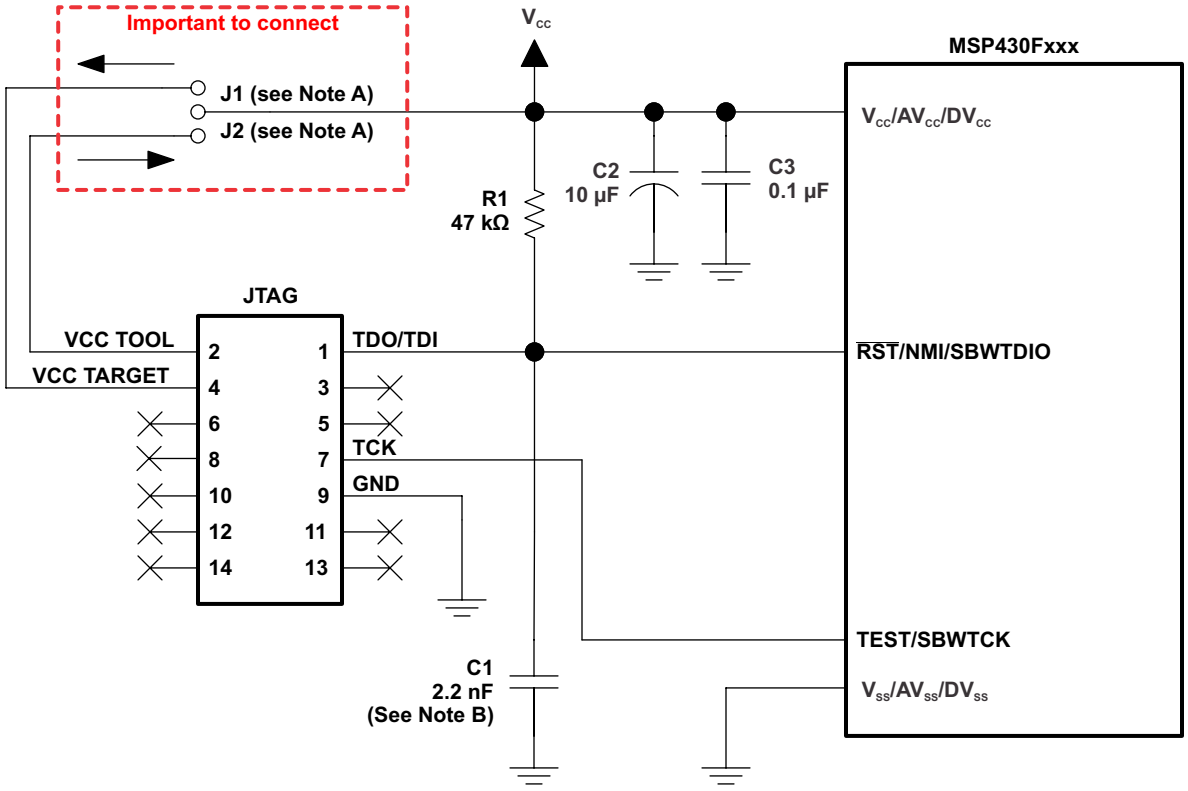

A If a local target power supply is used, make connection J1. If power from the debug or programming adapter is used, make connection J2.

B The device $\overline{RST}$/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.
Some EVMs use a value of 1.1 nF to enable high-speed SBW communication.

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 Ω) and do not connect TEST/VPP to TEST/SBWTCK.

**Figure 2-2. Signal Connections for 2-Wire JTAG Communication (Spy-Bi-Wire) Used by MSP430F2xx, MSP430G2xx, and MSP430F4xx Devices**


Copyright © 2009–2016, Texas Instruments Incorporated




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 $\overline{RST}$/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.
Some EVMs use a value of 1.1 nF to enable high-speed SBW communication.

**Figure 2-3. Signal Connections for 2-Wire JTAG Communication (Spy-Bi-Wire) Used by All MSP430 SBW-Capable Devices That are Not Part of F2xx, G2xx, F4xx Families**

**NOTE:** On some Spy-Bi-Wire capable MSP430 devices, TEST/SBWTCK is very sensitive to rising signal edges that can cause the test logic to enter a state where an entry sequence (either 2-wire or 4-wire) is not recognized correctly and JTAG access stays disabled. Unintentional edges on SBWTCK can occur when the JTAG connector is connected to the target device.



Copyright © 2009–2016, Texas Instruments Incorporated

## 2.2 External Power

The MSP-FET430UIF can supply targets with up to 60 mA through pin 2 of the 14-pin connector. Note that the target should not consume more than 60 mA, even as a peak current, as it may violate the USB specification. For example, if the target board has a capacitor on $V_{CC}$ more than 10 µF, it may cause inrush current during capacitor charging that may exceed 60 mA. In this case, the current should be limited by the design of the target board, or an external power supply should be used.

The $V_{CC}$ for the target can be selected between 1.8 V and 3.6 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 through 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 stand-alone 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 through 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 Bootloader (BSL)

The JTAG pins provide access to the memory of the MSP430 and CC430 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 "bootloader", formerly knows as the "bootstrap loader") that permits the flash memory to be erased and programmed using a reduced set of signals. The *MSP430 Programming With the Bootloader (BSL) User's Guide* (SLAU319) describes this interface. See the MSP430 website 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 #10 for a second alternative to sharing the JTAG and port pins.


Copyright © 2009–2016, Texas Instruments Incorporated

# 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 ..... 27
A.2 Known Issues ..... 29



Copyright © 2009–2016, Texas Instruments Incorporated

## 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 device 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 device. This is valid for PIF and UIF but is seen most often on the UIF. A solution is being developed.
   Workarounds:
   - Connect the $\overline{\text{RST}}$/NMI pin to the 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 MCU 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** that connects 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 use the on-chip ADC voltage references, the capacitor must be installed** on the target socket module. See the schematic of the target socket module to populate the capacitor according to the data sheet of the device.
6. **To use the charge pump on the devices with LCD+ Module, the capacitor must be installed** on the target socket module. See the 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 the 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).


Copyright © 2009–2016, Texas Instruments Incorporated

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 higher then expected.** The device current measurement may not be accurate with the debugger connected to the device. For accurate measurement, disconnect the debugger. Additionally some unused pins of the device should be terminated. See the *Connection of Unused Pins* table in the device's family user's guide.
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
    - 128-pin device (PEU package): Yamaichi IC500-1284-009P

    Enplas: www.enplas.com

    Wells-CTI: www.wellscti.com

    Yamaichi: www.yamaichi.us


Copyright © 2009–2016, Texas Instruments Incorporated

## 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 through 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.


Copyright © 2009–2016, Texas Instruments Incorporated

# Hardware

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


Copyright © 2009–2016, Texas Instruments Incorporated

Topic Page

B.1 MSP-TS430D8 ..... 33
B.2 MSP-TS430PW14 ..... 36
B.3 MSP-TS430L092 ..... 39
B.4 MSP-TS430L092 Active Cable ..... 42
B.5 MSP-TS430PW20 ..... 45
B.6 MSP-TS430PW24 ..... 49
B.7 MSP-TS430RGE24A ..... 52
B.8 MSP-TS430DW28 ..... 55
B.9 MSP-TS430PW28 ..... 58
B.10 MSP-TS430PW28A ..... 61
B.11 MSP-TS430RHB32A ..... 64
B.12 MSP-TS430DA38 ..... 67
B.13 MSP-TS430QFN23x0 ..... 70
B.14 MSP-TS430RSB40 ..... 73
B.15 MSP-TS430RHA40A ..... 76
B.16 MSP-TS430DL48 ..... 79
B.17 MSP-TS430RGZ48B ..... 82
B.18 MSP-TS430RGZ48C ..... 85
B.19 MSP-TS430PM64 ..... 88
B.20 MSP-TS430PM64A ..... 91
B.21 MSP-TS430PM64D ..... 94
B.22 MSP-TS430PM64F ..... 97
B.23 MSP-TS430RGC64B ..... 100
B.24 MSP-TS430RGC64C ..... 103
B.25 MSP-TS430RGC64USB ..... 107
B.26 MSP-TS430PN80 ..... 111
B.27 MSP-TS430PN80A ..... 114
B.28 MSP-TS430PN80B ..... 117
B.29 MSP-TS430PN80USB ..... 120
B.30 MSP-TS430PZ100 ..... 124
B.31 MSP-TS430PZ100A ..... 127
B.32 MSP-TS430PZ100B ..... 130
B.33 MSP-TS430PZ100C ..... 133
B.34 MSP-TS430PZ100D ..... 136
B.35 MSP-TS430PZ5x100 ..... 139
B.36 MSP-TS430PZ100USB ..... 142
B.37 MSP-TS430PZ100AUSB ..... 146
B.38 MSP-TS430PEU128 ..... 150
B.39 EM430F5137RF900 ..... 153
B.40 EM430F6137RF900 ..... 157
B.41 EM430F6147RF900 ..... 161
B.42 MSP-FET ..... 165
B.43 MSP-FET430UIF ..... 177


Copyright © 2009–2016, Texas Instruments Incorporated

B.44 MSP-FET430PIF ..... 183



Copyright © 2009–2016, Texas Instruments Incorporated

## B.1 MSP-TS430D8

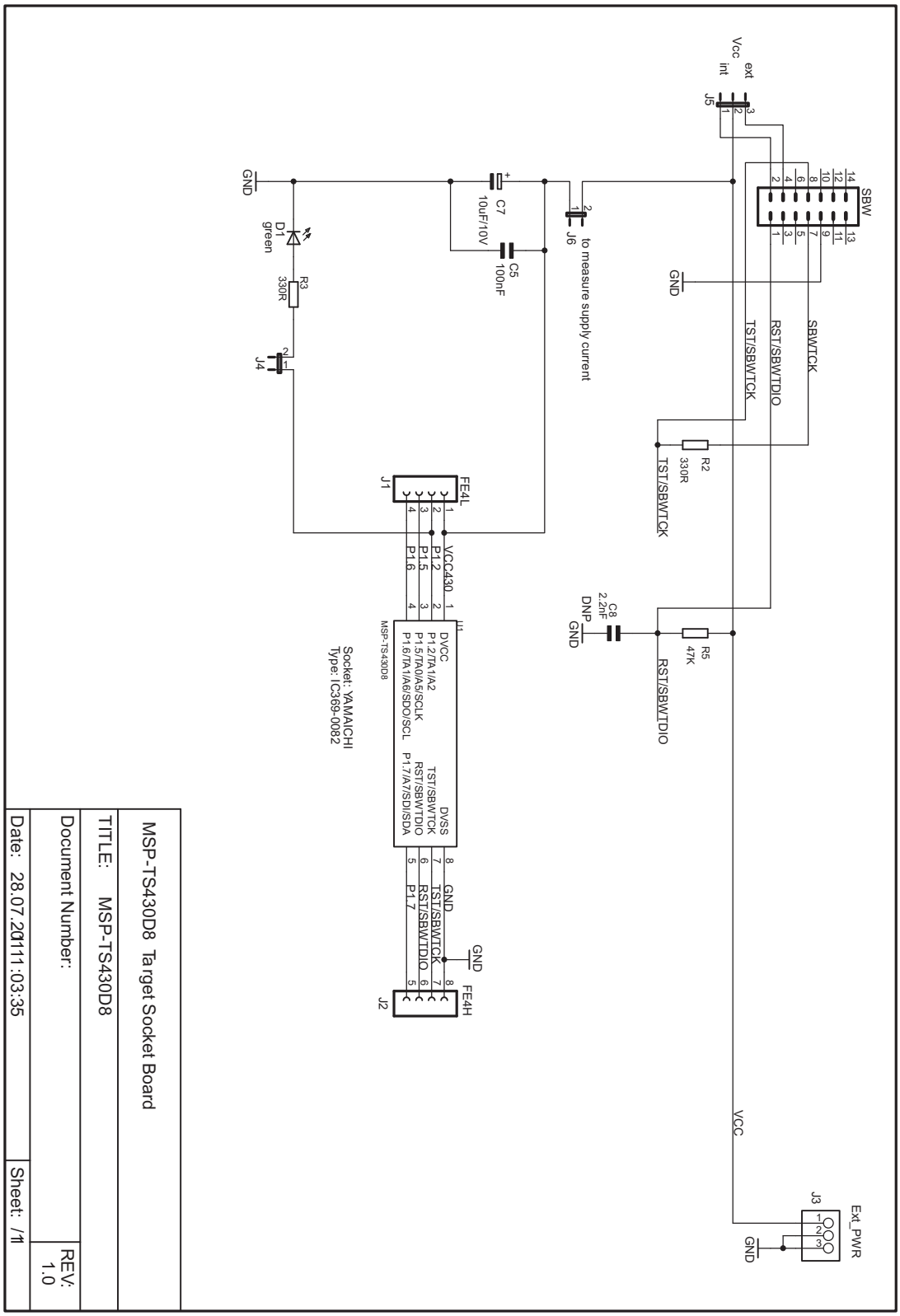



**Figure B-1. MSP-TS430D8 Target Socket Module, Schematic**


Copyright © 2009–2016, Texas Instruments Incorporated

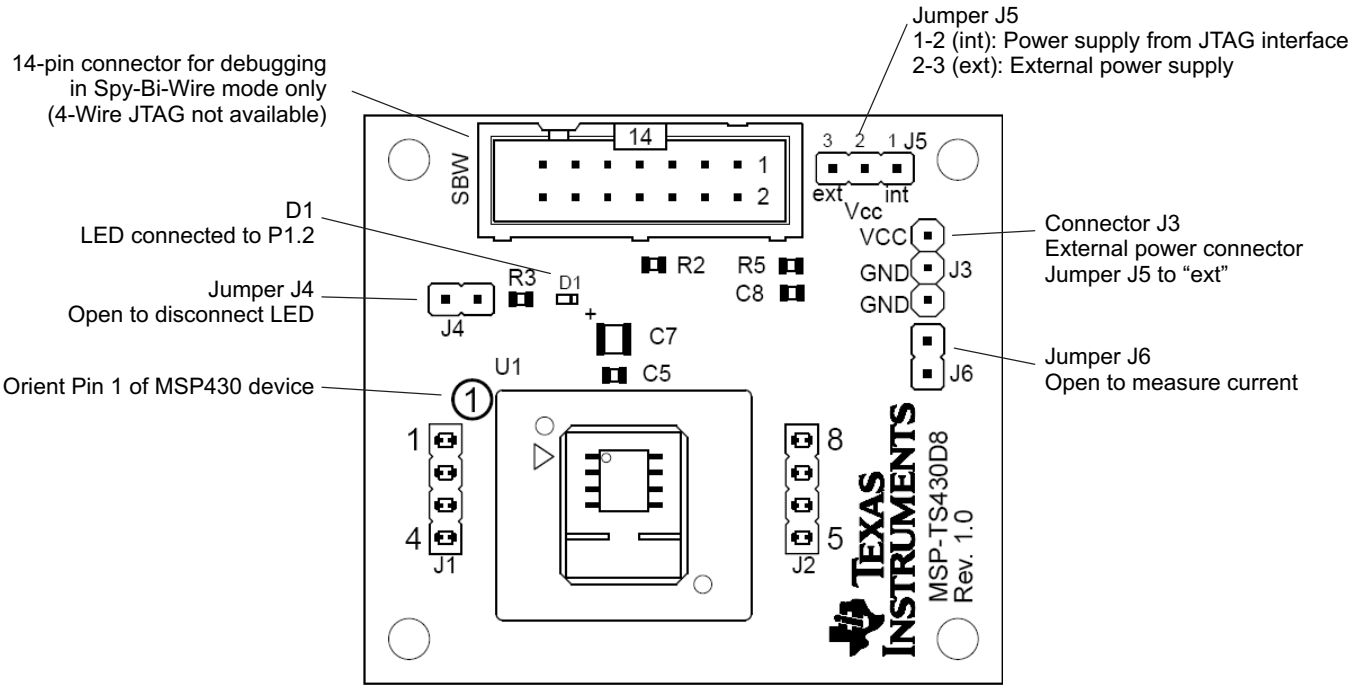



**Figure B-2. MSP-TS430D8 Target Socket Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-1. MSP-TS430D8 Bill of Materials**

| Position | Ref Des | No. per Board | Description | Digi-Key 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 | MSP430G2210, MSP430G2230 | | DNP: enclosed with kit. Is supplied by TI |
| 14 | PCB | 1 | 50,0mmx44,5mm | MSP-TS430D8 Rev. 1.0 | |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.2 MSP-TS430PW14

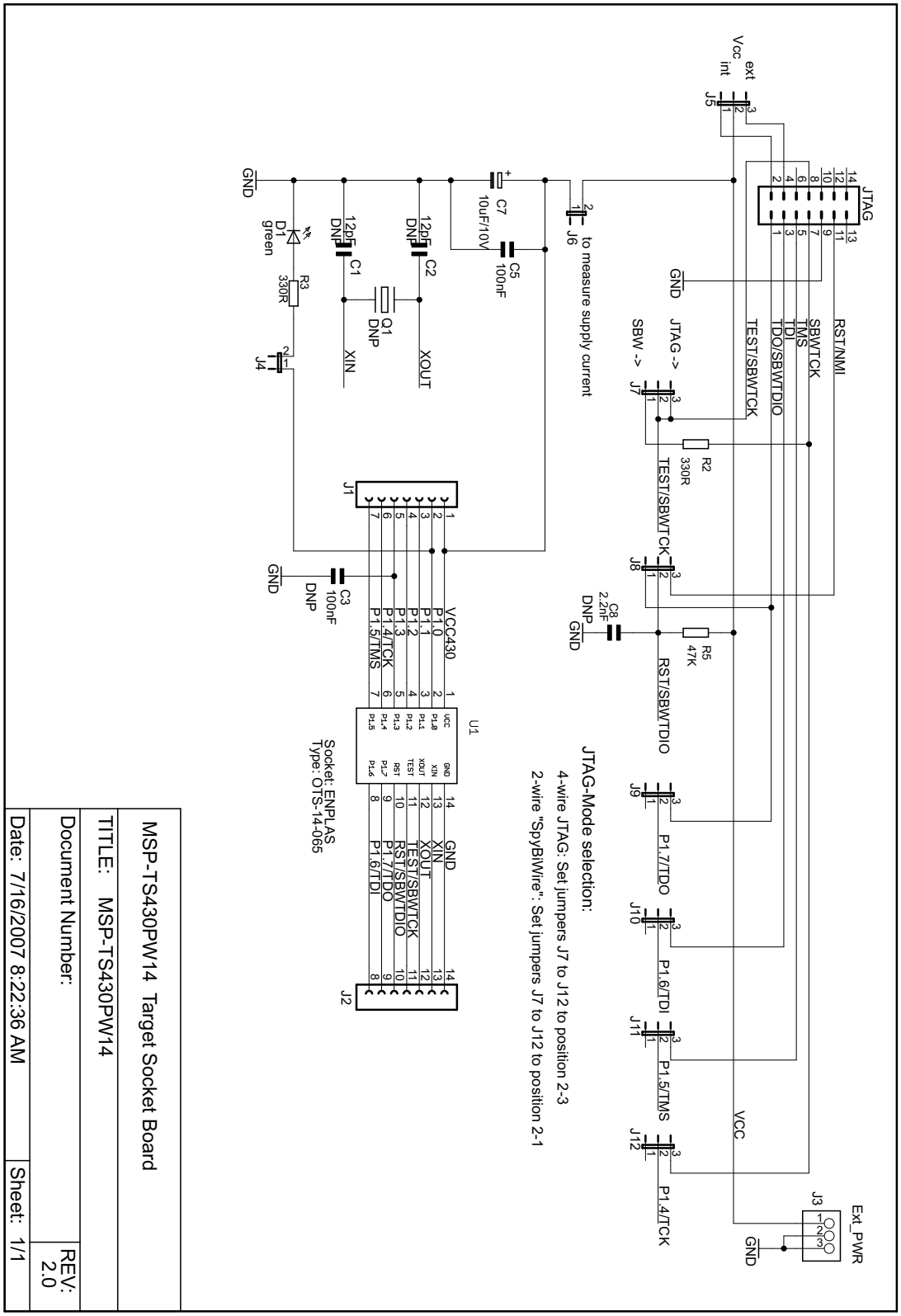



**Figure B-3. MSP-TS430PW14 Target Socket Module, Schematic**



Copyright © 2009–2016, Texas Instruments Incorporated

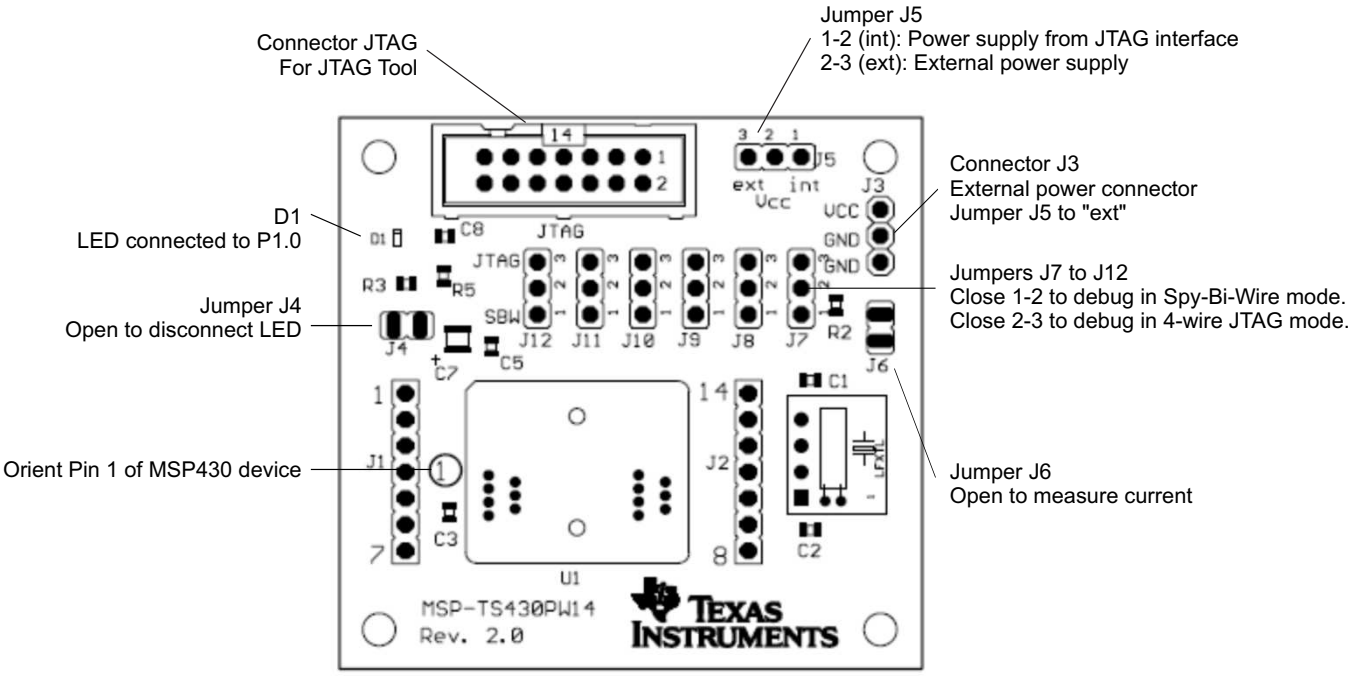



**Figure B-4. MSP-TS430PW14 Target Socket Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-2. MSP-TS430PW14 Bill of Materials**

| Position | Ref Des | No. per Board | Description | Digi-Key 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-ND<br>SAM1213-07-ND | DNP: Headers and receptacles enclosed with kit. Keep vias free of solder<br>: Header<br>: 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 | Approximately 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 |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.3 MSP-TS430L092

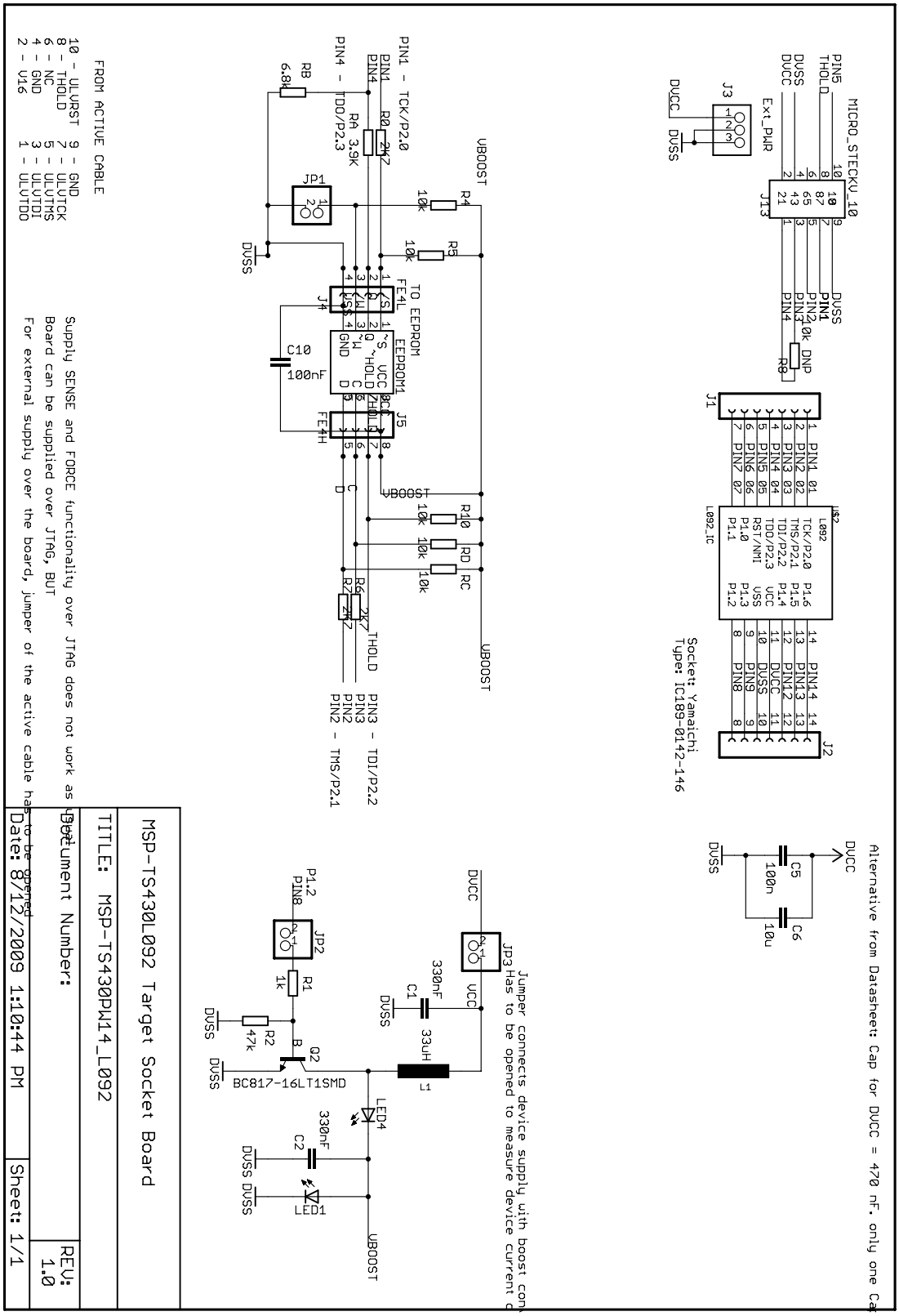



**Figure B-5. MSP-TS430L092 Target Socket Module, Schematic**


Copyright © 2009–2016, Texas Instruments Incorporated

### 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.

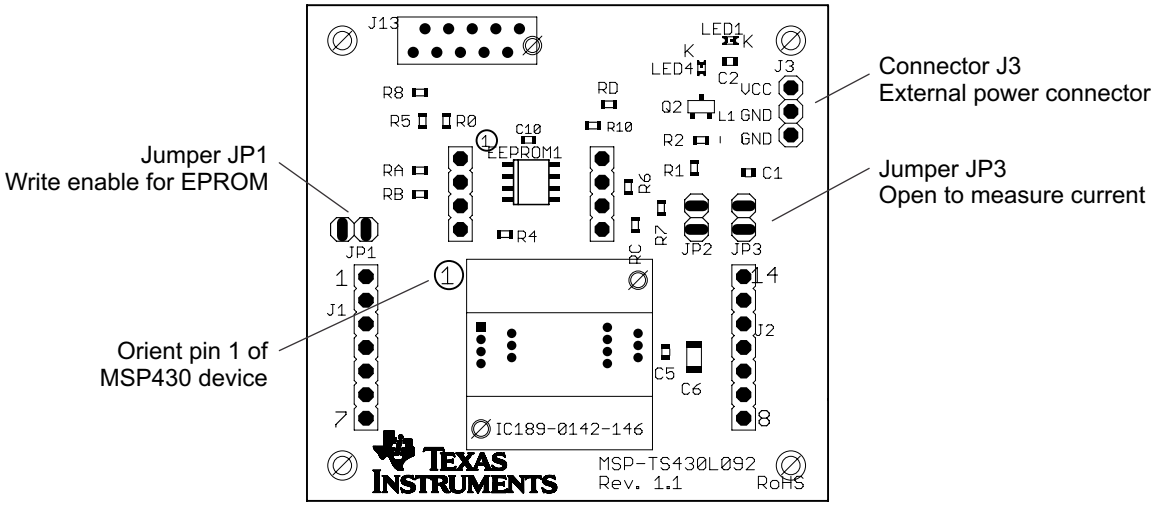



**Figure B-6. MSP-TS430L092 Target Socket Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-3. MSP-TS430L092 Bill of Materials**

| Pos. | Ref Des No. | No. Per Board | Description | Digi-Key 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<br>SAM1035-07-ND | DNP: headers and receptacles enclosed with kit. Keep vias free of solder.<br>: Header<br>: 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. | |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.4 MSP-TS430L092 Active Cable

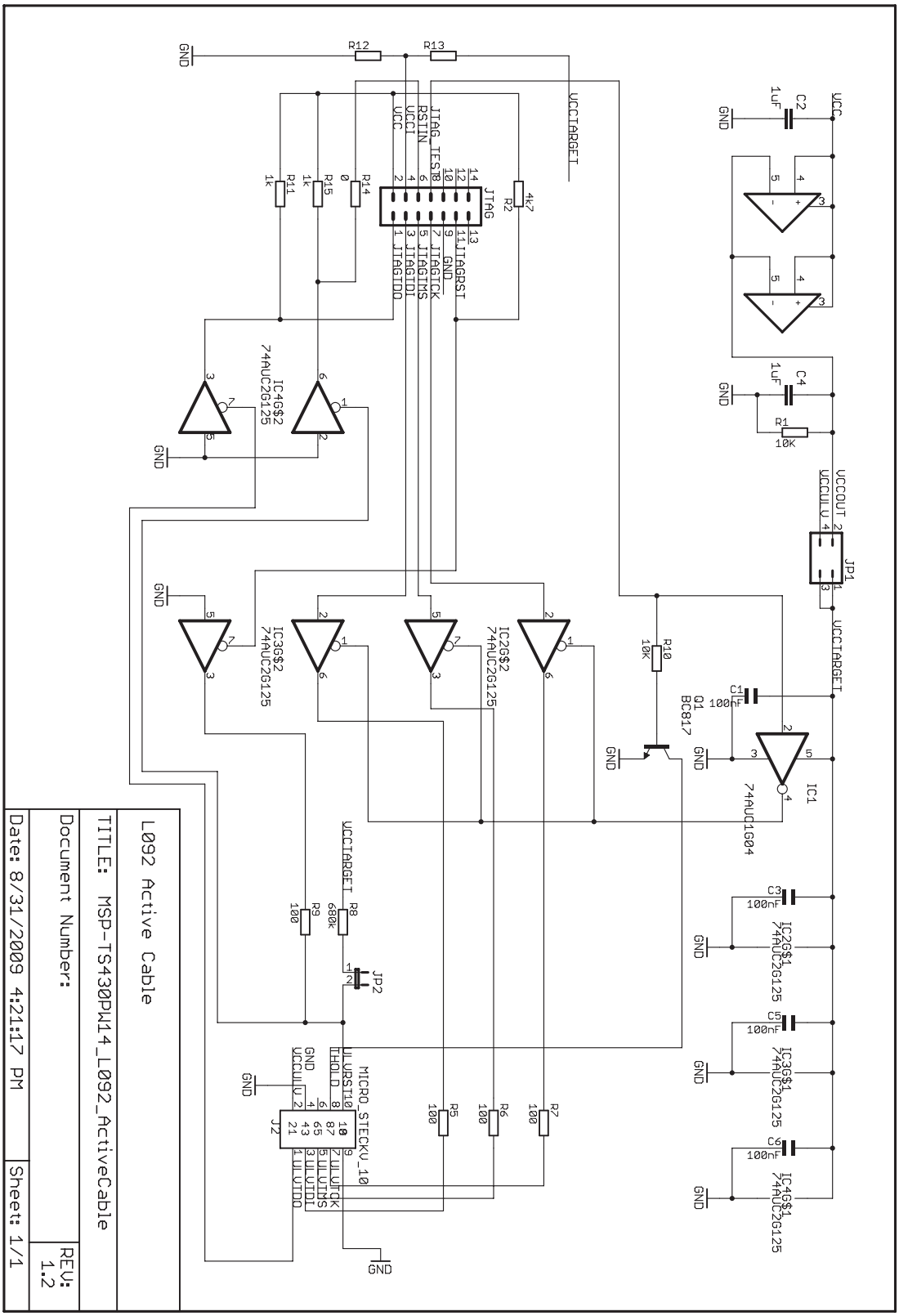



**Figure B-7. MSP-TS430L092 Active Cable Target Socket Module, Schematic**



Copyright © 2009–2016, Texas Instruments Incorporated

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.

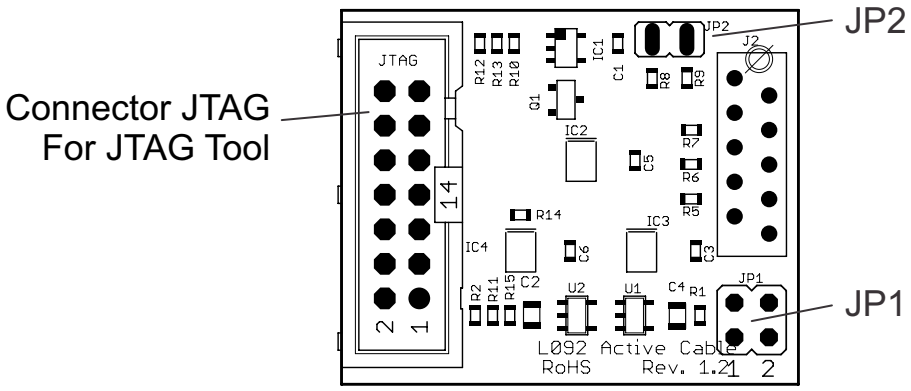



**Figure B-8. MSP-TS430L092 Active Cable Target Socket Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

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

| Pos. | Ref Des | No. Per Board | Description | Digi-Key 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 |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.5 MSP-TS430PW20

The MSP-TS430PW20 microcontroller development board supports the MSP430FR23x and MSP430FR21x FRAM devices in both 20-pin and 16-pin TSSOP (TI package code PW) packages. No microcontroller devices are included in the MSP-TS430PW20 kit, but can be ordered from the TI Store.

The MSP-TS430PW20 microcontroller development board has two jumpers on header J11 that direct the UART BSL signals, depending on which device is being used (see Figure B-9).

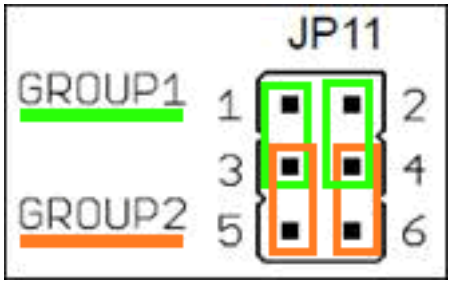



**Figure B-9. UART BSL Signal Select**

- GROUP2: Jumpers on 3-5 and 4-6 for MSP430FR231x PW16
- GROUP1: Jumpers on 1-3 and 2-4 for all other compatible devices, including MSP430FR231x PW20


Copyright © 2009–2016, Texas Instruments Incorporated

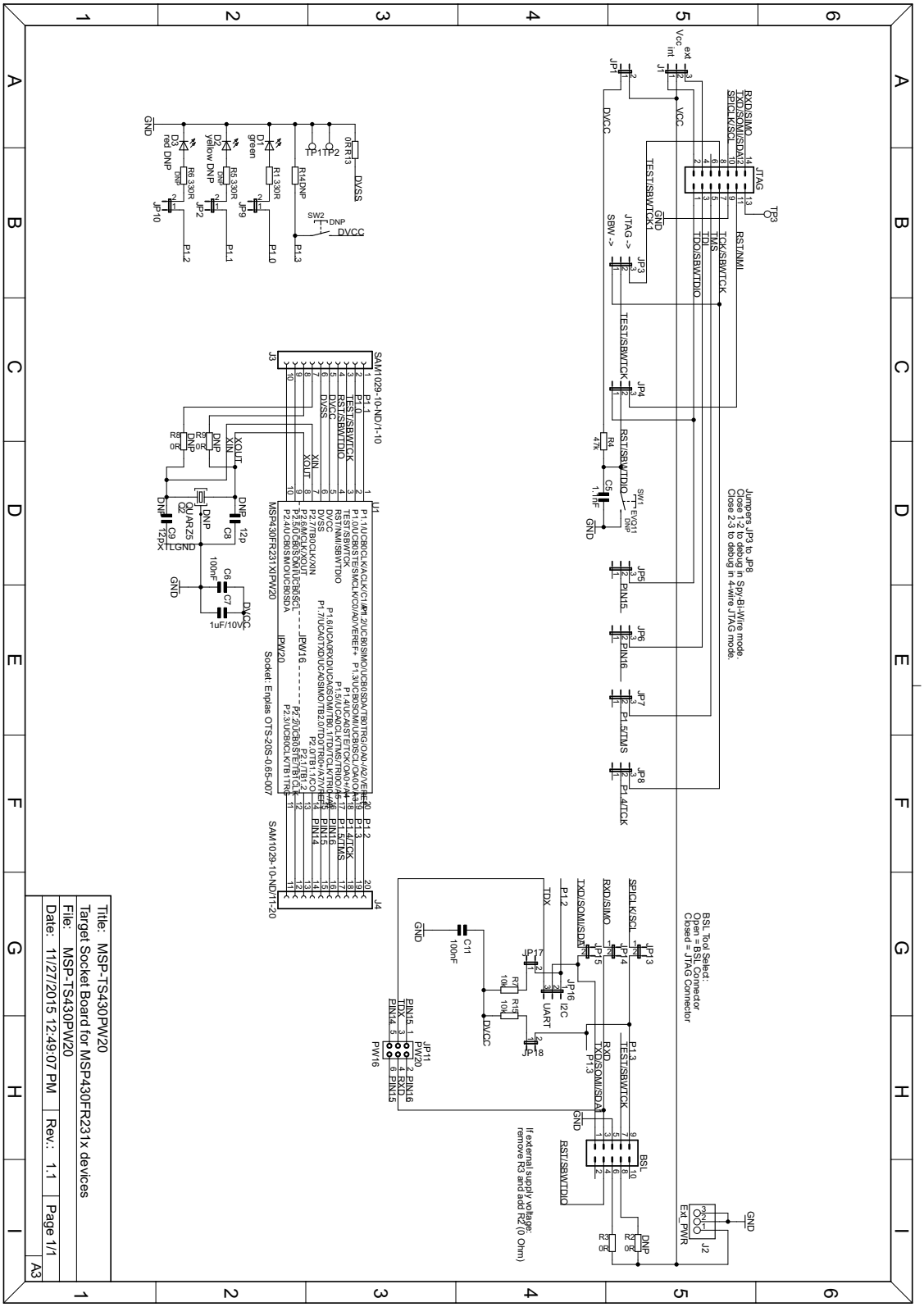



**Figure B-10. MSP-TS430PW20 Target Socket Module, Schematic**



Copyright © 2009–2016, Texas Instruments Incorporated

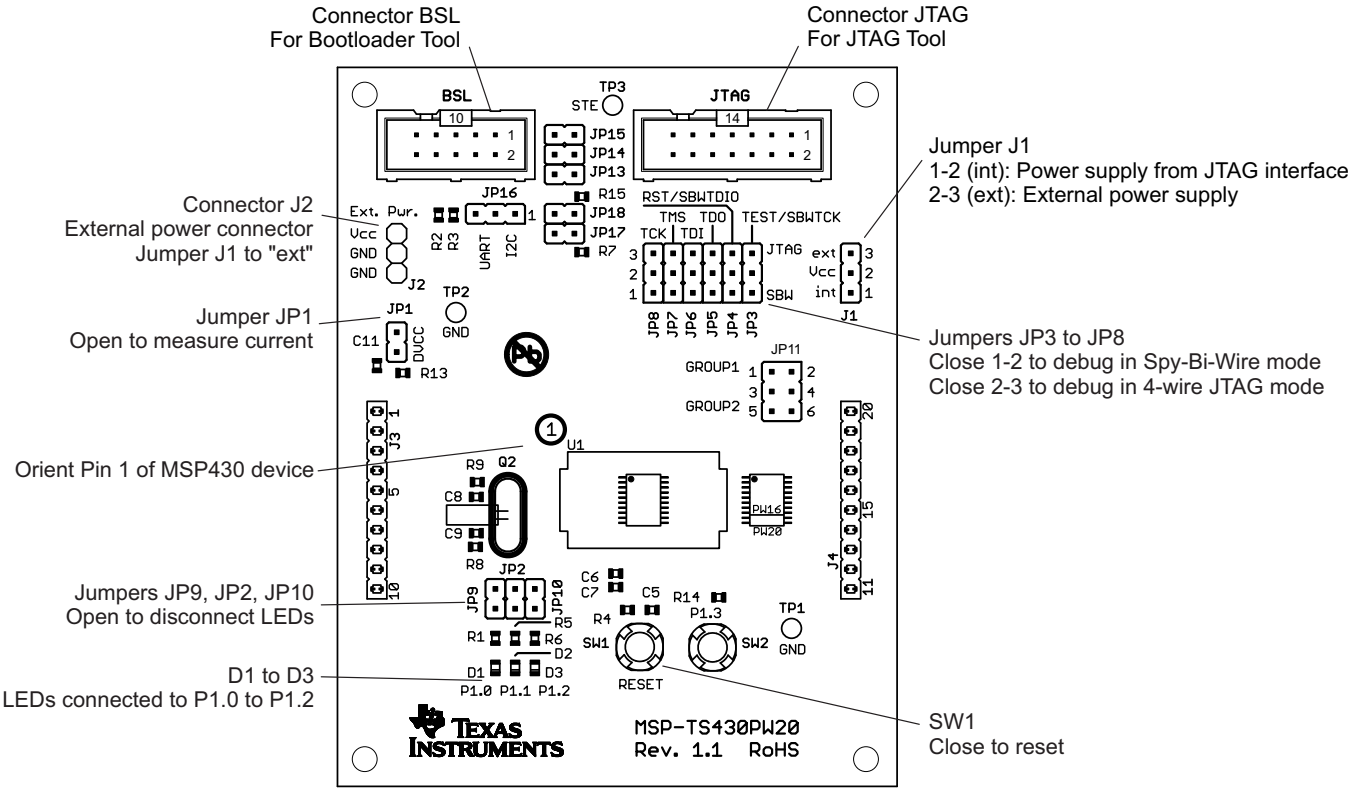



**Figure B-11. MSP-TS430PW20 Target Socket Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-6. MSP-TS430PW20 Bill of Materials**

| Pos. | Ref Des | No. Per Board | Description | Digi-Key Part No. | Comment |
|---|---|---|---|---|---|
| 1 | PCB | 1 | 90.0 x 92.5 mm | "MSP-TS430PW20" Rev. 1.1 | 2 layers, green solder mask |
| 2 | JP1, JP9, JP13, JP14, JP15 | 5 | 2-pin header, male, TH | SAM1035-02-ND | place jumper on header |
| 3 | JP17, JP18 | 2 | 2-pin header, male, TH | SAM1035-02-ND | place jumper on one pin only |
| 4 | JP2, JP10 | 2 | 2-pin header, male, TH | SAM1035-02-ND | DNP, keep pads free of solder |
| 5 | J1 | 1 | 3-pin header, male, TH | SAM1035-03-ND | place jumpers on pins 1-2 |
| 6 | JP3, JP4, JP5, JP6, JP7, JP8 | 6 | 3-pin header, male, TH | SAM1035-03-ND | place jumpers on pins 1-2 |
| 7 | JP16 | 1 | 3-pin header, male, TH | SAM1035-03-ND | place jumpers on pins 2-3 |
| 8 | J2 | 1 | 3-pin header, male, TH | SAM1035-03-ND | |
| 9 | JP11 | 1 | 2x3pin header, male, TH | SAM1034-03-ND | PW20: Place jumpers on pins 1-3 and 2-4<br>PW16: Place jumpers on pins 3-5 and 4-6 |
| 10 | R2, R8, R9 | 3 | 0R, 0805 | 541-0.0ATR-ND | DNP |
| 11 | R3, R13 | 2 | 0R, 0805 | 541-0.0ATR-ND | |
| 12 | C5 | 1 | 1.1nF, CSMD0805 | 490-1623-2-ND | |
| 13 | C7 | 1 | 1uF/10V, CSMD0805 | 490-1702-2-ND | |
| 14 | R7, R15 | 1 | 10k, 0805 | 541-10KATR-ND | |
| 15 | R4 | 1 | 47k, 0805 | 541-47KATR-ND | |
| 16 | C6, C11 | 2 | 100nF, CSMD0805 | 490-1666-1-ND | |
| 17 | C8, C9 | 2 | 12p, DNP, CSMD0805 | BC1257TR-ND | DNP |
| 18 | R1 | 1 | 330R, 0805 | 541-330ATR-ND | |
| 19 | R5, R6 | 2 | 330R, 0805 | 541-330ATR-ND | DNP |
| 20 | R14 | 1 | 47k, 0805 | 541-47KATR-ND | DNP |
| 21 | SW2 | 1 | EVQ-11L05R | P8079STB-ND | DNP, Keep vias free of solder |
| 22 | SW1 | 1 | EVQ-11L05R | P8079STB-ND | DNP, Keep vias free of solder |
| 23 | J3, J4 | 2 | 10-pin header, TH | SAM1029-10-ND | DNP: headers are enclosed with kit.<br>Keep vias free of solder. |
| 24 | J3, J4 | 2 | 10-pin receptacle, TH | SAM1213-10-ND | DNP: Receptacles are enclosed with kit.<br>Keep vias free of solder. |
| 25 | TP1, TP2, TP3 | 3 | Test point | | DNP, keep pads free of solder |
| 26 | BSL | 1 | 10-pin connector, male, TH | HRP10H-ND | |
| 27 | JTAG | 1 | 14-pin connector, male, TH | HRP14H-ND | |
| 28 | IC1 | 1 | Socket: OTS-20S-0.65-007 | | Manuf. Enplas |
| 29 | IC1 | 1 | MSP430FR2311IPW20 | | DNP: Free samples can be ordered in the TI Store |
| 30 | Q2 | 1 | 4MHz Crystal | 4MHz Buerklin: 78D134 | DNP: Crystal is enclosed with kit |
| 31 | Q2 | 1 | MSV3V-T1R (32.768KHz / 20ppm / 12.5pF) | | DNP: Crystal is enclosed with kit |
| 32 | D1 | 1 | green LED, HSMG-C170 DIODE0805 | 516-1434-1-ND | Avago, Farnell 5790852 |
| 33 | D3 | 1 | red LED, DIODE0805 | | DNP |
| 34 | D2 | 1 | yellow LED, DIODE0805 | | DNP |
| 35 | Rubber stand off | 4 | | Buerklin: 20H1724 | apply to corners at bottom side |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.6 MSP-TS430PW24

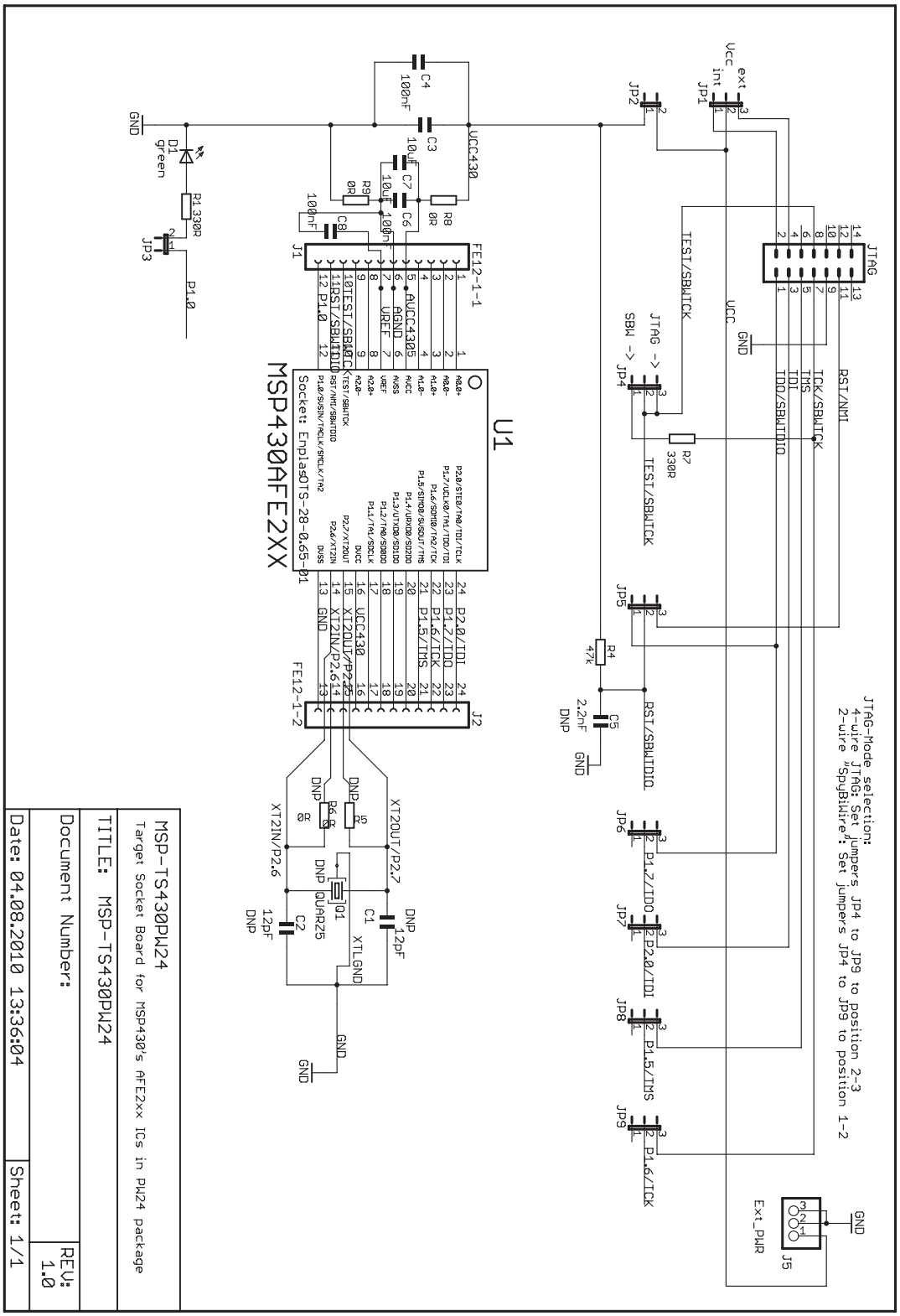



**Figure B-12. MSP-TS430PW24 Target Socket Module, Schematic**


Copyright © 2009–2016, Texas Instruments Incorporated

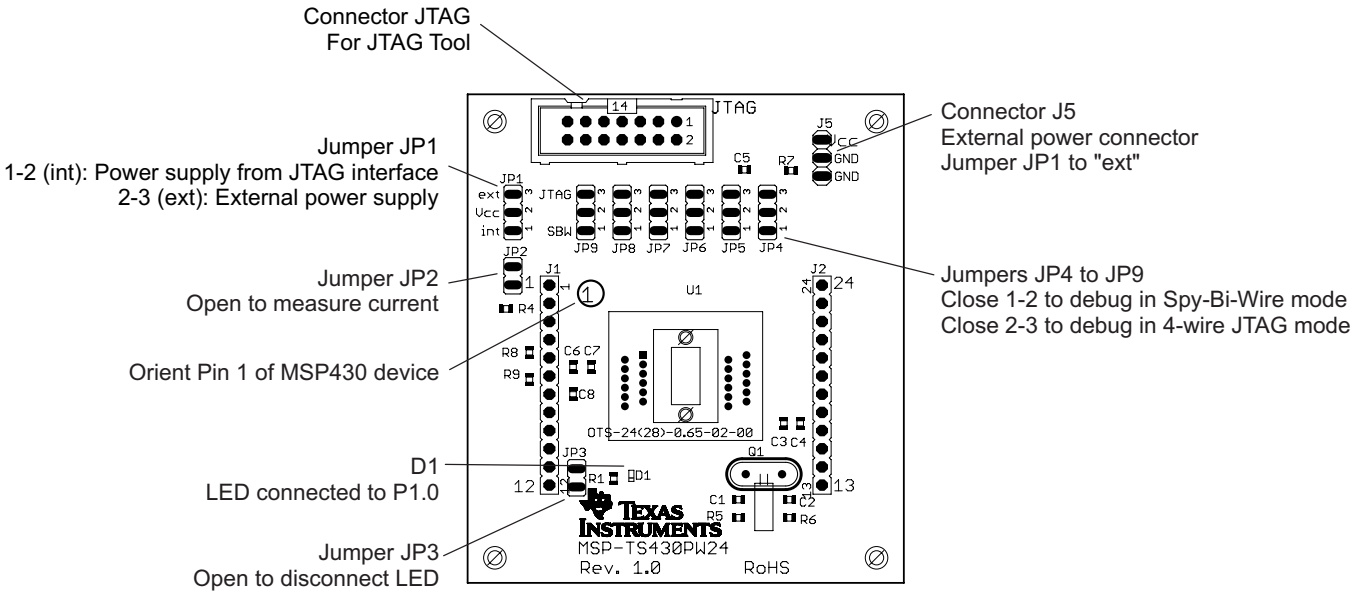



**Figure B-13. MSP-TS430PW24 Target Socket Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-7. MSP-TS430PW24 Bill of Materials**

| Position | Ref Des | No. per Board | Description | Digi-Key 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-ND SAM1213-07-ND | DNP: Headers and receptacles enclosed with kit. Keep vias free of solder. (Header and 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 and 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 | Approximately 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 |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.7 MSP-TS430RGE24A

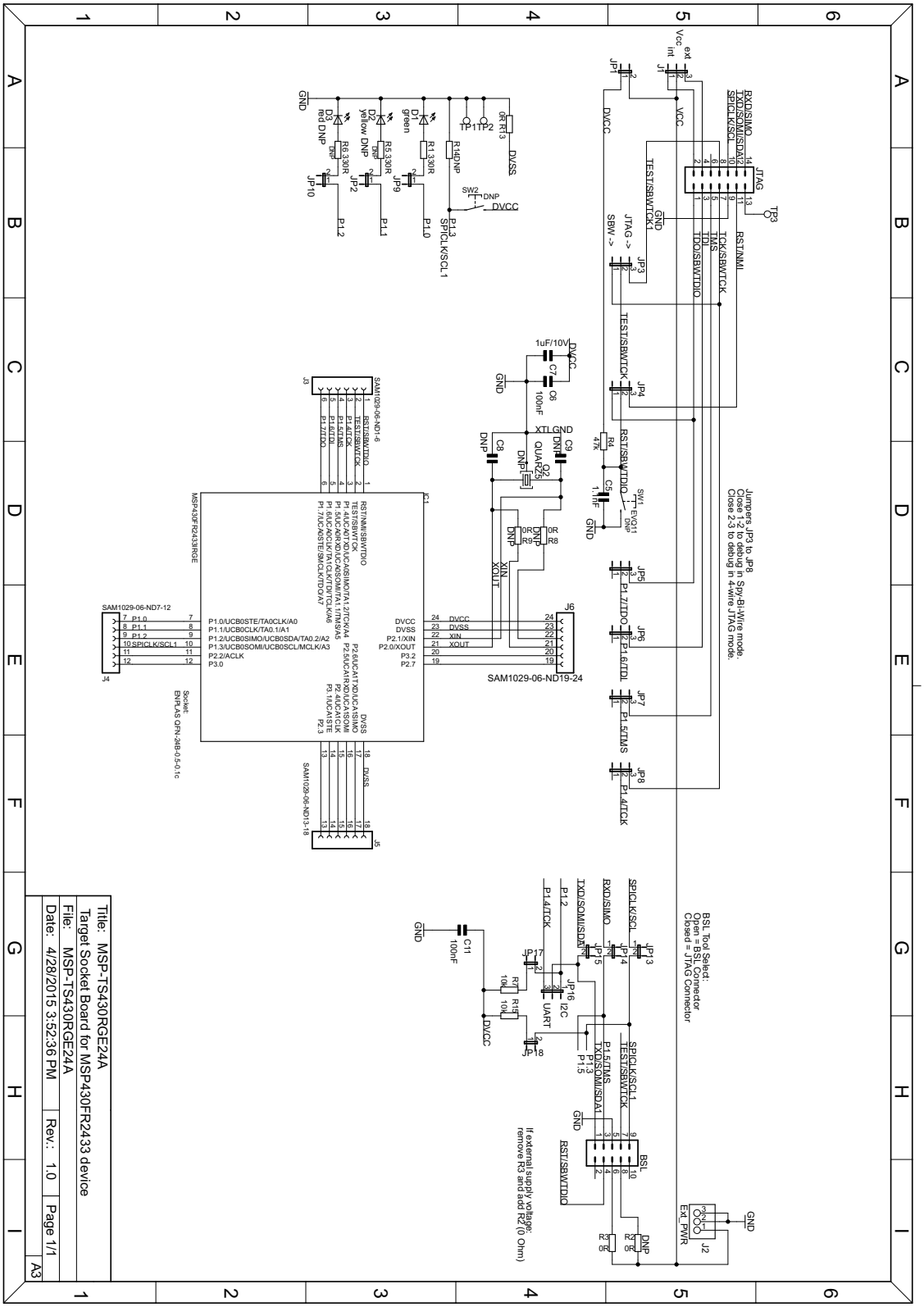



**Figure B-14. MSP-TS430RGE24A Target Socket Module, Schematic**



Copyright © 2009–2016, Texas Instruments Incorporated

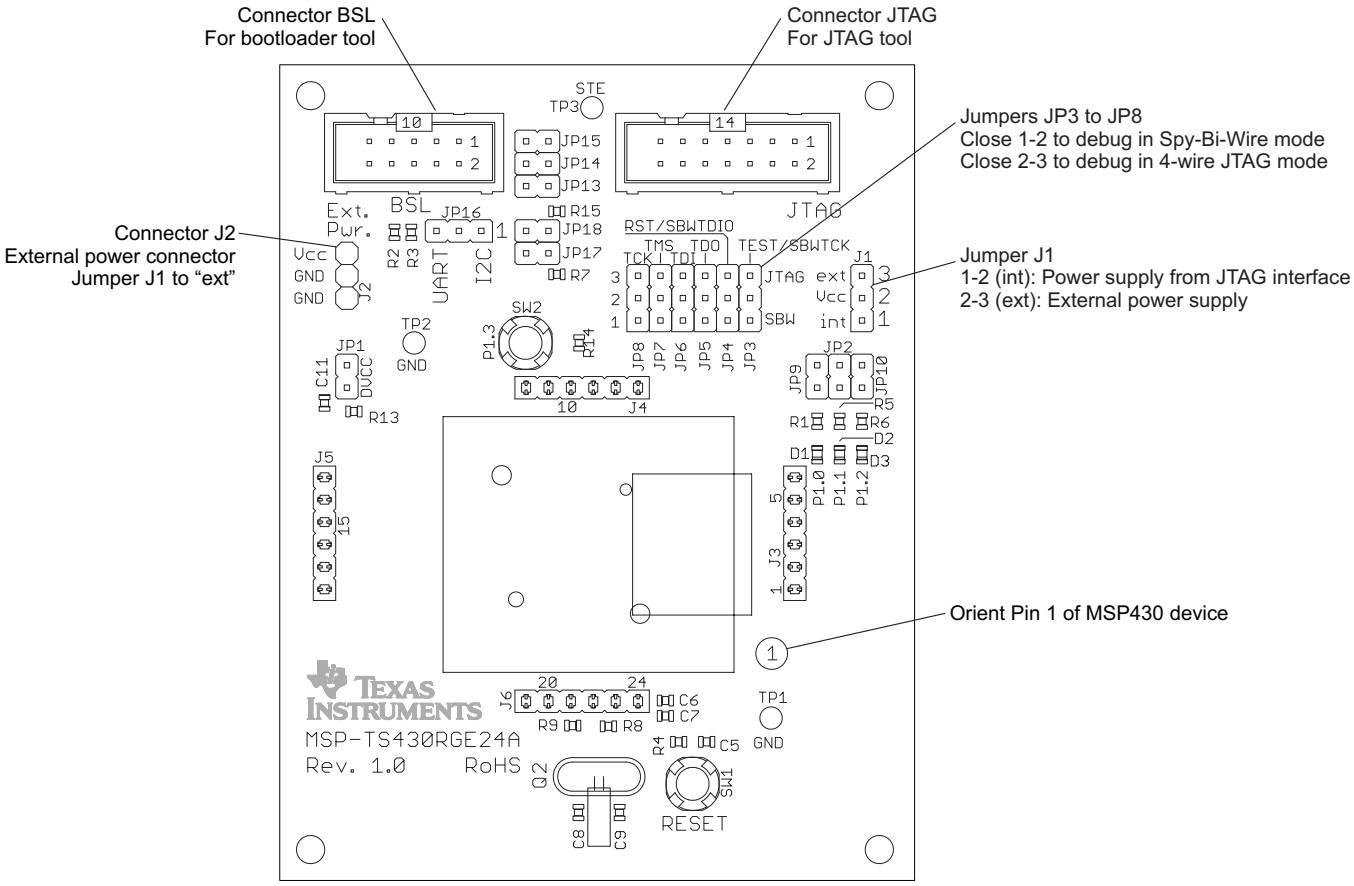



**Figure B-15. MSP-TS430RGE24A Target Socket Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-8. MSP-TS430RGE24A Bill of Materials (BOM)**

| Position | Ref Des | No. per Board | Description | Digi-Key Part No. | Comment |
|---|---|---|---|---|---|
| 1 | PCB | 1 | 90.0 x 92.5 mm | "MSP-TS430RGE24A" Rev. 1.0 | 2 layers, red solder mask |
| 2 | JP1, JP9, JP13, JP14, JP15 | 5 | 2-pin header, male, TH | SAM1035-02-ND | place jumper on header |
| 3 | JP17, JP18 | 2 | 2-pin header, male, TH | SAM1035-02-ND | place jumper on one pin only |
| 4 | JP2, JP10 | 2 | 2-pin header, male, TH | SAM1035-02-ND | DNP, keep pads free of solder |
| 5 | J1 | 1 | 3-pin header, male, TH | SAM1035-03-ND | place jumpers on pins 1-2 |
| 6 | JP3, JP4, JP5, JP6, JP7, JP8, JP16 | 7 | 3-pin header, male, TH | SAM1035-03-ND | place jumpers on pins 2-3 |
| 7 | J2 | 1 | 3-pin header, male, TH | SAM1035-03-ND | |
| 8 | R2, R8, R9 | 3 | 0R, 0805 | 541-0.0ATR-ND | DNP |
| 9 | R3, R13 | 2 | 0R, 0805 | 541-0.0ATR-ND | |
| 10 | C5 | 1 | 1.1nF, CSMD0805 | 490-1623-2-ND | |
| 11 | C7 | 1 | 1uF/10V, CSMD0805 | 490-1702-2-ND | |
| 12 | R7, R15 | 1 | 10k, 0805 | 541-10KATR-ND | |
| 13 | R4 | 1 | 47k, 0805 | 541-47KATR-ND | |
| 14 | C6, C11 | 2 | 100nF, CSMD0805 | 490-1666-1-ND | |
| 15 | R1 | 1 | 330R, 0805 | 541-330ATR-ND | |
| 16 | R5, R6 | 2 | 330R, 0805 | 541-330ATR-ND | DNP |
| 17 | R14 | 1 | 47k, 0805 | 541-47KATR-ND | DNP |
| 18 | C8, C9 | 2 | DNP, CSMD0805 | | DNP |
| 19 | SW2 | 1 | EVQ-11L05R | P8079STB-ND | DNP, Keep vias free of solder. Lacon: 1251459 |
| 20 | SW1 | 1 | EVQ-11L05R | P8079STB-ND | DNP, Keep vias free of solder, Lacon: 1251459 |
| 21 | J3, J4, J5, J6 | 4 | 6-pin header, TH | SAM1029-06-ND | DNP: headers enclosed in kit.<br>Keep vias free of solder. |
| 22 | J3, J4, J5, J6 | 4 | 6-pin receptacle, TH | SAM1213-06-ND | DNP: receptacles enclosed in kit.<br>Keep vias free of solder. |
| 23 | TP1, TP2, TP3 | 3 | Test point | | DNP, keep pads free of solder |
| 24 | BSL | 1 | 10-pin connector, male, TH | HRP10H-ND | |
| 25 | JTAG | 1 | 14-pin connector, male, TH | HRP14H-ND | |
| 26 | IC1 | 1 | Socket:QFN-24B-0.5-0.1c | | Manuf. Enplas |
| 27 | IC1 | 1 | MSP430FR2433IRGER | | DNP: Free samples can be ordered in the TI Store |
| 28 | Q2 | 1 | DNP: MS3V-TR1 (32,768kHz/ 20ppm/12,5pF) | depends on application | DNP: Micro Crystal, enclosed in kit. Keep vias free of solder |
| 29 | D1 | 1 | green LED, HSMG-C170 DIODE0805 | 516-1434-1-ND | Avago, Farnell 5790852 |
| 30 | D3 | 1 | red (DNP), DIODE0805 | | DNP |
| 31 | D2 | 1 | yellow (DNP), DIODE0805 | | DNP |
| 32 | Rubber stand off | 4 | | Buerklin: 20H1724 | Apply to corners at bottom side |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.8 MSP-TS430DW28

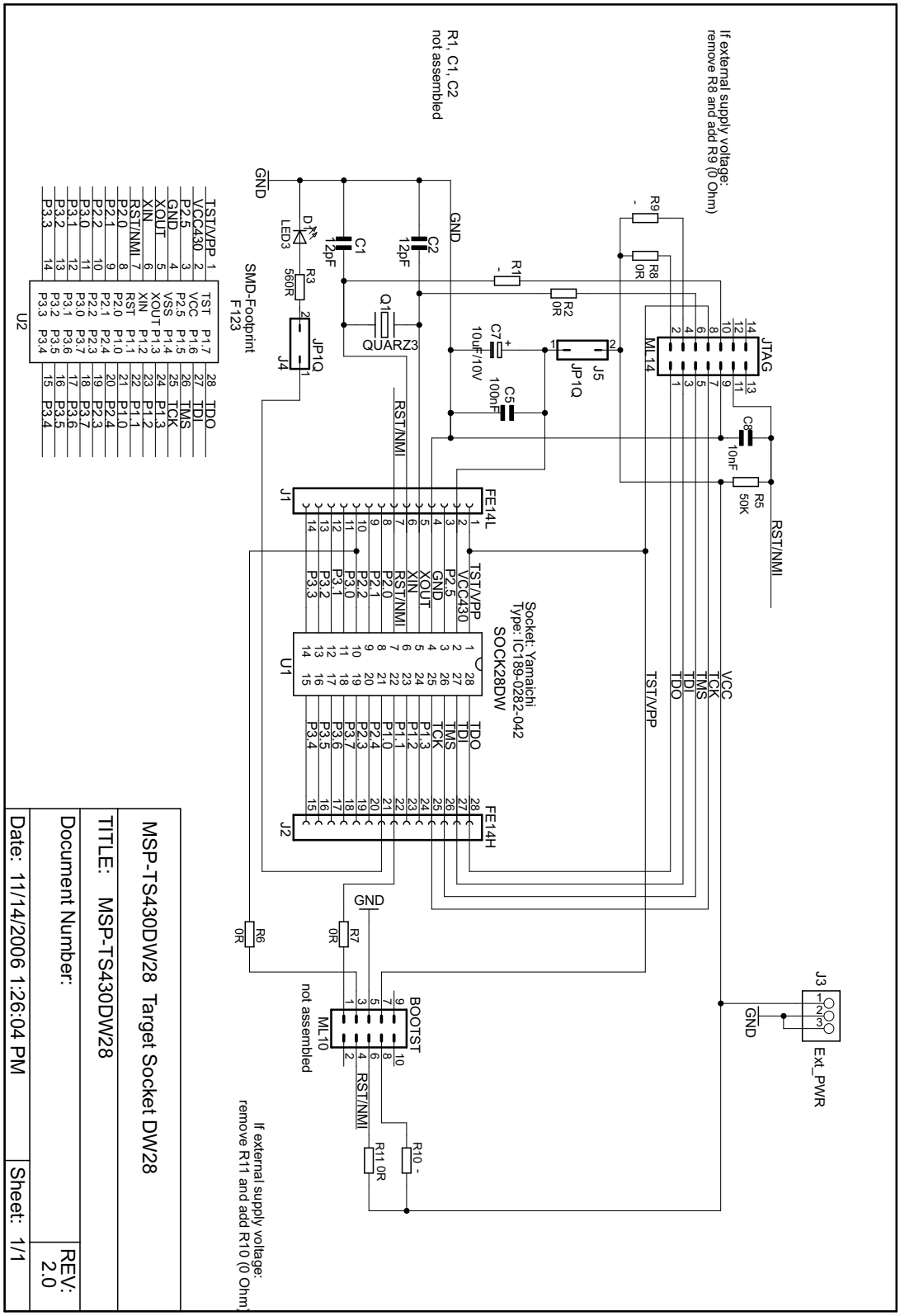



**Figure B-16. MSP-TS430DW28 Target Socket Module, Schematic**


Copyright © 2009–2016, Texas Instruments Incorporated

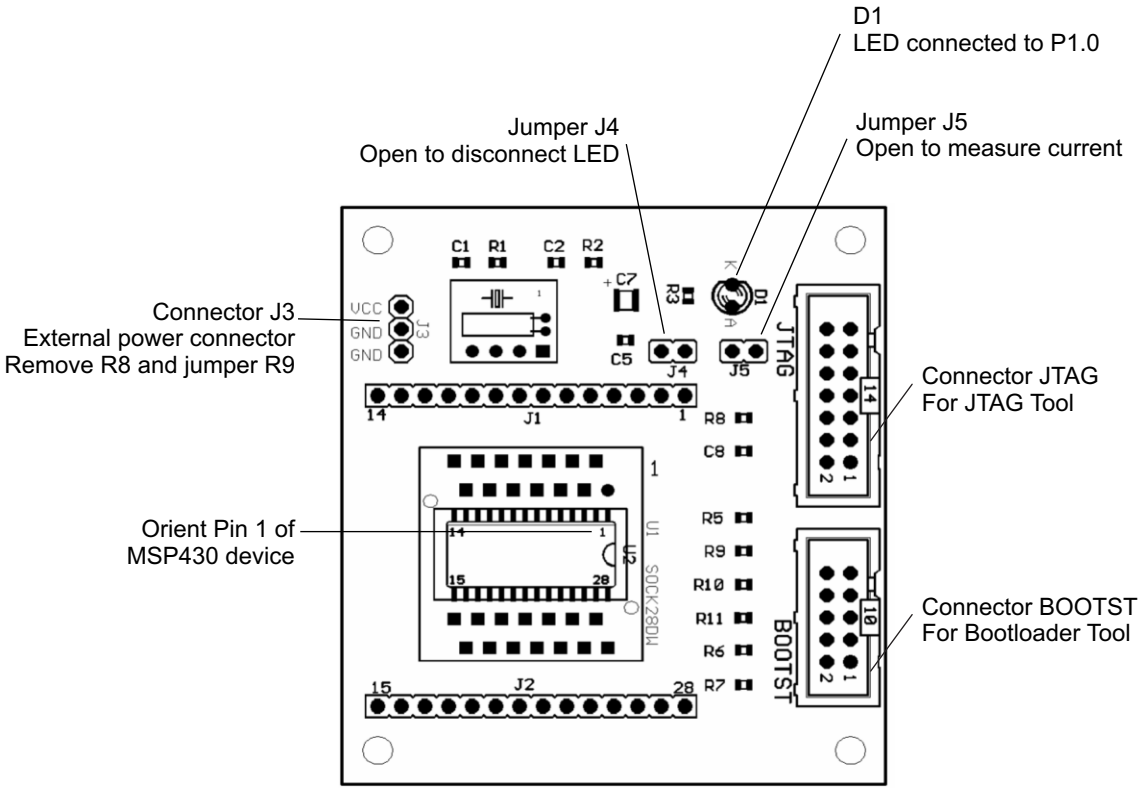



**Figure B-17. MSP-TS430DW28 Target Socket Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-9. MSP-TS430DW28 Bill of Materials**

| Position | Ref Des | No. per Board | Description | Digi-Key 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.<br>: Header<br>: Receptacle |
| 7.1 | | 2 | 14-pin header, TH female | | DNP: Headers and receptacles enclosed with kit. Keep vias free of solder.<br>: Header<br>: 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 |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.9 MSP-TS430PW28

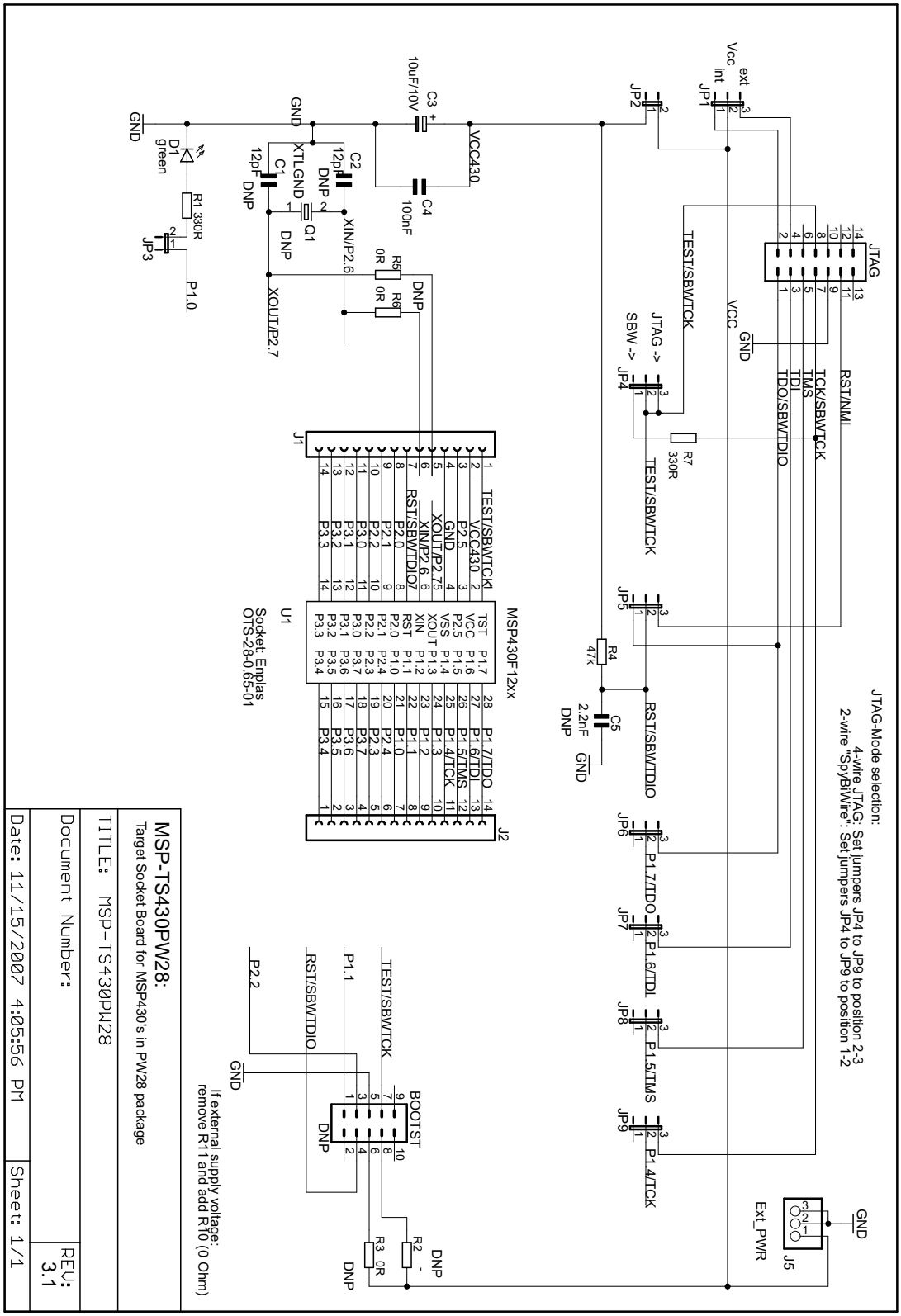



**Figure B-18. MSP-TS430PW28 Target Socket Module, Schematic**



Copyright © 2009–2016, Texas Instruments Incorporated

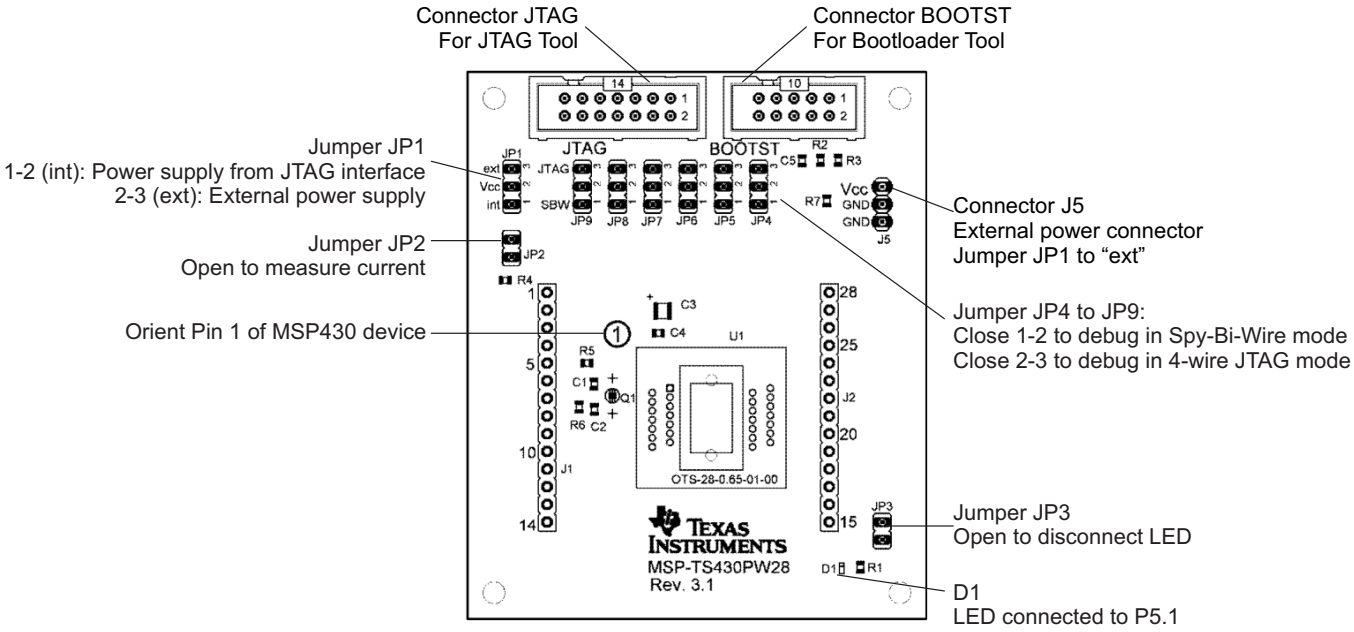



**Figure B-19. MSP-TS430PW28 Target Socket Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-10. MSP-TS430PW28 Bill of Materials[1]**

| Pos. | Ref Des | No. per Board | Description | Digi-Key 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.<br>: Header<br>: Receptacle |
| 7.1 | | 2 | 14-pin header, TH female | | DNP: headers and receptacles enclosed with kit.Keep vias free of solder.<br>: Header<br>: 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


Copyright © 2009–2016, Texas Instruments Incorporated

## B.10 MSP-TS430PW28A

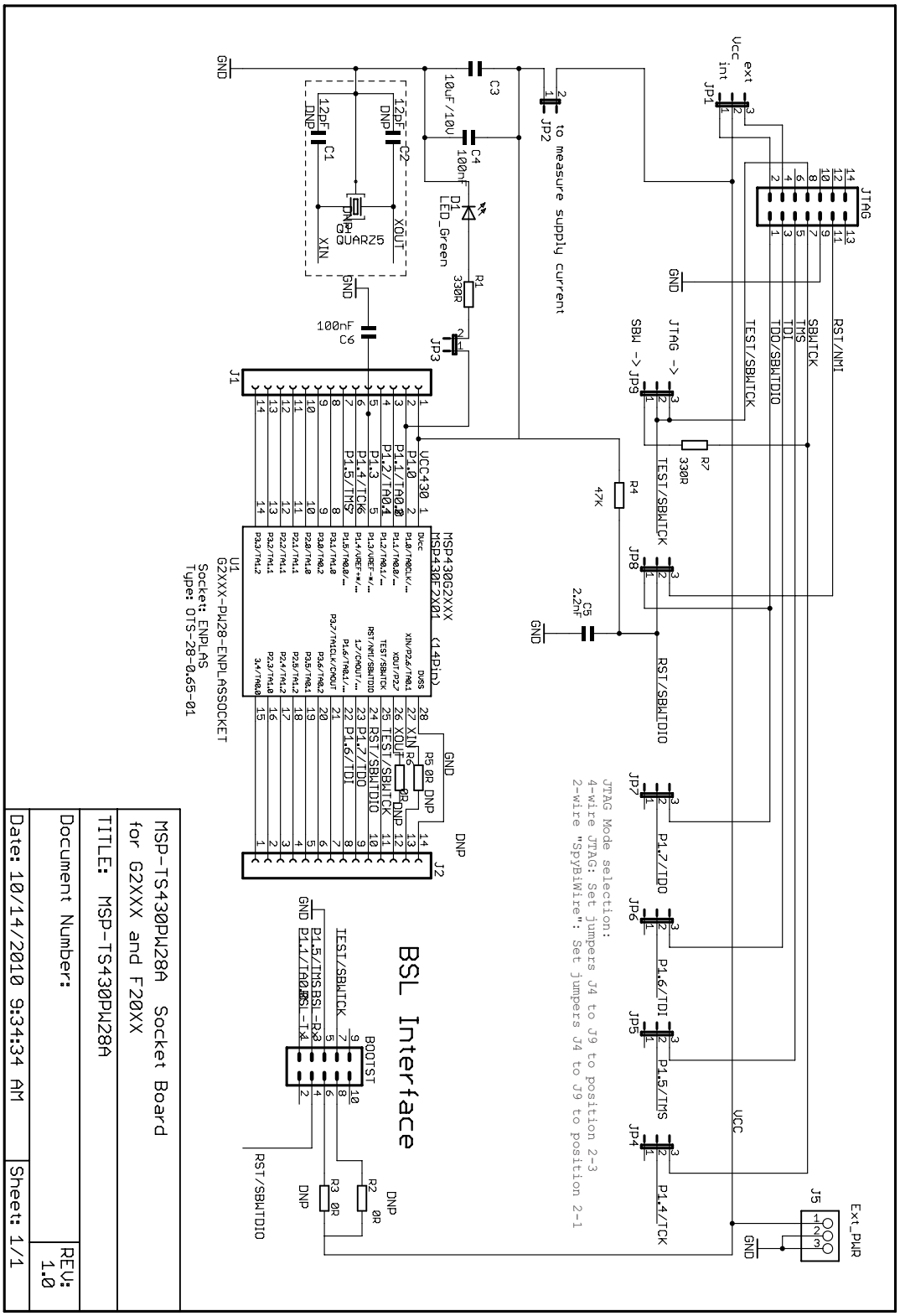



**Figure B-20. MSP-TS430PW28A Target Socket Module, Schematic**


Copyright © 2009–2016, Texas Instruments Incorporated

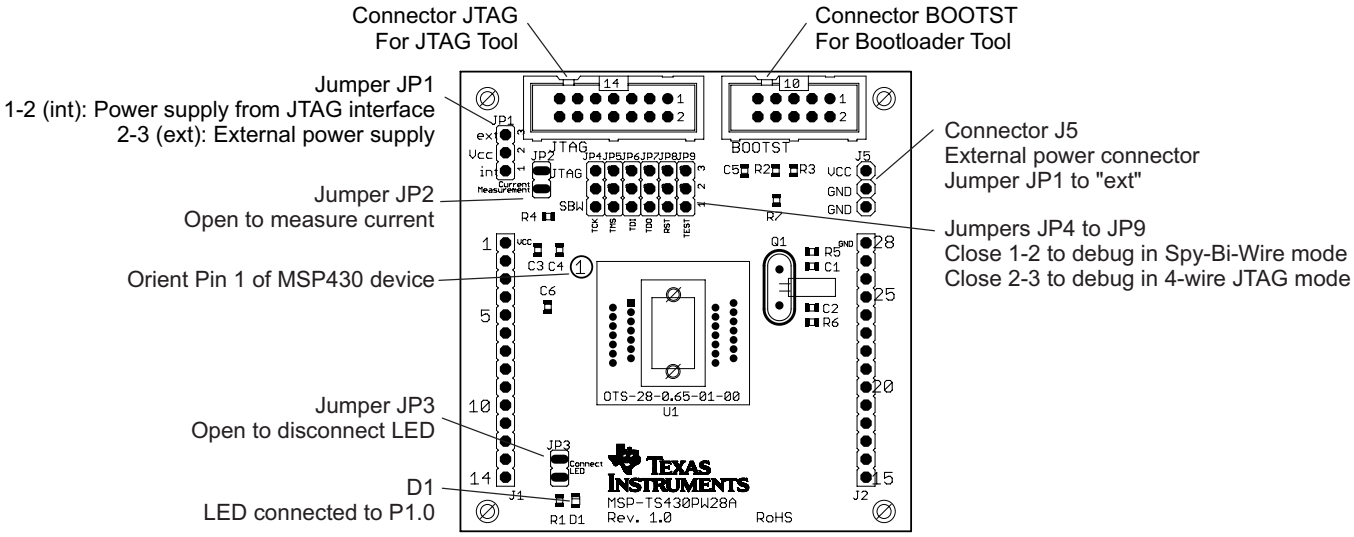



**Figure B-21. MSP-TS430PW28A Target Socket Module, PCB (Red)**

**NOTE:** For bootloader use, the BSL connector and only one of the resistors R2 or R3 need to be populated. If the board is supplied internally, R3 (0 Ω) must be assembled. If the board is supplied externally, R2 (0 Ω) must be assembled, and R3 must be removed.



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-11. MSP-TS430PW28A Bill of Materials**

| Position | Ref Des | No. per Board | Description | Digi-Key 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 and 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 | Approximately 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 |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.11 MSP-TS430RHB32A

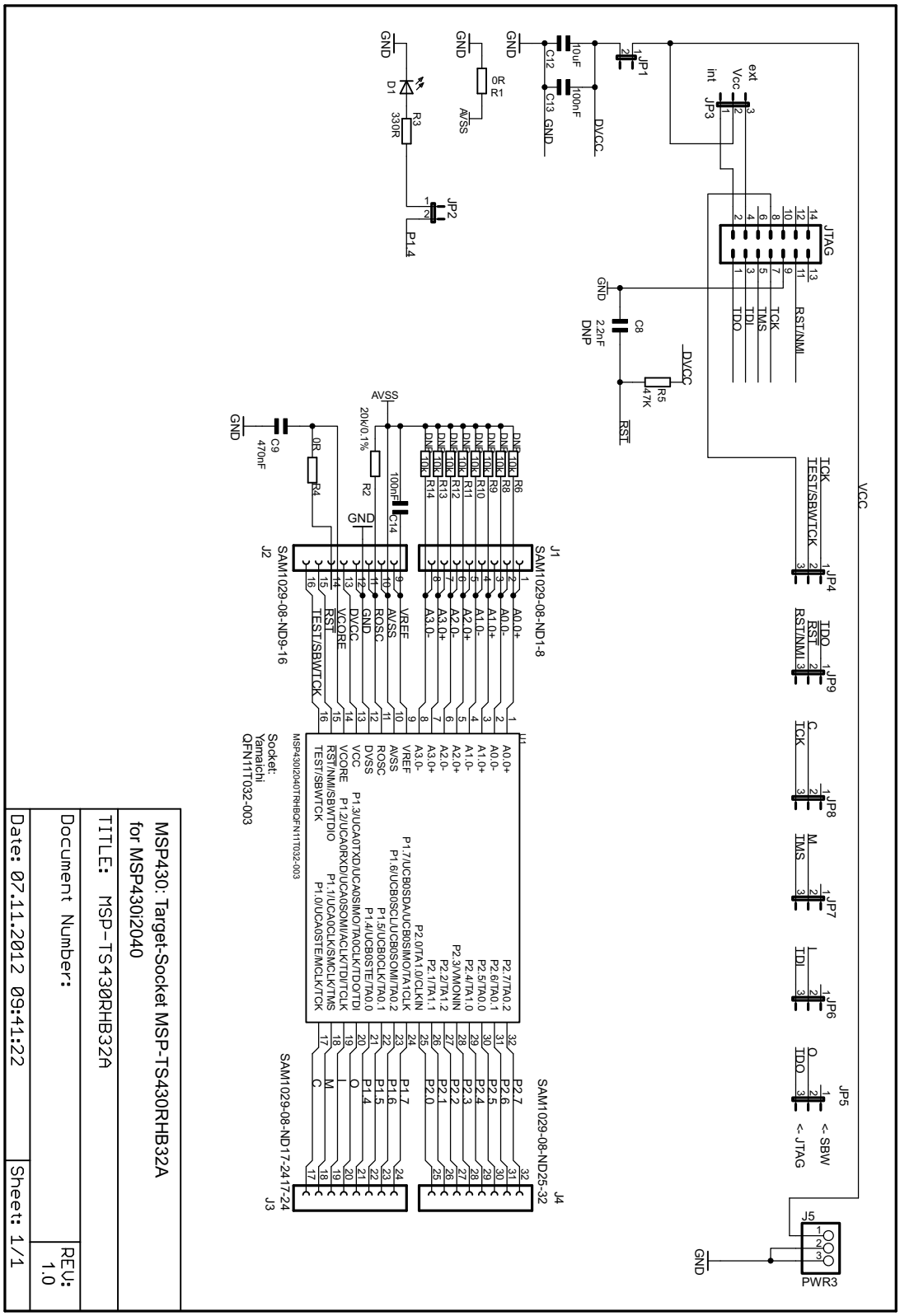



**Figure B-22. MSP-TS430RHB32A Target Socket Module, Schematic**



Copyright © 2009–2016, Texas Instruments Incorporated

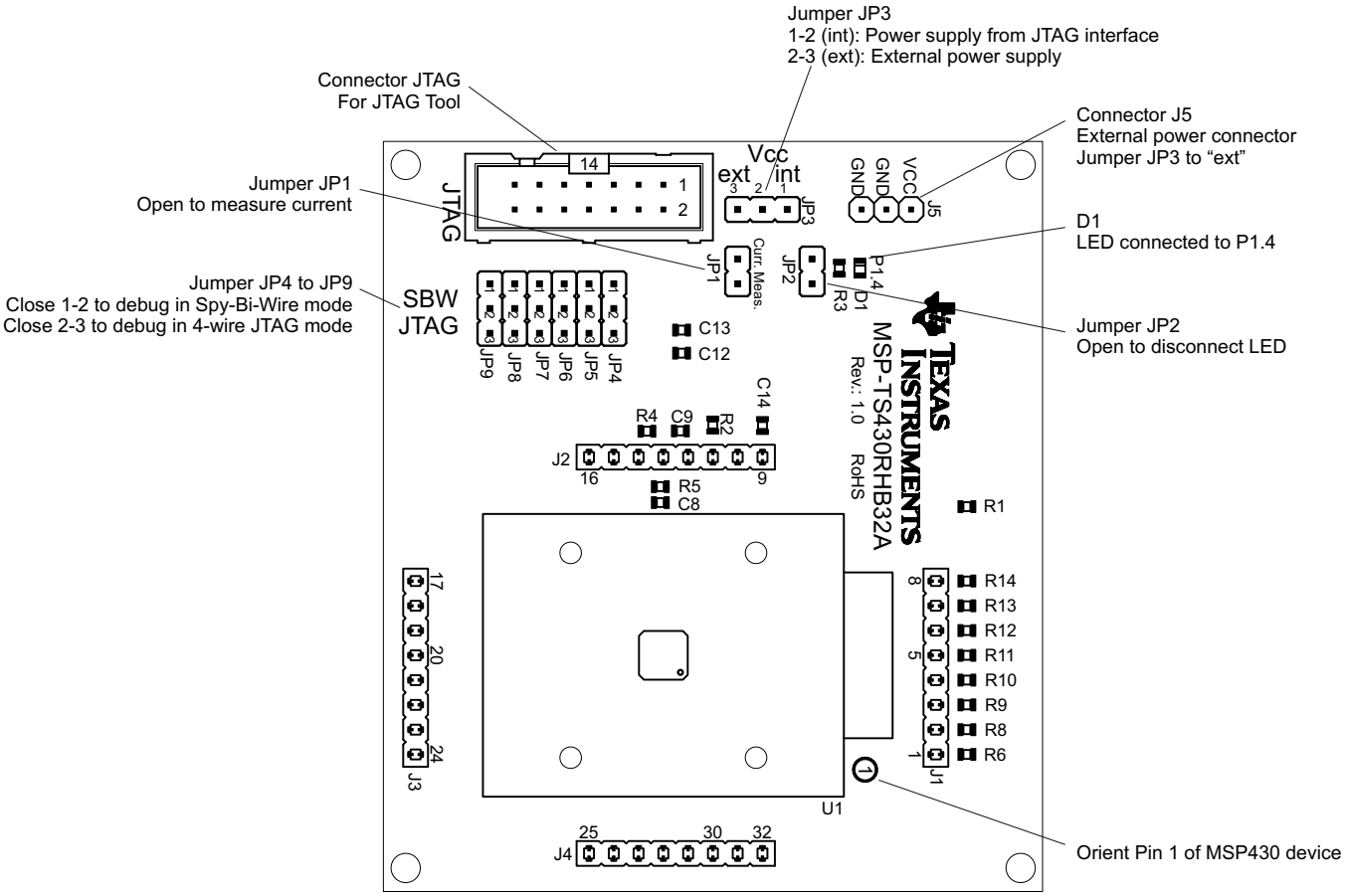



**Figure B-23. MSP-TS430RHB32A Target Socket Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-12. MSP-TS430RHB32A Bill of Materials**

| Pos. | Ref Des | No. per Board | Description | Digi-Key Part No. | Comment |
|---|---|---|---|---|---|
| 1 | PCB | 1 | 76.9 x 67.6 mm | MSP-TS430RHB32A Rev. 1 | 2 layers, red solder mask |
| 2 | D1 | 1 | green LED, DIODE0805 | P516TR-ND | |
| 3 | JP1, JP2 | 2 | 2-pin header, male, TH | SAM1035-02-ND | place jumper on header |
| 4 | JP3, JP4, JP5, JP6, JP7, JP8, JP9 | 7 | 3-pin header, male, TH | SAM1035-03-ND | place jumpers on pins 1-2 (SBW) |
| 5 | R1, R4 | 2 | 0R, 0805 | 541-0.0ATR-ND | |
| 6 | C8 | 1 | 2.2nF, CSMD0805 | 490-1628-2-ND | DNP |
| 7 | R6, R8, R9, R10, R11, R12, R13, R14 | 8 | 10k, 0805 | 311-10KARTR-ND | DNP |
| 8 | C12 | 1 | 10uF, CSMD0805 | 445-1371-2-ND | |
| 9 | R2 | 1 | 20k/0.1%, 0805 | P20KDACT-ND | |
| 10 | R5 | 1 | 47K, 0805 | 311-47KARTR-ND | |
| 11 | C13, C14 | 2 | 100nF, CSMD0805 | 311-1245-2-ND | |
| 12 | R3 | 1 | 330R, 0805 | 541-330ATR-ND | |
| 13 | C9 | 1 | 470nF, CSMD0805 | 445-1357-2-ND | |
| 14 | J1, J2, J3, J4 | 1 | 8-pin header, TH | SAM1029-08-ND | DNP: headers and receptacles, enclosed with kit.<br>Keep vias free of solder. |
| 15 | J1, J2, J3, J4 | 1 | 8-pin receptable, TH | SAM1213-08-ND | DNP: headers and receptacles, enclosed with kit.<br>Keep vias free of solder. |
| 16 | JTAG | 1 | 14-pin connector, male, TH | HRP14H-ND | |
| 17 | U1 | 1 | Socket QFN11T032-003 | | Manuf.: Yamaichi |
| 18 | U1 | 1 | MSP430i2041TRHB | | DNP: enclosed with kit.<br>Is supplied by TI |
| 19 | J5 | 1 | 3-pin header, male, TH | SAM1035-03-ND | |
| 20 | Rubber stand off | 4 | | Buerklin: 20H1724 | apply to corners at bottom side |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.12 MSP-TS430DA38

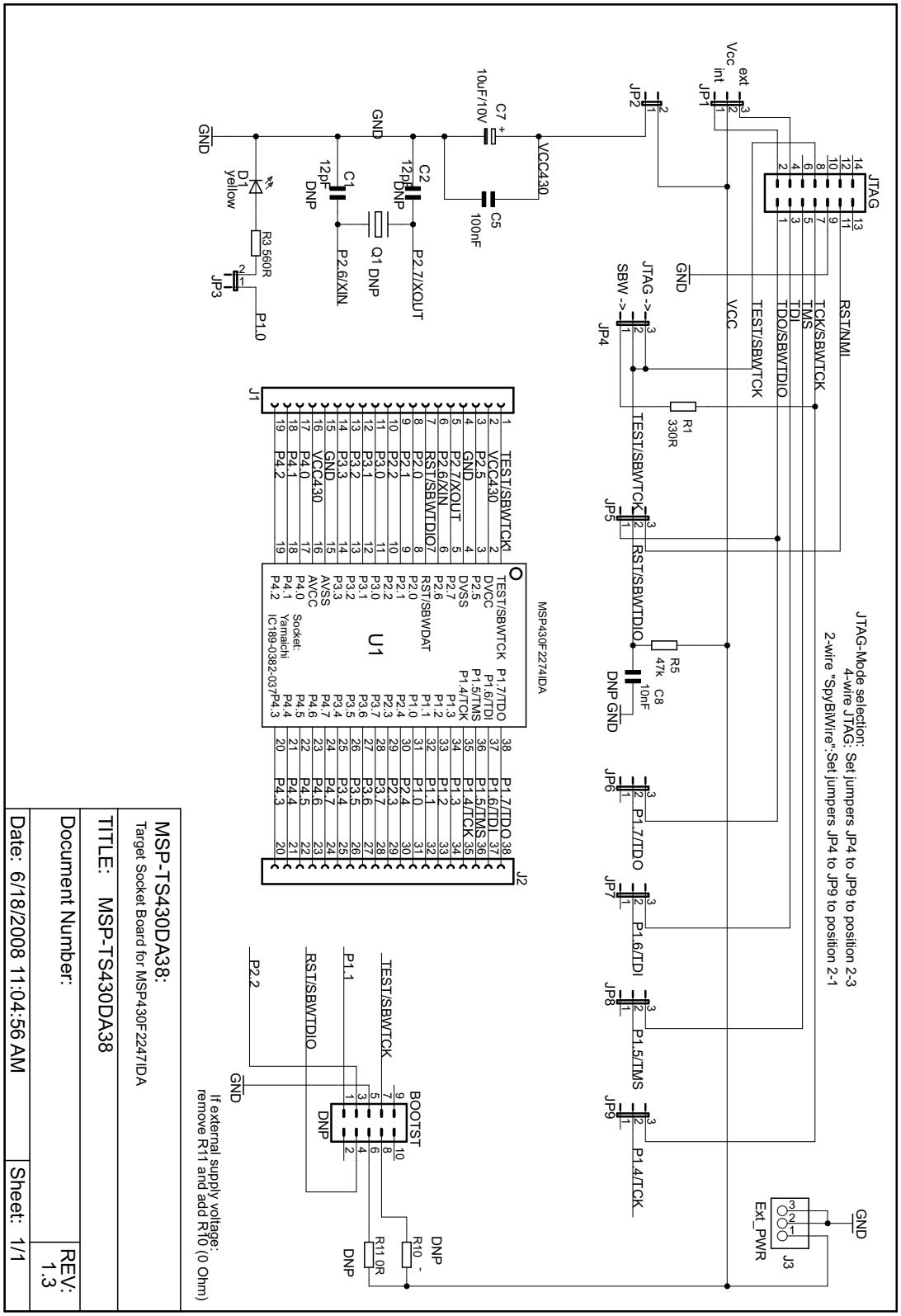



**Figure B-24. MSP-TS430DA38 Target Socket Module, Schematic**


Copyright © 2009–2016, Texas Instruments Incorporated

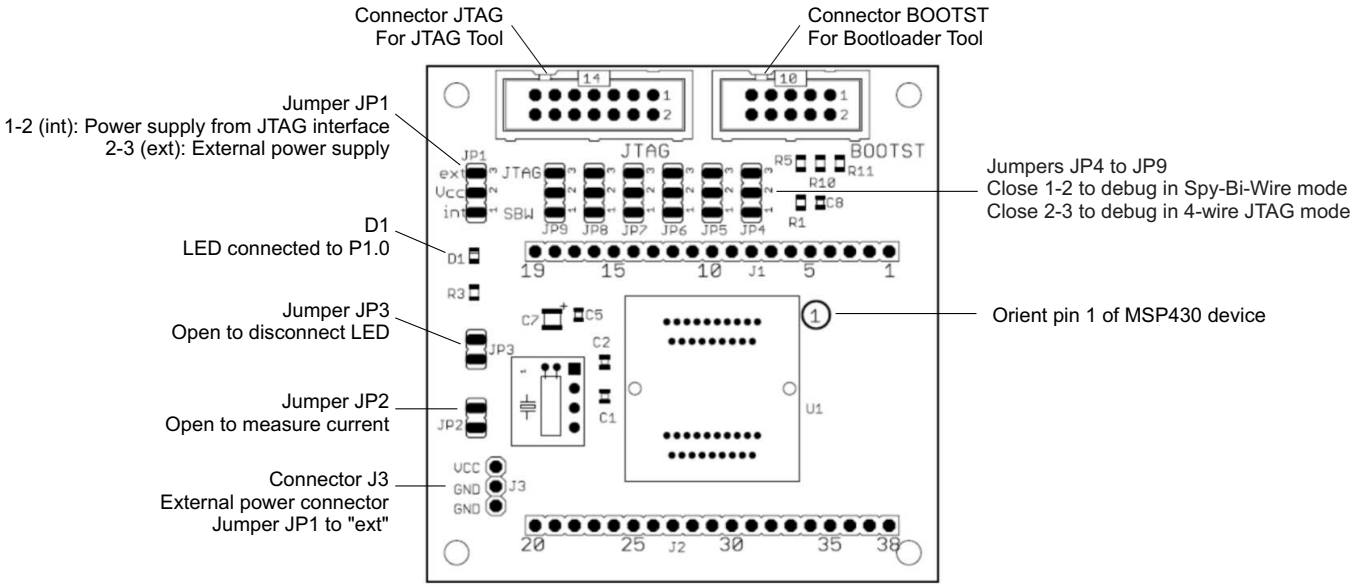



**Figure B-25. MSP-TS430DA38 Target Socket Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-13. MSP-TS430DA38 Bill of Materials**

| Pos. | Ref Des | No. per Board | Description | Digi-Key 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-ND<br>SAM1213-19-ND | DNP: headers and receptacles enclosed with kit.Keep vias free of solder.<br>: Header<br>: 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 |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.13 MSP-TS430QFN23x0

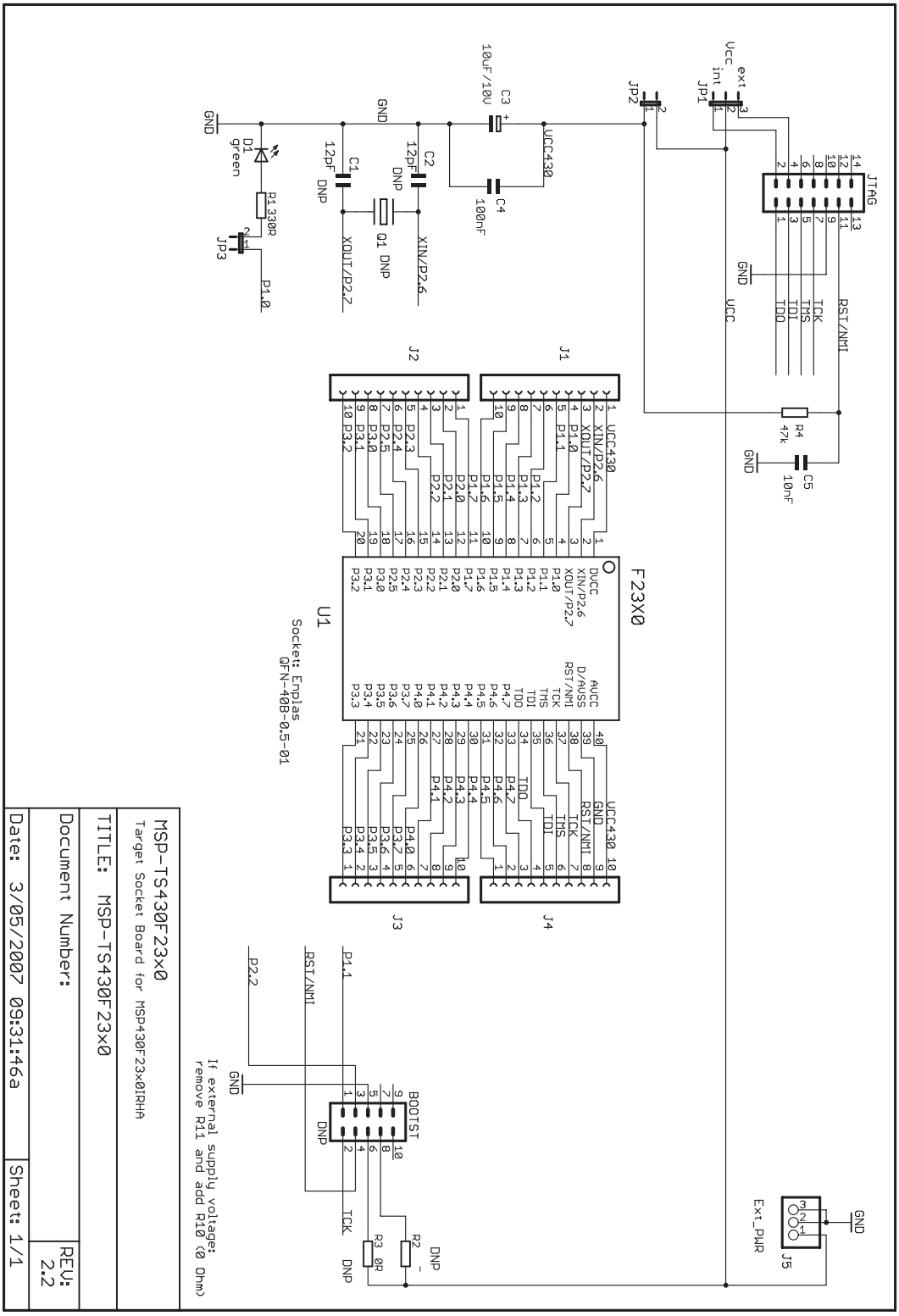



**Figure B-26. MSP-TS430QFN23x0 Target Socket Module, Schematic**



Copyright © 2009–2016, Texas Instruments Incorporated

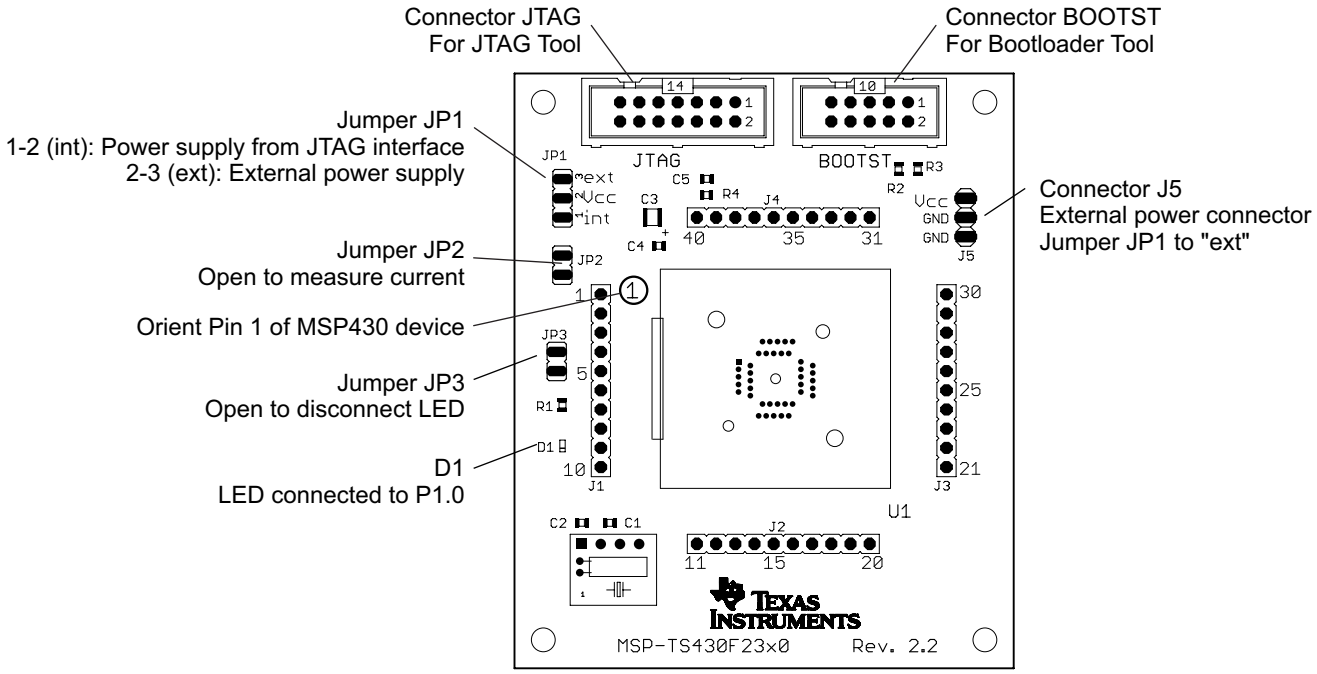



**Figure B-27. MSP-TS430QFN23x0 Target Socket Module, PCB**

**NOTE:** For bootloader use, the BSL connector and only one of the resistors R2 or R3 need to be populated. If the board is supplied internally, R3 (0 Ω) must be assembled. If the board is supplied externally, R2 (0 Ω) must be assembled, and R3 must be removed.



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-14. MSP-TS430QFN23x0 Bill of Materials**

| Pos. | Ref Des | No. per Board | Description | Digi-Key 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-ND<br>SAM1212-10-ND | DNP: headers and receptacles enclosed with kit.Keep vias free of solder.<br>: Header<br>: 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 |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.14 MSP-TS430RSB40

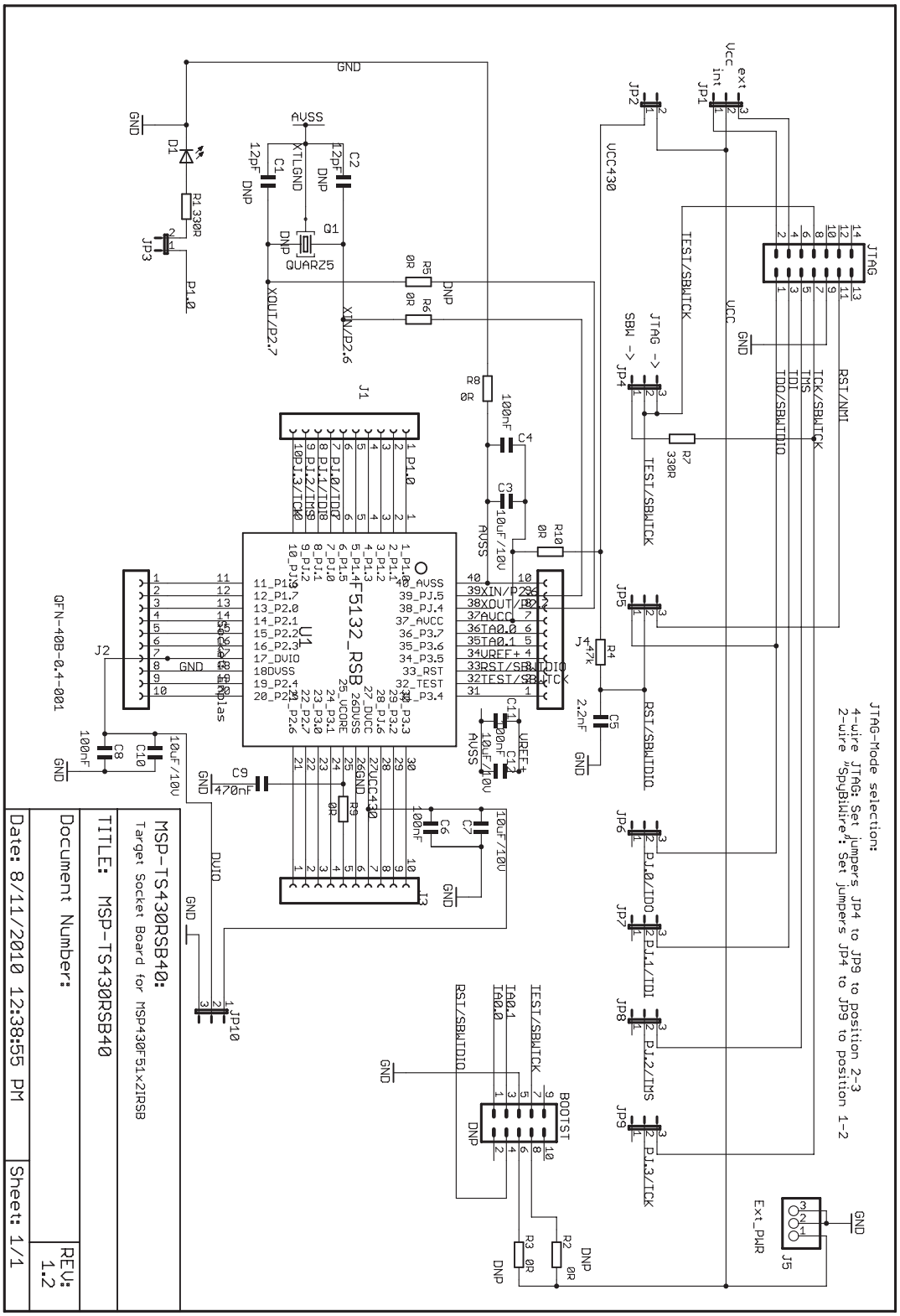



**Figure B-28. MSP-TS430RSB40 Target Socket Module, Schematic**


Copyright © 2009–2016, Texas Instruments Incorporated

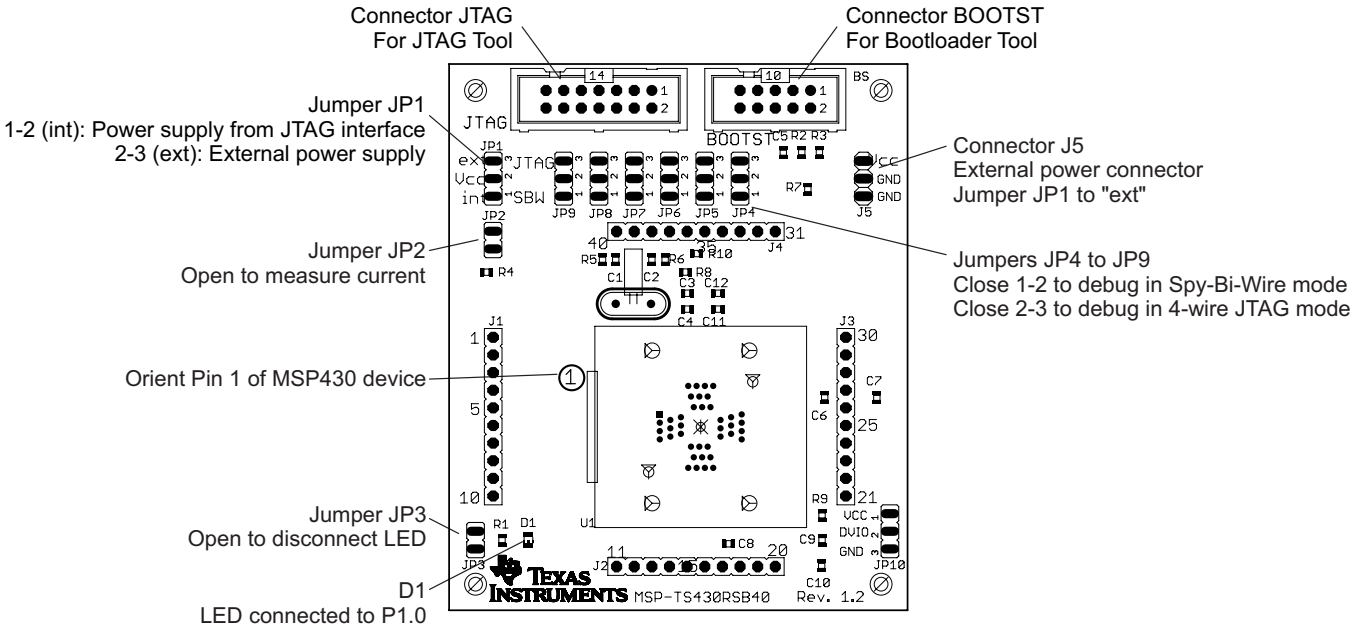



**Figure B-29. MSP-TS430RSB40 Target Socket Module, PCB**

**NOTE:** For bootloader use, the BSL connector and only one of the resistors R2 or R3 need to be populated. If the board is supplied internally, R3 (0 Ω) must be assembled. If the board is supplied externally, R2 (0 Ω) must be assembled, and R3 must be removed.



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-15. MSP-TS430RSB40 Bill of Materials**

| Pos. | Ref Des | No. Per Board | Description | Digi-Key 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.<br>: Header<br>: Receptacle |
| 7.1 | | 4 | 10-pin header, TH | | DNP: headers and receptacles enclosed with kit. Keep vias free of solder.<br>: Header<br>: 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 |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.15 MSP-TS430RHA40A

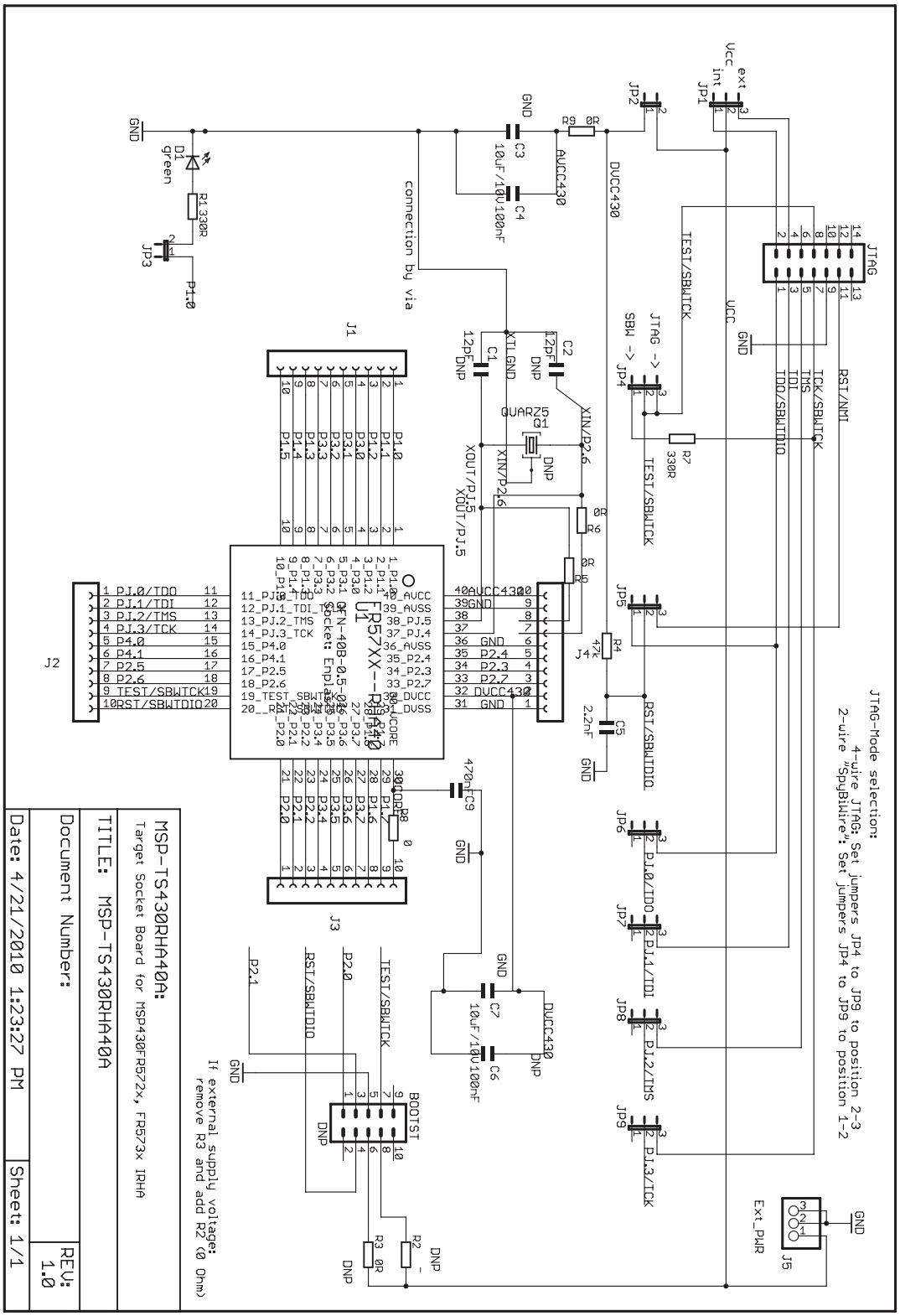



**Figure B-30. MSP-TS430RHA40A Target Socket Module, Schematic**



Copyright © 2009–2016, Texas Instruments Incorporated

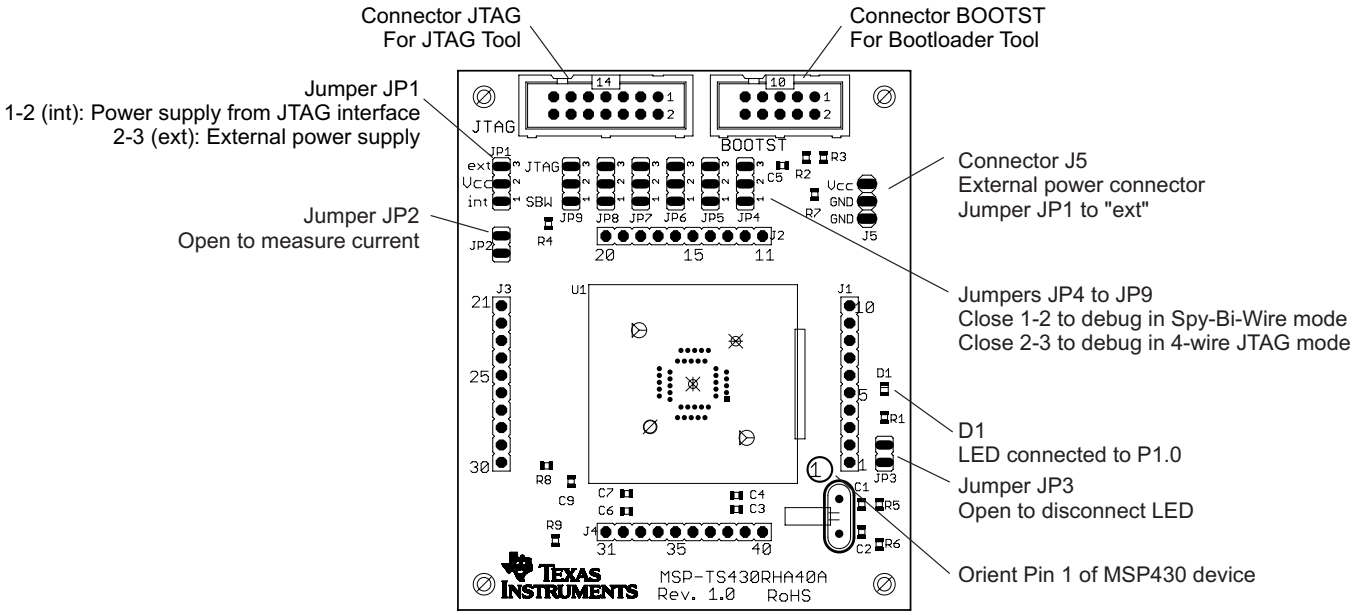



**Figure B-31. MSP-TS430RHA40A Target Socket Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

## Table B-16. MSP-TS430RHA40A Bill of Materials

| Position | Ref Des | No. per Board | Description | Digi-Key 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.<br>: Header<br>: Receptacle |
| 7.1 | | 4 | 10-pin header, TH | | DNP: headers and receptacles enclosed with kit. Keep vias free of solder.<br>: Header<br>: 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 |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.16 MSP-TS430DL48

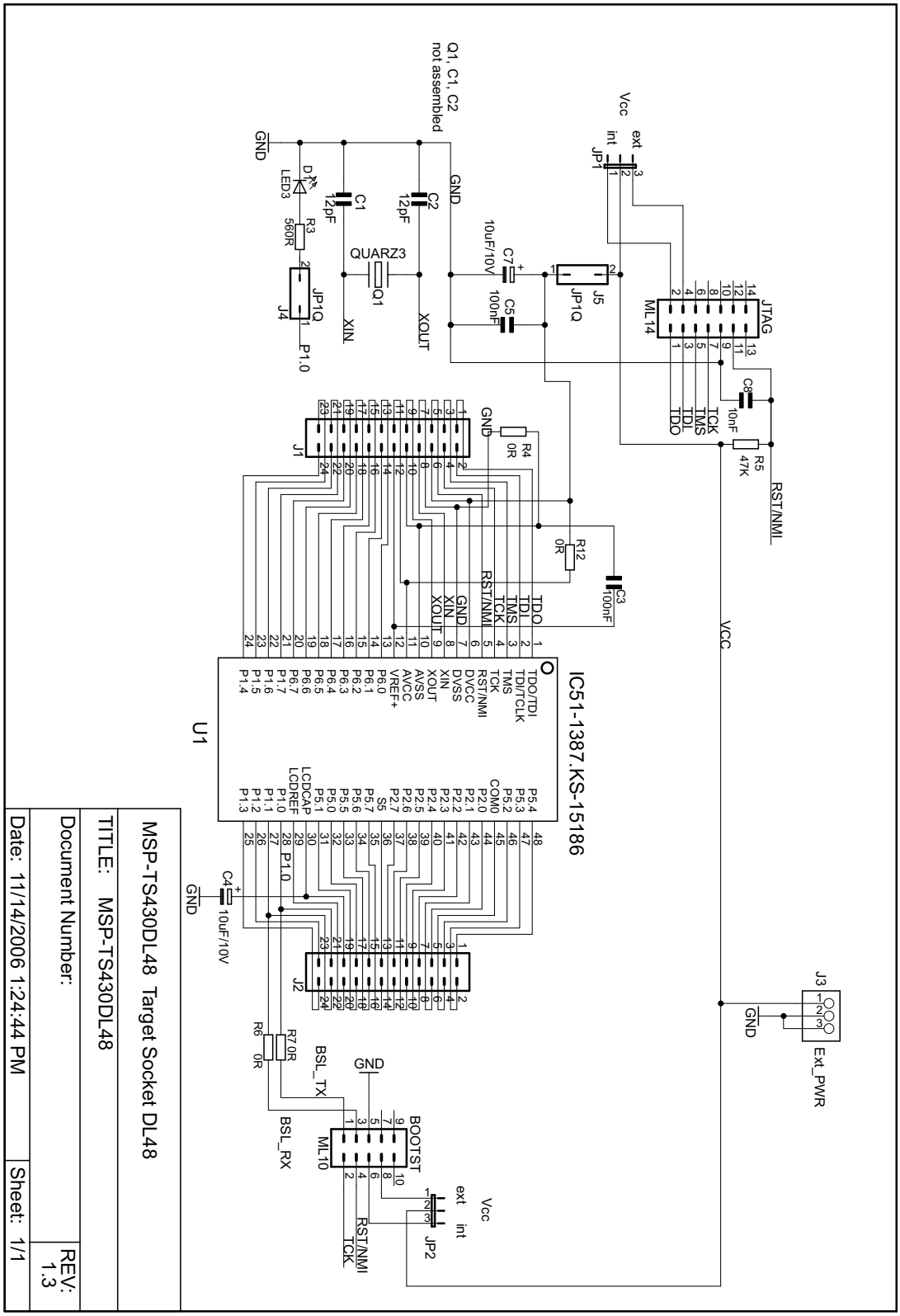



**Figure B-32. MSP-TS430DL48 Target Socket Module, Schematic**


Copyright © 2009–2016, Texas Instruments Incorporated

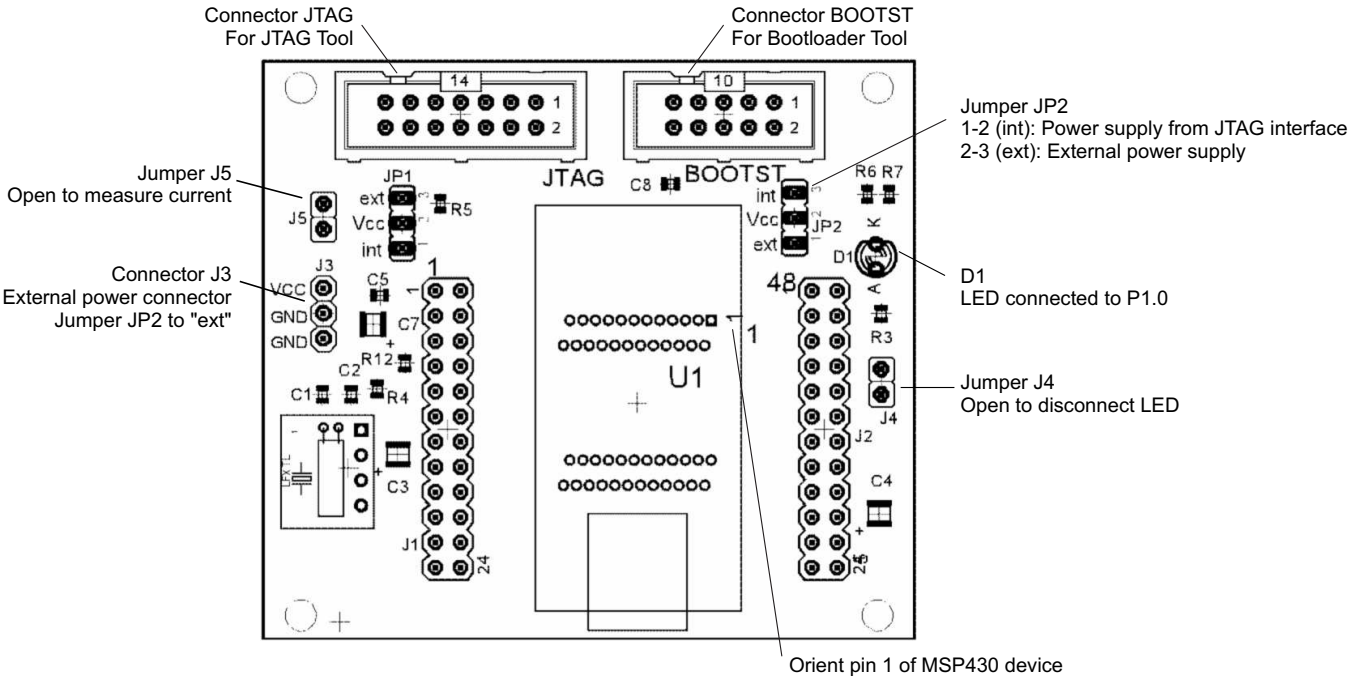



**Figure B-33. MSP-TS430DL48 Target Socket Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-17. MSP-TS430DL48 Bill of Materials**

| Pos. | Ref Des | No. per Board | Description | Digi-Key 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-ND<br>SAM1212-12-ND | DNP: Headers and receptacles enclosed with kit.Keep vias free of solder.<br>: Header<br>: 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 |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.17 MSP-TS430RGZ48B

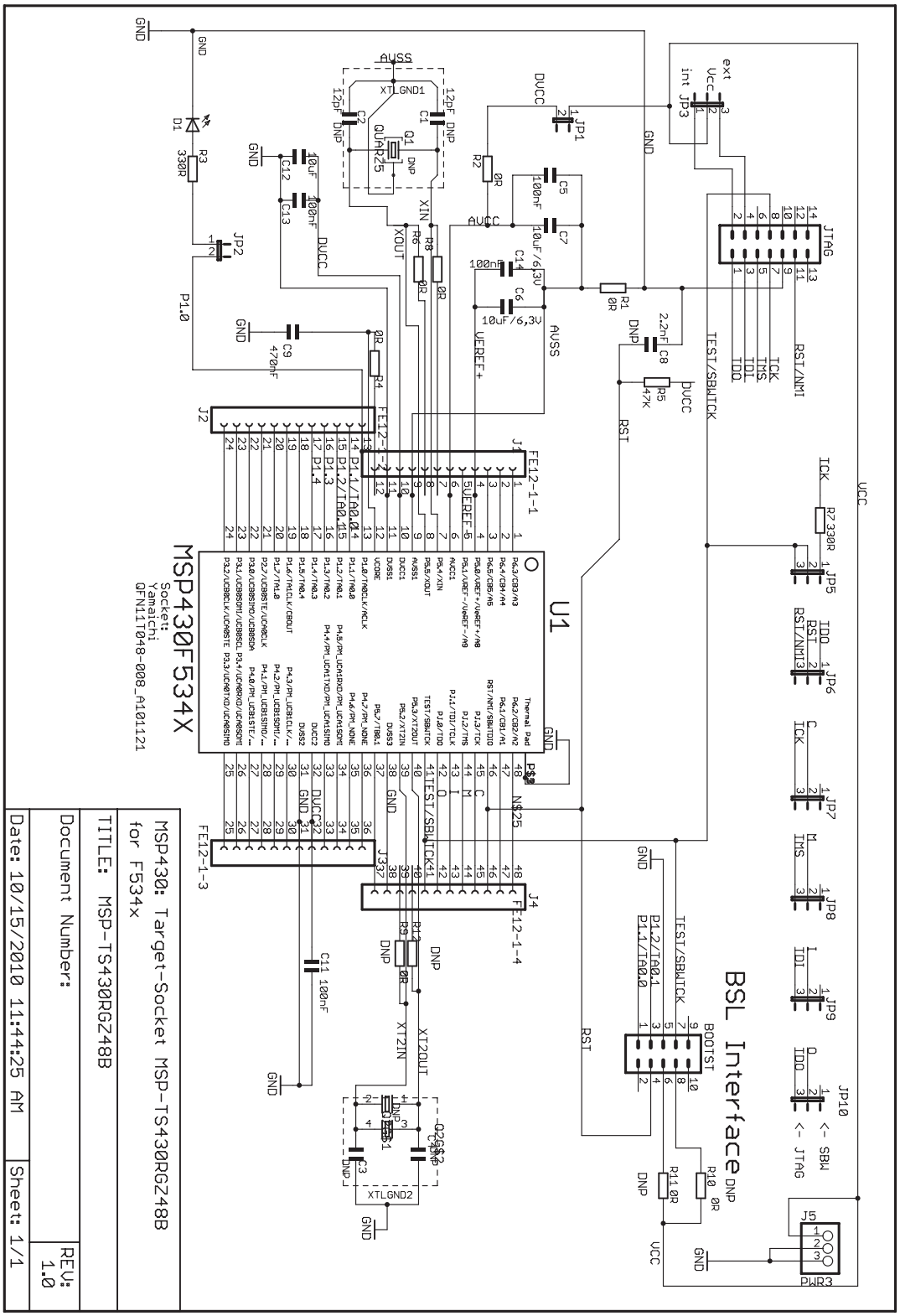



**Figure B-34. MSP-TS430RGZ48B Target Socket Module, Schematic**



Copyright © 2009–2016, Texas Instruments Incorporated

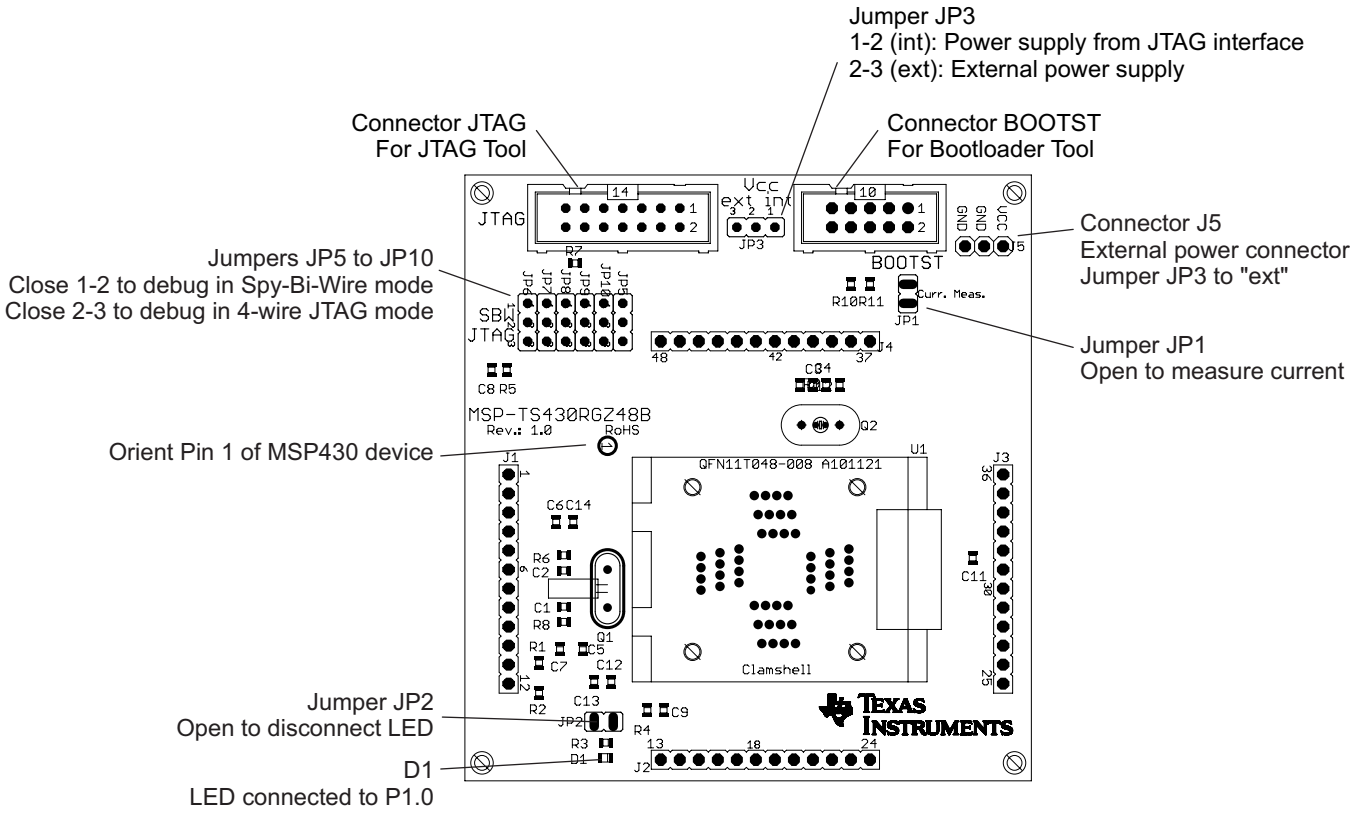



**Figure B-35. MSP-TS430RGZ48B Target Socket Module, PCB**

**NOTE:** For bootloader use, the BSL connector and only one of the resistors R10 or R11 must be populated. If the board is supplied internally, R11 (0 Ω) must be assembled. If the board is supplied externally, R10 (0 Ω) must be assembled, and R11 must be removed.



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-18. MSP-TS430RGZ48B Bill of Materials**

| Position | Ref Des | No. per Board | Description | Digi-Key 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 | Approximately 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 |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.18 MSP-TS430RGZ48C

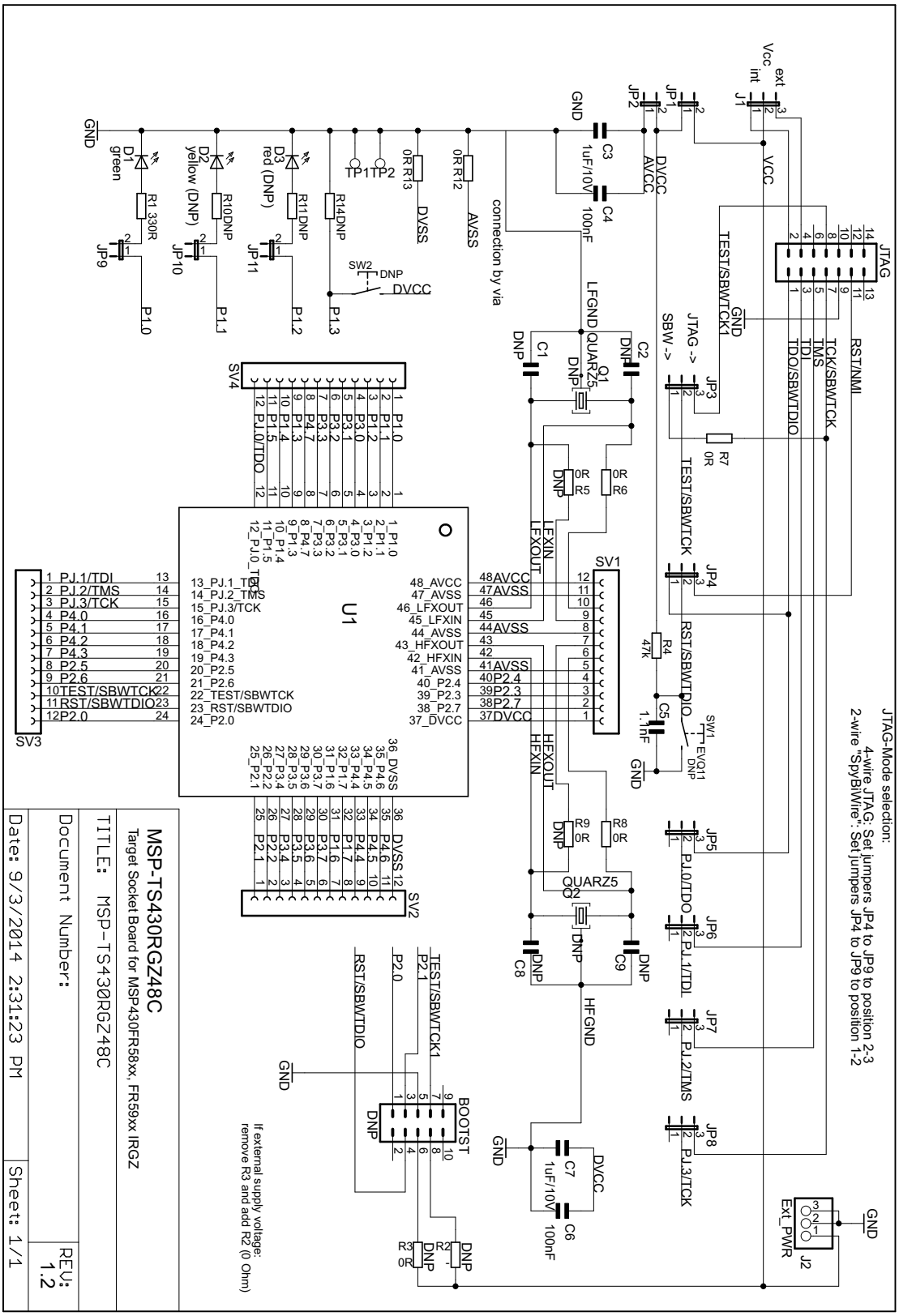



**Figure B-36. MSP-TS430RGZ48C Target Socket Module, Schematic**


Copyright © 2009–2016, Texas Instruments Incorporated

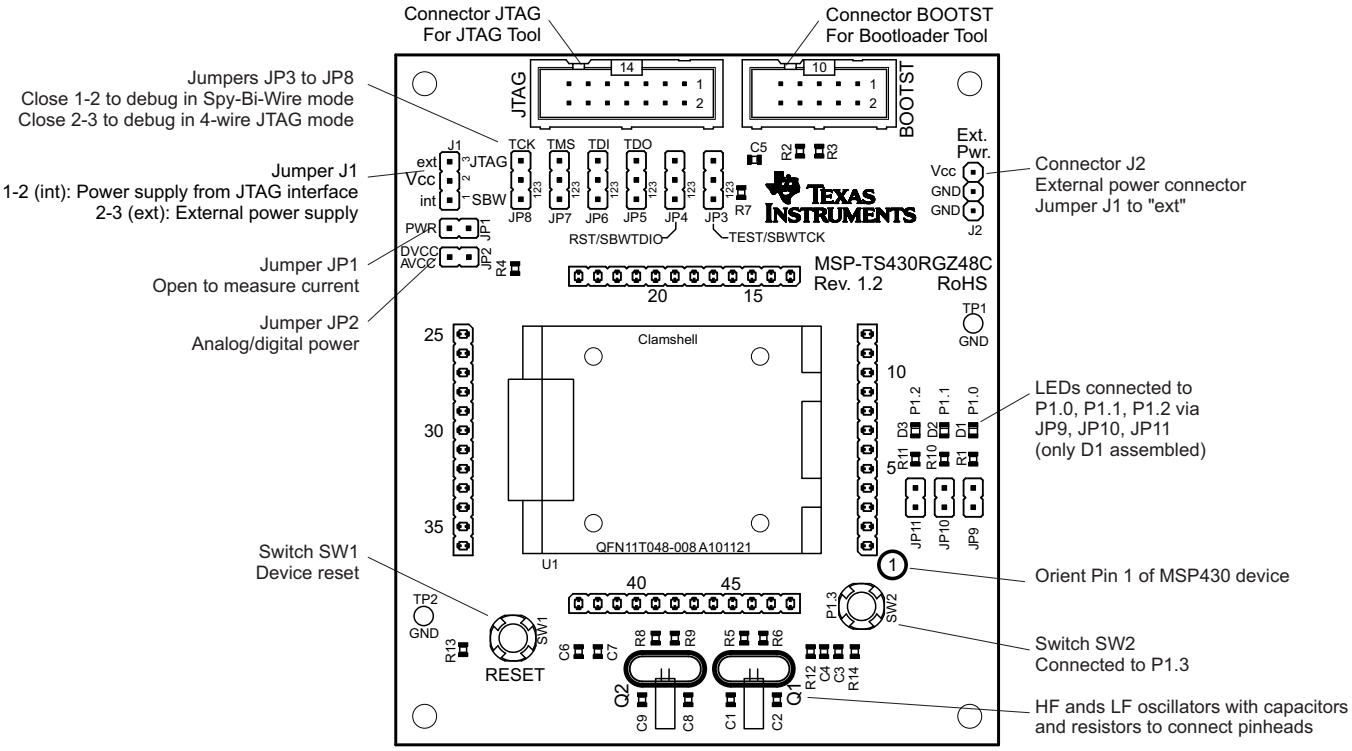



**Figure B-37. MSP-TS430RGZ48C Target Socket Module, PCB**

**NOTE:** LFOSC and HFOSC pins are swapped at SV1.
42_HFXIN (pin 42) → SV1 (pin 7)
43_HFXOUT (pin 43) → SV1 (pin 6)
45_LFXIN (pin 45) → SV1 (pin 10)
46_LFXOUT (pin 46) → SV1 (pin 9)



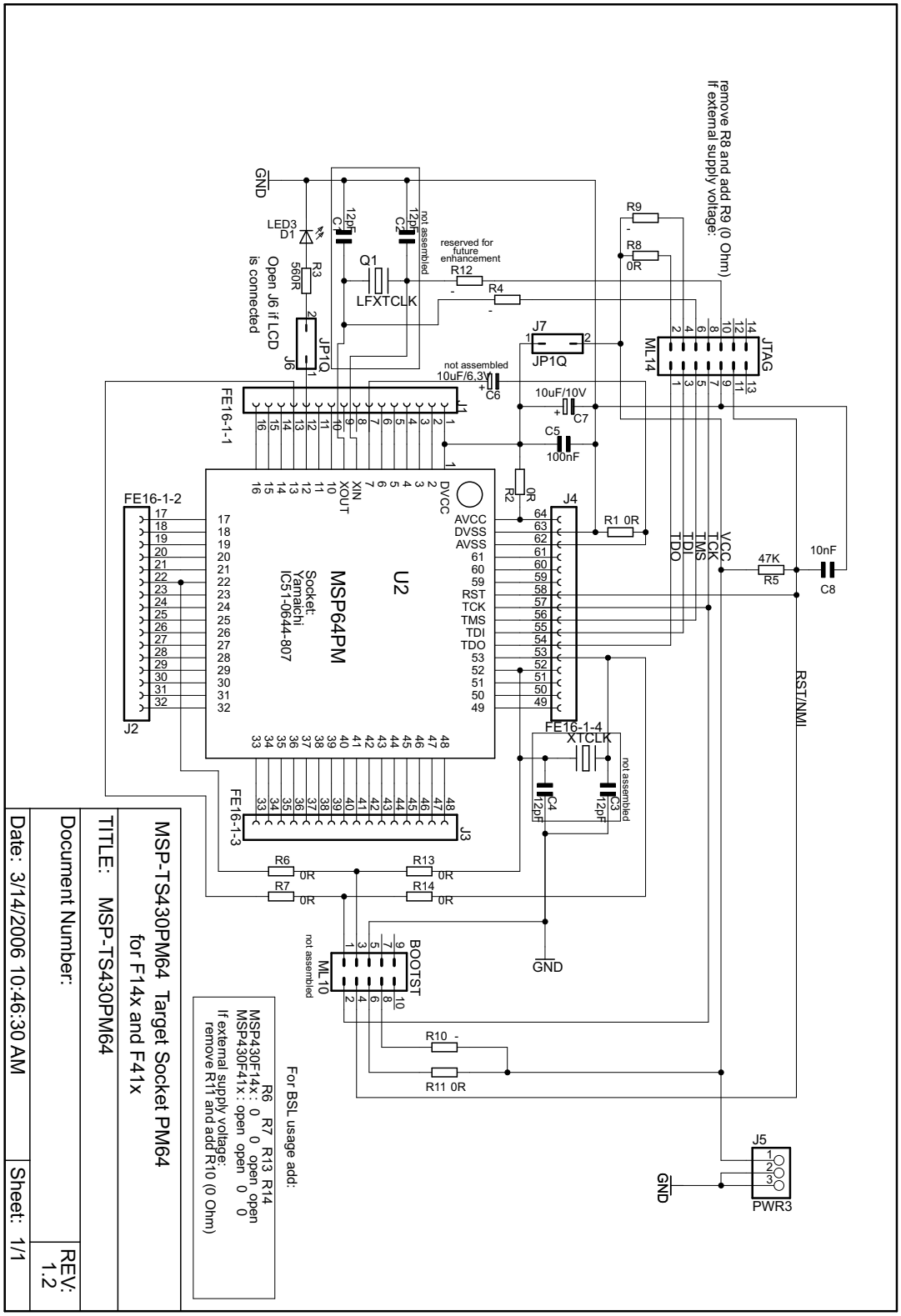
Copyright © 2009–2016, Texas Instruments Incorporated

## Table B-19. MSP-TS430RGZ48C Bill of Materials

| Pos | Ref Des | Number Per Board | Description | Digi-Key Part Number | Comment |
|---|---|---|---|---|---|
| 1 | SV1, SV2, SV3, SV4 | 4 | 12-pin header, TH | SAM1029-12-ND | DNP: headers and receptacles enclosed with kit. Keep vias free of solder.<br>: Header<br>: Receptacle |
| 1.1 | SV1, SV2, SV3, SV4 | 4 | 12-pin receptable, TH | SAM1213-12-ND | DNP: headers and receptacles enclosed with kit. Keep vias free of solder.<br>: Header<br>: Receptacle |
| 2 | JP1, JP2, JP9 | 3 | 2-pin header, male, TH | SAM1035-02-ND | Place jumper on header |
| 3 | JP10, JP11 | 2 | 2-pin header, male, TH | SAM1035-02-ND | DNP |
| 4 | J1, JP3, JP4, JP5, JP6, JP7, JP8 | 7 | 3-pin header, male, TH | SAM1035-03-ND | Place jumpers on pins 2-3 |
| 5 | J2 | 1 | 3-pin header, male, TH | SAM1035-03-ND | |
| 6 | JP1, JP2, JP9, J1, JP3, JP4, JP5, JP6, JP7, JP8 | 10 | Jumper | 15-38-1024-ND | Place on: JP1, JP2, JP9, J1, JP3, JP4, JP5, JP6, JP7, JP8 |
| 7 | R2, R3, R5, R6, R8, R9, R10, R11, R14 | 9 | DNP, 0805 | | DNP |
| 8 | R12, R13, R7 | 3 | 0R, 0805 | 541-000ATR-ND | |
| 9 | C5 | 1 | 1.1nF, CSMD0805 | 490-1623-2-ND | |
| 10 | C3, C7 | 2 | 1uF, 10V, CSMD0805 | 490-1702-2-ND | |
| 11 | R4 | 1 | 47k, 0805 | 541-47000ATR-ND | |
| 12 | C4, C6 | 2 | 100nF, CSMD0805 | 311-1245-2-ND | |
| 13 | R1 | 1 | 330R, 0805 | 541-330ATR-ND | |
| 14 | C1, C2, C8, C9 | 4 | DNP, CSMD0805 | | DNP |
| 15 | SW1, SW2 | 2 | EVQ-11L05R | P8079STB-ND | DNP |
| 16 | BOOTST | 1 | 10-pin connector, male, TH | HRP10H-ND | DNP, keep vias free of solder |
| 17 | JTAG | 1 | 14-pin connector, male, TH | HRP14H-ND | |
| 18 | Q1 | 1 | DNP: MS3V-TR1 (32768kHz, 20ppm, 12.5pF) | depends on application | Micro Crystal, DNP, enclosed in kit, keep vias free of solder |
| 19 | Q2 | 1 | DNP, Christal | depends on application | DNP, keep vias free of solder |
| 20 | U1 | 1 | Socket: QFN11T048-008 A101121-001 | | Manuf.: Yamaichi |
| 20.1 | U1 | 1 | MSP430FR5969IRGZ | | DNP: enclosed with kit. Is supplied by TI. |
| 21 | D1 | 1 | green LED, DIODE0805 | P516TR-ND | |
| 22 | D3 | 1 | red (DNP), DIODE0805 | | DNP |
| 23 | D2 | 1 | yellow (DNP), DIODE0805 | | DNP |
| 24 | TP1, TP2 | 2 | Testpoint | | DNP, keep pads free of solder |
| 25 | Rubber stand off | 4 | | Buerklin: 20H1724 | apply to corners at bottom side |
| 26 | PCB | 1 | 79.6 x 91.0 mm | MSP-TS430RGZ48C Rev. 1.2 | 2 layers, black solder mask |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.19 MSP-TS430PM64




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

**Figure B-38. MSP-TS430PM64 Target Socket Module, Schematic**



Copyright © 2009–2016, Texas Instruments Incorporated

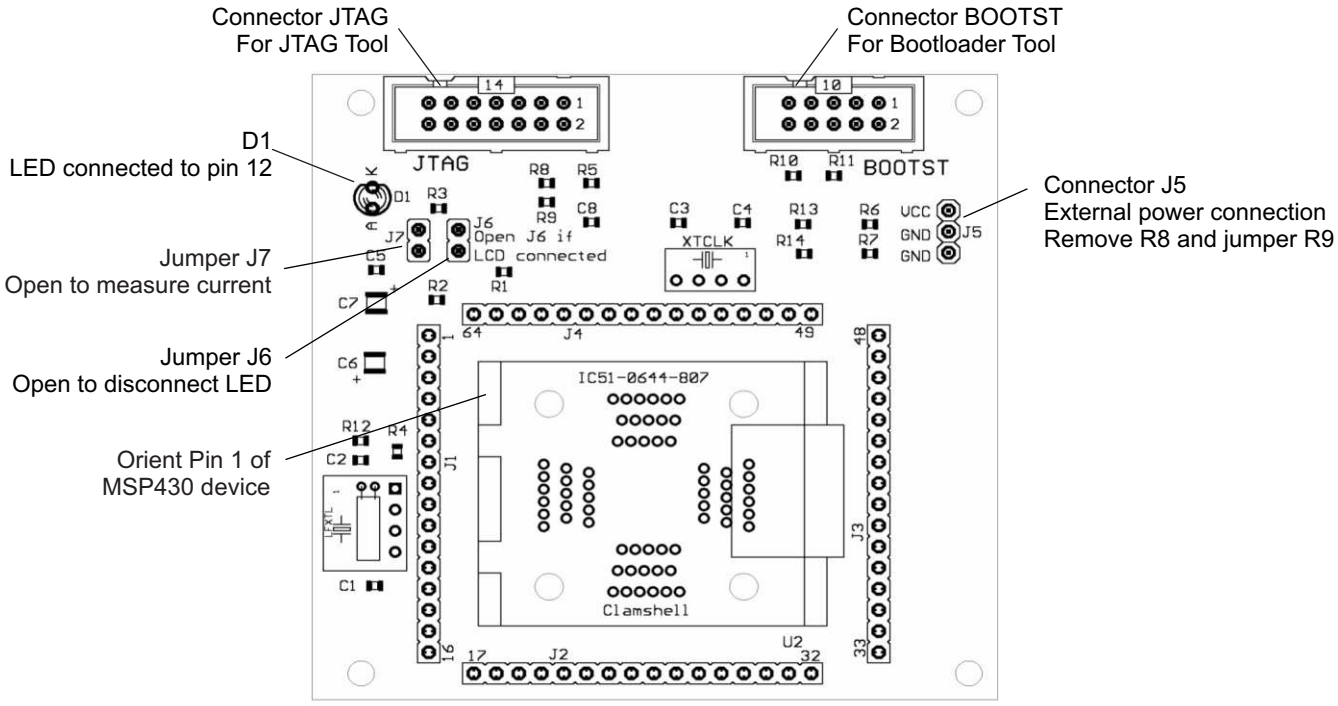



**Figure B-39. MSP-TS430PM64 Target Socket Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

## Table B-20. MSP-TS430PM64 Bill of Materials

| Pos. | Ref Des | No. per Board | Description | Digi-Key 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-ND<br>SAM1213-16-ND | DNP: Headers and receptacles enclosed with kit.Keep vias free of solder.<br>: Header<br>: 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<br>MSP430F417IPM | | DNP: Enclosed with kit supplied by TI |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.20 MSP-TS430PM64A

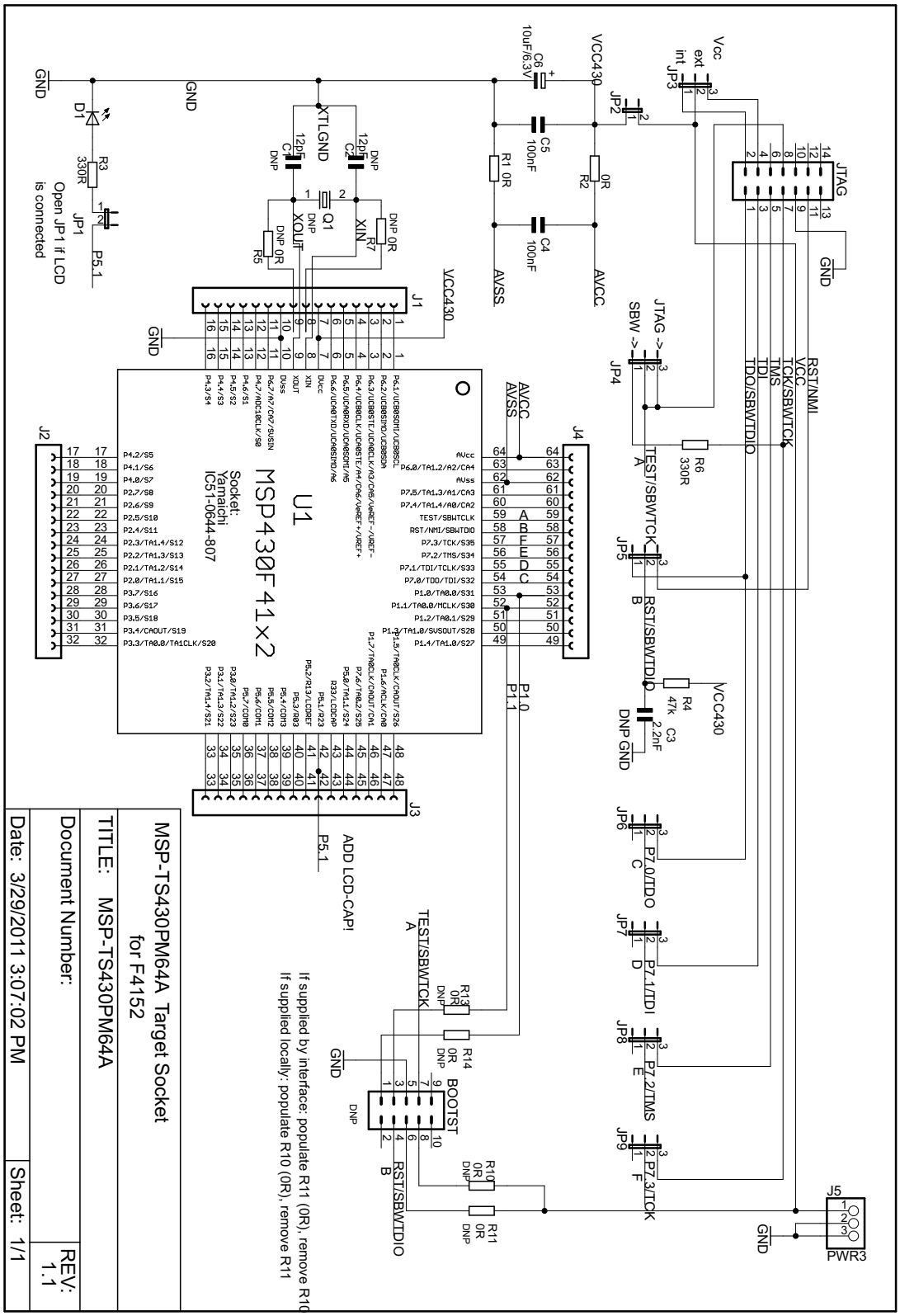



**Figure B-40. MSP-TS430PM64A Target Socket Module, Schematic**


Copyright © 2009–2016, Texas Instruments Incorporated

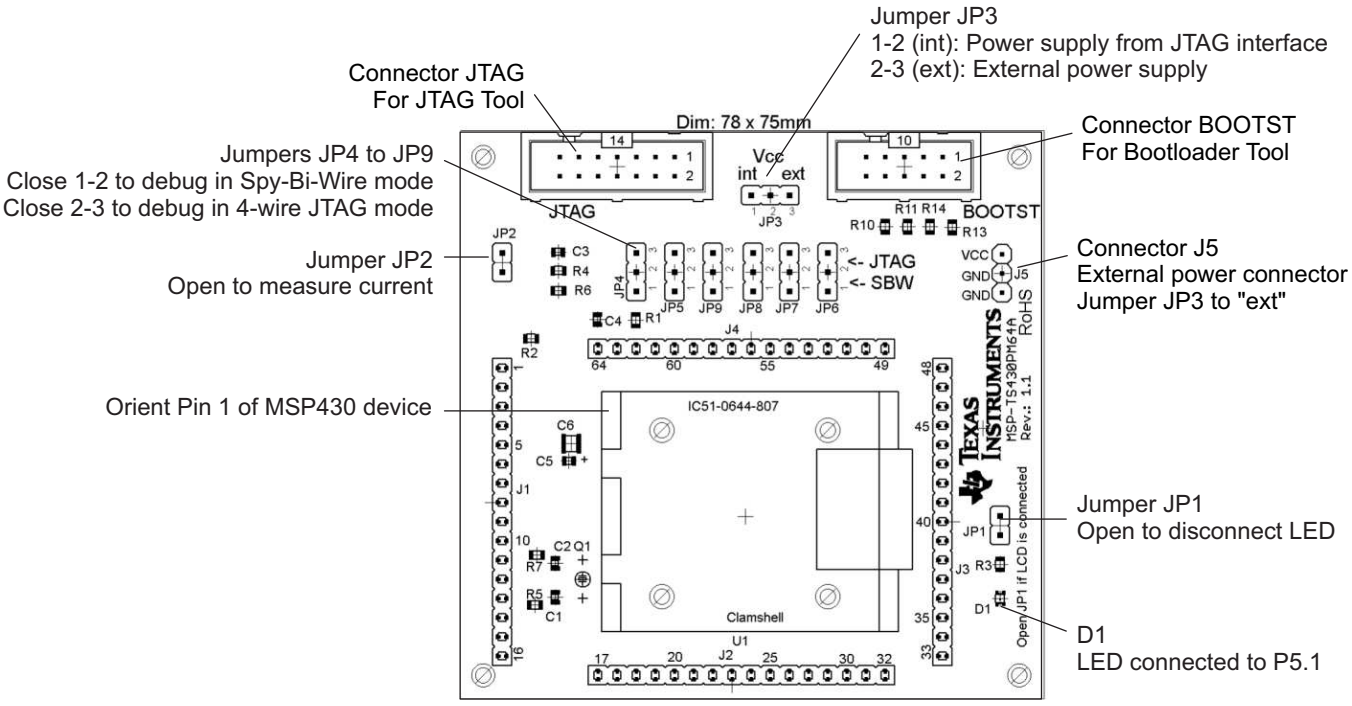



**Figure B-41. MSP-TS430PM64A Target Socket Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-21. MSP-TS430PM64A Bill of Materials**

| Pos. | Ref Des | No. per Board | Description | Digi-Key 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-ND<br>SAM1213-16-ND | DNP: Headers and receptacles enclosed with kit. Keep vias free of solder.<br>: Header<br>: 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 |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.21 MSP-TS430PM64D

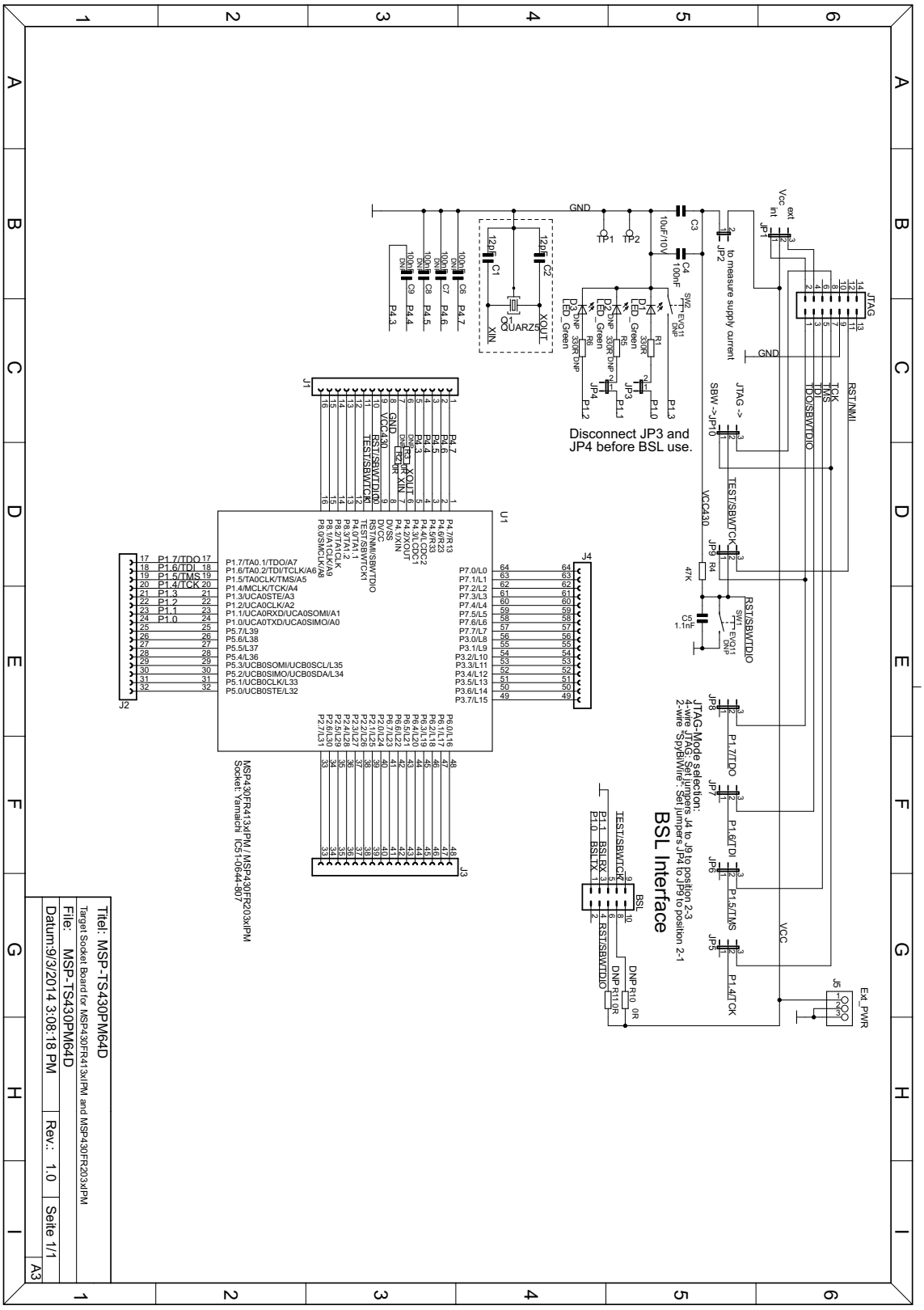



**Figure B-42. MSP-TS430PM64D Target Socket Module, Schematic**



Copyright © 2009–2016, Texas Instruments Incorporated

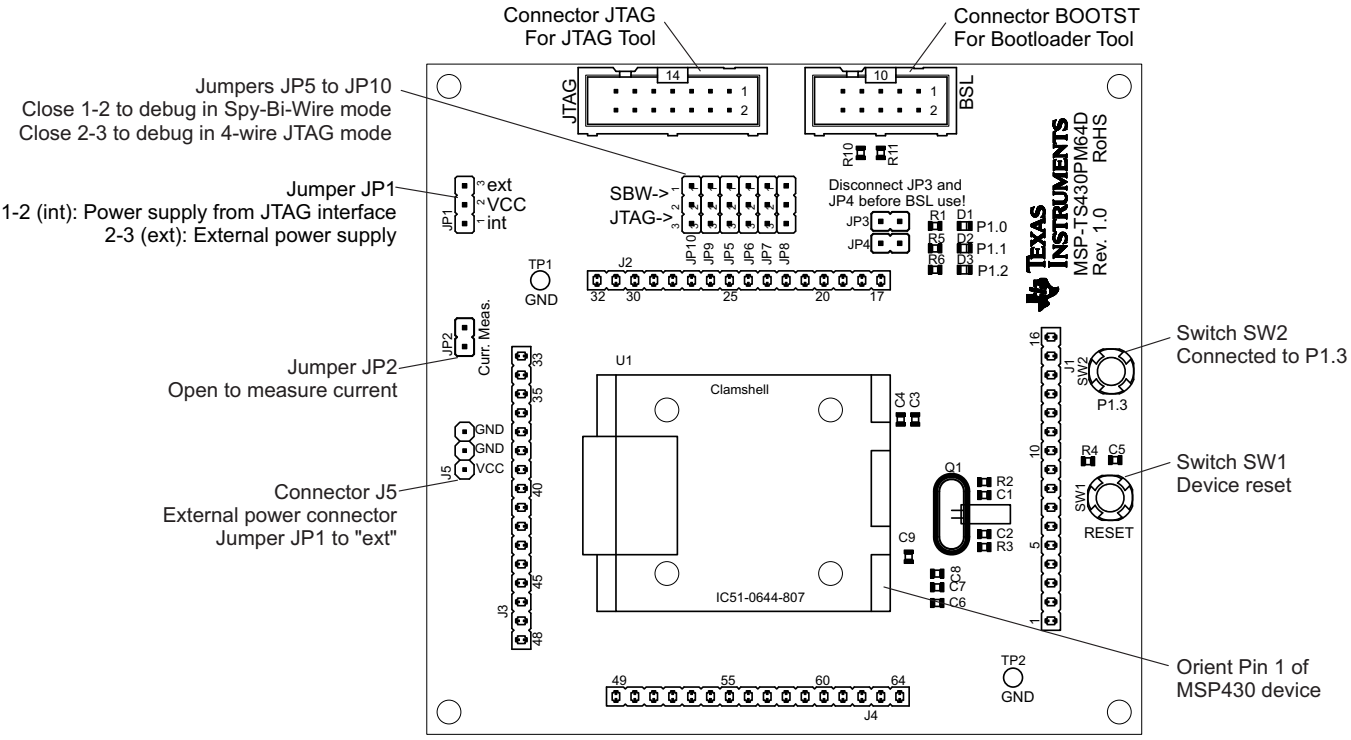



**Figure B-43. MSP-TS430PM64D Target Socket Module, PCB**

**NOTE:** For bootloader use, the BSL connector and only one of the resistors R10 or R11 must be populated. If the board is supplied internally, R11 (0 Ω) must be assembled. If the board is supplied externally, R10 (0 Ω) must be assembled, and R11 must be removed.



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-22. MSP-TS430PM64D Bill of Materials**

| Pos. | Ref Des | No. per Board | Description | Digi-Key Part No. | Comment |
|---|---|---|---|---|---|
| 1 | PCB | 1 | 90x96 mm | MSP-TS430PM64D Rev. 1.0 | 2 layers, 90x96mm, white solder mask |
| 2 | BSL | 1 | 10-pin connector, male, TH | HRP10H-ND | DNP, keep vias free of solder |
| 3 | D1 | 1 | Green LED, HSMG-C170, DIODE0805 | 516-1434-1-ND | Avago, Farnell 5790852 |
| 4 | D2, D3 | 2 | LED, DIODE0805 | | DNP |
| 5 | JP2, JP3, JP4 | 3 | 2-pin header, male, TH | SAM1035-02-ND | place jumper on header |
| 6 | JP1, JP5, JP6, JP7, JP8, JP9, JP10 | 7 | 3-pin header, male, TH | SAM1035-03-ND | place jumpers on pins 2-3 (JTAG) |
| 7 | R1 | 1 | 330R, 0805 | 541-330ATR-ND | |
| 8 | R5, R6 | 2 | 330R, 0805 | 541-330ATR-ND | DNP |
| 9 | R2, R3, R10, R11 | 4 | 0R, 0805 | 541-0.0ATR-ND | DNP |
| 10 | R4 | 1 | 47K, 0805 | 311-47KARTR-ND | |
| 11 | C1, C2 | 2 | 12pF, CSMD0805 | 709-1169-2-ND | |
| 12 | C3 | 1 | 10uF/10V, CSMD0805 | 445-1371-2-ND | |
| 13 | C4 | 1 | 100nF, CSMD0805 | 311-1245-2-ND | |
| 14 | C6, C7, C8, C9 | 4 | 100nF, CSMD0805 | 311-1245-2-ND | DNP |
| 15 | C5 | 1 | 1.1nF, CSMD0805 | 490-1623-2-ND | |
| 16 | J1, J2, J3, J4 | 1 | 16-pin header, TH | SAM1029-16-ND | DNP: headers and receptacles, enclosed with kit. Keep vias free of solder. |
| 17 | J1, J2, J3, J4 | 1 | 16-pin receptable, TH | SAM1213-16-ND | DNP: headers and receptacles, enclosed with kit. Keep vias free of solder. |
| 18 | JTAG | 1 | 14-pin connector, male, TH | HRP14H-ND | |
| 19 | U1 | 1 | Socket IC51-0644-807 | | Manuf.: Yamaichi |
| 20 | U1 | 2 | MSP430FR4133IPM | | DNP: enclosed with kit. Is supplied by TI. |
| 21 | J5 | 1 | 3-pin header, male, TH | SAM1035-03-ND | |
| 22 | Q1 | 1 | Microcrystal 32768Hz, MS3V-T1R (32.768kHz, 20ppm, 12.5pF) | | |
| 23 | SW1, SW2 | 2 | Panasonic EVQ11 | P8079STB-ND | DNP, Lacon: 1251459 |
| 24 | Rubber stand off | 4 | | Buerklin: 20H1724 | apply to corners at bottom side |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.22 MSP-TS430PM64F

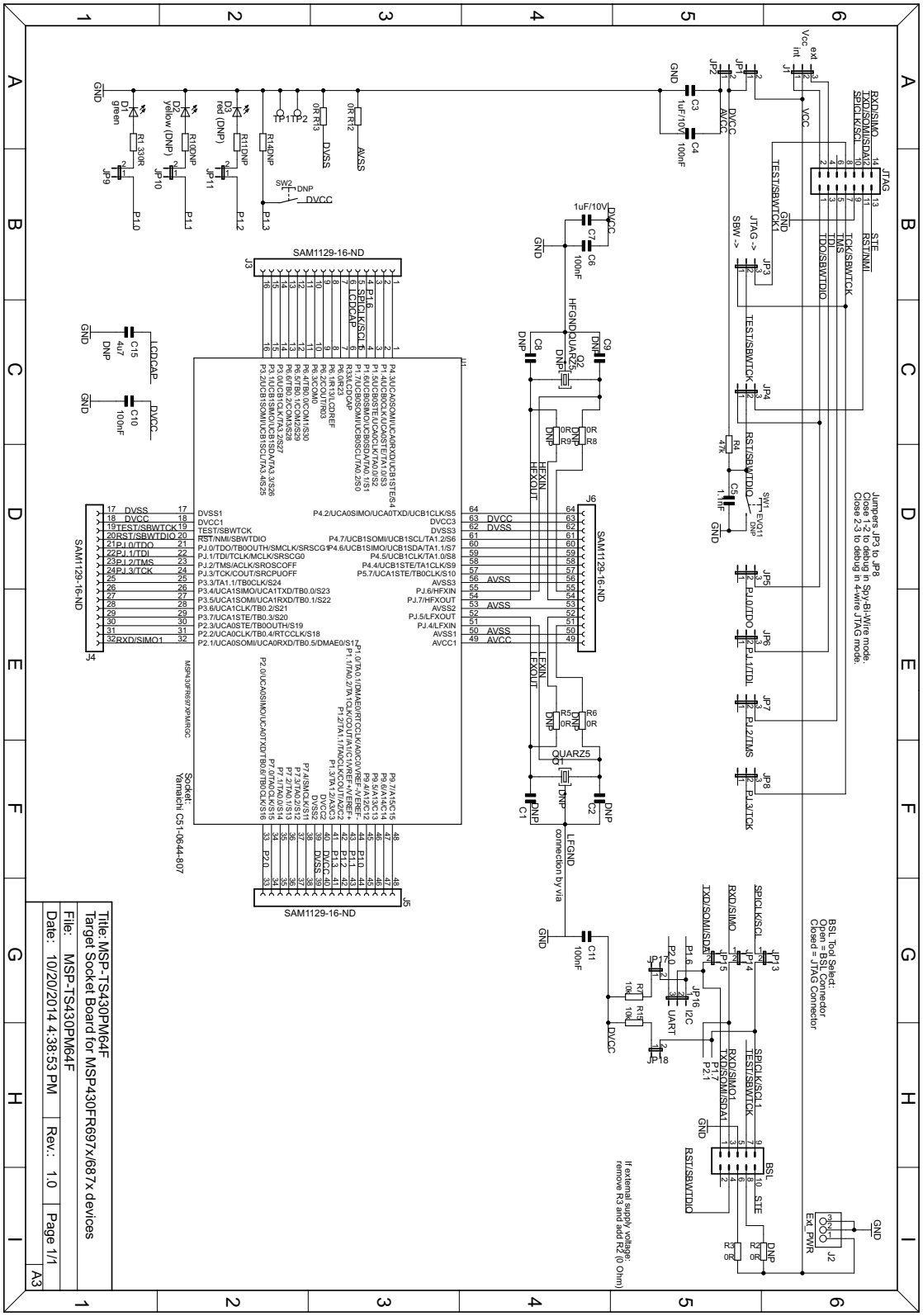
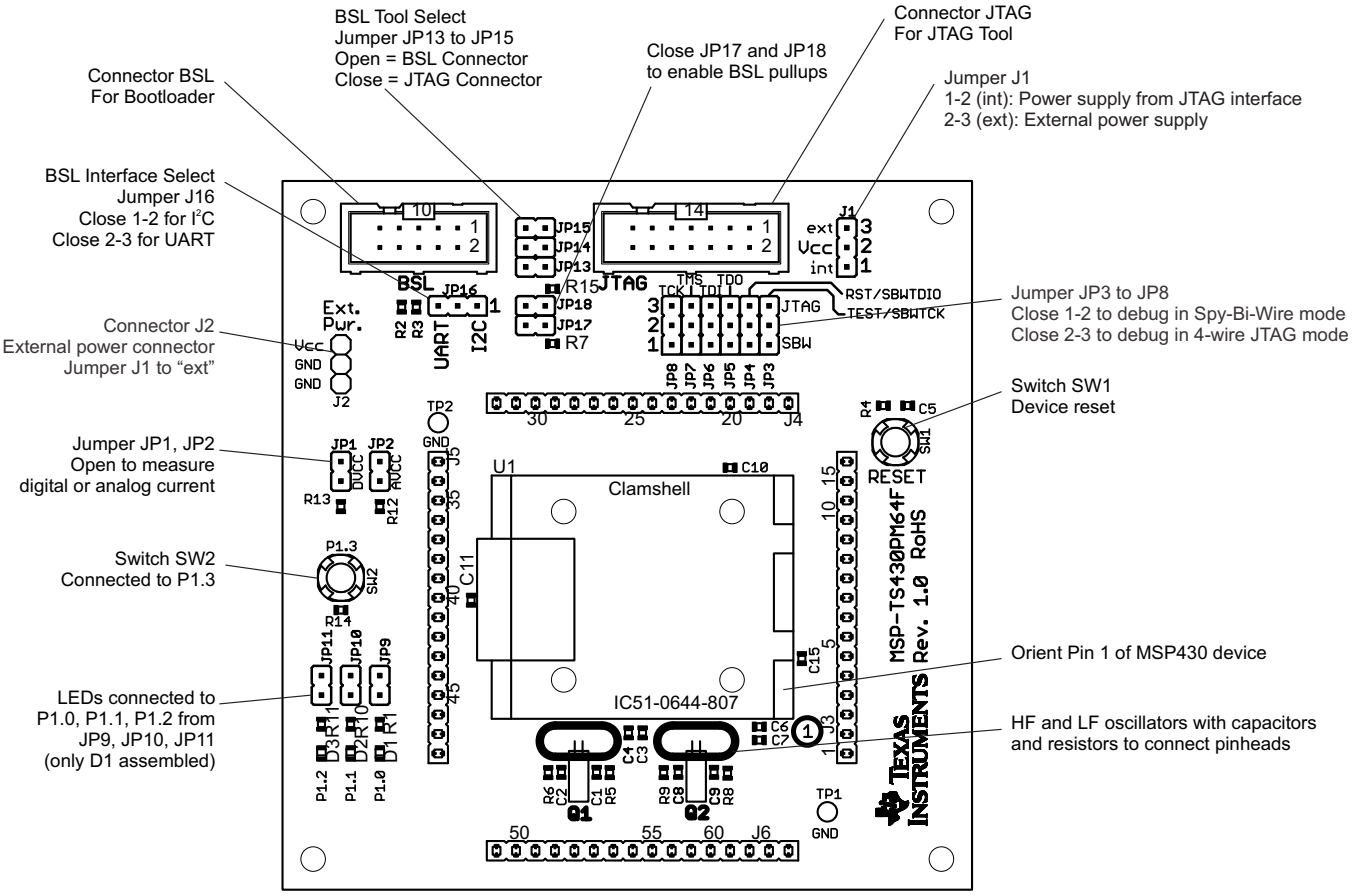



**Figure B-44. MSP-TS430PM64F Target Socket Module, Schematic**


Copyright © 2009–2016, Texas Instruments Incorporated




This target board supports UART or I²C BSL configuration. To select the configuration to use, set the jumpers as shown in the following table.

| Jumper Configuration | UART BSL Configuration | I²C BSL Configuration |
|---|---|---|
| JP17 and JP18 | Open | Close |
| JP16 | Close 2-3 (UART) | Close 1-2 (I2C) |

**Figure B-45. MSP-TS430PM64F Target Socket Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

## Table B-23. MSP-TS430PM64F Bill of Materials (BOM)

| Pos. | Ref Des | Number per Board | Description | DigiKey Part Number | Comment |
|---|---|---|---|---|---|
| 1 | PCB | 1 | 90.0 x 92.5 mm | MSP-TS430PM64F Rev. 1.0 | 2 layers, purple solder mask |
| 2 | JP1, JP2, JP9, JP13, JP14, JP15, | 6 | 2-pin header, male, TH | SAM1035-02-ND | place jumper on header |
| 3 | JP17, JP18 | 2 | 2-pin header, male, TH | SAM1035-02-ND | place jumper on header's pin1 only |
| 4 | JP10, JP11 | 2 | 2-pin header, male, TH | SAM1035-02-ND | DNP, keep pads free of solder |
| 5 | J1 | 1 | 3-pin header, male, TH | SAM1035-03-ND | place jumpers on pins 1-2 |
| 6 | JP3, JP4, JP5, JP6, JP7, JP8, JP16 | 7 | 3-pin header, male, TH | SAM1035-03-ND | place jumpers on pins 2-3 |
| 7 | J2 | 1 | 3-pin header, male, TH | SAM1035-03-ND | |
| 8 | R2, R5, R6, R8, R9 | 5 | 0R, 0805 | 541-0.0ATR-ND | DNP |
| 9 | R3, R12, R13 | 3 | 0R, 0805 | 541-0.0ATR-ND | |
| 10 | C5 | 1 | 1.1nF, CSMD0805 | 490-1623-2-ND | |
| 11 | C3, C7 | 2 | 1uF/10V, CSMD0805 | 490-1702-2-ND | |
| 12 | C15 | 1 | 4u7, CSMD0805 | 445-1370-1-ND | DNP |
| 13 | R7, R15 | 1 | 10k, 0805 | 541-10KATR-ND | |
| 14 | R4 | 1 | 47k, 0805 | 541-47KATR-ND | |
| 15 | C4, C6, C10, C11 | 4 | 100nF, CSMD0805 | 490-1666-1-ND | |
| 16 | R1 | 1 | 330R, 0805 | 541-330ATR-ND | |
| 17 | R10, R11 | 2 | 330R, 0805 | 541-330ATR-ND | DNP |
| 18 | R14 | 1 | 47k, 0805 | 541-47KATR-ND | DNP |
| 19 | C1, C2, C8, C9 | 4 | DNP, CSMD0805 | | DNP |
| 20 | SW2 | 1 | EVQ-11L05R | P8079STB-ND | DNP, Lacon: 1251459 |
| 21 | SW1 | 1 | EVQ-11L05R | P8079STB-ND | DNP, Lacon: 1251459 |
| 22 | J3, J4, J5, J6 | 4 | 16-pin header, TH | SAM1029-16-ND | DNP: headers enclosed with kit. Keep vias free of solder. |
| 23 | J3, J4, J5, J6 | 4 | 16-pin receptacle, TH | SAM1213-16-ND | DNP: receptacles enclosed with kit. Keep vias free of solder. |
| 24 | TP1, TP2 | 2 | Testpoint | | DNP, keep pads free of solder |
| 25 | BSL | 1 | 10-pin connector, male, TH | HRP10H-ND | |
| 26 | JTAG | 1 | 14-pin connector, male, TH | HRP14H-ND | |
| 27 | U1 | 1 | Socket:IC51-0644-807 | | Manuf. Yamaichi |
| 28 | U1 | 2 | MSP430FR6972IPMR | | DNP: enclosed with kit. Is supplied by TI. |
| 29 | Q1 | 1 | DNP: MS3V-TR1 (32,768kHz/ 20ppm/12,5pF) | depends on application | Micro Crystal, DNP, enclosed in kit, keep vias free of solder |
| 30 | Q2 | 1 | DNP, Crystal | depends on application | DNP, keep vias free of solder |
| 31 | D1 | 1 | green LED, HSMG-C170 DIODE0805 | 516-1434-1-ND | Avago, Farnell 5790852 |
| 32 | D3 | 1 | red (DNP), DIODE0805 | | DNP |
| 33 | D2 | 1 | yellow (DNP), DIODE0805 | | DNP |
| 34 | Rubber stand off | 4 | | Buerklin: 20H1724 | apply to corners at bottom side |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.23 MSP-TS430RGC64B

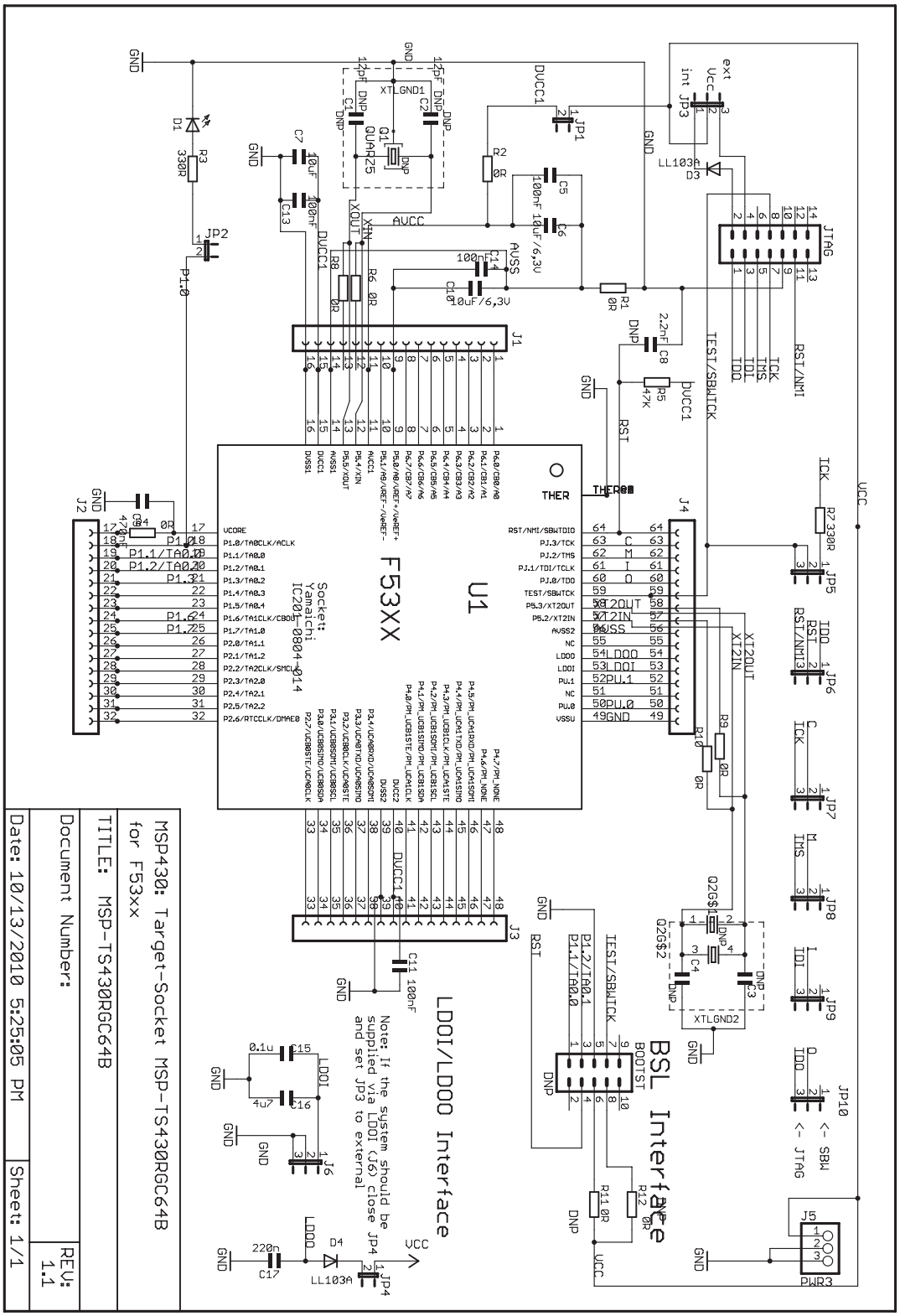



**Figure B-46. MSP-TS430RGC64B Target Socket Module, Schematic**



Copyright © 2009–2016, Texas Instruments Incorporated

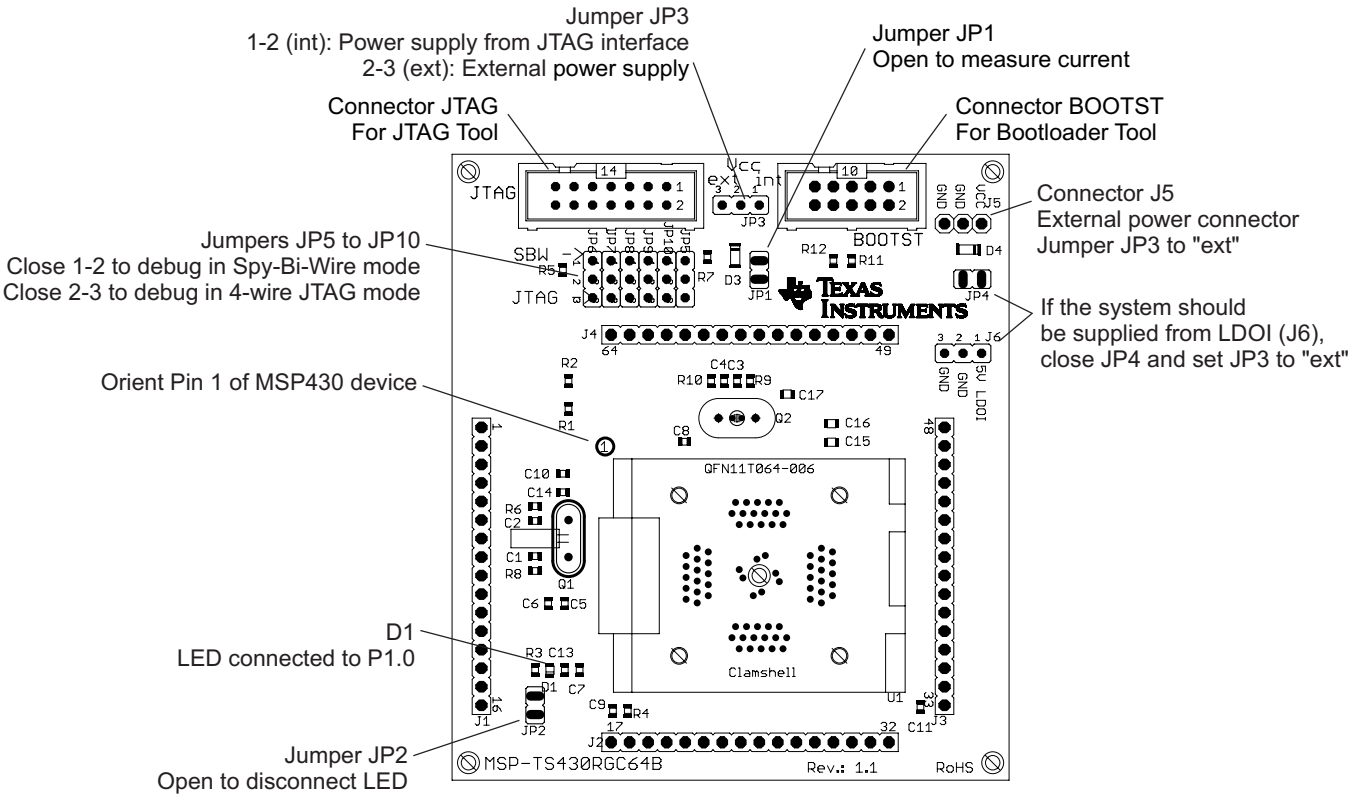



**Figure B-47. MSP-TS430RGC64B Target Socket Module, PCB**

**NOTE:** For bootloader use, the BSL connector and only one of the resistors R11 or R12 must be populated. If the board is supplied internally, R11 (0 Ω) must be assembled. If the board is supplied externally, R12 (0 Ω) must be assembled, and R11 must be removed.



Copyright © 2009–2016, Texas Instruments Incorporated

## Table B-24. MSP-TS430RGC64B Bill of Materials

| Pos. | Ref Des | No. per Board | Description | Digi-Key Part No. | Comment |
|---|---|---|---|---|---|
| 1 | C1, C2 | 0 | 12pF, SMD0805 | | DNP |
| 2 | C3, C4 | 0 | 47pF, SMD0805 | | DNP |
| 3 | C6, C7, C10 | 3 | 10uF, 6.3V, SMD0805 | | |
| 4 | C5, C11, C13, C14, C15 | 5 | 100nF, SMD0805 | 311-1245-2-ND | |
| 5 | C8 | 1 | 2.2nF, SMD0805 | | |
| 6 | C9 | 1 | 470nF, SMD0805 | 478-1403-2-ND | |
| 7 | C16 | 1 | 4.7uF, SMD0805 | | |
| 8 | C17 | 1 | 220nF, SMD0805 | | |
| 9 | D1 | 1 | green LED, SMD0805 | P516TR-ND | |
| 10 | J1, J2, J3, J4 | 0 | 16-pin header, TH | SAM1029-16-ND (Header) SAM1213-16-ND (Receptacle) | DNP: Headers and receptacles enclosed with kit. Keep vias free of solder: |
| 11 | J5 , J6 | 2 | 3-pin header, male, TH | | |
| 12 | 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, |
| 13 | JP1, JP2, JP4 | 3 | 2-pin header, male, TH | SAM1035-02-ND | Place jumper on header |
| 14 | | 10 | Jumper | 15-38-1024-ND | See Pos. 12 and Pos. 13 |
| 15 | JTAG | 1 | 14-pin connector, male, TH | HRP14H-ND | |
| 16 | BOOTST | 0 | 10-pin connector, male, TH | | "DNP Keep vias free of solder" |
| 17 | Q1 | 0 | Crystal | Micro Crystal MS3V-T1R 32.768kHz, C(Load) = 12.5pF | DNP: Q1 Keep vias free of solder |
| 18 | Q2 | 0 | Crystal | Q2: 4MHz Buerklin: 78D134 | DNP: Q2 Keep vias free of solder |
| 19 | Insulating disk to Q2 | 0 | Insulating disk to Q2 | http://www.ettinger.de/Art_Detail.cfm?ART_ARTNUM=70.08.121 | |
| 20 | R3, R7 | 2 | 330 Ω, SMD0805 | 541-330ATR-ND | |
| 21 | R1, R2, R4, R6, R8, R9,R10, R11, R12 | 3 | 0 Ohm, SMD0805 | 541-000ATR-ND | DNP: R6, R8, R9, R10, R11,R12 |
| 22 | R5 | 1 | 47k Ω, SMD0805 | 541-47000ATR-ND | |
| 23 | U1 | 1 | Socket: QFN11T064-006-N-HSP | | Manuf.: Yamaichi |
| 24 | PCB | 1 | 85 x 76 mm | | 2 layers |
| 25 | Adhesive plastic feet | 4 | Approximately 6mm width, 2mm height | for example, 3M Bumpons Part No. SJ-5302 | Apply to corners at bottom side |
| 26 | D3,D4 | | | | |
| 27 | MSP430 | 2 | MSP430F5310 RGC | | DNP: enclosed with kit, supplied by TI |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.24 MSP-TS430RGC64C

The MSP-TS430RGC64C target board has been designed with the option to operate with the target device DVIO input voltage supplied via header J6 (see Figure B-48). This development platform does not supply the 1.8-V DVIO rail on board and it MUST be provided by external power supply for proper device operation. For correct JTAG connection, programming, and debug operation, it is important to follow this procedure:

1. Make sure that the VCC and DVIO voltage supplies are OFF and that the power rails are fully discharged to 0 V.
2. Enable the 1.8-V external DVIO power supply.
3. Enable the 1.8-V to 3.6-V VCC power supply (alternatively, this supply can be provided from the MSP-FET430UIF JTAG debugger interface).
4. Connect the MSP-FET430UIF JTAG connector to the target board.
5. Start the debug session using IAR or CCS IDE.

For more information on debugging the MSP4and MSP430F525x, see the device-specific data sheets (MSP430F522x: SLAS718; MSP430F525x: SLAS903) and *Designing with MSP430F522x and MSP430F521x Devices* (SLAA558).

For debugging of devices (MSP430F524x and MSP430F523x) without use of the DVIO power domain, short JP4 with the jumper.


Copyright © 2009–2016, Texas Instruments Incorporated

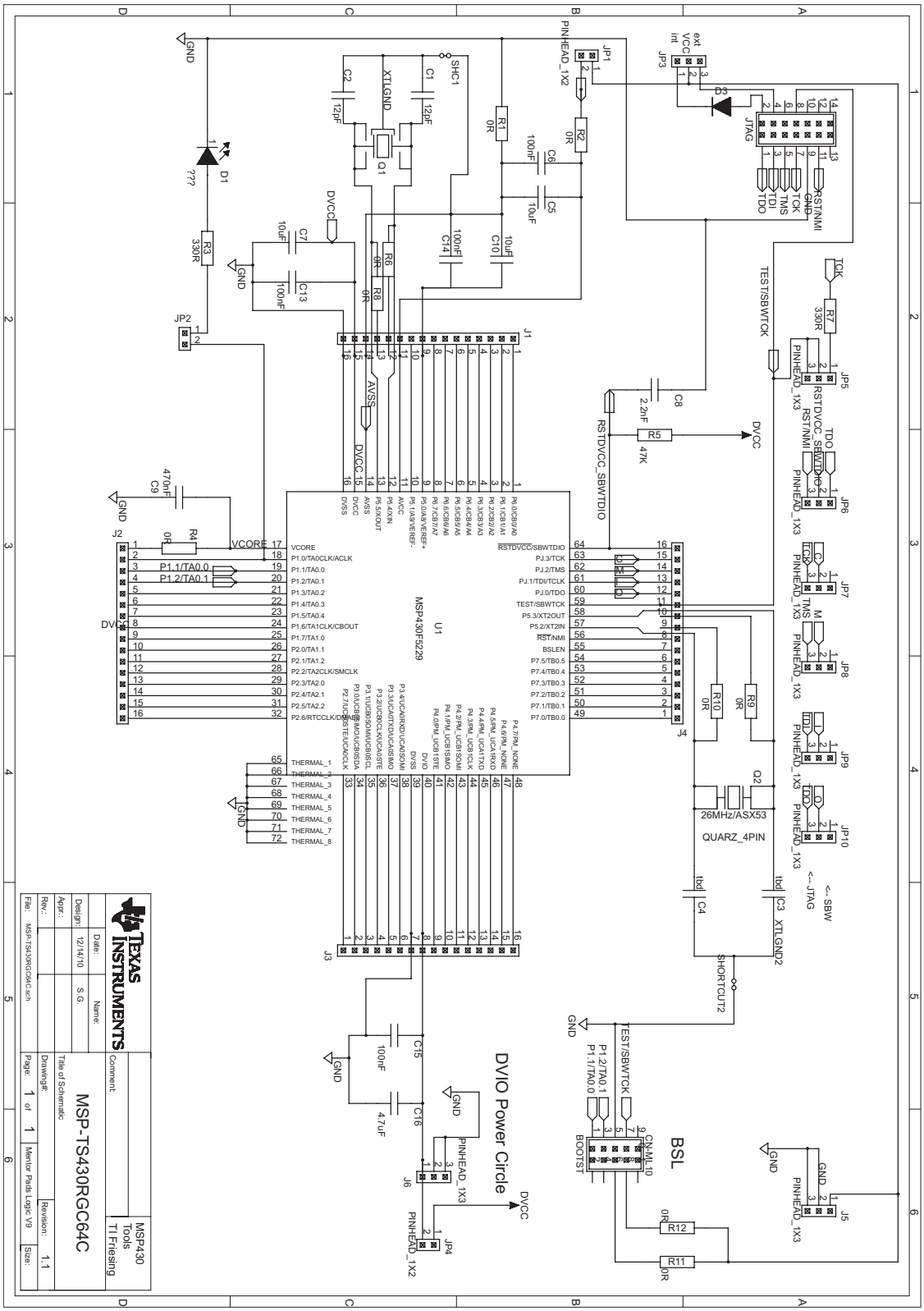



**Figure B-48. MSP-TS430RGC64C Target Socket Module, Schematic**



Copyright © 2009–2016, Texas Instruments Incorporated

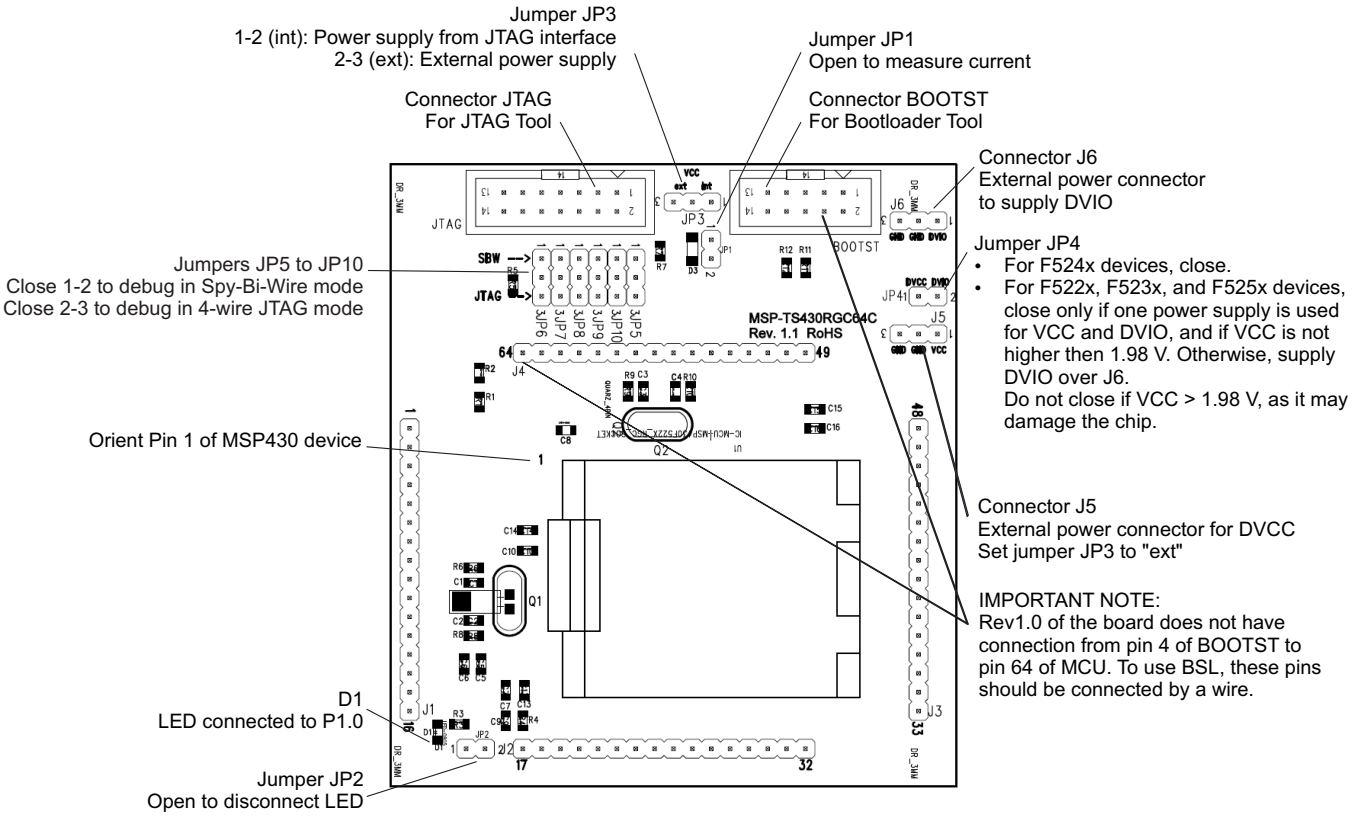



**Figure B-49. MSP-TS430RGC64C Target Socket Module, PCB**

**NOTE:** For bootloader use, the BSL connector and only one of the resistors R11 or R12 must be populated. If the board is supplied internally, R11 (0 Ω) must be assembled. If the board is supplied externally, R12 (0 Ω) must be assembled, and R11 must be removed.



Copyright © 2009–2016, Texas Instruments Incorporated

## Table B-25. MSP-TS430RGC64C Bill of Materials

| Item | Qty | Reference | Value | Description | Comment | Supplier No. |
|---|---|---|---|---|---|---|
| 1 | 0 | C1, C2 | 12pF | CAP, SMD, Ceramic, 0805 | DNP C1 C2 | |
| 2 | 0 | C3, C4 | | CAP, SMD, Ceramic, 0805 | DNP C3 C4 | |
| 4 | 3 | C5, C7, C10 | 10uF | CAP, SMD, Ceramic, 0805 | | |
| 5 | 5 | C8 C6 C13-15 | 100nF | CAP, SMD, Ceramic, 0805 | | Digi-Key: 311-1245-2-ND |
| 5 | 5 | C8 | 2.2nF | CAP, SMD, Ceramic, 0805 | | |
| 6 | 1 | C9 | 470nF | CAP, SMD, Ceramic, 0805 | | Digi-Key: 478-1403-2-ND |
| 7 | 1 | C16 | 4.7uF | CAP, SMD, Ceramic, 0805 | | |
| 8 | 1 | D1 | Green LED | LED, SMD, 0805 | | |
| 9 | 4 | J1-J4 | 16-pin header | Pin header 1x16: Grid: 100mil (2.54 mm) | DNP: headers and receptacles enclosed with kit. Keep vias free of solder.<br>: Header<br>: Receptacle | <br><br>SAM1029-16-ND<br>SAM1213-16-ND |
| 10 | 2 | J5, J6 | 3-pin header, male, TH | Pin header 1x3: Grid: 100mil (2.54 mm) | | SAM1035-03-ND |
| 11 | | JP5, JP6, JP7, JP8, JP9, JP10 | 3-pin header, male, TH | Pinheader 1x3: Grid: 100mil (2.54 mm) | place jumpers on pins 2-3 | SAM1035-03-ND |
| 12 | | JP3 | 3-pin header, male, TH | Pin header 1x3: Grid: 100mil (2.54 mm) | place jumper on pins 1-2 | SAM1035-03-ND |
| 13 | | JP1, JP2, JP4 | 2-pin header, male, TH | Pin header 1x2; Grid: 100mil (2.54 mm) | place jumper on header | SAM1035-02-ND |
| 14 | 10 | | Jumper | | Place on: JP1, JP2, JP3, JP4, JP5, JP6, JP7, JP8, JP9, JP10 | 15-38-1024-ND |
| 15 | 1 | JTAG | 2x7Pin,Wanne | Header, THD, Male 2x7 Pin, Wanne, 100mil spacing | | HRP14H-ND |
| 16 | 0 | BOOTST | 2x5Pin,Wanne | Header, THD, Male 2x5 Pin, Wanne, 100mil spacing | | DNP |
| 17 | 1 | Q1 | 26MHz/ASX53 | CRYSTAL, SMD, 5x3MM, 26MHz | | Only Kit. |
| 18 | 0 | Q2 | 26MHz/ASX53 | CRYSTAL, SMD, 5x3MM, 26MHz | | 300-8219-1-ND |
| 19 | 1 | D3 | LL103A | DIODE, SMD, SOD123, Schottky | | Buerklin: 24S3406 |
| 20 | 2 | R3, R7 | 330 Ohm, SMD0805 | | | 541-330ATR-ND |
| 21 | 1 | R5 | 47k Ohm, SMD0805 | RES, SMD, 0805, 1/8W, x% | | 541-47000ATR-ND |
| 22 | | R1, R2, R4, R6, R8, R9, R10, R11, R12 | 0 Ohm, SMD0805 | RES, SMD, 0805, 1/8W, x% | DNP: R6, R8, R9, R10, R11,R12 | 541-000ATR-ND |
| 23 | 1 | U1 | | Socket: QFN11T064-006-N-HSP | Manuf.: Yamaichi | |
| 24 | 2 | MSP430 | MSP430F5229IRGCR | IC, MCU, SMD, 9.15x9.15mm Thermal Pad with Socket | | |
| 25 | 4 | Rubber stand off | Rubber stand off | | apply to corners at bottom side | Buerklin: 20H1724 |
| 26 | 1 | PCB | 84 x 76 mm | 84 x 76 mm | | |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.25 MSP-TS430RGC64USB

Due to the use of diodes in the power chain, the voltage on the MSP430F5xx device is approximately 0.3 V lower than is set by the debugging tool. Set the voltage in the IDE to 0.3 V higher than desired; for example, to run the MCU at 3.0 V, set it to 3.3 V.

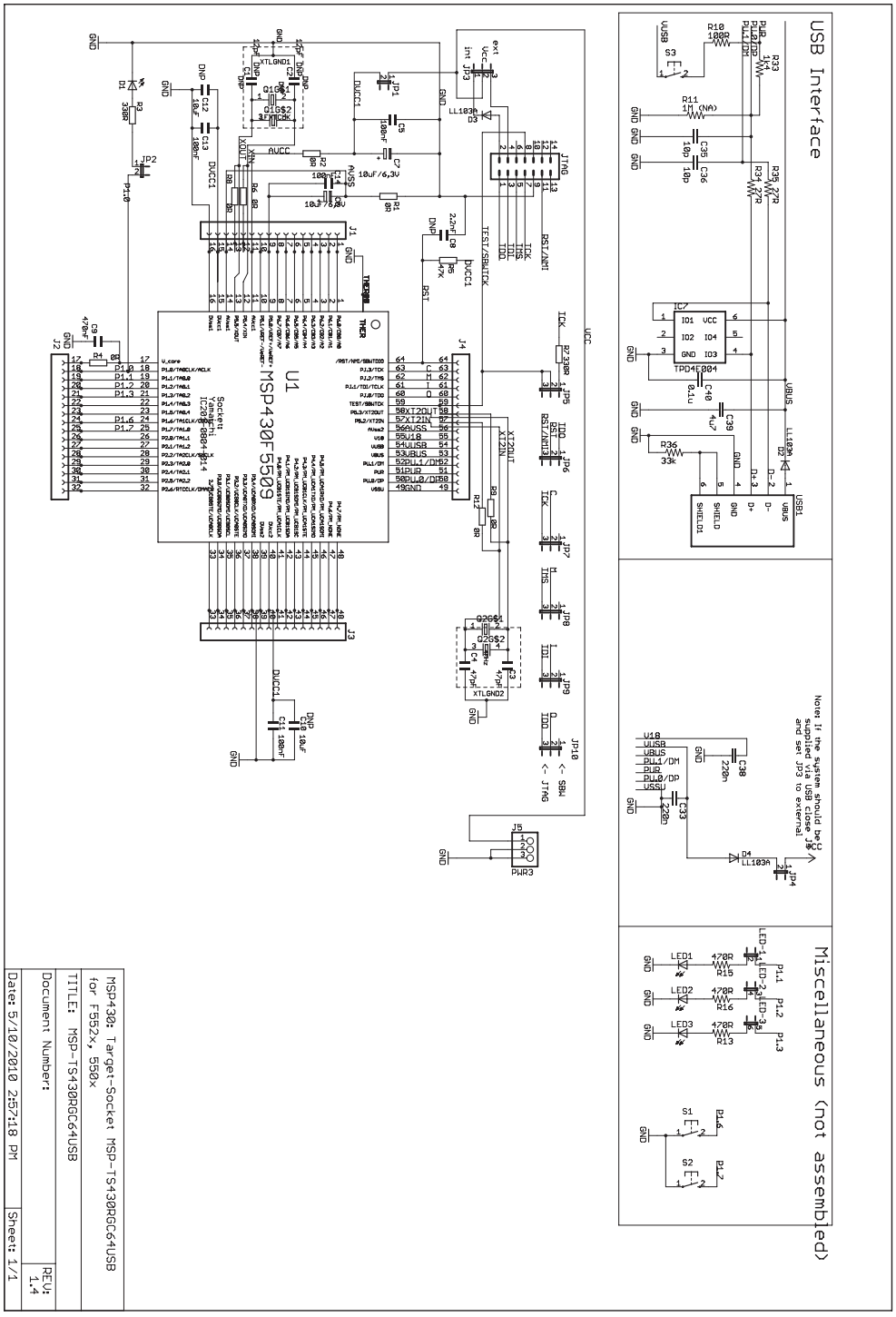



**Figure B-50. MSP-TS430RGC64USB Target Socket Module, Schematic**


Copyright © 2009–2016, Texas Instruments Incorporated

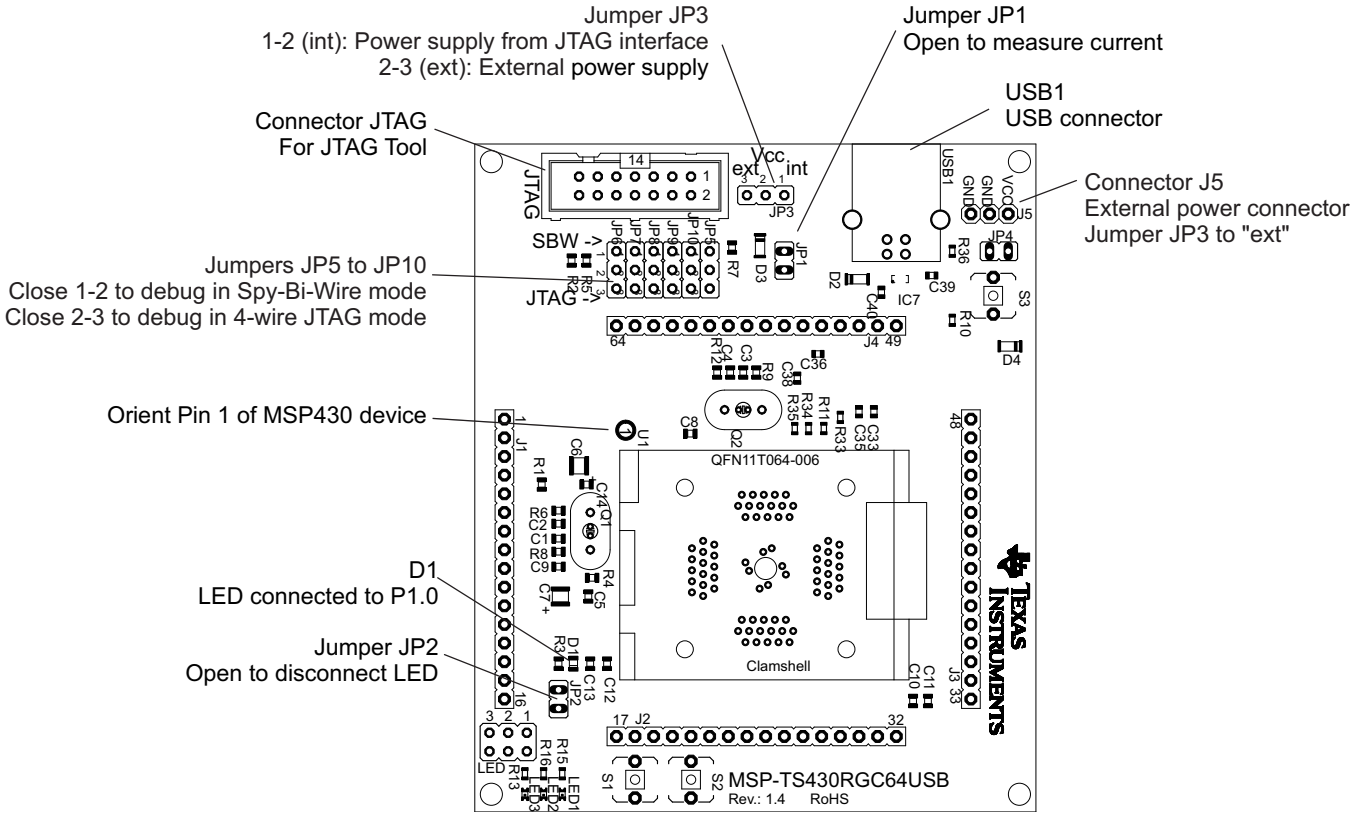



**Figure B-51. MSP-TS430RGC64USB Target Socket Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-26. MSP-TS430RGC64USB Bill of Materials**

| Pos. | Ref Des | No. Per Board | Description | Digi-Key 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 | 10uF, SMD0805 | | 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 | 16-pin header, TH | | DNP: headers and receptacles enclosed with kit. Keep vias free of solder. |
| | | | | SAM1029-16-ND | : Header |
| | | | | SAM1213-16-ND | : 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, JP4 | 3 | 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 | | 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 | Q1: Micro Crystal MS1V-T1K 32.768kHz, C(Load) = 12.5pF | DNP: Q1<br>Keep vias free of solder |
| 15 | Q2 | 1 | Crystal | Q2: 4MHz Buerklin: 78D134 | |
| 16 | R3, R7 | 2 | 330 Ω, SMD0805 | 541-330ATR-ND | |
| 17 | R1, R2, R4, R6, R8, R9, R12 | 2 | 0 Ω, SMD0805 | 541-000ATR-ND | DNP: R4, R6, R8, R9, R12 |
| 18 | R10 | 1 | 100 Ω, SMD0805 | Buerklin: 07E500 | |
| 18 | R11 | 1 | 1M Ω, SMD0805 | | |
| 18 | R5 | 1 | 47k Ω, SMD0805 | 541-47000ATR-ND | |
| 19 | U1 | 1 | Socket: QFN11T064-006 | | Manuf.: Yamaichi |
| 20 | PCB | 1 | 79 x 77 mm | | 2 layers |
| 21 | Rubber stand off | 4 | | Buerklin: 20H1724 | Apply to corners at bottom side |
| 22 | MSP430 | 2 | MSP430F5509 RGC | | DNP: enclosed with kit. Is supplied by TI |
| 23 | Insulating disk to Q2 | 1 | Insulating disk to Q2 | http://www.ettinger.de/Art_Detail.cfm?ART_ARTNUM=70.08.121 | |
| 27 | C33 | 1 | 220n SMD0603 | Buerklin: 53D2074 | |
| 28 | C35 | 1 | 10p SMD0603 | Buerklin: 56D102 | |
| 29 | C36 | 1 | 10p SMD0603 | Buerklin: 56D102 | |
| 30 | C38 | 1 | 220n SMD0603 | Buerklin: 53D2074 | |
| 31 | C39 | 1 | 4u7 SMD0603 | Buerklin: 53D2086 | |
| 32 | C40 | 1 | 0.1u SMD0603 | Buerklin: 53D2068 | |
| 33 | D2, D3, D4 | 3 | LL103A | Buerklin: 24S3406 | |
| 34 | IC7 | 1 | TPD4E004 | | Manu: TI |
| 36 | LED | 0 | JP3QE | SAM1032-03-ND | DNP |

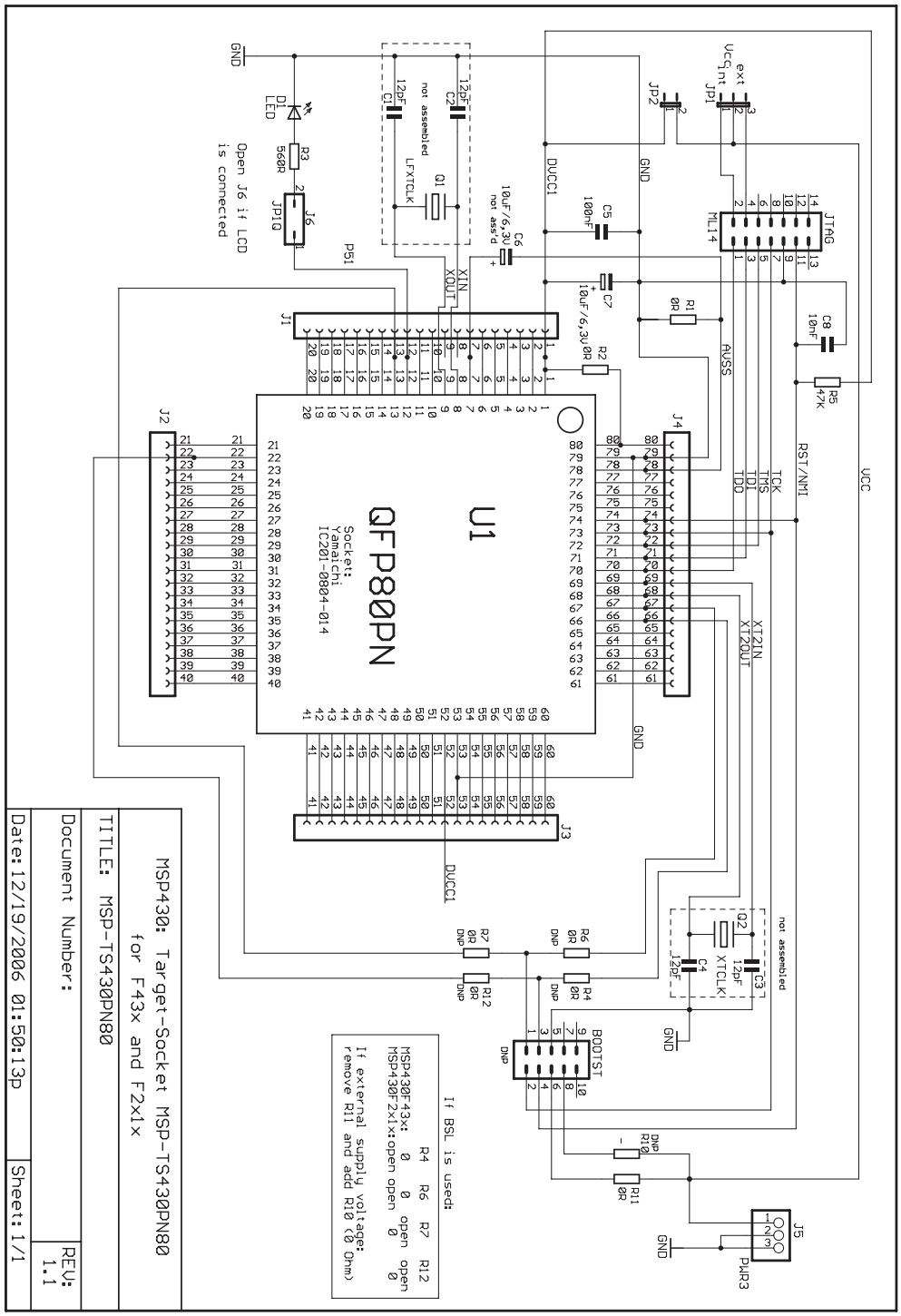

Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-26. MSP-TS430RGC64USB Bill of Materials (continued)**

| Pos. | Ref Des | No. Per Board | Description | Digi-Key Part No. | Comment |
|---|---|---|---|---|---|
| 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 / 1k5 | 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 | |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.26 MSP-TS430PN80




NOTE: For MSP430F47x and MSP430FG47x devices:
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).
For use of BSL: connect pin 1 of BOOST to pin 58 of U1 and pin 3 of BOOST to pin 57 of U1.

**Figure B-52. MSP-TS430PN80 Target Socket Module, Schematic**


Copyright © 2009–2016, Texas Instruments Incorporated

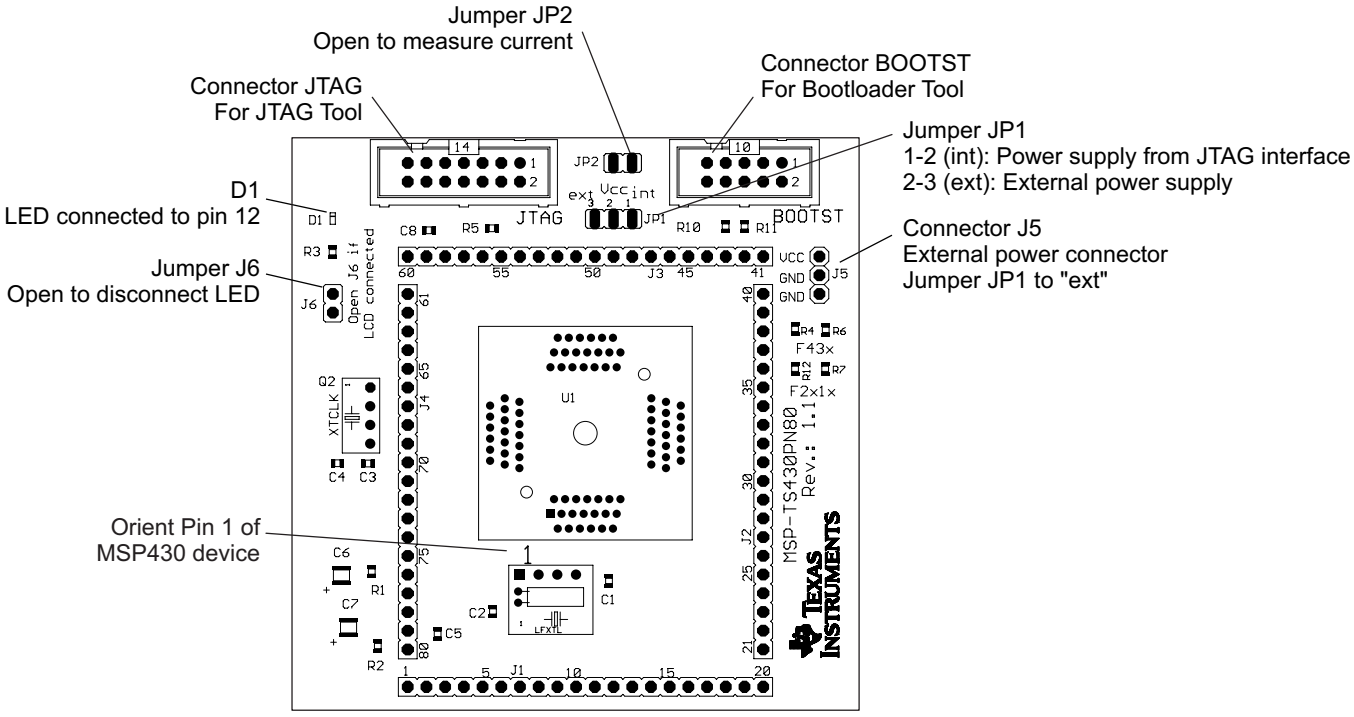



**Figure B-53. MSP-TS430PN80 Target Socket Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-27. MSP-TS430PN80 Bill of Materials**

| Pos. | Ref Des | No. per Board | Description | Digi-Key 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-ND<br>SAM1213-20-ND | DNP: Headers and receptacles enclosed with kit.Keep vias free of solder.<br>: Header<br>: 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 | Q1: 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 | R1, R2, R4, R6, R7, R10, R11, R12 | 2 | 0 Ω, SMD0805 | 541-000ATR-ND | DNP: R4, R6, R7, R10, R11, R12 |
| 15 | R5 | 1 | 47k Ω, 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 | for example, 3M Bumpons Part No. SJ-5302 | Apply to corners at bottom side |
| 19 | MSP430 | 2 | MSP430FG439IPN | | DNP: Enclosed with kit supplied by TI |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.27 MSP-TS430PN80A

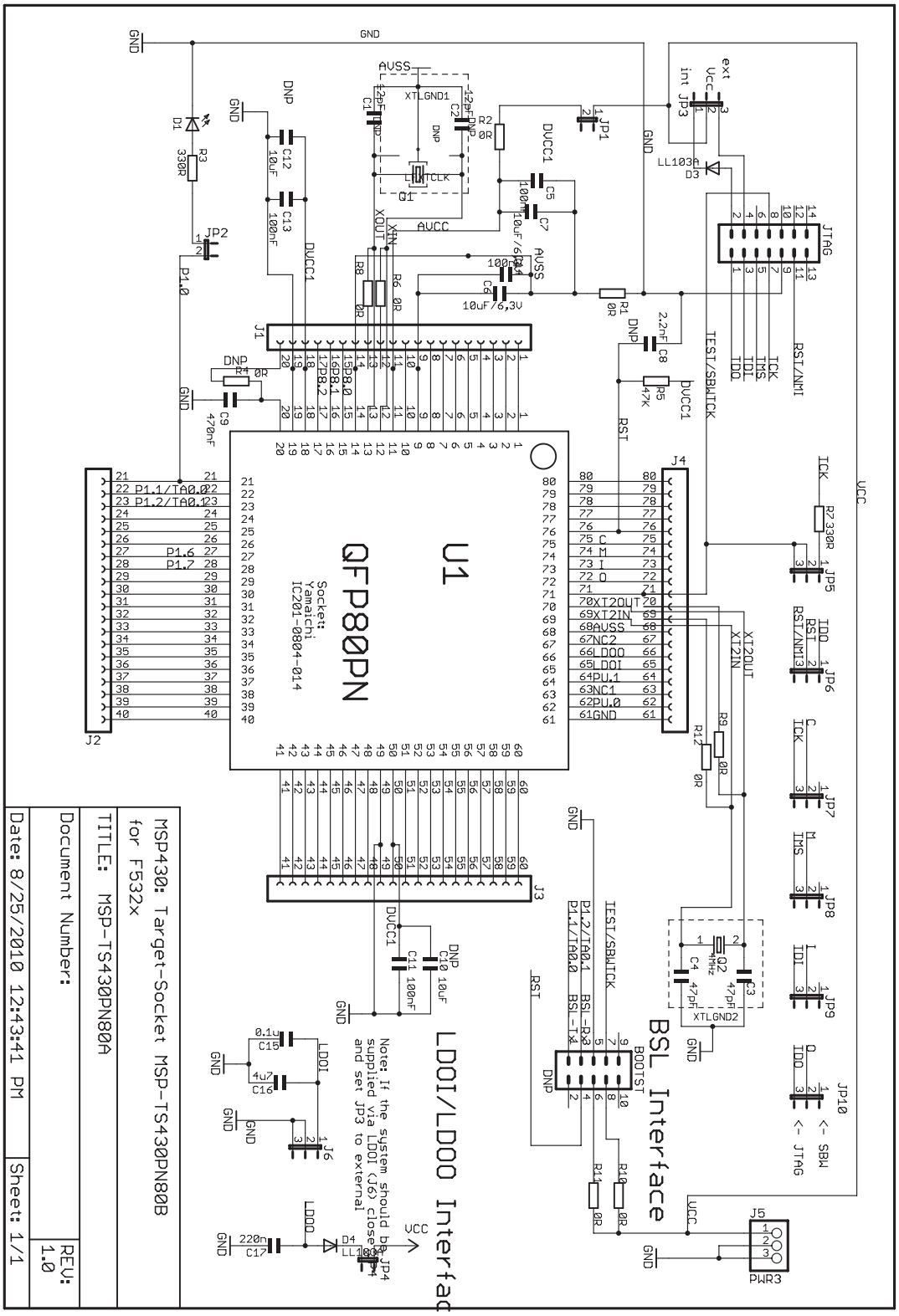



**Figure B-54. MSP-TS430PN80A Target Socket Module, Schematic**



Copyright © 2009–2016, Texas Instruments Incorporated

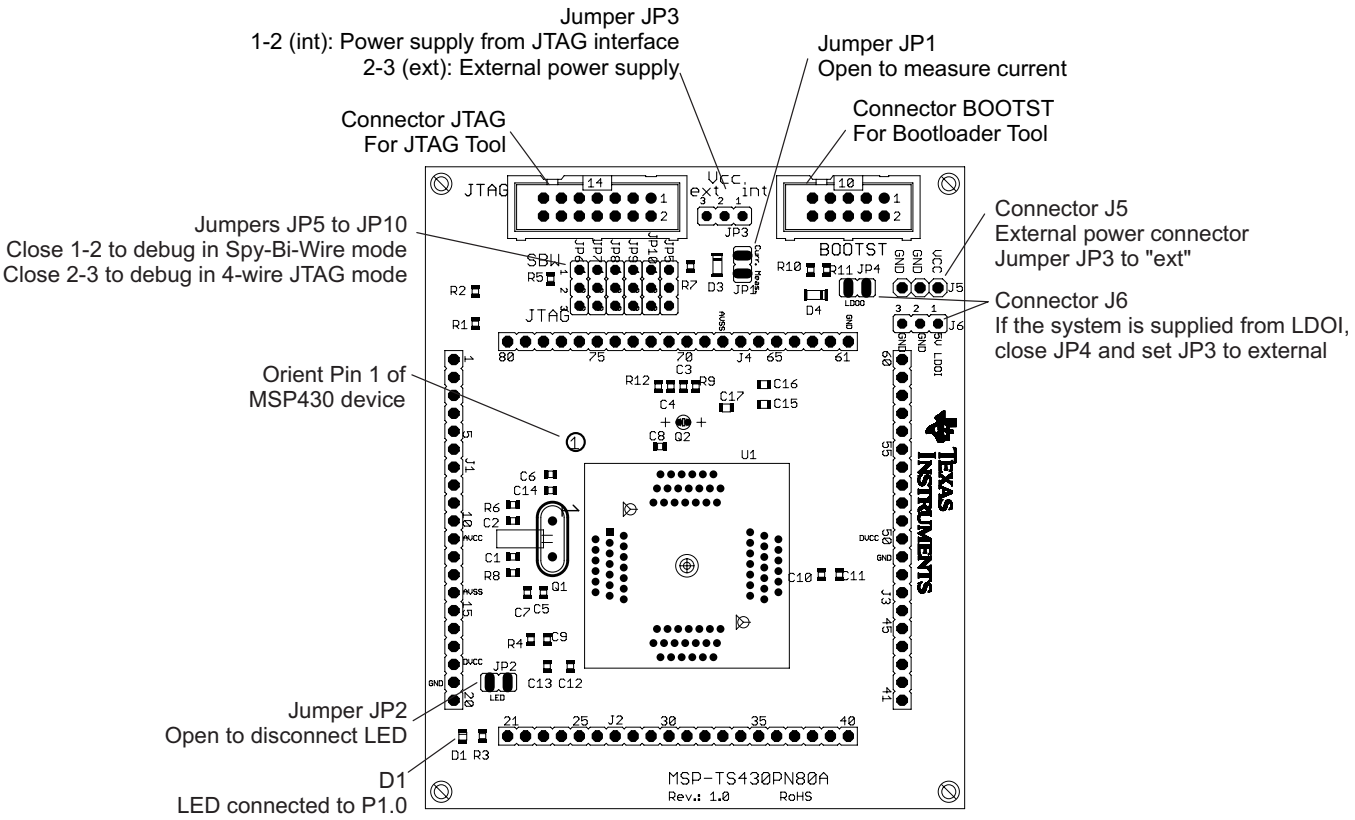



**Figure B-55. MSP-TS430PN80A Target Socket Module, PCB**

**NOTE:** For bootloader use, the BSL connector and only one of the resistors R10 or R11 must be populated. If the board is supplied internally, R11 (0 Ω) must be assembled. If the board is supplied externally, R10 (0 Ω) must be assembled, and R11 must be removed.



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-28. MSP-TS430PN80A Bill of Materials**

| Position | Ref Des | No. per Board | Description | Digi-Key Part No. | Comment |
|---|---|---|---|---|---|
| 1 | C1, C2 | 0 | 12pF, SMD0805 | | DNP |
| 2 | C3, C4 | 0 | 47pF, SMD0805 | | DNP |
| 3 | C6, C7, C10, C12 | 3 | 10uF, 6.3V, SMD0805 | | DNP C10 |
| 4 | C5, C11, C13, C14, C15 | 5 | 100nF, SMD0805 | 311-1245-2-ND | |
| 5 | C8 | 1 | 2.2nF, SMD0805 | | |
| 6 | C9 | 1 | 470nF, SMD0805 | 478-1403-2-ND | |
| 7 | C16 | 1 | 4.7uF, SMD0805 | | |
| 8 | C17 | 1 | 220nF, SMD0805 | | |
| 9 | D1 | 1 | green LED, SMD0805 | P516TR-ND | |
| 10 | J1, J2, J3, J4 | 0 | 20-pin header, TH | SAM1029-20-ND (Header) SAM1213-20-ND (Receptacle) | DNP: Headers and receptacles enclosed with kit. Keep vias free of solder: |
| 11 | J5 , J6 | 2 | 3-pin header, male, TH | | |
| 12 | 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, |
| 13 | JP1, JP2, JP4 | 3 | 2-pin header, male, TH | SAM1035-02-ND | Place jumper on header |
| 14 | | 10 | Jumper | 15-38-1024-ND | See Pos. 12 and Pos. 13 |
| 15 | JTAG | 1 | 14-pin connector, male, TH | HRP14H-ND | |
| 16 | BOOTST | 0 | 10-pin connector, male, TH | | "DNP Keep vias free of solder" |
| 17 | Q1 | 0 | Crystal | Micro Crystal MS3V-T1R 32.768kHz, C(Load) = 12.5pF | DNP: Q1 Keep vias free of solder |
| 18 | Q2 | 0 | Crystal | Q2: 4MHz Buerklin: 78D134 | DNP: Q2 Keep vias free of solder |
| 19 | Insulating disk to Q2 | 0 | Insulating disk to Q2 | http://www.ettinger.de/Art_Detail.cfm?ART_ARTNUM=70.08.121 | |
| 20 | D3,D4 | 2 | LL103A | Buerklin: 24S3406 | |
| 21 | R3, R7 | 2 | 330 Ω, SMD0805 | 541-330ATR-ND | |
| 22 | R1, R2, R4, R6, R8, R9,R10, R11, R12 | 3 | 0 Ohm, SMD0805 | 541-000ATR-ND | DNP: R6, R8, R9, R10, R11,R12 |
| 23 | R5 | 1 | 47k Ω, SMD0805 | 541-47000ATR-ND | |
| 24 | U1 | 1 | Socket:IC201-0804-014 | | Manuf.: Yamaichi |
| 25 | PCB | 1 | 77 x 91 mm | | 2 layers |
| 26 | Adhesive plastic feet | 4 | Approximately 6mm width, 2mm height | for example, 3M Bumpons Part No. SJ-5302 | Apply to corners at bottom side |
| 27 | MSP430 | 2 | MSP430F5329IPN | | DNP: enclosed with kit, supplied by TI |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.28 MSP-TS430PN80B

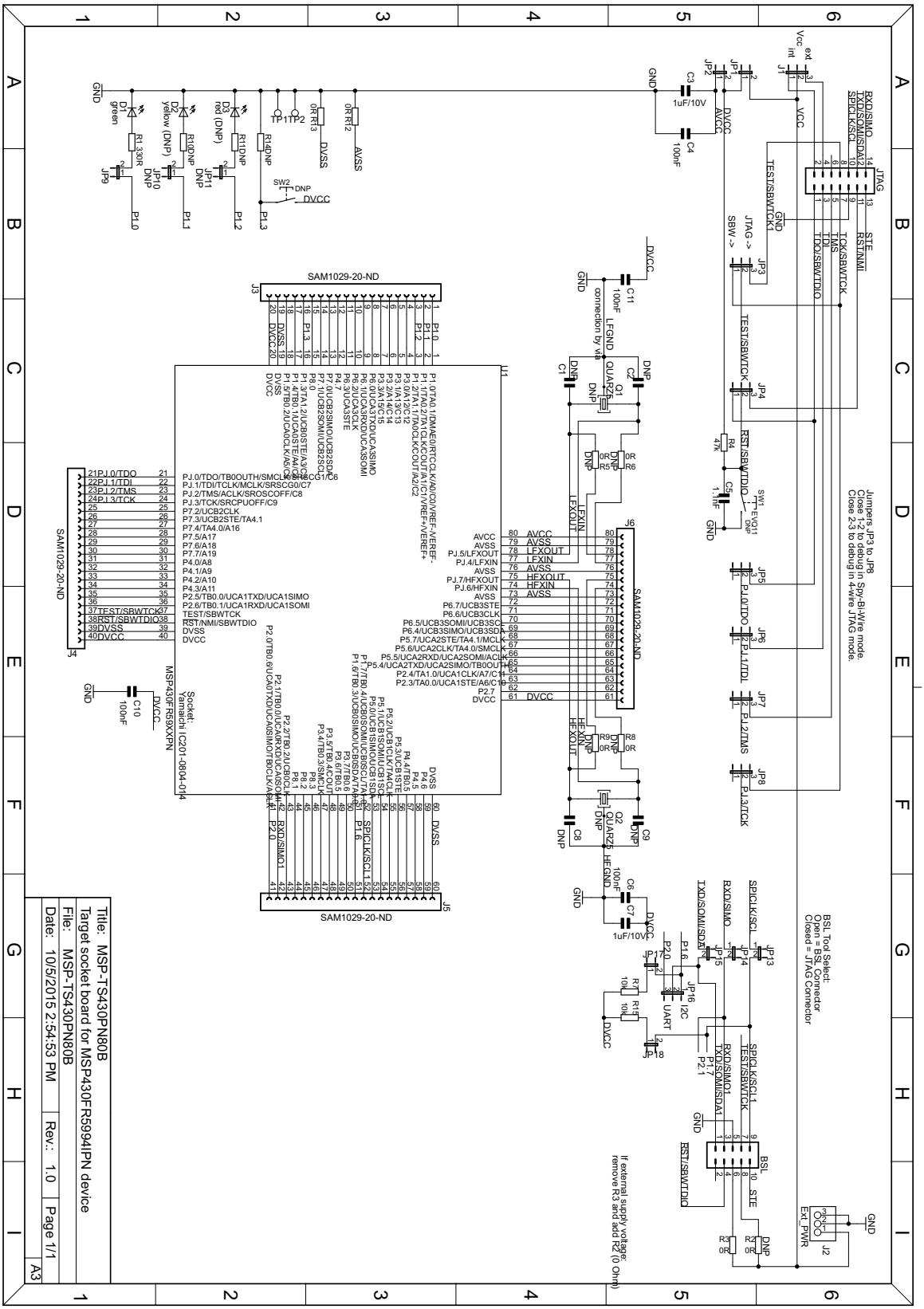



**Figure B-56. MSP-TS430PN80B Target Socket Module, Schematic**


Copyright © 2009–2016, Texas Instruments Incorporated

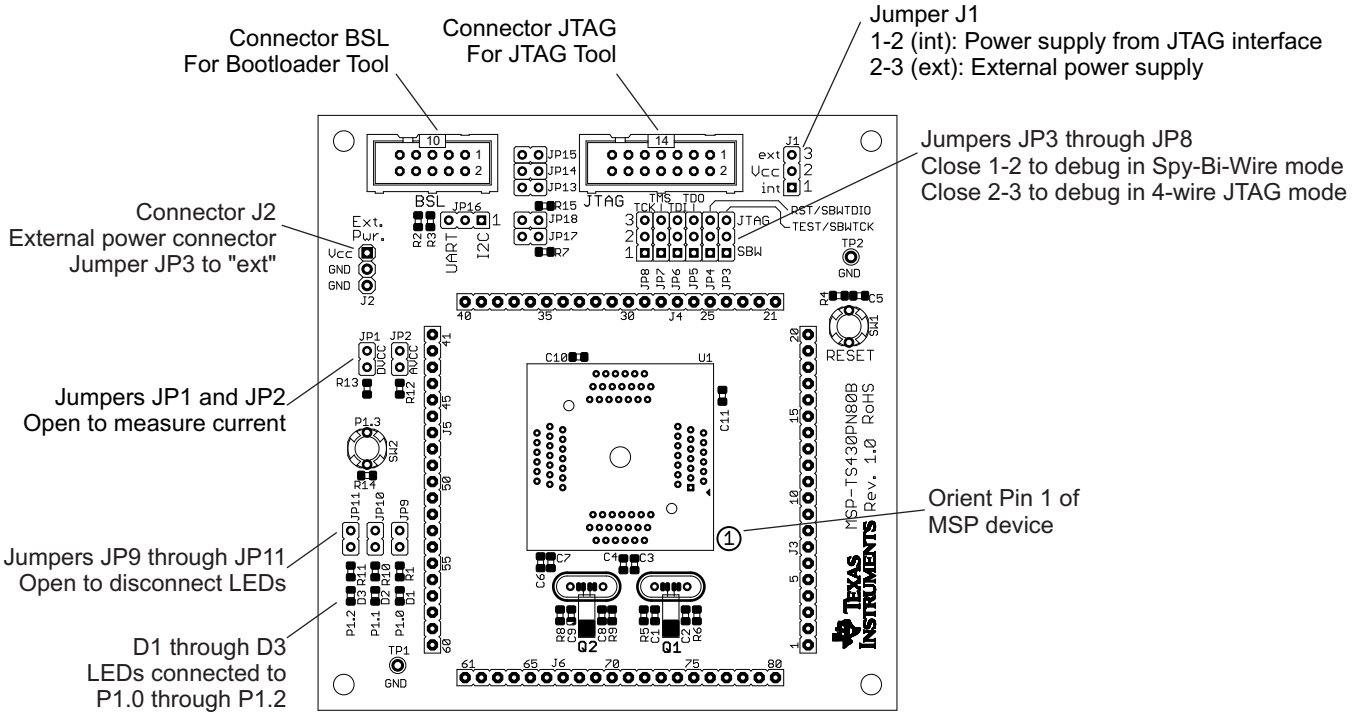



**Figure B-57. MSP-TS430PN80B Target Socket Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

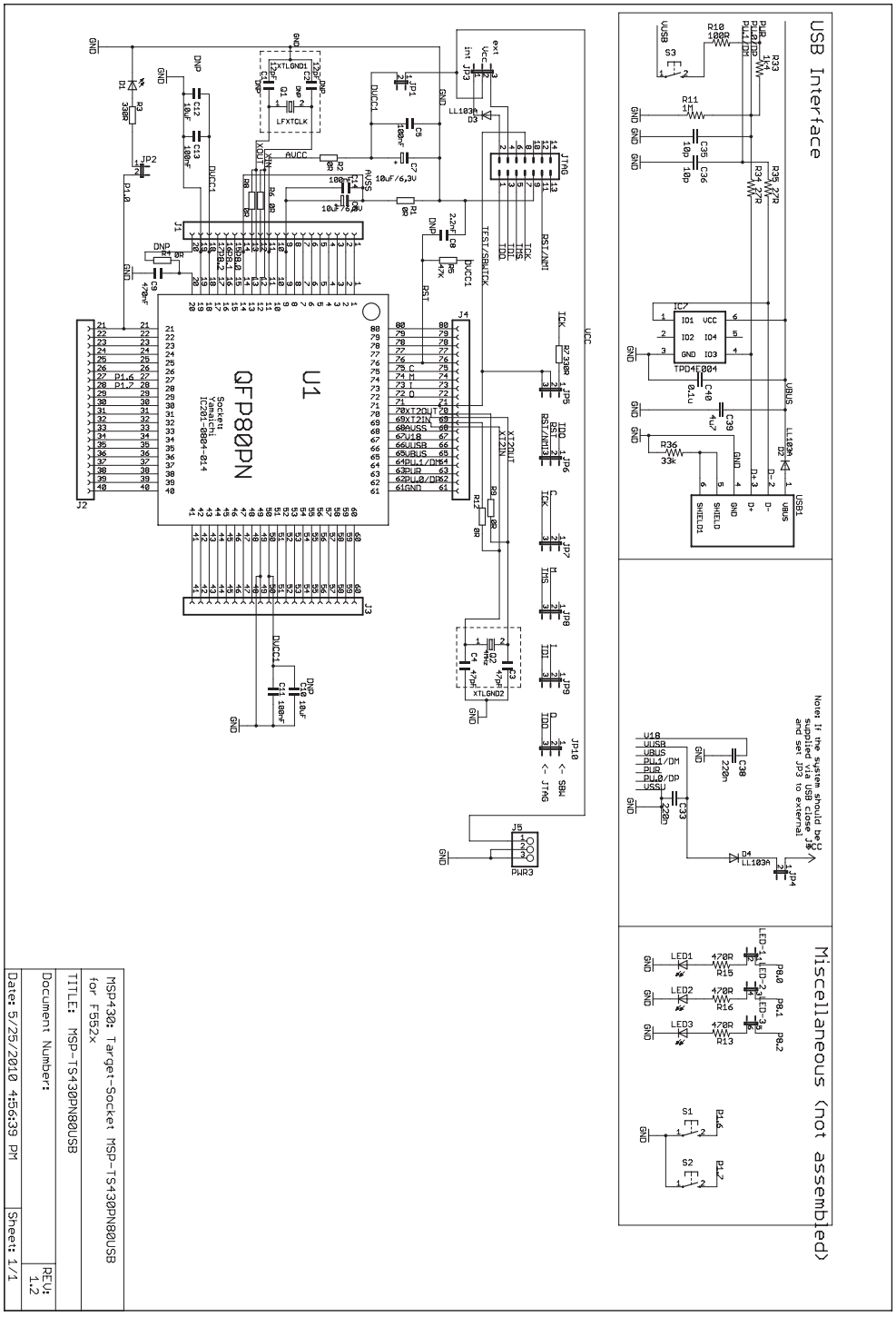
**Table B-29. MSP-TS430PN80B Bill of Materials**

| Position | Ref Des | No. per Board | Description | Digi-Key Part No. | Comment |
|---|---|---|---|---|---|
| 1 | PCB | 1 | 90.0 x 92.5 mm | "MSP-TS430PN80B" Rev. 1.0 | 2 layers, blue solder mask |
| 2 | JP1, JP2, JP9, JP13, JP14, JP15 | 6 | 2-pin header, male, TH | SAM1035-02-ND | place jumper on header |
| 3 | JP17, JP18 | 2 | 2-pin header, male, TH | SAM1035-02-ND | place jumper on one side of header |
| 4 | JP10, JP11 | 2 | 2-pin header, male, TH | SAM1035-02-ND | DNP, keep pads free of solder |
| 5 | J1 | 1 | 3-pin header, male, TH | SAM1035-03-ND | place jumpers on pins 1-2 |
| 6 | JP3, JP4, JP5, JP6, JP7, JP8, JP16 | 7 | 3-pin header, male, TH | SAM1035-03-ND | place jumpers on pins 2-3 |
| 7 | J2 | 1 | 3-pin header, male, TH | SAM1035-03-ND | |
| 8 | R2, R5, R6, R8, R9 | 5 | 0R, 0805 | 541-0.0ATR-ND | DNP |
| 9 | R3, R12, R13 | 3 | 0R, 0805 | 541-0.0ATR-ND | |
| 10 | C5 | 1 | 1.1nF, CSMD0805 | 490-1623-2-ND | |
| 11 | C3, C7 | 2 | 1uF/10V, CSMD0805 | 490-1702-2-ND | |
| 12 | R7, R15 | 2 | 10k, 0805 | 541-10KATR-ND | |
| 13 | R4 | 1 | 47k, 0805 | 541-47KATR-ND | |
| 14 | C4, C6, C10, C11 | 4 | 100nF, CSMD0805 | 490-1666-1-ND | |
| 15 | R1 | 1 | 330R, 0805 | 541-330ATR-ND | |
| 16 | R10, R11 | 2 | 330R, 0805 | 541-330ATR-ND | DNP |
| 17 | R14 | 1 | 47k, 0805 | 541-47KATR-ND | DNP |
| 18 | C1, C2, C8, C9 | 4 | DNP, CSMD0805 | | DNP |
| 19 | SW2 | 1 | EVQ-11L05R | P8079STB-ND | DNP, keep pads free of solder |
| 20 | SW1 | 1 | EVQ-11L05R | P8079STB-ND | DNP, keep pads free of solder |
| 21 | TP1, TP2 | 2 | Test point | | DNP, keep pads free of solder |
| 22 | BSL | 1 | 10-pin connector, male, TH | HRP10H-ND | |
| 23 | JTAG | 1 | 14-pin connector, male, TH | HRP14H-ND | |
| 24 | U1 | 1 | Socket IC201-0804-014 | | Manuf. Yamaichi |
| 25 | MSP device | 1 | MSP430FR5994 | | DNP: Not enclosed in kit |
| 26 | Q1 | 1 | DNP: MS3V-TR1 (32768kHz, 20ppm, 12.5pF) | depends on application | Micro Crystal, DNP, enclosed in kit, keep vias free of solder |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.29 MSP-TS430PN80USB

Due to the use of diodes in the power chain, the voltage on the MSP430F5xx device is approximately 0.3 V lower than is set by the debugging tool. Set the voltage in the IDE to 0.3 V higher than desired; for example, to run the MCU at 3.0 V, set it to 3.3 V.




NOTE: R11 should be populated.

**Figure B-58. MSP-TS430PN80USB Target Socket Module, Schematic**



Copyright © 2009–2016, Texas Instruments Incorporated

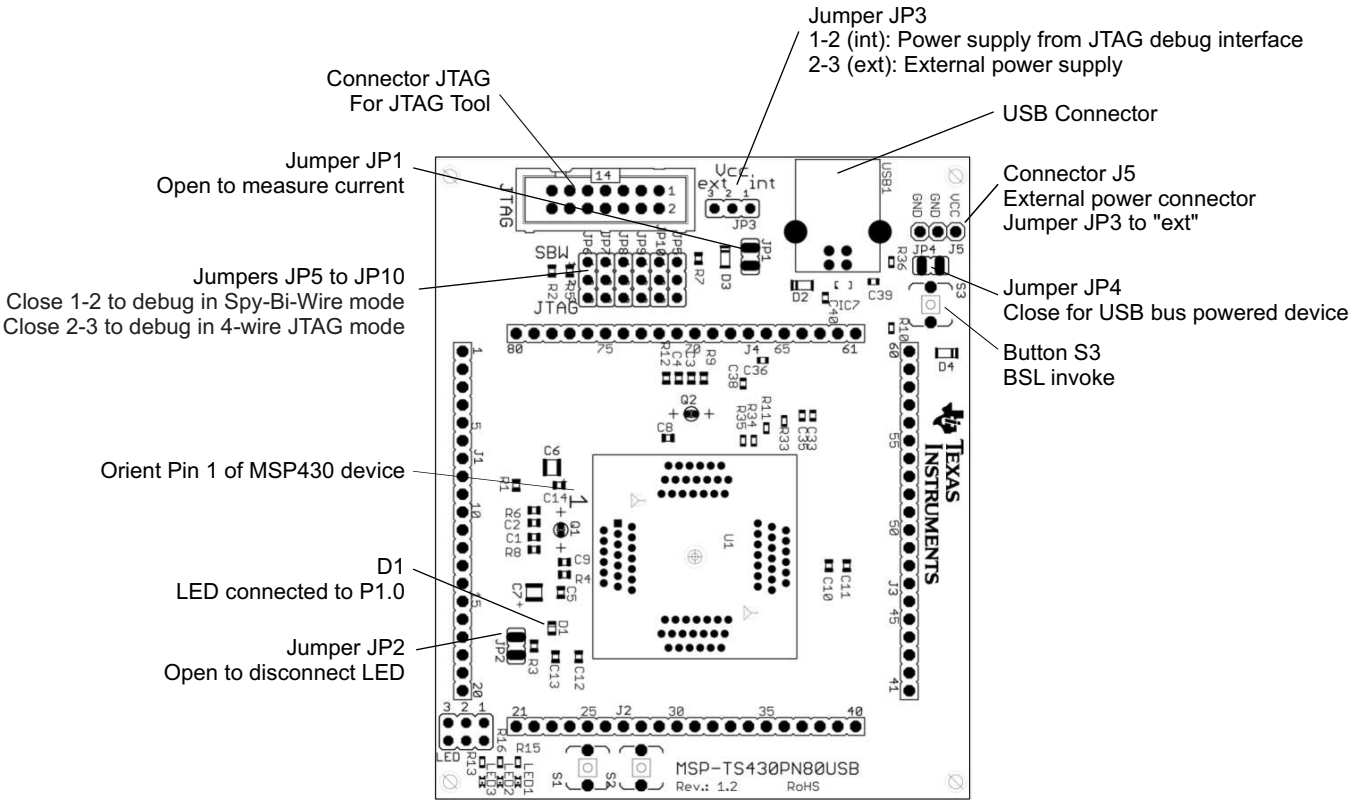



**Figure B-59. MSP-TS430PN80USB Target Socket Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

## Table B-30. MSP-TS430PN80USB Bill of Materials

| Pos. | Ref Des | No. per Board | Description | Digi-Key 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 | 10uF, 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. |
| 7.1 | | 4 | 20-pin header, TH | SAM1213-20-ND | DNP: headers and receptacles enclosed with kit. Keep vias free of solder.<br>: Header<br>: 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 | Micro Crystal MS1V-T1K 32.768kHz, C(Load) = 12.5pF | DNP: Q1 Keep vias free of solder |
| 15 | Q2 | 1 | Crystal | "Q2: 4MHzBuerklin: 78D134" | |
| 16 | R3, R7 | 2 | 330 Ω, SMD0805 | 541-330ATR-ND | |
| 17 | R1, R2, R4, R6, R8, R9, R12 | 2 | 0 Ω, SMD0805 | 541-000ATR-ND | DNP: R4, R6, R8, R9, R12 |
| 18 | R10 | 1 | 100 Ω, SMD0805 | Buerklin: 07E500 | |
| 18 | R11 | 0 | 1M Ω, SMD0805 | | DNP |
| 18 | R5 | 1 | 47k Ω, 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 | Insulating disk to 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 | |
| 29 | C36 | 1 | 10p | Buerklin: 56D102 | |
| 30 | C38 | 1 | 220n | Buerklin: 53D2074 | |

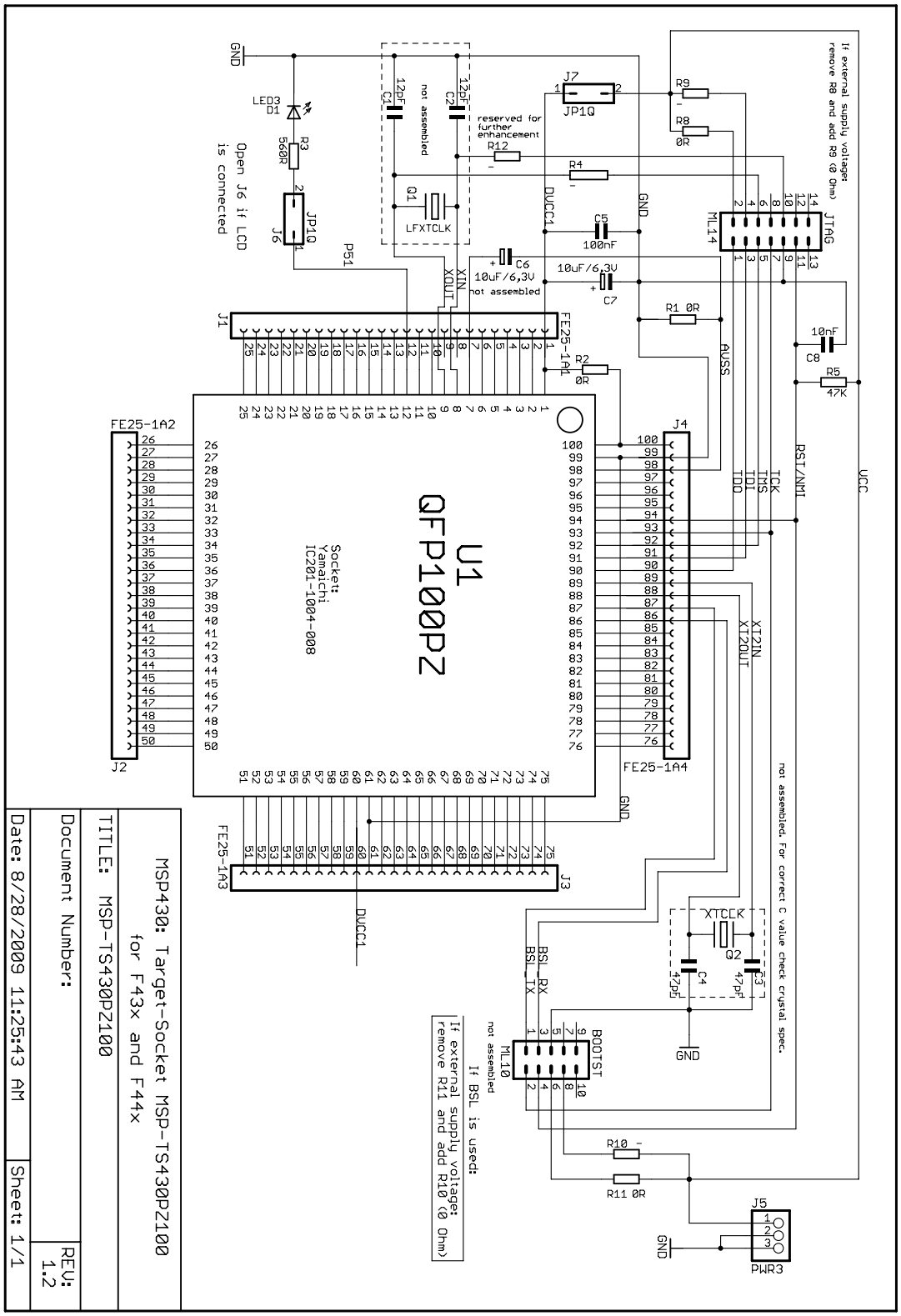

Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-30. MSP-TS430PN80USB Bill of Materials (continued)**

| Pos. | Ref Des | No. per Board | Description | Digi-Key Part No. | Comment |
|---|---|---|---|---|---|
| 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 | |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.30 MSP-TS430PZ100




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

**Figure B-60. MSP-TS430PZ100 Target Socket Module, Schematic**



Copyright © 2009–2016, Texas Instruments Incorporated

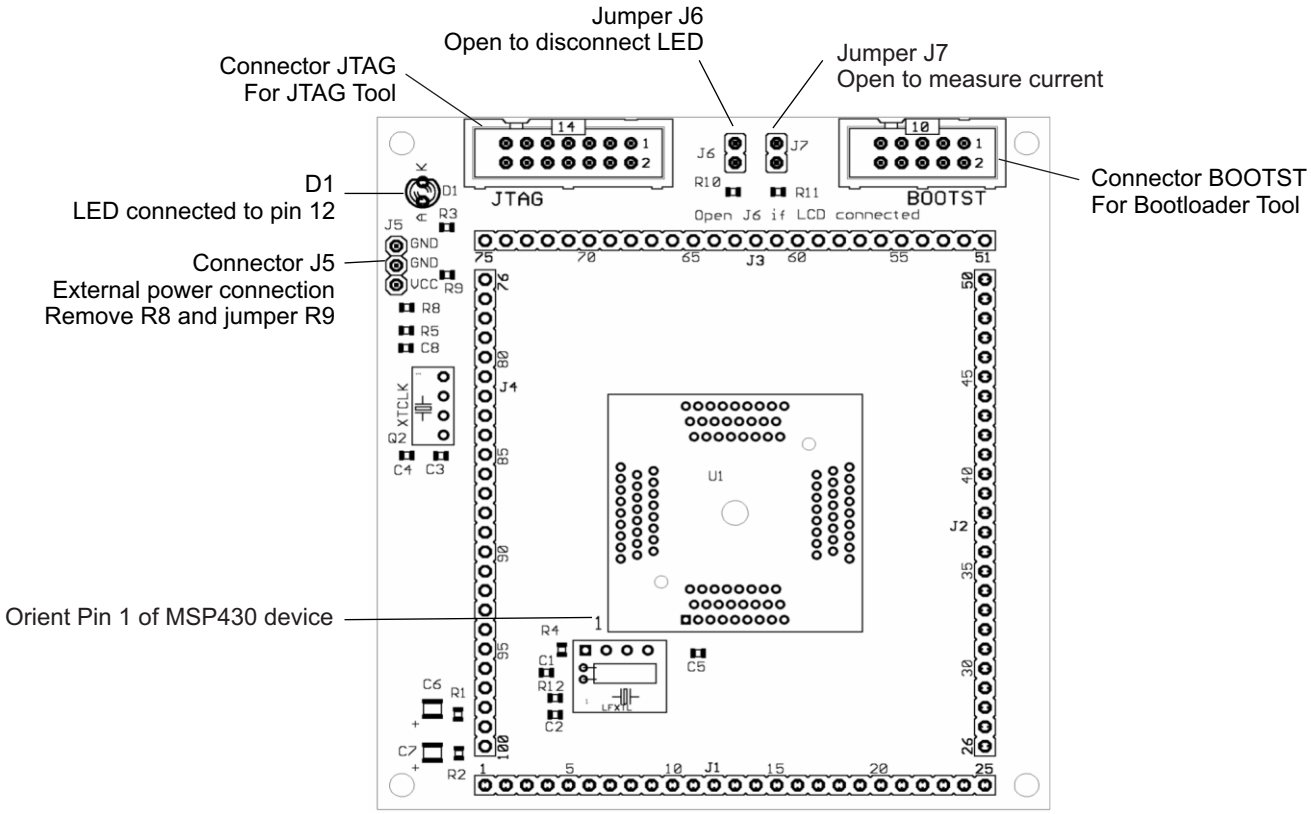



**Figure B-61. MSP-TS430PZ100 Target Socket Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-31. MSP-TS430PZ100 Bill of Materials**

| Pos. | Ref Des | No. per Board | Description | Digi-Key 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-ND<br>SAM1213-25-ND | DNP: Headers and receptacles enclosed with kit.Keep vias free of solder.<br>: Header<br>: 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 | Q1: Micro Crystal MS1V-T1K 32.768kHz, C(Load) = 12.5pF | DNP: Keep vias free of solder |
| 14 | R3 | 1 | 330 Ω, SMD0805 | 541-330ATR-ND | |
| 15 | R1, R2, R4, R8, R9, R10, R11, R12 | 3 | 0 Ω, SMD0805 | 541-000ATR-ND | DNP: R4, R9, R10, R12 |
| 16 | R5 | 1 | 47k Ω, SMD0805 | 541-47000ATR-ND | |
| 17 | U1 | 1 | Socket: IC201-1004-008 or IC357-1004-53N | | Manuf.: Yamaichi |
| 18 | PCB | 1 | 82 x 90 mm | | 2 layers |
| 19 | Adhesive Plastic feet | 4 | ~6mm width, 2mm height | for example, 3M Bumpons Part No. SJ-5302 | Apply to corners at bottom side |
| 20 | MSP430 | 2 | MSP430FG4619IPZ | | DNP: enclosed with kit supplied by TI |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.31 MSP-TS430PZ100A

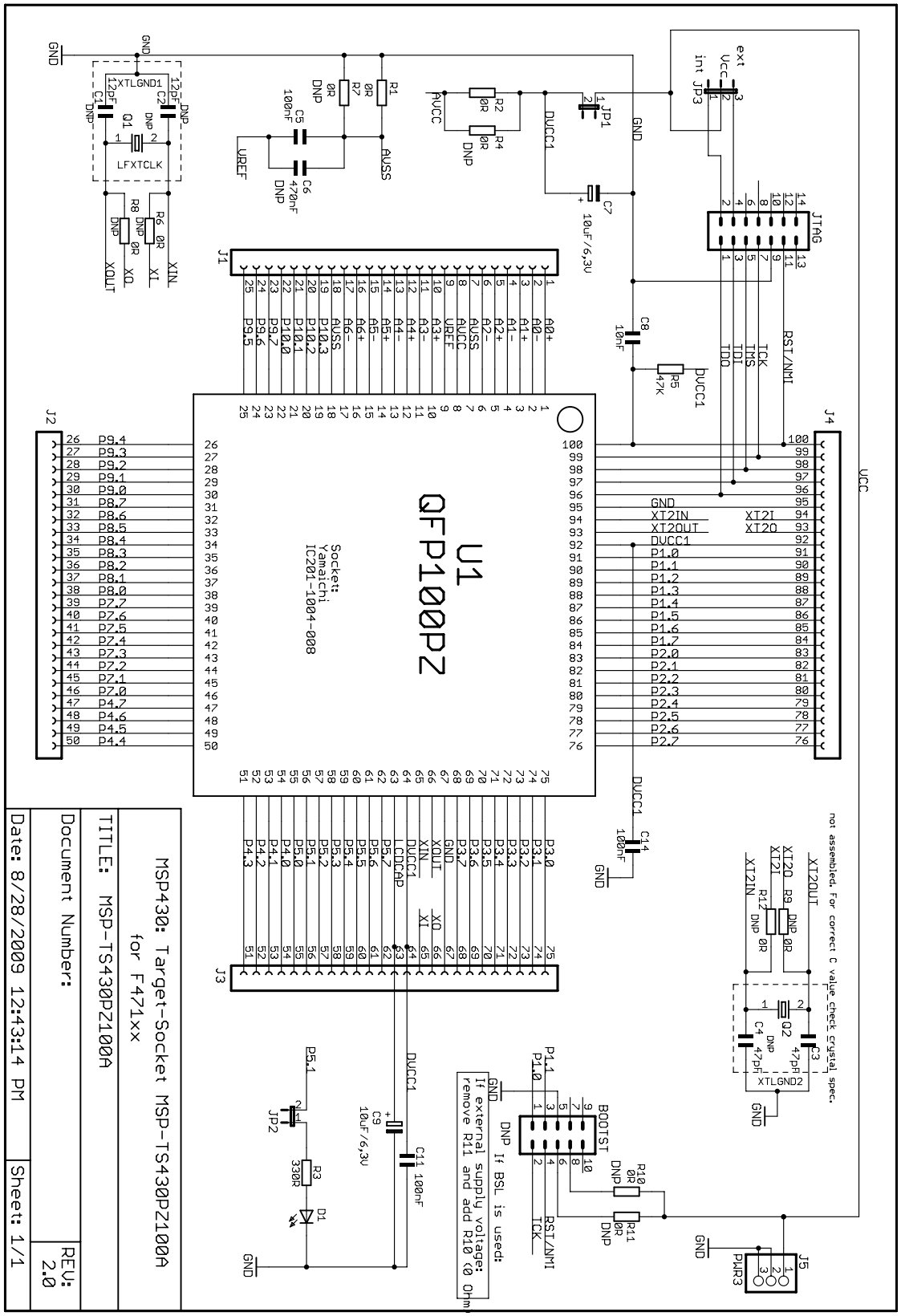



**Figure B-62. MSP-TS430PZ100A Target Socket Module, Schematic**


Copyright © 2009–2016, Texas Instruments Incorporated

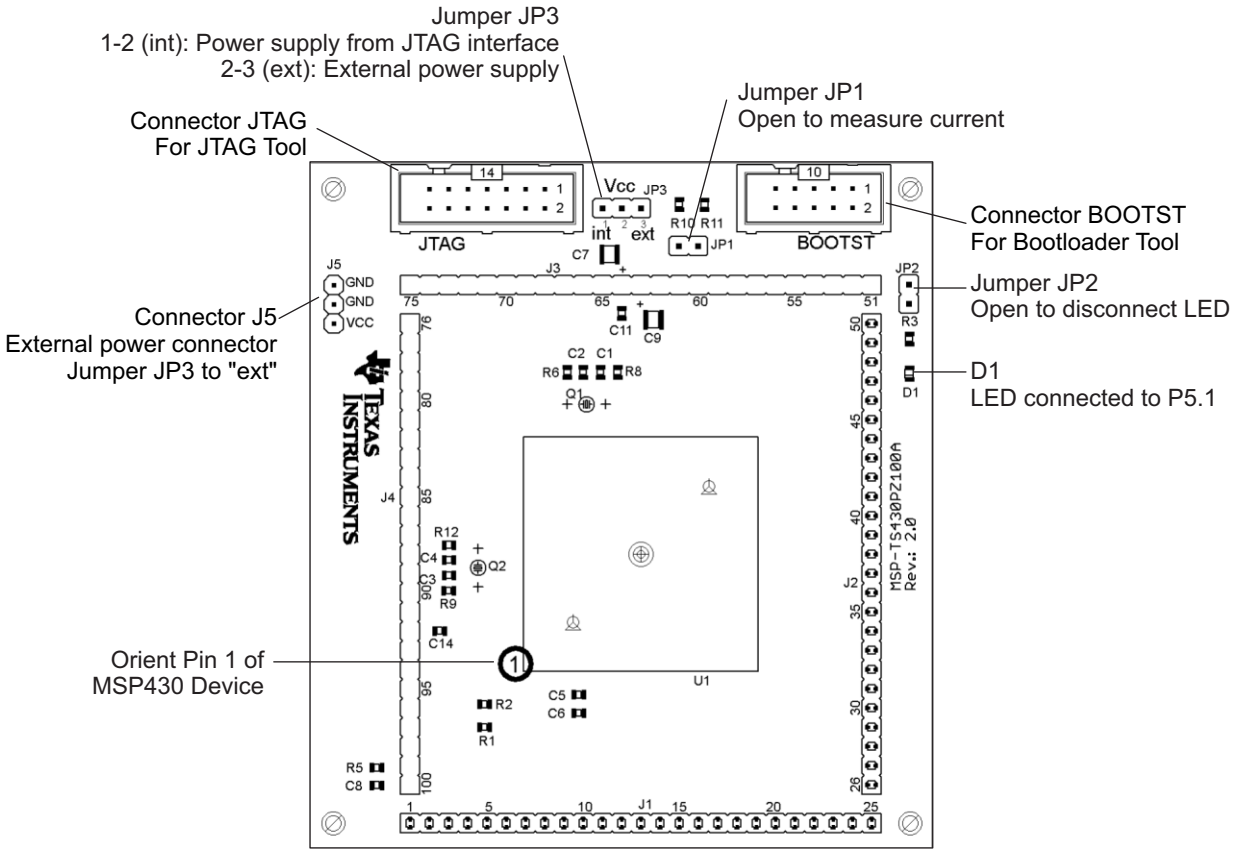



**Figure B-63. MSP-TS430PZ100A Target Socket Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

## Table B-32. MSP-TS430PZ100A Bill of Materials

| Pos. | Ref Des | No. per Board | Description | Digi-Key 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-ND<br>SAM1213-25-ND | DNP: Headers and receptacles enclosed with kit.Keep vias free of solder.<br>: Header<br>: 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 | Q1: Micro Crystal MS1V-T1K 32.768kHz, C(Load) = 12.5pF | DNP: Keep vias free of solder |
| 16 | R3 | 1 | 330 Ω, SMD0805 | 541-330ATR-ND | |
| 17 | R1, R2, R4, R6, R7, R8, R9, R10, R11, R12 | 2 | 0 Ω, SMD0805 | 541-000ATR-ND | DNP: R4, R6, R7, R8, R9, R10, R11, R12 |
| 18 | R5 | 1 | 47k Ω, 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 | MSP430F47197IPZ | | DNP: Enclosed with kit supplied by TI |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.32 MSP-TS430PZ100B

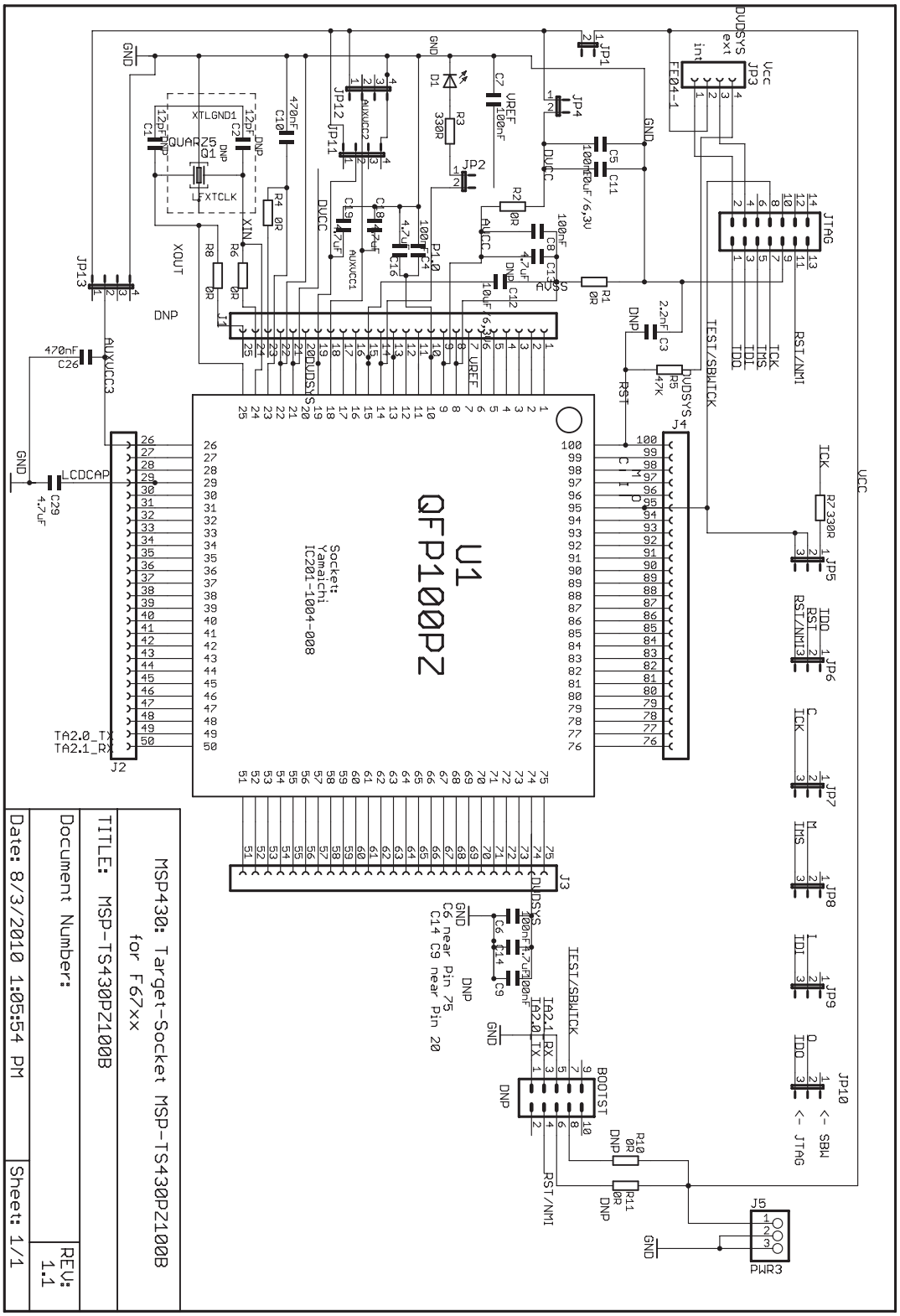



**Figure B-64. MSP-TS430PZ100B Target Socket Module, Schematic**



Copyright © 2009–2016, Texas Instruments Incorporated

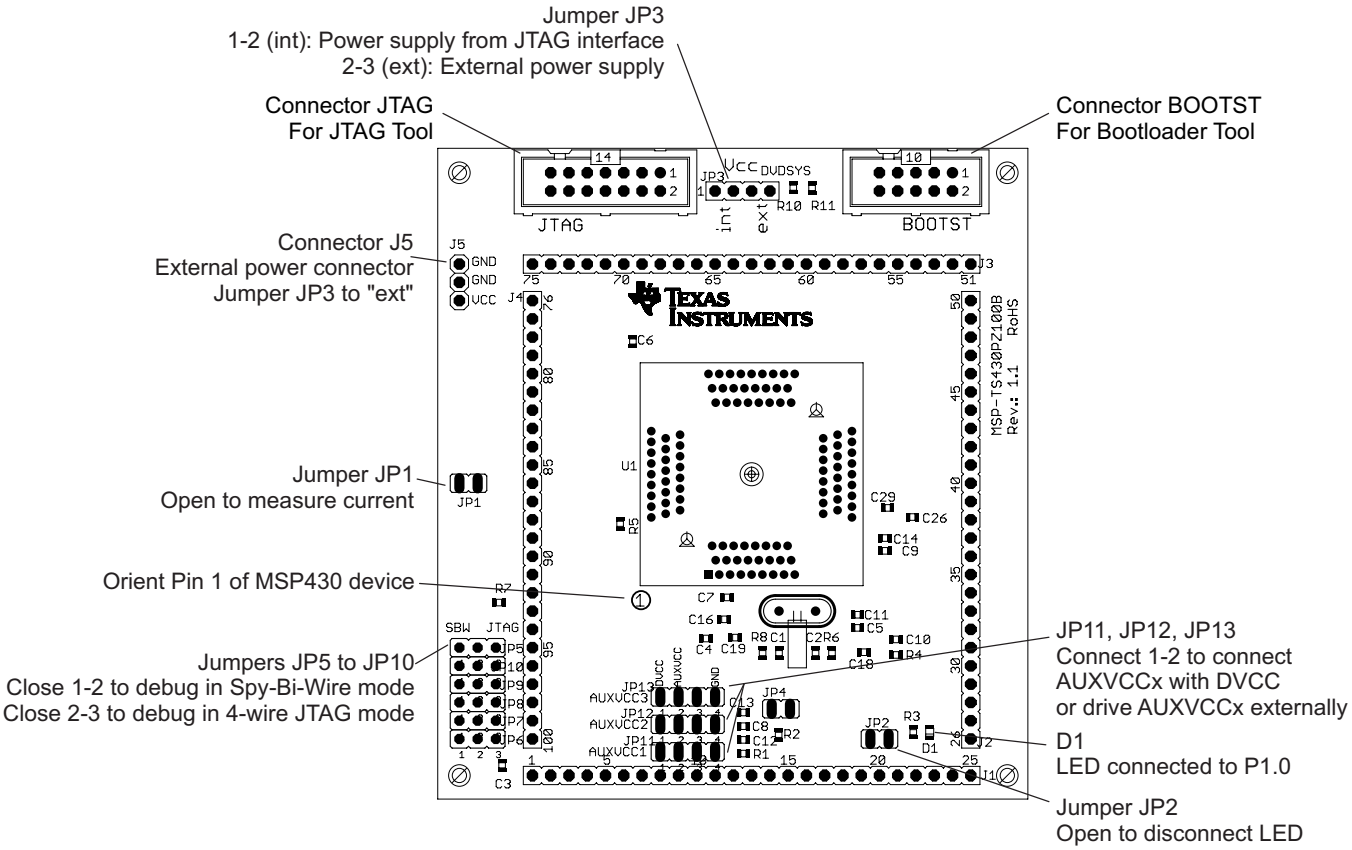



**Figure B-65. MSP-TS430PZ100B Target Socket Module, PCB**

**NOTE:** For bootloader use, the BSL connector and only one of the resistors R10 or R11 must be populated. If the board is supplied internally, R11 (0 Ω) must be assembled. If the board is supplied externally, R10 (0 Ω) must be assembled, and R11 must be removed.



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-33. MSP-TS430PZ100B Bill of Materials**

| Position | Ref Des | No. per Board | Description | Digi-Key Part No. | Comment |
|---|---|---|---|---|---|
| 1 | C1, C2 | 0 | 12pF, SMD0805 | | DNP |
| 2 | C4, C5, C6 , C7, C8, C9 | 6 | 100nF, SMD0805 | 311-1245-2-ND | |
| 3 | C10, C26 | 2 | 470 nF, SMD0805 | 478-1403-2-ND | |
| 4 | C11, C12 | 1 | 10 uF / 6.3 V SMD0805 | | C12 DNP |
| 5 | C13, C14, C16, C18, C19, C29 | 6 | 4.7 uF SMD0805 | | |
| 6 | D1 | 1 | green LED, SMD0805 | P516TR-ND | |
| 7 | J1, J2, J3, J4 | 0 | 25-pin header, TH | SAM1029-25-ND (Header) SAM1213-25-ND (Receptacle) | DNP: Headers and receptacles enclosed with kit. Keep vias free of solder: |
| 8 | J5 | 1 | 3-pin header, male, TH | | |
| 9 | 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, |
| 10 | JP1, JP2, JP4 | 3 | 2-pin header, male, TH | SAM1035-02-ND | Place jumper on header |
| 11 | JP11, JP12, JP13 | 3 | 4-pin header, male, TH | | place jumper on header 1-2 |
| 12 | | 13 | Jumper | 15-38-1024-ND | See Pos. 9 and Pos. 10 and Pos. 11 |
| 15 | JTAG | 1 | 14-pin connector, male, TH | HRP14H-ND | |
| 16 | BOOTST | 0 | 10-pin connector, male, TH | | "DNP Keep vias free of solder" |
| 17 | Q1 | 0 | Crystal | | DNP: Q1 Keep vias free of solder |
| 21 | R3, R7 | 2 | 330 Ω, SMD0805 | 541-330ATR-ND | |
| 22 | R1, R2, R4, R6, R8, R10, R11 | 2 | 0 Ohm, SMD0805 | 541-000ATR-ND | DNP: R4, R6, R8, R10, R11 |
| 23 | R5 | 1 | 47k Ω, SMD0805 | 541-47000ATR-ND | |
| 24 | U1 | 1 | Socket: IC357-1004-53N | | Manuf.: Yamaichi |
| 25 | PCB | 1 | 90 x 82 mm | | 2 layers |
| 26 | Adhesive plastic feet | 4 | Approximately 6mm width, 2mm height | for example, 3M Bumpons Part No. SJ-5302 | Apply to corners at bottom side |
| 27 | MSP430 | 2 | MSP430F6733IPZ | | DNP: enclosed with kit, supplied by TI |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.33 MSP-TS430PZ100C

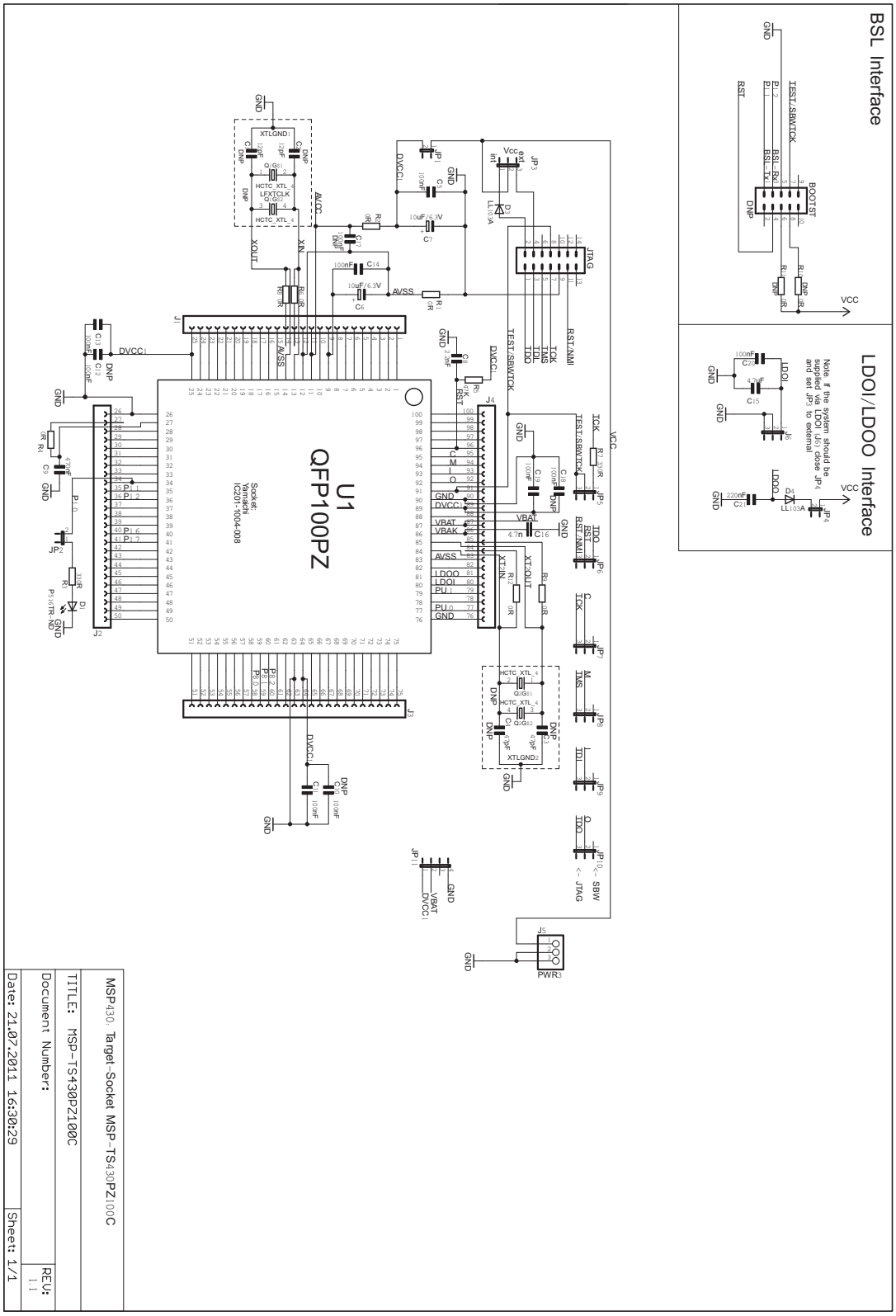



**Figure B-66. MSP-TS430PZ100C Target Socket Module, Schematic**


Copyright © 2009–2016, Texas Instruments Incorporated

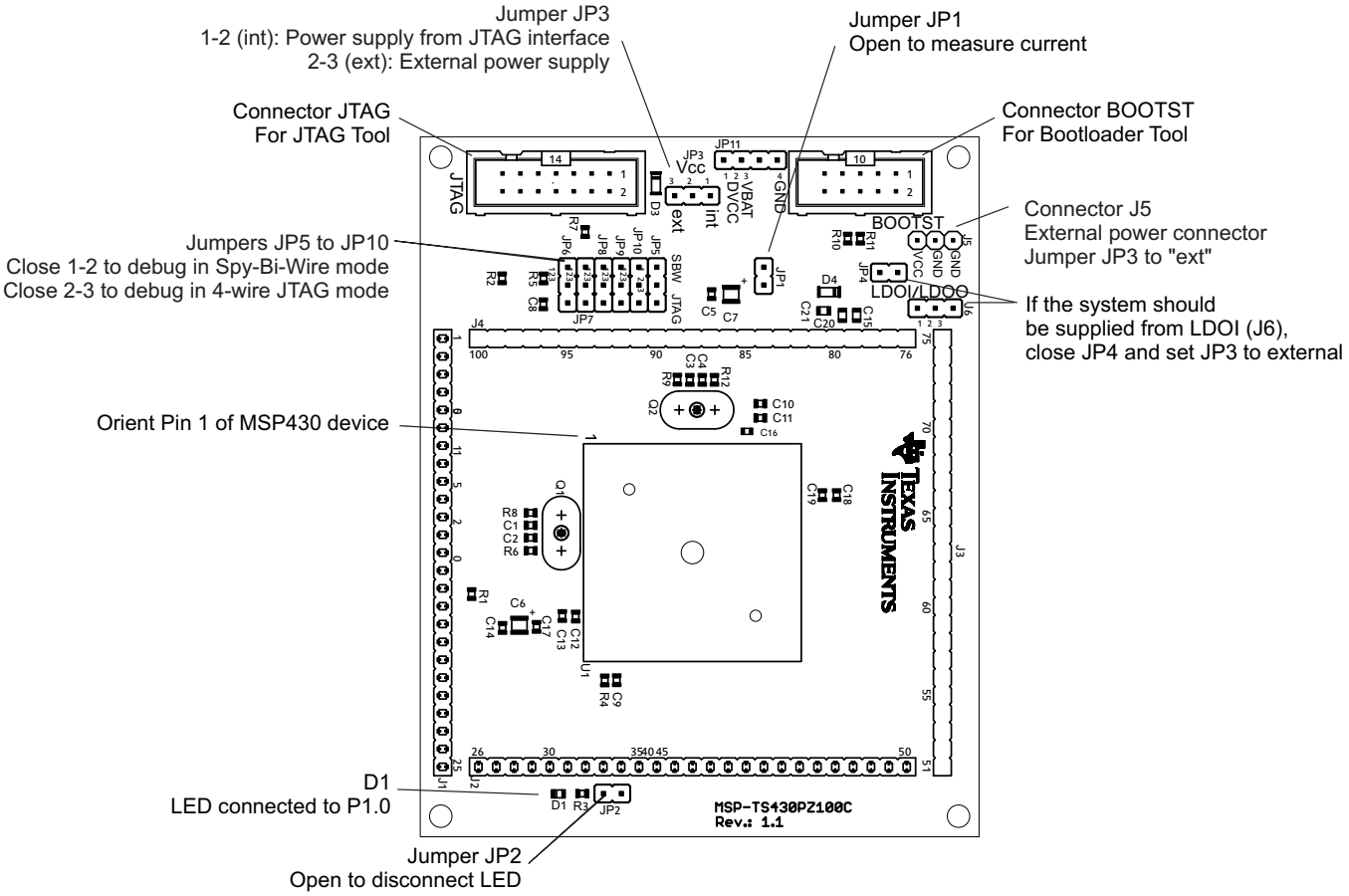



**Figure B-67. MSP-TS430PZ100C Target Socket Module, PCB**

**NOTE:** For bootloader use, the BSL connector and only one of the resistors R10 or R11 must be populated. If the board is supplied internally, R11 (0 Ω) must be assembled. If the board is supplied externally, R10 (0 Ω) must be assembled, and R11 must be removed.



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-34. MSP-TS430PZ100C Bill of Materials**

| Pos. | Ref Des | Number Per Board | Description | Digi-Key Part No. | Comment |
|---|---|---|---|---|---|
| 1 | C1, C2 | 0 | 12pF, SMD0805 | | DNP: C1, C2 |
| 1.1 | C3, C4 | 2 | 47pF, SMD0805 | | DNP: C3, C4 |
| 2 | C6, C7 | 2 | 10uF, 6.3V, Tantal Size B | 511-1463-2-ND | |
| 3 | C5, C11, C13, C14, C19, C20 | 6 | 100nF, SMD0805 | 311-1245-2-ND | |
| 3.1 | C10, C12, C18,17 | 0 | 100nF, SMD0805 | 311-1245-2-ND | DNP: C10, C12,C18, C17 |
| 4 | C8 | 1 | 2.2nF, SMD0805 | Buerklin 53 D 292 | |
| 5 | C9 | 1 | 470nF, SMD0805 | 478-1403-2-ND | |
| 6 | D1 | 1 | green LED, SMD0805 | P516TR-ND | |
| 7 | J1, J2, J3, J4 | 4 | 25-pin header, TH | SAM1029-25-ND | DNP: headers and receptacles enclosed with kit. Keep vias free of solder. |
| 7.1 | | 4 | 25-pin header, TH | SAM1213-25-ND | DNP: headers and receptacles enclosed with kit. Keep vias free of solder. |
| 8 | J5, J6 | 2 | 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 |
| 10.1 | JP4 | 1 | 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 | | 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 | BOOTST | 1 | 10-pin connector, male, TH | HRP10H-ND | DNP, keep vias free of solder |
| 15 | Q1 | 0 | Crystal | | DNP: Q1<br>Keep vias free of solder |
| 16 | Q2 | 1 | Crystal | | DNP: Q2 Keep vias free of solder |
| 17 | R3, R7 | 2 | 330 Ohm, SMD0805 | 541-330ATR-ND | |
| 18 | R1, R2, R4, R6, R8, R9, R10, R11, R12 | 3 | 0 Ohm, SMD0805 | 541-000ATR-ND | DNP: R6, R8, R9, R10, R11, R12 |
| 19 | R5 | 1 | 47k Ohm, SMD0805 | 541-47000ATR-ND | |
| 20 | U1 | 1 | Socket: IC357-1004-53N | | Manuf.: Yamaichi |
| 21 | PCB | 1 | 79.5 x 99.5 mm | MSP-TS430PZ100C Rev 1.0 | 2 layers |
| 22 | Rubber stand off | 4 | | Buerklin: 20H1724 | apply to corners at bottom side |
| 23 | MSP430 | 2 | MSP430F643x | | DNP: enclosed with kit. Is supplied by TI. |
| 24 | C16 | 1 | 4.7 nF SMD0603 | Buerklin 53 D 2042 | |
| 26 | D3, D4 | 2 | LL103A | Buerklin: 24S3406 | |
| 27 | JP11 | 1 | 4-pin header, male, TH | SAM1035-04-ND | Place jumper on Pin 1 and Pin 2 |
| 28 | C15 | 1 | 4.7 uF, SMD0805 | Buerklin 53 D 2430 | |
| 29 | C21 | 1 | 220nF, SMD0805 | Buerklin 53 D 2381 | |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.34 MSP-TS430PZ100D

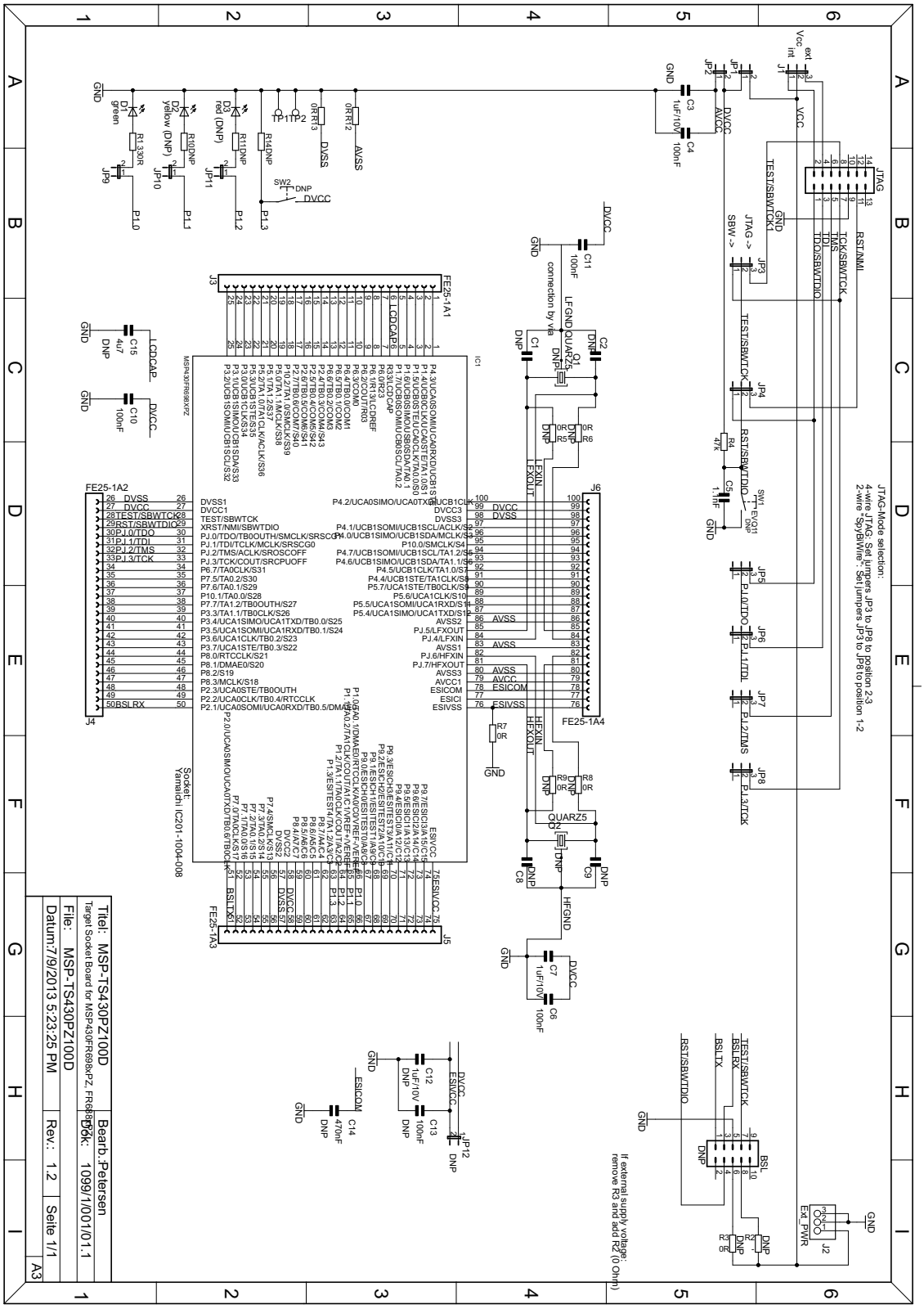



**Figure B-68. MSP-TS430PZ100D Target Socket Module, Schematic**



Copyright © 2009–2016, Texas Instruments Incorporated

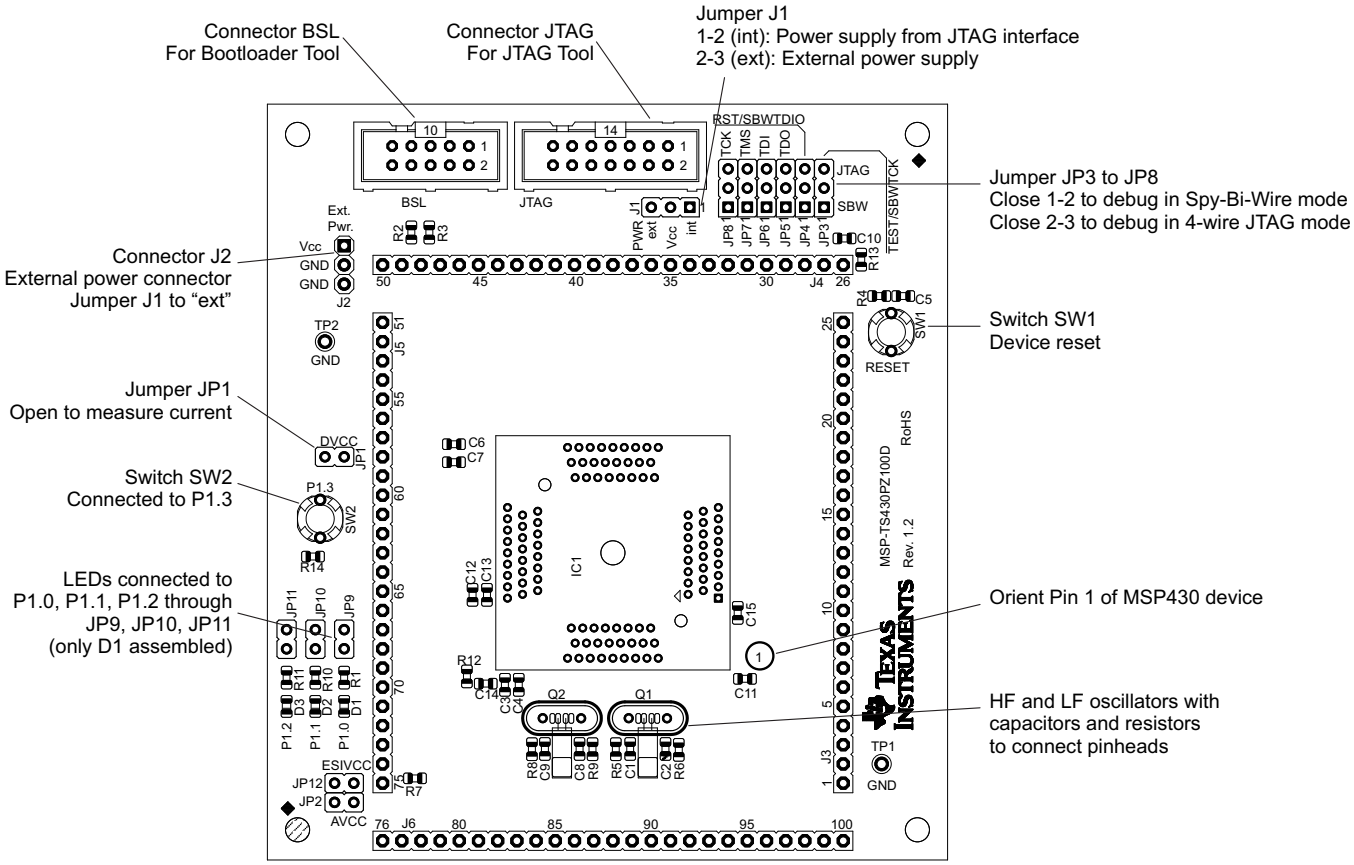



**Figure B-69. MSP-TS430PZ100D Target Socket Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-35. MSP-TS430PZ100D Bill of Materials**

| Pos. | Ref Des | Number Per Board | Description | Digi-Key Part No. | Comment |
|---|---|---|---|---|---|
| 1 | PCB | 1 | 90.0 x 100.0 mm | MSP-TS430PZ100D Rev 1.2 | 2 layers, white solder mask |
| 2 | JP1, JP2, JP9 | 3 | 2-pin header, male, TH | SAM1035-02-ND | place jumper on header |
| 3 | JP10, JP11, JP12 | 3 | 2-pin header, male, TH | SAM1035-02-ND | DNP, keep pads free of solder |
| 4 | J1 | 1 | 3-pin header, male, TH | SAM1035-03-ND | place jumpers on pins 1-2 |
| 5 | JP3, JP4, JP5, JP6, JP7, JP8 | 6 | 3-pin header, male, TH | SAM1035-03-ND | place jumpers on pins 2-3 |
| 6 | J2 | 1 | 3-pin header, male, TH | SAM1035-03-ND | |
| 7 | R2, R3, R5, R6, R8, R9 | 6 | 0R, 0805 | 541-0.0ATR-ND | DNP |
| 8 | R7, R12, R13 | 3 | 0R, 0805 | 541-0.0ATR-ND | |
| 9 | C5 | 1 | 1.1nF, CSMD0805 | 490-1623-2-ND | |
| 10 | C3, C7 | 2 | 1uF/10V, CSMD0805 | 490-1702-2-ND | |
| 11 | C12 | 1 | 1uF/10V, CSMD0805 | 490-1702-2-ND | DNP |
| 12 | R4 | 1 | 47k, 0805 | 541-47KATR-ND | |
| 13 | C4, C6, C10, C11 | 4 | 100nF, CSMD0805 | 490-1666-1-ND | |
| 14 | C13 | 1 | 100nF, CSMD0805 | 490-1666-1-ND | DNP |
| 15 | C15 | 1 | 4u7, CSMD0805 | 445-1370-1-ND | DNP |
| 16 | R1 | 1 | 330R, 0805 | 541-330ATR-ND | |
| 17 | C14 | 1 | 470nF, CSMD0805 | 587-1290-2-ND | DNP |
| 18 | R10, R11 | 2 | 330R, 0805 | 541-330ATR-ND | DNP |
| 19 | R14 | 1 | 47k, 0805 | 541-47KATR-ND | DNP |
| 20 | C1, C2, C8, C9 | 4 | DNP, CSMD0805 | | DNP |
| 21 | SW2 | 1 | EVQ-11L05R | P8079STB-ND | DNP |
| 22 | SW1 | 1 | EVQ-11L05R | P8079STB-ND | DNP |
| 23 | J3, J4, J5, J6 | 4 | 25-pin header, TH | SAM1029-25-ND | DNP: headers and receptacles enclosed with kit. Keep vias free of solder. : Header |
| 24 | J3, J4, J5, J6 | 4 | 25-pin receptacle, TH | SAM1213-25-ND | DNP: headers and receptacles enclosed with kit. Keep vias free of solder. : Receptacle |
| 25 | TP1, TP2 | 2 | Testpoint | | DNP, keep pads free of solder |
| 26 | BSL | 1 | 10-pin connector, male, TH | HRP10H-ND | DNP, keep vias free of solder |
| 27 | JTAG | 1 | 14-pin connector, male, TH | HRP14H-ND | |
| 28 | IC1 | 1 | Socket: IC201-1004-008 | | Manuf. Yamaichi |
| 29 | IC1 | 1 | MSP430FR6989 | | DNP: enclosed with kit. Is supplied by TI |
| 30 | Q1 | 1 | DNP: MS3V-TR1 (32768kHz/20ppm/12,5pF) | depends on application | Micro Crystal, DNP, enclosed in kit, keep vias free of solder |
| 31 | Q2 | 1 | DNP, Crystal | depends on application | DNP, keep vias free of solder |
| 32 | D1 | 1 | green LED, DIODE0805 | P516TR-ND | |
| 33 | D3 | 1 | red (DNP), DIODE0805 | | DNP |
| 34 | D2 | 1 | yellow (DNP), DIODE0805 | | DNP |
| 35 | Rubber stand off | 4 | | Buerklin: 20H1724 | apply to corners at bottom side |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.35 MSP-TS430PZ5x100

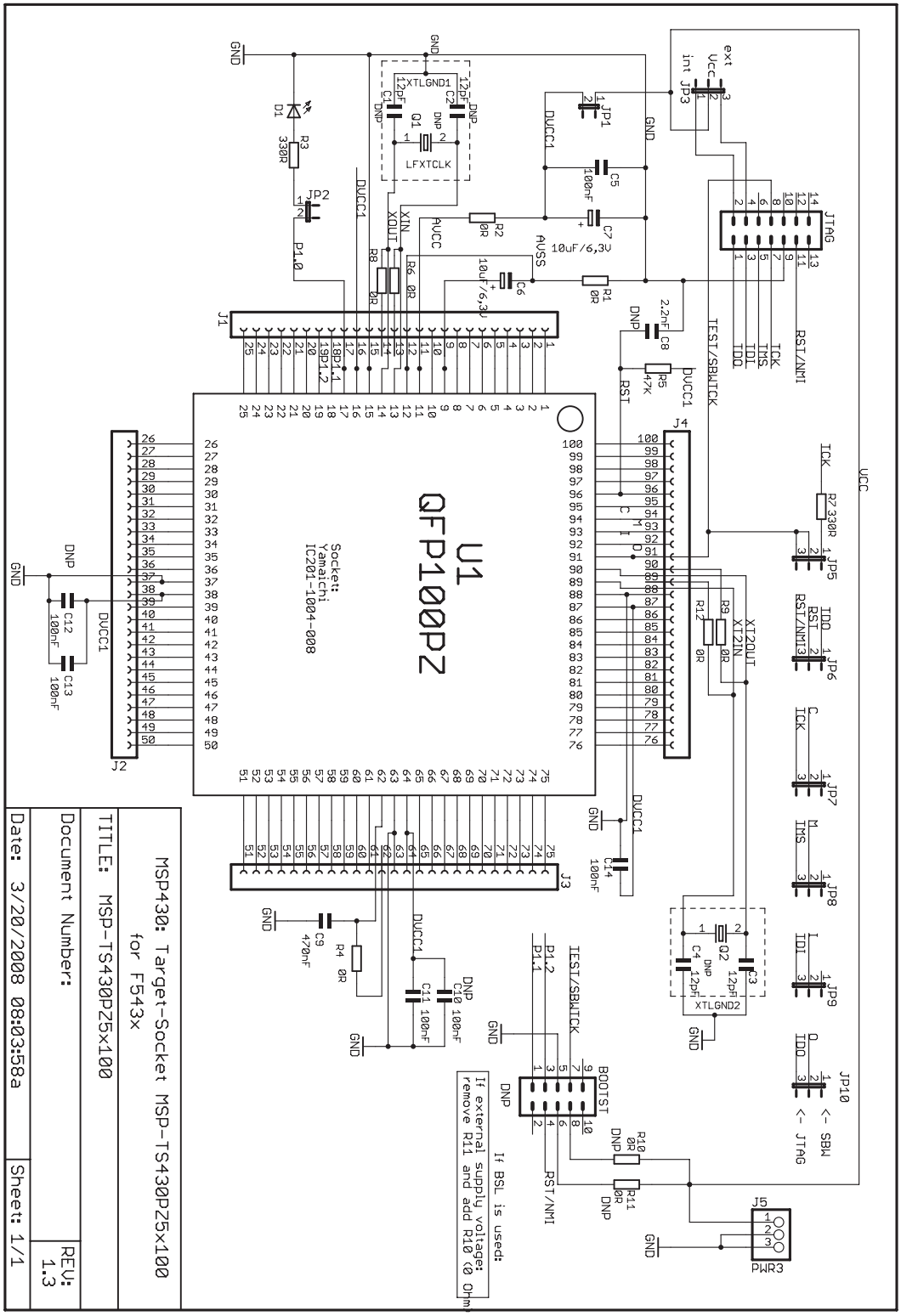



**Figure B-70. MSP-TS430PZ5x100 Target Socket Module, Schematic**


Copyright © 2009–2016, Texas Instruments Incorporated

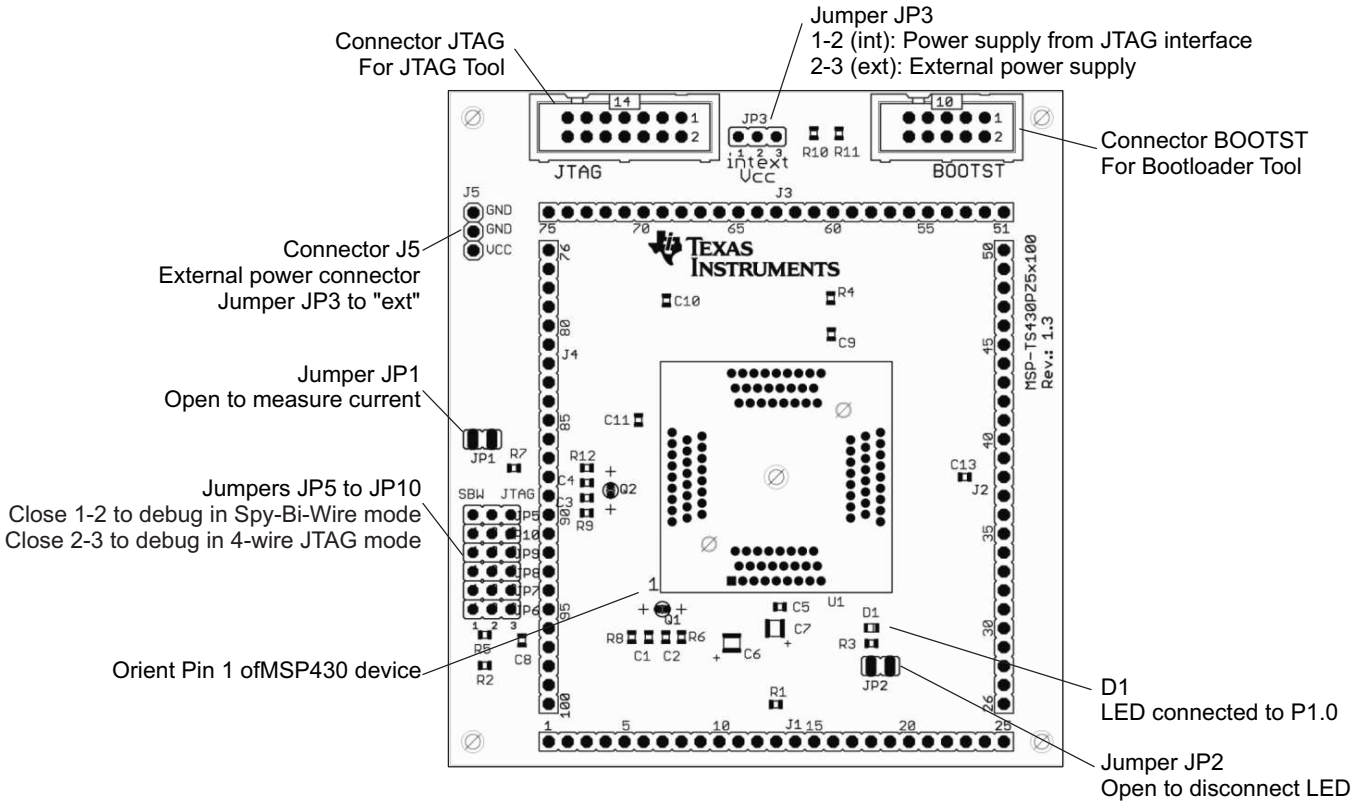



**Figure B-71. MSP-TS430PZ5x100 Target Socket Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-36. MSP-TS430PZ5x100 Bill of Materials**

| Pos. | Ref Des | No. Per Board | Description | Digi-Key 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-ND<br>SAM1213-25-ND | DNP: headers and receptacles enclosed with kit. Keep vias free of solder.<br>: Header<br>: 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 | Q1: Micro Crystal MS1V-T1K 32.768kHz, C(Load) = 12.5pF | DNP: Keep vias free of solder |
| 16 | R3, R7 | 2 | 330 Ω, SMD0805 | 541-330ATR-ND | |
| 17 | R1, R2, R4, R6, R8, R9, R10, R11, R12 | 3 | 0 Ω, SMD0805 | 541-000ATR-ND | DNP: R6, R8, R9, R10, R11, R12 |
| 18 | R5 | 1 | 47k Ω, 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 |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.36 MSP-TS430PZ100USB

Due to the use of diodes in the power chain, the voltage on the MSP430F5xx device is approximately 0.3 V lower than is set by the debugging tool. Set the voltage in the IDE to 0.3 V higher than desired; for example, to run the MCU at 3.0 V, set it to 3.3 V.

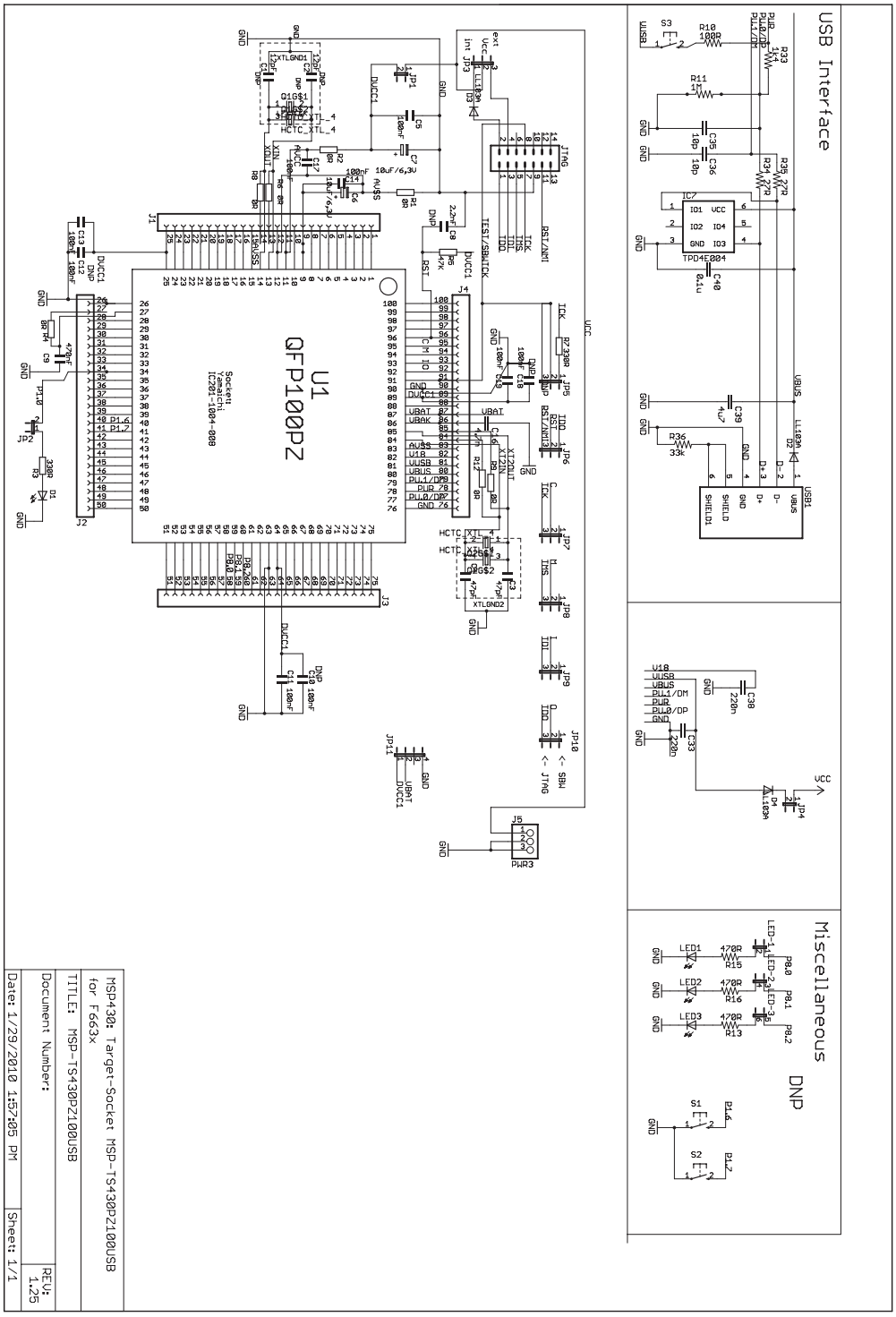



**Figure B-72. MSP-TS430PZ100USB Target Socket Module, Schematic**



Copyright © 2009–2016, Texas Instruments Incorporated

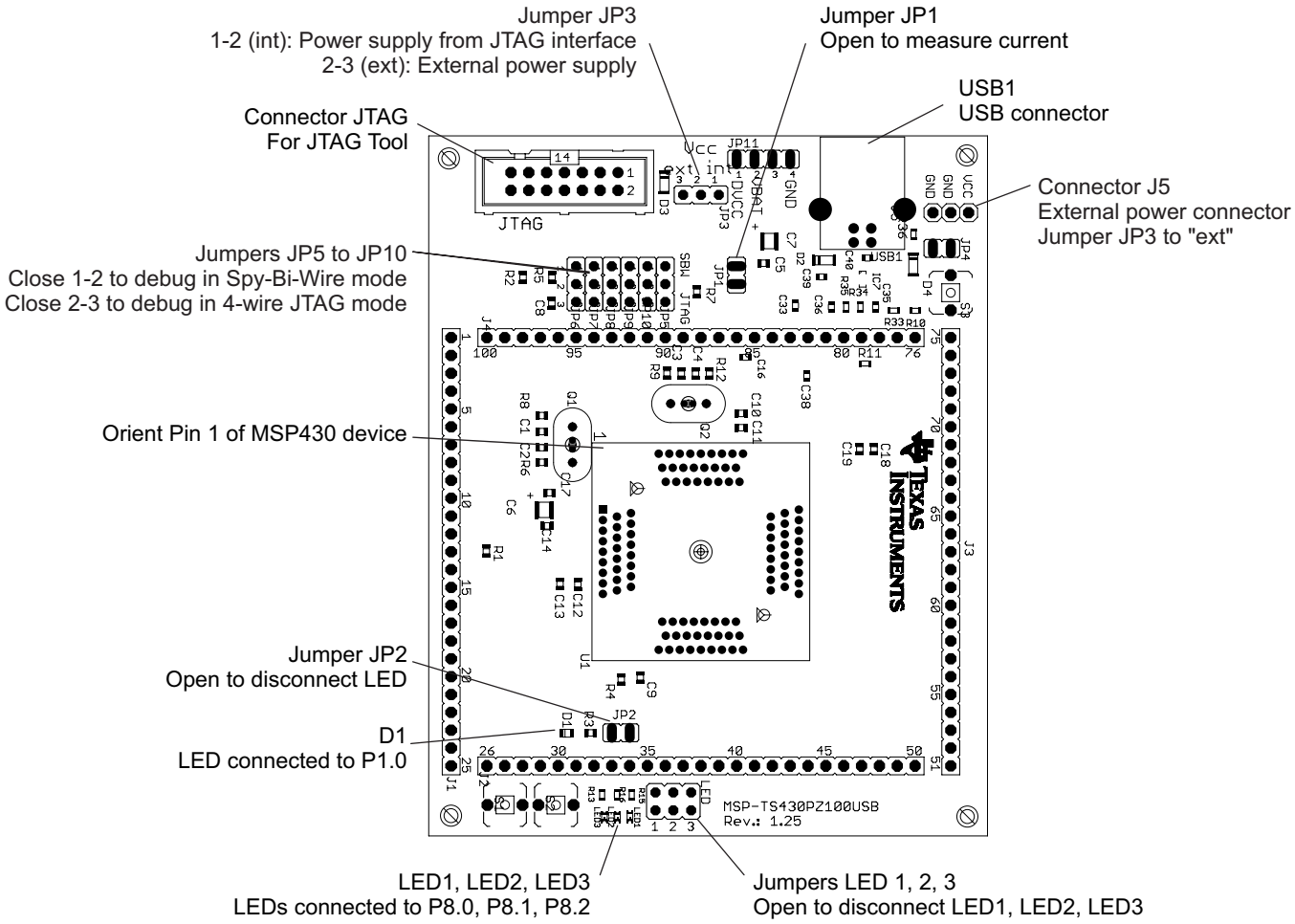



**Figure B-73. MSP-TS430PZ100USB Target Socket Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

## Table B-37. MSP-TS430PZ100USB Bill of Materials

| Pos. | Ref Des | No. Per Board | Description | Digi-Key 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, C19 | 5 | 100nF, SMD0805 | 311-1245-2-ND | |
| 3.1 | C10, C12, C18, C17 | 0 | 100nF, SMD0805 | 311-1245-2-ND | DNP: C10, C12,C18, C17 |
| 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 | 25-pin header, TH | SAM1029-25-ND | DNP: headers and receptacles enclosed with kit. Keep vias free of solder.<br>: Header<br>: Receptacle |
| 7.1 | | 4 | 25-pin header, TH | SAM1213-25-ND | DNP: headers and receptacles enclosed with kit. Keep vias free of solder.<br>: Header<br>: 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, JP4 | 3 | 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 | | 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 | Micro Crystal MS1V-T1K 32.768kHz, C(Load) = 12.5pF | DNP: Q1. Keep vias free of solder |
| 15 | Q2 | 1 | Crystal | Q2: 4MHz, Buerklin: 78D134 | |
| 16 | R3, R7 | 2 | 330 Ω, SMD0805 | 541-330ATR-ND | |
| 17 | R1, R2, R4, R6, R8, R9, R12 | 3 | 0 Ω, SMD0805 | 541-000ATR-ND | DNP: R6, R8, R9, R12 |
| 18 | R10 | 1 | 100 Ω, SMD0805 | Buerklin: 07E500 | |
| 18 | R11 | 1 | 1M Ω, SMD0603 | | not existing in Rev 1.0 |
| 18 | R5 | 1 | 47k Ω, SMD0805 | 541-47000ATR-ND | |
| 19 | U1 | 1 | Socket:IC201-1004-008 | | Manuf.: Yamaichi |
| 20 | PCB | 1 | 79 x 77 mm | | 2 layers |
| 21 | Rubber stand off | 4 | | Buerklin: 20H1724 | apply to corners at bottom side |
| 22 | MSP430 | 2 | MSP430F6638IPZ | | DNP: enclosed with kit. Is supplied by TI |
| 23 | Insulating disk to Q2 | 1 | Insulating disk to Q2 | http://www.ettinger.de/Art_Detail.cfm?ART_ARTNUM=70.08.121 | |
| 24 | C16 | 1 | 4.7 nF SMD0603 | | |
| 27 | C33 | 1 | 220n SMD0603 | Buerklin: 53D2074 | |
| 28 | C35, C36 | 2 | 10p SMD0603 | Buerklin: 56D102 | |
| 30 | C38 | 1 | 220n SMD0603 | Buerklin: 53D2074 | |
| 31 | C39 | 1 | 4u7 SMD0603 | Buerklin: 53D2086 | |


Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-37. MSP-TS430PZ100USB Bill of Materials (continued)**

| Pos. | Ref Des | No. Per Board | Description | Digi-Key Part No. | Comment |
|---|---|---|---|---|---|
| 32 | C40 | 1 | 0.1u SMD0603 | Buerklin: 53D2068 | |
| 33 | D2, D3, D4 | 3 | LL103A | Buerklin: 24S3406 | |
| 34 | IC7 | 1 | TPD4E004 | | Manu: TI |
| 35 | LED | 0 | JP3QE | SAM1032-03-ND | DNP |
| 36 | LED1, LED2, LED3 | 0 | LEDCHIPLED_0603 | FARNELL: 852-9833 | DNP |
| 37 | R13, R15, R16 | 0 | 470R SMD0603 | Buerklin: 07E564 | DNP |
| 38 | R33 | 1 | 1k4 / 1k5 SMD0603 | Buerklin: 07E612 | |
| 39 | R34 | 1 | 27R SMD0603 | Buerklin: 07E444 | |
| 40 | R35 | 1 | 27R SMD0603 | Buerklin: 07E444 | |
| 41 | R36 | 1 | 33k SMD0603 | Buerklin: 07E740 | |
| 42 | S1, S2, S3 | 1 | PB | P12225STB-ND | DNP S1 and S2. (Only S3) |
| 43 | USB1 | 1 | USB_RECEPTACLE | FARNELL: 117-7885 | |
| 44 | JP11 | 1 | 4-pin header, male, TH | SAM1035-04-ND | place jumper only on Pin 1 |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.37 MSP-TS430PZ100AUSB

The development board MSP-TS430PZ100AUSB supports the MSP430FG662x and MSP430FG642x flash devices in the 100-pin QFP package. MSP430FG6626IPZ devices are not included in the MSP-TS430PZ100AUSB kit. Free samples can be ordered from www.ti.com/product/MSP430FG6626/samplebuy.

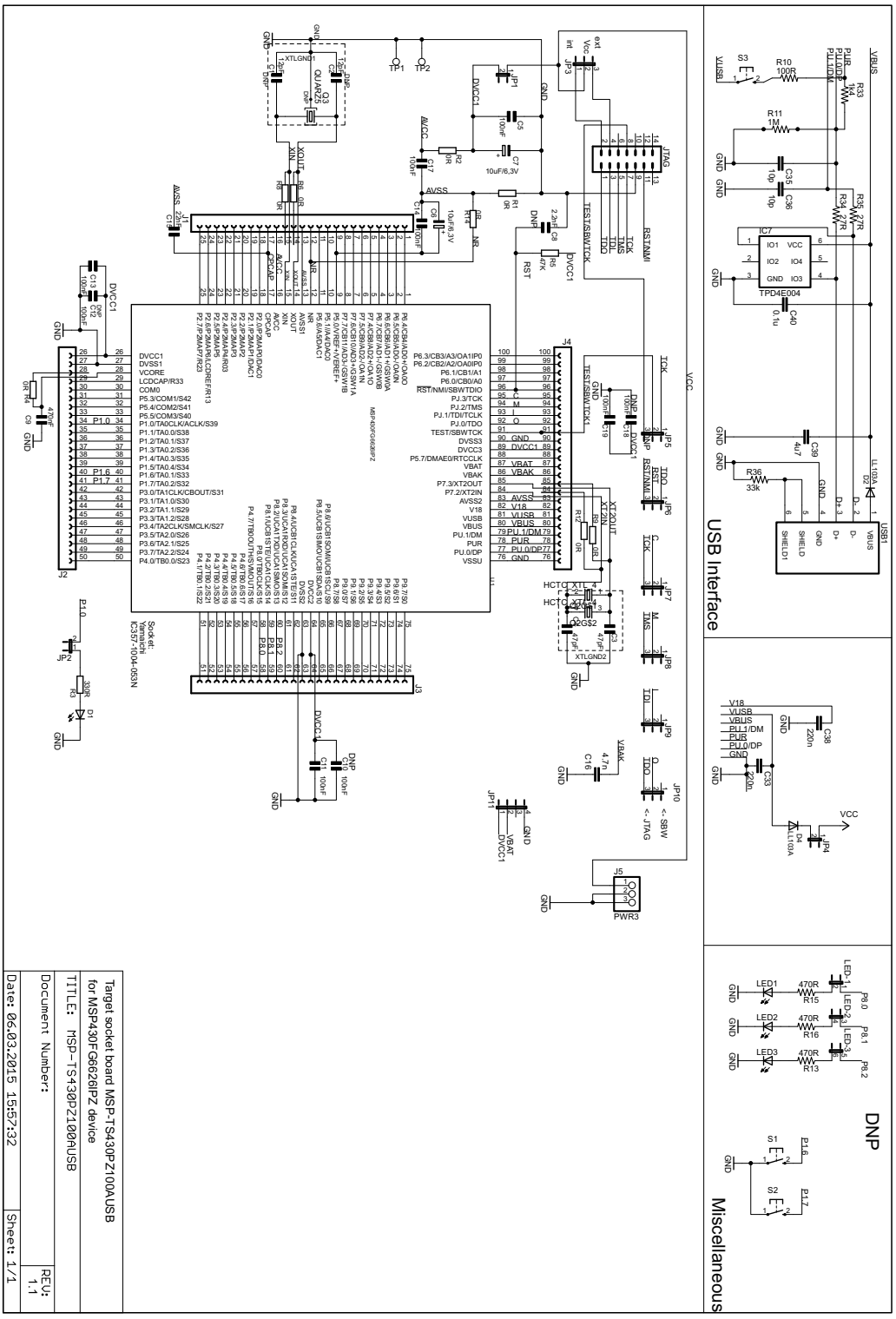



**Figure B-74. MSP-TS430PZ100AUSB Target Socket Module, Schematic**



Copyright © 2009–2016, Texas Instruments Incorporated

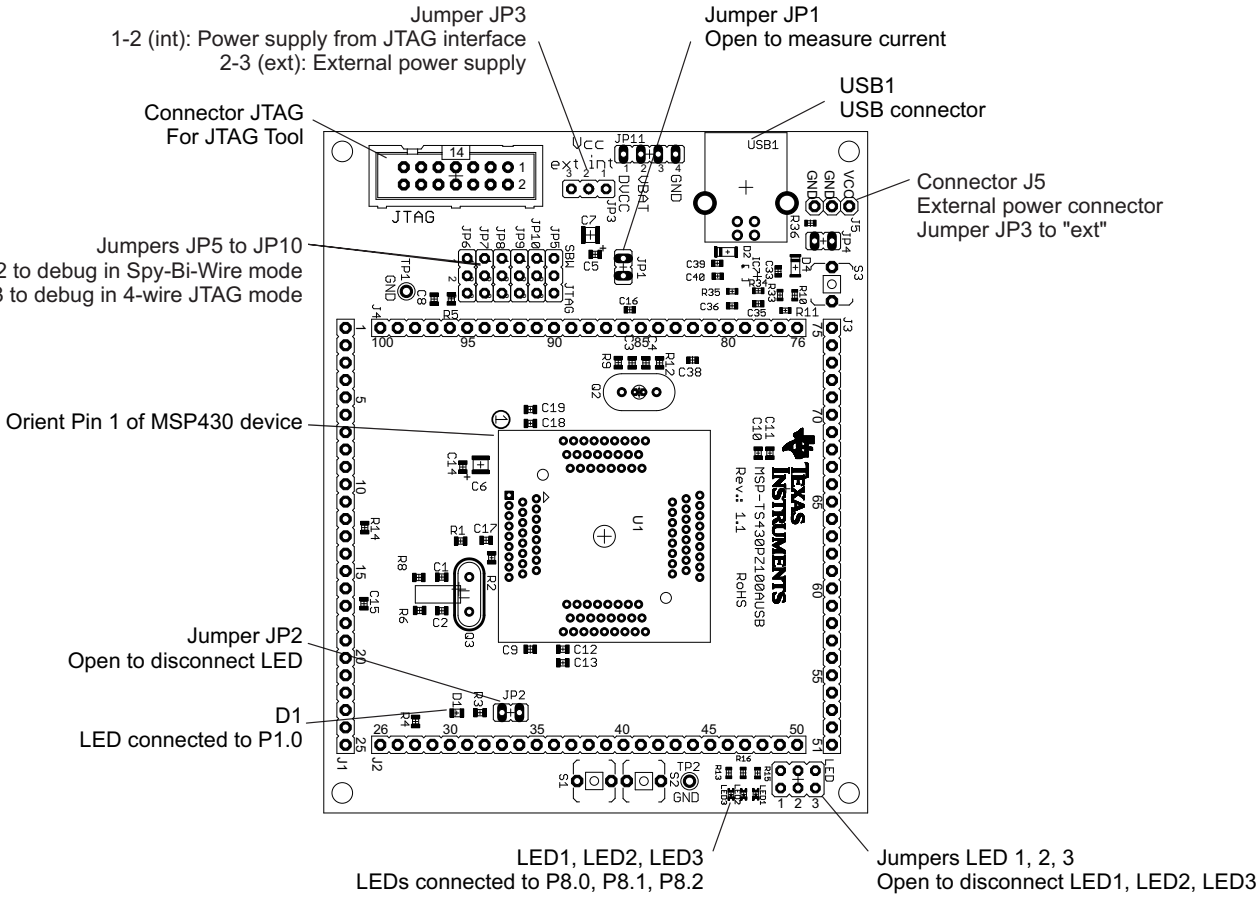



**Figure B-75. MSP-TS430PZ100AUSB Target Socket Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

## Table B-38. MSP-TS430PZ100AUSB Bill of Materials

| Pos. | Ref Des | No. Per Board | Description | Digi-Key Part No. | Comment |
|---|---|---|---|---|---|
| 1 | PCB Rev. 1.1 | 1 | 99.65mm x 79.54mm | | 2 layers, red solder mask |
| 2 | C1, C2 | 2 | 12pF, SMD0805 | | DNP: C1, C2 |
| 3 | C10, C12, C17, C18 | 9 | 100nF, SMD0805 | 311-1245-2-ND | DNP: C10, C12,C18, C17 |
| 4 | C15 | 1 | 22nF, CSMD0805 | 311-1242-1-ND | |
| 5 | C16 | 1 | 4.7 nF SMD0603 | 311-1250-1-ND | |
| 6 | C3, C4 | 2 | 47pF, CSMD0805 | 709-1337-1-ND | |
| 7 | C33, C38 | 2 | 220n SMD0603 | | Buerklin: 53D2074 |
| 8 | C35, C36 | 2 | 10p SMD0603 | | Buerklin: 56D102 |
| 9 | C39 | 1 | 4u7 SMD0603 | | Buerklin: 53D2086 |
| 10 | C40 | 1 | 0.1u SMD0603 | | Buerklin: 53D2068 |
| 11 | C5, C11, C13, C14, C19 | 5 | 100nF, SMD0805 | 311-1245-2-ND | |
| 12 | C6, C7 | 2 | 10uF/6.3V, Tantal Size B | 511-1463-2-ND | |
| 13 | C8 | 1 | 2.2nF, CSMD0805 | 709-1339-1-ND | |
| 14 | C9 | 1 | 470nF, SMD0805 | 478-1403-2-ND | |
| 15 | D1 | 1 | green LED, HSMG-C170 DIODE0805 | 516-1434-1-ND | Avago, Farnell 5790852 |
| 16 | D2, D4 | 2 | LL103A, SOD-80 | | Buerklin: 24S3406 |
| 17 | IC7 | 1 | TPD4E004DRYR | 296-23618-1-ND | Manu: TI |
| 18 | J1, J2, J3, J4 | 4 | 25-pin header, TH | SAM1029-25-ND | DNP: Headers enclosed in kit. Keep vias free of solder. |
| 19 | J1, J2, J3, J4 | 4 | 25-pin receptacle, TH | SAM1213-25-ND | DNP: Receptacles enclosed in kit. Keep vias free of solder. |
| 20 | J5 | 1 | 3-pin header, male, TH | SAM1035-03-ND | |
| 21 | JP1, JP2, JP4 | 3 | 2-pin header, male, TH | SAM1035-02-ND | place jumper on header |
| 22 | JP11 | 1 | 4-pin header, male, TH | SAM1035-04-ND | Place jumper on Pin 1 and 2 |
| 23 | JP3 | 1 | 3-pin header, male, TH | SAM1035-03-ND | place jumper on pins 1-2 |
| 24 | JP5, JP6, JP7, JP8, JP9, JP10 | 6 | 3-pin header, male, TH | SAM1035-03-ND | place jumpers on pins 2-3 |
| 25 | Jumpers for JP1, JP2, JP3, JP4, JP5, JP6, JP7, JP8, JP9, JP10, JP11 | 11 | Jumper | 15-38-1024-ND | |
| 26 | JTAG | 1 | 14-pin connector, male, TH | HRP14H-ND | |
| 27 | LED | 1 | JP3QE | SAM1032-03-ND | DNP |
| 28 | LED1, LED2, LED3 | 3 | FARNELL: 852-9833 | | DNP |
| 29 | MSP430 | 2 | MSP430FG6626IPZ | | DNP: Free samples can be ordered in the TI Store |
| 30 | Q2 | 1 | Crystal | Q2: 4MHz Buerklin: 78D134 | |
| 31 | Q3 | 1 | MS3V-T1R (32.768kHz/ 20ppm/12.5pF) | | |
| 32 | R1, R2, R4 | 3 | 0 Ohm, SMD0805 | 541-0.0ATR-ND | |
| 33 | R10 | 1 | 100R, R0603 | 541-100GCT-ND | |
| 34 | R11 | 1 | 1M, R0603 | 541-1.0MGCT-ND | |
| 35 | R13, R15, R16 | 3 | 470R SMD0603 | Buerklin: 07E564 | DNP |
| 36 | R14 | 1 | 0 Ohm, SMD0805 | 541-0.0ATR-ND | |
| 37 | R3 | 1 | 330 Ohm, SMD0805 | 541-330ATR-ND | |


Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-38. MSP-TS430PZ100AUSB Bill of Materials (continued)**

| Pos. | Ref Des | No. Per Board | Description | Digi-Key Part No. | Comment |
|---|---|---|---|---|---|
| 38 | R33 | 1 | 1k4 / 1k5 SMD0603 | | Buerklin: 07E612 |
| 39 | R34, R35 | 2 | 27R SMD0603 | | Buerklin: 07E444 |
| 40 | R36 | 1 | 33k SMD0603 | | Buerklin: 07E740 |
| 41 | R5 | 1 | 47k Ohm, SMD0805 | 541-47000ATR-ND | |
| 42 | R6, R8, R9, R12 | 4 | 0 Ohm, SMD0805 | 541-000ATR-ND | DNP |
| 43 | S1, S2 | 1 | PB | P12225STB-ND | DNP |
| 44 | S3 | 1 | PB | P12225STB-ND | |
| 45 | TP1, TP2 | 2 | Test point | | DNP, Keep vias free of solder |
| 46 | U1 | 1 | Socket: IC357-1004-53N | | Manuf.: Yamaichi |
| 47 | USB1 | 1 | USB Receptacle | | FARNELL: 117-7885 |
| 48 | Insulating disk for Q2 | 1 | Insulating disk for Q2 | | ettinger.de 70.08.121 |
| 49 | Rubber stand off | 4 | | Buerklin: 20H1724 | Apply to corners at bottom side |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.38 MSP-TS430PEU128

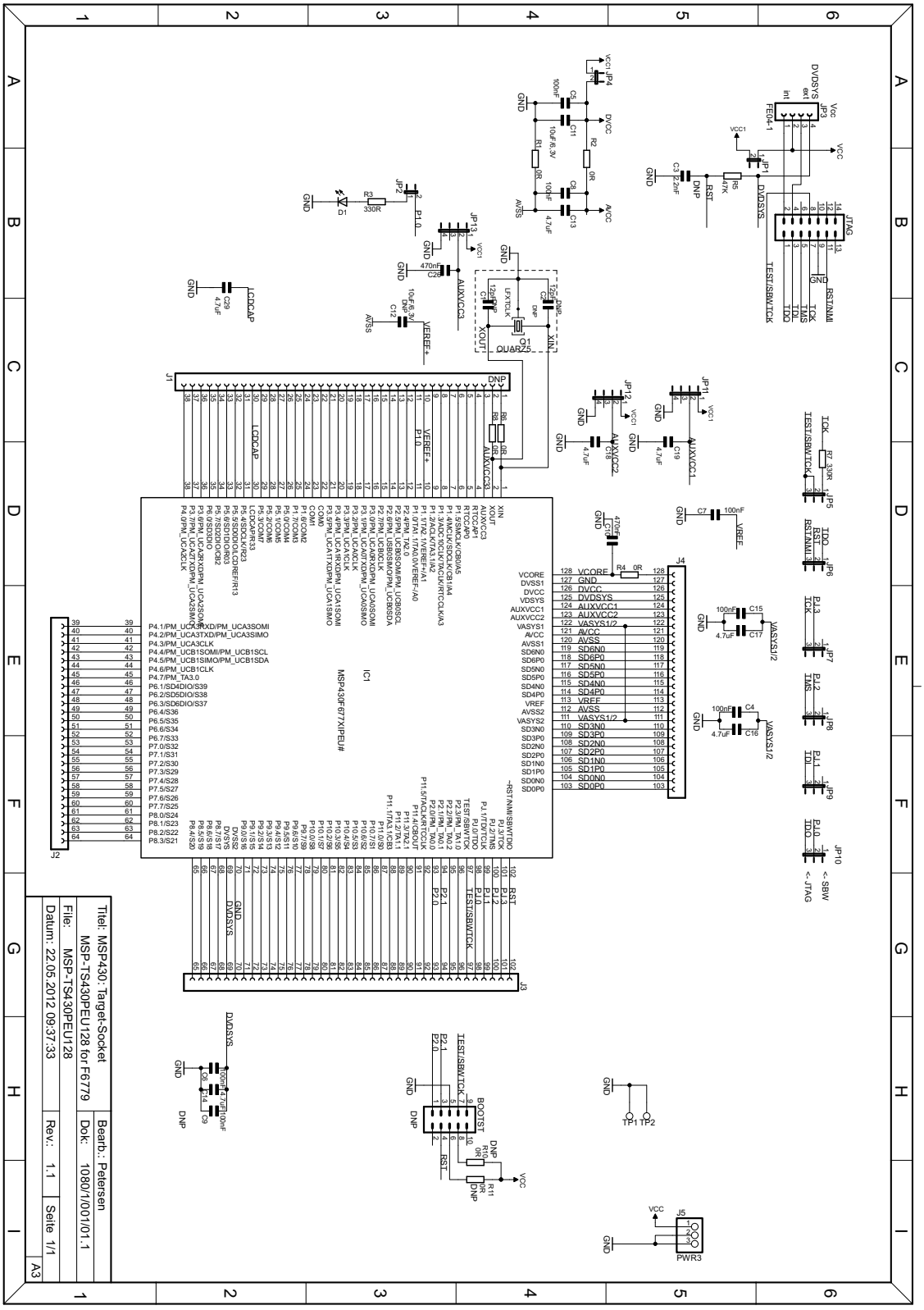



**Figure B-76. MSP-TS430PEU128 Target Socket Module, Schematic**



Copyright © 2009–2016, Texas Instruments Incorporated

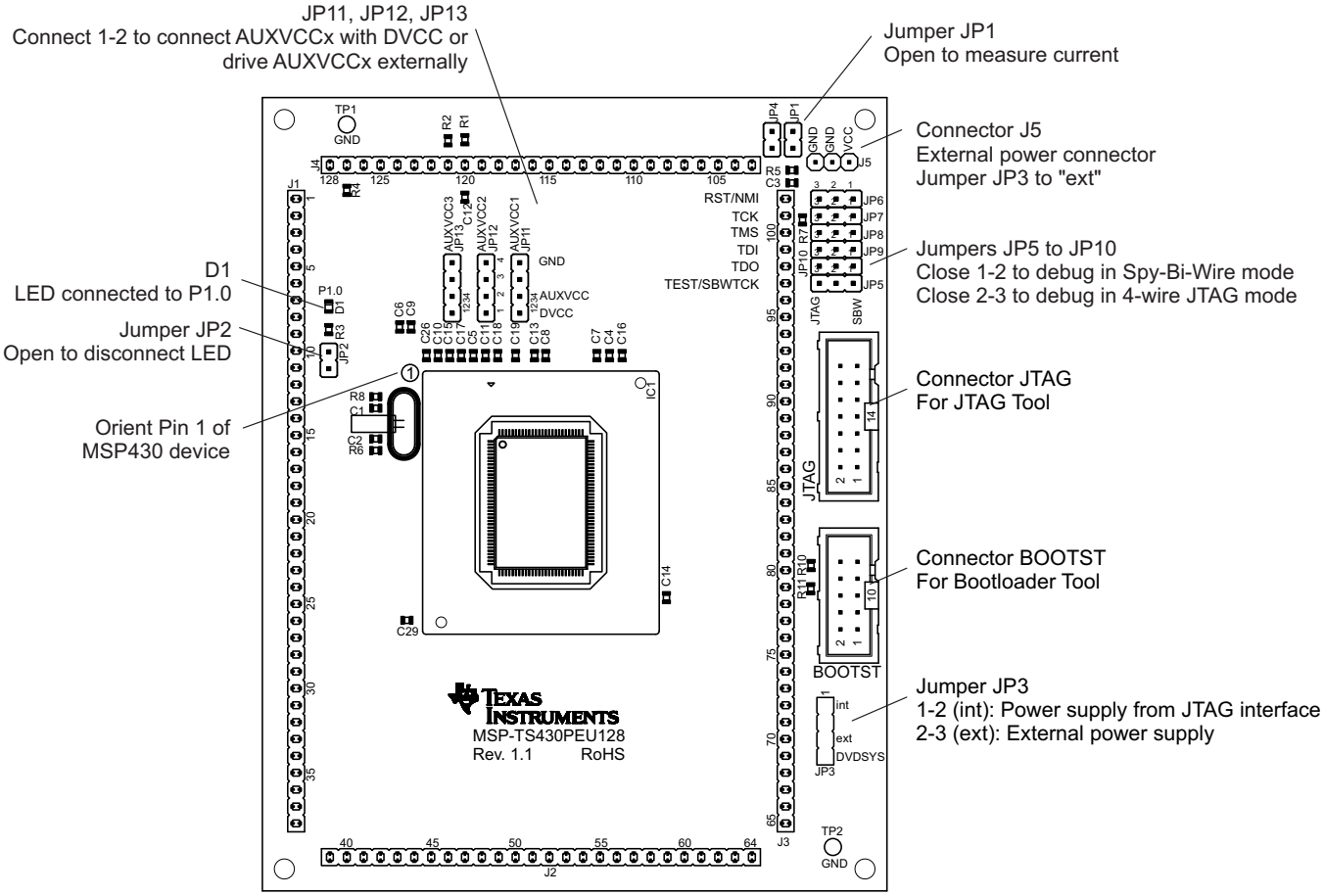



**Figure B-77. MSP-TS430PEU128 Target Socket Module, PCB**

**NOTE:** For bootloader use, the BSL connector and only one of the resistors R10 or R11 must be populated. If the board is supplied internally, R11 (0 Ω) must be assembled. If the board is supplied externally, R10 (0 Ω) must be assembled, and R11 must be removed.

**NOTE:** The MSP-TS430PEU128 Rev 1.1 ships with the following modifications:

- R7 value is changed to 0 Ω instead of 330 Ω.
- JTAG pin 8 is connected only to JP5 pin 3, and not to pin 2.
- JP5 pin 2 is connected to IC1 pin 97.
- BOOTST pin 7 is connected to IC1 pin 97.



Copyright © 2009–2016, Texas Instruments Incorporated

## Table B-39. MSP-TS430PEU128 Bill of Materials

| Pos. | Ref Des | No. Per Board | Description | Digi-Key Part No. | Comment |
|---|---|---|---|---|---|
| 1 | PCB | 1 | 94x119.4mm, 4 layers | MSP-TS430PEU128 Rev. 1.1 | 4 layers, green solder mask |
| 2 | D1 | 1 | green LED, DIODE0805 | 516-1434-1-ND | |
| 3 | JP1, JP2, JP4 | 3 | 2-pin header, male, TH | SAM1035-02-ND | Place jumper on header |
| 4 | JP5, JP6, JP7, JP8, JP9, JP10 | 6 | 3-pin header, male, TH | SAM1035-03-ND | Place jumpers on pins 1-2 (SBW) |
| 5 | JP11, JP12, JP13 | 3 | 4-pin header, male, TH | SAM1035-04-ND | Place jumpers on pins 1-2 (AVCC=VCC) |
| 6 | JP3 | 1 | 4-pin header, male, TH | SAM1035-04-ND | Place jumpers on pins 1-2 |
| 7 | JP1, JP2, JP3, JP4, JP5, JP6, JP7, JP8, JP9, JP10, JP11, JP12, JP13 | 13 | Jumper | WM4592-ND | |
| 8 | R1, R2, R4, R6, R8 | 5 | 0R, 0805 | 541-0.0ATR-ND | |
| 9 | R10, R11 | 2 | 0R, 0805 | 541-0.0ATR-ND | DNP |
| 10 | C3 | 1 | 2.2nF, CSMD0805 | 490-1628-2-ND | DNP |
| 11 | C13, C14, C16, C17, C18, C19, C29 | 7 | 4.7uF, 6.3V, CSMD0805 | 587-1302-2-ND | |
| 12 | C11 | 1 | 10uF, 6.3V, CSMD0805 | 445-1372-2-ND | |
| 13 | C12 | 1 | 10uF, 6.3V, CSMD0805 | 445-1372-2-ND | DNP |
| 14 | C1, C2 | 2 | 12pF, CSMD0805 | 490-5531-2-ND | DNP |
| 15 | R5 | 1 | 47K, 0805 | 311-47KARTR-ND | |
| 16 | C4, C5, C6, C7, C8, C15 | 6 | 100nF, CSMD0805 | 311-1245-2-ND | |
| 17 | C9 | 1 | 100nF, CSMD0805 | 311-1245-2-ND | DNP |
| 18 | R3, R7 | 2 | 330R, 0805 | 541-330ATR-ND | |
| 19 | C10, C26 | 2 | 470nF, CSMD0805 | 587-1282-2-ND | |
| 20 | BOOTST | 1 | 10-pin connector, male, TH | HRP10H-ND | DNP, keep vias free of solder |
| 21 | JTAG | 1 | 14-pin connector, male, TH | HRP14H-ND | |
| 22 | IC1 Socket | 1 | Socket: IC500-1284-009P | | Manuf. Yamaichi |
| 23 | IC1 | 2 | MSP430F67791IPEU | | DNP: enclosed with kit. Is supplied by TI |
| 24 | J5 | 1 | 3-pin header, male, TH | SAM1035-03-ND | |
| 25 | Q1 | 1 | Crystal: MS3V-T1R 32.768kHz 12.5pF ±20ppm | | DNP: Crystal enclosed with kit. Keep vias free of solder |
| 26 | TP1, TP2 | 2 | Test point | | DNP, keep vias free of solder |
| 27 | J2,J4 | 2 | 26-pin header, TH | SAM1029-26-ND | DNP: Headers enclosed with kit. Keep vias free of solder. |
| 28 | J2,J4 | 2 | 26-pin receptable, TH | SAM1213-26-ND | DNP: Receptacles enclosed with kit. Keep vias free of solder. |
| 29 | J1, J3 | 2 | 38-pin header, TH | SAM1029-38-ND | DNP: Headers enclosed with kit. Keep vias free of solder. |
| 30 | J1, J3 | 2 | 38-pin receptable, TH | SAM1213-38-ND | DNP: Receptacles enclosed with kit. Keep vias free of solder. |
| 31 | Rubber feet | 4 | Rubber feet | Buerklin: 20H1724 | apply to bottom side corners |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.39 EM430F5137RF900

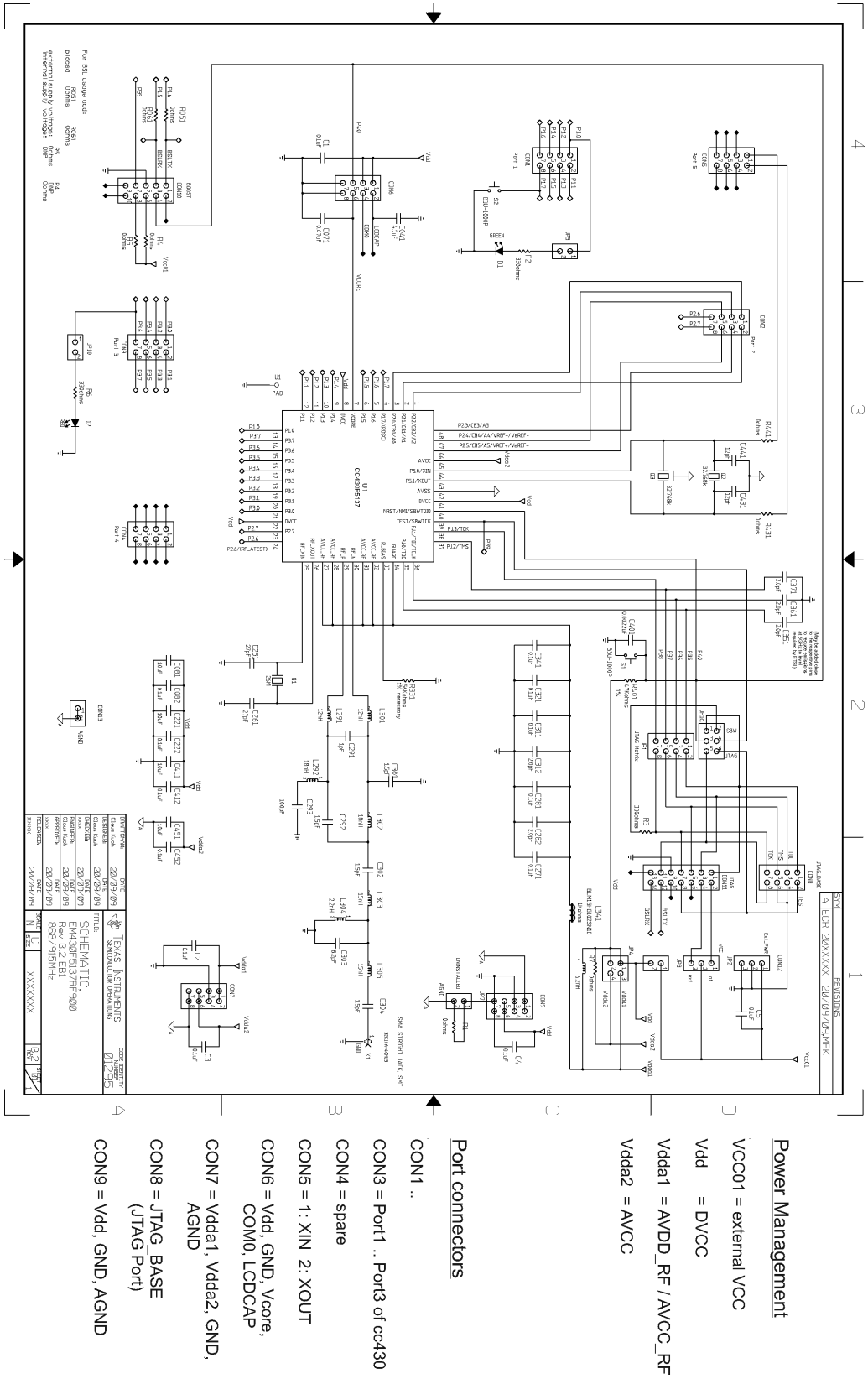



**Figure B-78. EM430F5137RF900 Target Board, Schematic**


Copyright © 2009–2016, Texas Instruments Incorporated

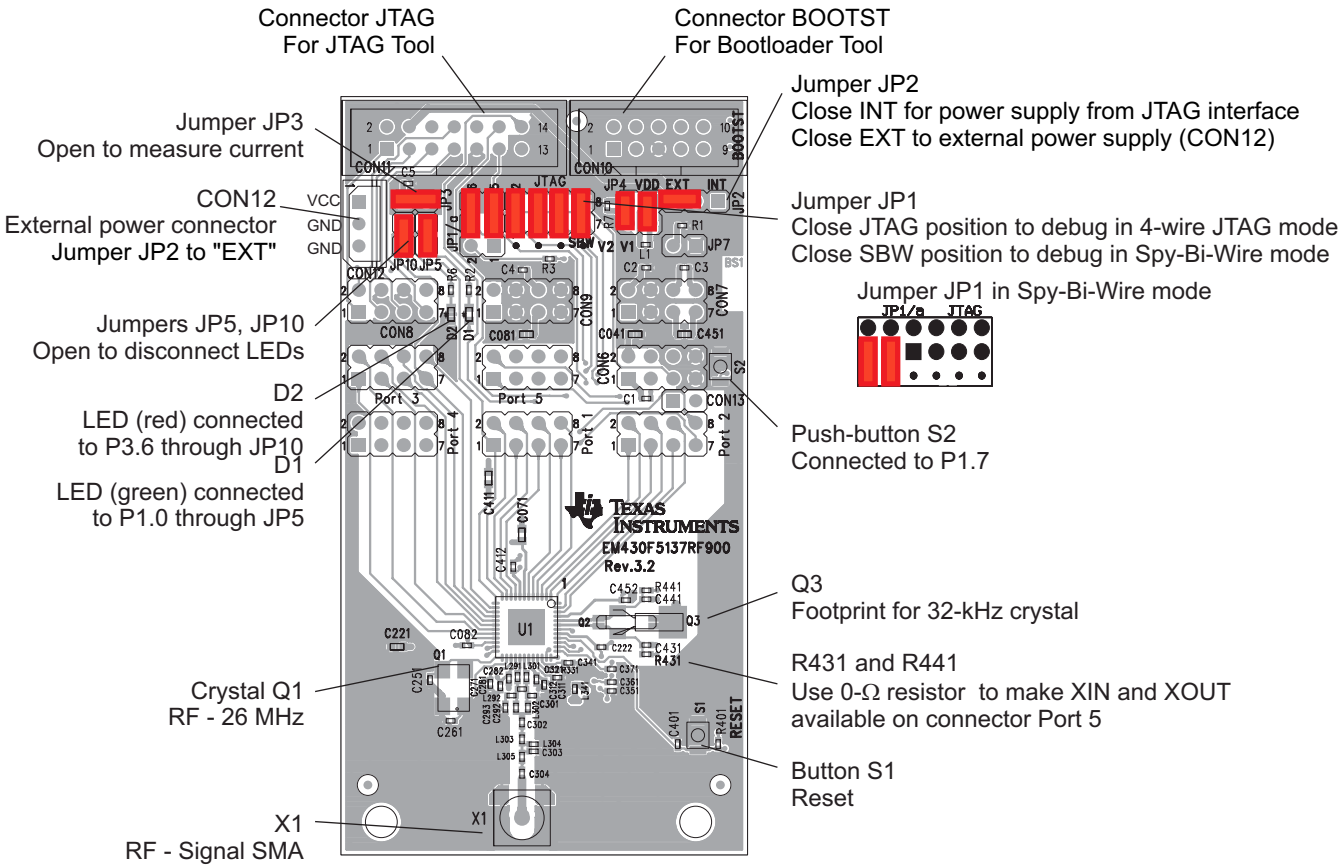



**Figure B-79. EM430F5137RF900 Target board, PCB**

The battery pack that is included with the EM430F5137RF900 kit may be connected to CON12. Ensure correct battery insertion regarding the polarity as indicated in battery holder.



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-40. EM430F5137RF900 Bill of Materials**

| Item | Reference | No. per Board | Description | Value | Manufacturer's Part Number | Manufacturer | Comment |
|---|---|---|---|---|---|---|---|
| 1 | Q1 | 1 | ( CUSTOMER SUPPLY ) CRYSTAL, SMT, 4P, 26MHz | 26M | ASX-531(CS) | AKER ELECTRONIC | |
| 2 | C1-C5, C082, C222, C271, C281, C311, C321, C341, C412, C452 | 14 | CAPACITOR, SMT, 0402, CER, 16V, 10%, 0.1uF | 0.1uF | 0402YC104KAT2A | AVX | |
| 3 | C071 | 1 | CAPACITOR, SMT, 0603, CERAMIC, 0.47uF, 16V, 10%, X5R | 0.47uF | 0603YD474KAT2A | AVX | |
| 4 | R401 | 1 | RES0402, 47.0K | 47kΩ | CRCW04024702F100 | DALE | |
| 5 | CON11 | 1 | HEADER, THU, MALE, 14P, 2X7, 25.4x9.2x9.45mm | | 09 18 514 6323 | HARTING | |
| 6 | CON10 | 0 | HEADER, THU, MALE, 10P, 2X5, 20.32x9.2x9.45mm | | 09 18 510 6323 | HARTING | DNP |
| 7 | D1 | 1 | LED, SMT, 0603, GREEN, 2.1V | active | APT1608MGC | KINGBRIGHT | |
| 8 | D2 | 1 | LED, SMT, 0603, RED, 2.0V | active | APT1608EC | KINGBRIGHT | |
| 9 | Q3 | 0 | UNINSTALLED CRYSTAL, SMT, 3P, MS1V (Customer Supply) | 32.768k | MS1V-T1K (UN) | MICRO CRYSTAL | DNP |
| 10 | CON12 | 1 | HEADER, THU, MALE, 3P, 1x3, 9.9x4.9x5.9mm | | 22-03-5035 | MOLEX | |
| 11 | C251, C261 | 2 | 50V, 5%, 27pF | 27pF | GRM36COG270J50 | MURATA | |
| 12 | L341 | 1 | FERRITE, SMT, 0402, 1.0kΩ, 250mA | 1kΩ | BLM15HG102SN1D | MURATA | |
| 13 | C293 | 1 | CAPACITOR, SMT, 0402, CERAMIC, 100pF, 50V, 0.25pF, C0G(NP0) | 100pF | GRM1555C1H101JZ01 | MURATA | |
| 14 | L304 | 1 | INDUCTOR, SMT, 0402, 2.2nH, 0.1nH, 220mA, 500MHz | 0.0022uH | LQP15MN2N2B02 | MURATA | |
| 15 | L303, L305 | 2 | INDUCTOR, SMT, 0402, 15nH, 2%, 450mA, 250MHz | 0.015uH | LQW15AN15NG00 | MURATA | |
| 16 | L292, L302 | 2 | INDUCTOR, SMT, 0402, 18nH, 2%, 370mA, 250MHz | 0.018uH | LQW15AN18NG00 | MURATA | |
| 17 | C291 | 1 | CAPACITOR, SMT, 0402, CERAMIC, 1pF, 50V, 0.05pF, C0G(NP0) | 1pF | GRM1555C1H1R0WZ01 | MURATA | |
| 18 | C303 | 1 | CAPACITOR, SMT, 0402, CERAMIC, 8.2pF, 50V, 0.05pF, C0G(NP0) | 8.2pF | GRM1555C1H8R2WZ01 | MURATA | |
| 19 | C292, C301-C302, C304 | 4 | CAPACITOR, SMT, 0402, CERAMIC, 1.5pF, 50V, 0.05pF, C0G(NP0) | 1.5pF | GRM1555C1H1R5WZ01 | MURATA | |
| 20 | L291, L301 | 2 | INDUCTOR, SMT, 0402, 12nH, 2%, 500mA, 250MHz | 0.012uH | LQW15AN12NG00 | MURATA | |
| 21 | C282, C312, C351, C361, C371 | 5 | CAPACITOR, SMT, 0402, CERAMIC, 2pF, 50V, 0.1pF, C0G | 2.0pF | GRM1555C1H2R0BZ01 | Murata | |
| 22 | L1 | 1 | INDUCTOR, SMT, 0402, 6.2nH, 0.1nH, 130mA, 500MHz | 6.2nH | LQP15MN6N2B02 | Murata | |
| 23 | S1-S2 | 2 | ULTRA-SMALL TACTILE SWITCH, SMT, 2P, SPST-NO, 1.2x3x2.5mm, 0.05A, 12V | | B3U-1000P | OMRON | |
| 24 | R4-R5, R051, R061, R431, R441 | 0 | UNINSTALLED RESISTOR/JUMPER, SMT, 0402, 0 Ω, 5%, 1/16W | 0Ω | ERJ-2GE0R00X | PANASONIC | DNP |
| 24a | R7 | 1 | RESISTOR/JUMPER, SMT, 0402, 0 Ω, 5%, 1/16W | 0Ω | ERJ-2GE0R00X | PANASONIC | |


Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-40. EM430F5137RF900 Bill of Materials (continued)**

| Item | Reference | No. per Board | Description | Value | Manufacturer's Part Number | Manufacturer | Comment |
|---|---|---|---|---|---|---|---|
| 25 | R2-R3, R6 | 3 | RESISTOR, SMT, 0402, THICK FILM, 5%, 1/16W, 330 | 330Ω | ERJ-2GEJ331 | PANASONIC | |
| 26 | C431, C441 | 0 | CAPACITOR, SMT, 0402, CER, 12pF, 50V, 5%, NPO | 12pF | ECJ-0EC1H120J | PANASONIC | |
| 27 | C401 | 1 | CAPACITOR, SMT, 0402, CER, 2200pF, 50V, 10%, X7R | 0.0022uF | ECJ-0EB1H222K | PANASONIC | |
| 28 | R331 | 1 | RESISTOR, SMT, THICK FILM, 56K, 1/16W, 5% | 56kΩ | ERJ-2GEJ563 | PANASONIC | |
| 29 | C081, C221, C411, C451 | 4 | CAPACITOR, SMT, 0603, CERAMIC, 10uF, 6.3V, 20%, X5R | 10uF | ECJ-1VB0J106M | PANASONIC | |
| 30 | R1 | 1 | RESISTOR/JUMPER, SMT, 0402, 0 Ω, 5%, 1/16W | 0Ω | ERJ-2GE0R00X | PANASONIC | |
| 31 | C041 | 0 | UNINSTALLED CAP CERAMIC 4.7UF 6.3V X5R 0603 | 4.7uF | ECJ-1VB0J475K | Panasonic | DNP |
| 32 | X1 | 1 | SMA STRIGHT JACK, SMT | | 32K10A-40ML5 | ROSENBERGER | |
| 33 | Q2 | 0 | Crystal, SMT, 32.768 kHz | 32.768k | MS3V-T1R | Micro Crystal | DNP |
| 34 | U1 | 1 | DUT, SMT, PQFP, RGZ-48, 0.5mmLS, 7.15x7.15x1mm, THRM.PAD | | CC430F5137 | TI | |
| 35 | JP1 | 1 | Pin Connector 2x4pin | | 61300821121 | WUERTH | |
| 36 | CON1-CON9 | 0 | Pin Connector 2x4pin | | 61300821121 | WUERTH | DNP |
| 37 | JP2 | 1 | Pin Connector 1x3pin | | 61300311121 | WUERTH | |
| 38 | JP3, JP5, JP10 | 3 | Pin Connector 1x2pin | | 61300211121 | WUERTH | |
| 38a | JP7, CON13 | 0 | Pin Connector 1x2pin | | 61300211121 | WUERTH | DNP |
| 39 | JP4 | 1 | Pin Connector 2x2pin | | 61300421121 | WUERTH | DNP |
| 40 | JP1a | 1 | Pin Connector 2x3pin | | 61300621121 | WUERTH | |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.40 EM430F6137RF900

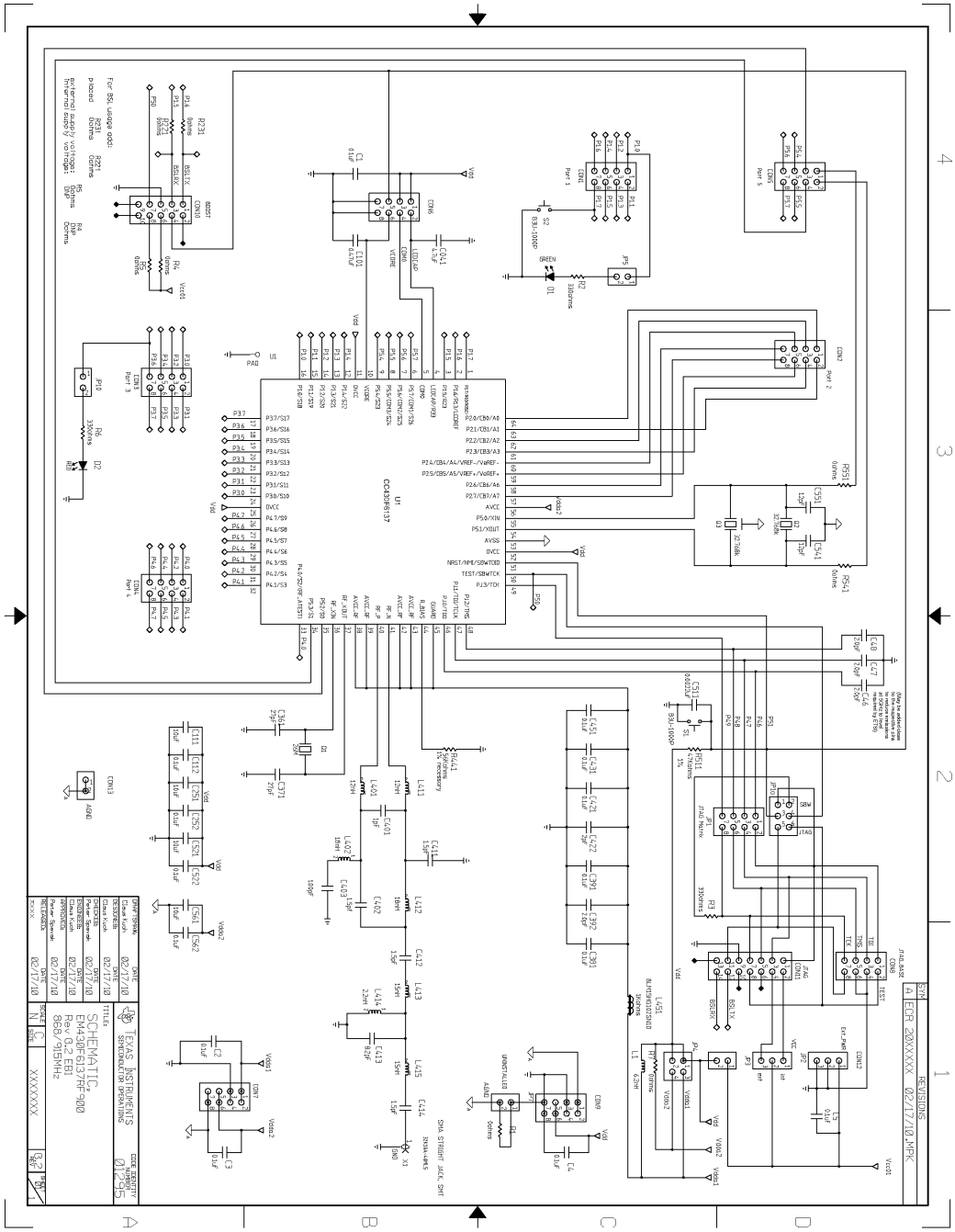



**Figure B-80. EM430F6137RF900 Target Board, Schematic**


Copyright © 2009–2016, Texas Instruments Incorporated

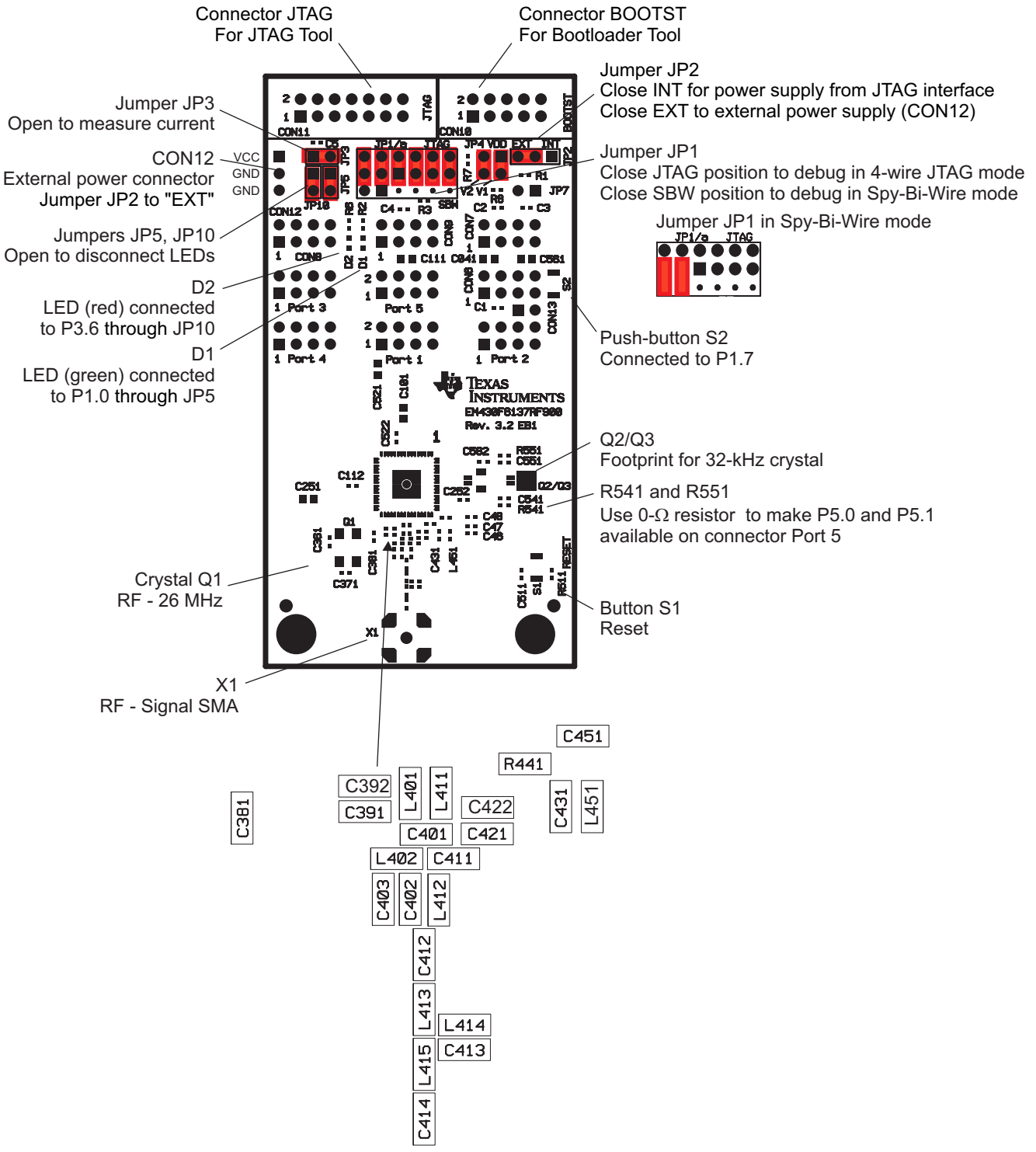



**Figure B-81. EM430F6137RF900 Target Board, PCB**

The battery pack that is included with the EM430F6137RF900 kit may be connected to CON12. Ensure correct battery insertion regarding the polarity as indicated in battery holder.



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-41. 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, 1.0kΩ, 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 Ω, 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 Ω, 5%, 1/16W | ERJ-2GE0R00X | PANASONIC |
| 31 | X1 | 1 | SMA STRIGHT JACK, SMT | 32K10A-40ML5 | ROSENBERGER |
| 33 | U1 | 1 | DUT, SMT, PQFP, RGC-64, 0.5mmLS, 9.15x9.15x1mm, THRM.PAD | CC430F6137 | TI |
| 34 | JP1 | 1 | Pin Connector 2x4pin | 61300821121 | WUERTH |


Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-41. EM430F6137RF900 Bill of Materials (continued)**

| Pos. | Ref Des | No. per Board | Description | Part No. | Manufacturer |
|---|---|---|---|---|---|
| 35 | JP2 | 1 | Pin Connector 1x3pin | 61300311121 | WUERTH |
| 36a | JP3, JP5, JP10 | 3 | Pin Connector 1x2pin | 61300211121 | WUERTH |
| 38 | JP1a | 1 | Pin Connector 2x3pin | 61300621121 | WUERTH |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.41 EM430F6147RF900

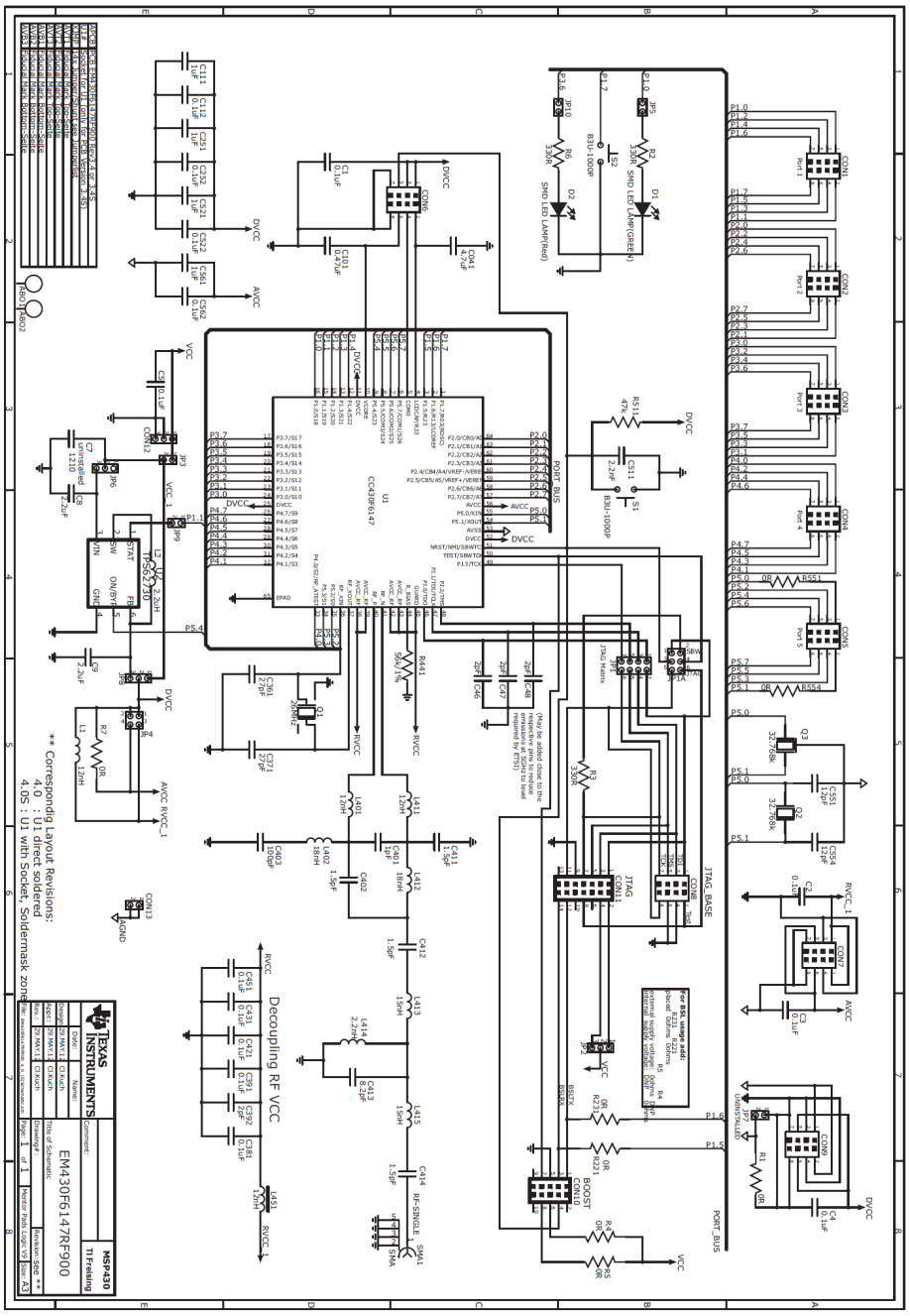



**Figure B-82. EM430F6147RF900 Target Board, Schematic**


Copyright © 2009–2016, Texas Instruments Incorporated

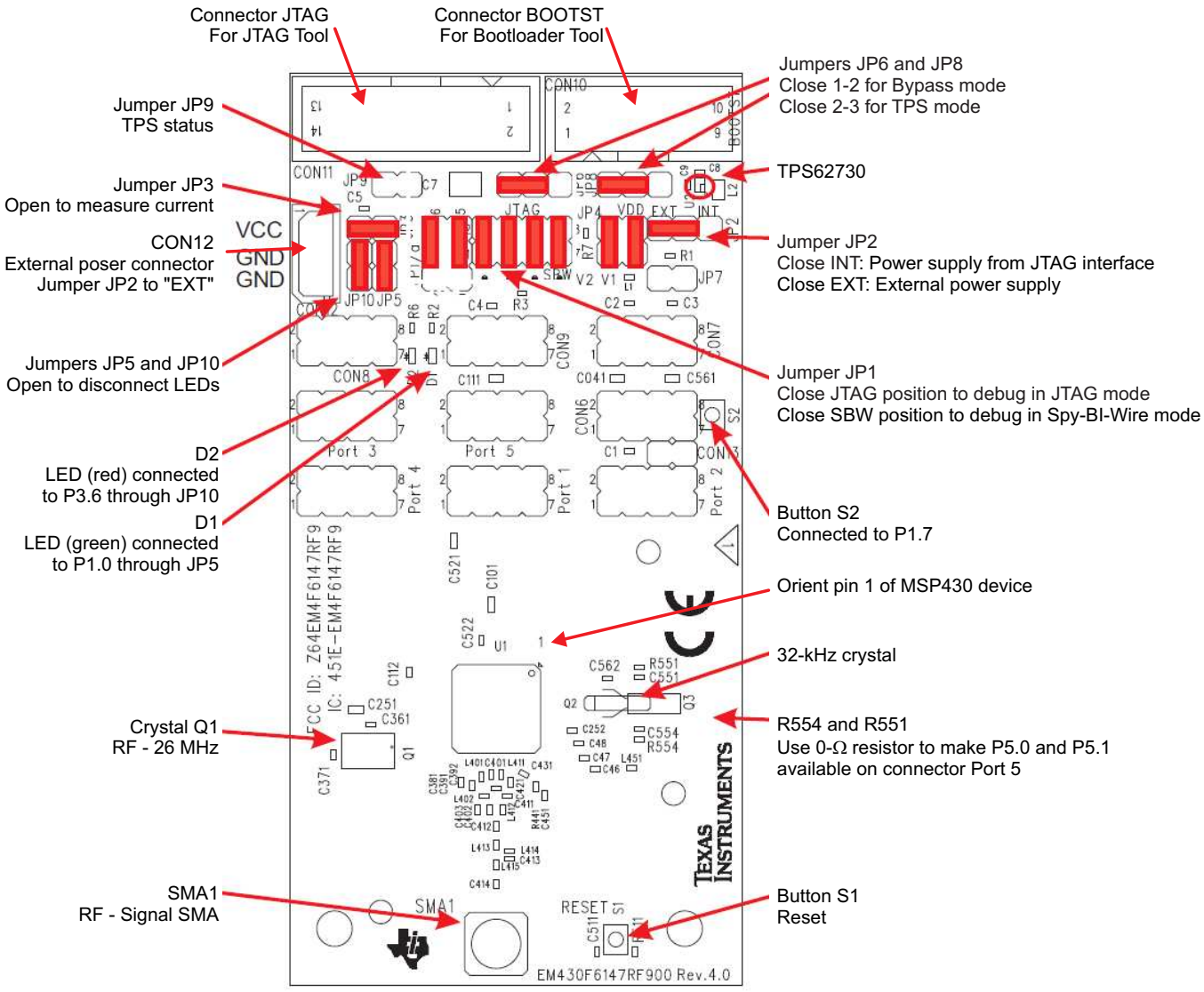



**Figure B-83. EM430F6147RF900 Target Board, PCB**

The battery pack which comes with the EM430F6147RF900 kit may be connected to CON12. Ensure correct battery insertion regarding the polarity as indicated in battery holder.



Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-42. EM430F6147RF900 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 | C1-5 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 | Inductor, SMD, 0402, 12nH, 5%, 370mA | LQW15AN12NJ00 | 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 | 1 | Inductor, SMD, 0402, 15nH, 5%, 370mA, 250MHz | LQW15AN15NJ00 | MURATA |
| 15 | L415 | 1 | INDUCTOR,SMT,0402,15nH,±5%,460mA,250MHz | LQW15AN15NJ00 | MURATA |
| 16 | L402, L412 | 2 | Inductor, SMD, 0402, 18nH, 5%, 460mA, 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 | L1, L401, L411 | 3 | INDUCTOR, SMT, 0402, 12nH, ±5%, 500mA, 250MHz | LQW15AN12NJ00 | MURATA |
| 21 | C46-C48, C392 | 4 | CAPACITOR, SMT, 0402, CERAMIC, 2.0pF, 50V, ±0.25pF, C0G(NP0) | GRM1555C1H2R0CZ01 | MURATA |
| 22 | L2 | 1 | Inductor, SMD, 0805, 2.2uH, 20%, 600mA, 50MHz | LQM21PN2R2MC0 | MURATA |
| 23 | S1-S2 | 2 | ULTRA-SMALL TACTILE SWITCH, SMT, 2P, SPST-NO, 1.2x3x2.5mm, 0.05A, 12V | B3U-1000P | OMRON |
| 24 | R1, R7, R551, R554 | 4 | RESISTOR/JUMPER, SMT, 0402, 0 Ω, 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, 1uF, 6.3V, 20%, X5R | ECJ-1VB0J105K | 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 | X1 | 1 | SMA STRIGHT JACK, SMT | 32K10A-40ML5 | ROSENBERGER |
| 31 | U1 | 1 | DUT, SMT, PQFP, RGC-64, 0.5mmLS, 9.15x9.15x1mm, THRM.PAD | CC430F6147 | TI |


Copyright © 2009–2016, Texas Instruments Incorporated

**Table B-42. EM430F6147RF900 Bill of Materials (continued)**

| Pos. | Ref Des | No. per Board | Description | Part No. | Manufacturer |
|---|---|---|---|---|---|
| 33 | U2 | 1 | IC, Step Down Converter with Bypass Mode for Low Power Wireless | TPS62370 | TI |
| 34 | JP1 | 1 | Pin Connector 2x4pin | 61300821121 | WUERTH |
| 35 | JP2, JP6, JP8 | 3 | Pin Connector 1x3pin | 61300311121 | WUERTH |
| 36a | JP3, JP5, JP9, JP10 | 4 | Pin Connector 1x2pin | 61300211121 | WUERTH |
| 38 | JP1a | 1 | Pin Connector 2x3pin | 61300621121 | WUERTH |
| 38 | C7 | 1 | Capacitor, Ceramic, 1206, 16V, X5R, 20% | GRM31CR61C226ME15L | MURATA |
| 38 | C8-9 | 2 | CAP, SMD, Ceramic, 0402, 2.2uF, X5R | GRM155R60J225ME15D | MURATA |
| 38 | C041 | 1 | CAP, SMD, Ceramic, 0603, 4.7uF, 16V, 10%, X5R | | MURATA |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.42 MSP-FET

The MSP-FET is a powerful flash emulation tool to quickly begin application development on MSP430 microcontrollers.

The MSP-FET provides a USB interface to program and debug the MSP430 devices in-system through the JTAG interface or the pin-saving Spy-Bi-Wire (2-wire JTAG) protocol. Furthermore, the USB interface can be used for UART backchannel and MSP target BSL communication. UART and $I^2C$ BSL communication modes are supported.

The MSP-FET development tool supports development with all MSP430 devices and is designed for use with PCBs that contain MSP430 devices; for example, the MSP430 target socket boards.

### *B.42.1 Features*

- USB debugging interface to connect a MSP430 MCU to a PC for real-time in-system programming and debugging
- Software configurable supply voltage between 1.8 V and 3.6 V at 100 mA
- Supports JTAG Security Fuse blow to protect code
- Supports all MSP430 boards with JTAG header
- Supports both JTAG and Spy-Bi-Wire (2-wire JTAG) debug protocols

### *B.42.2 Release Notes*

The MSP-FET is supported by MSP Debug Stack (MSPDS) revision 3.4.0.20 and higher. Observe the following MSPDS-specific MSP-FET limitations.

#### B.42.2.1 MSPDS 3.4.0.20 Limitations

- EEM access to F149 and L092 devices is possible only when JTAG speed is set to slow.
- Poly Fuse Blow in Spy-Bi-Wire mode is in beta state and is not officially supported.
- The UART backchannel function is not implemented (even though an additional COM port is shown on the PC).

#### B.42.2.2 MSPDS UART Backchannel Implementation

In MSPDS v3.4.1.0 and later, the UART backchannel function is implemented and supported for the MSP-FET. The baud rates that are supported depend on the target configuration and the debug settings. Table B-43 shows which baud rates are supported with certain configuration combinations.
A green cell with ✓ means that the corresponding baud rate is supported without any data loss with the specified combination of settings.
A red cell with ✗ means that the corresponding baud rate is not supported (data loss is expected) with the specified combination of settings.

**Table B-43. UART Backchannel Implementation**

| Target MCLK Frequency: | 1 MHz | 1 MHz | 8 MHz | 8 MHz | 1 MHz | 1 MHz | 8 MHz | 8 MHz |
|---|---|---|---|---|---|---|---|---|
| Debugger: | Active | Active | Active | Active | Inactive | Inactive | Inactive | Inactive |
| Flow Control: | No | Yes | No | Yes | No | Yes | No | Yes |
| 4800 baud | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 9600 baud | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 19200 baud | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 28800 baud | ✗ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 38400 baud | ✗ | ✓ | ✗ | ✓ | ✗ | ✓ | ✓ | ✓ |
| 57200 baud | ✗ | ✓ | ✗ | ✓ | ✗ | ✓ | ✗ | ✓ |
| 115200 baud | ✗ | ✗ | ✗ | ✓ | ✗ | ✗ | ✗ | ✓ |


Copyright © 2009–2016, Texas Instruments Incorporated




**Figure B-84. MSP-FET Top View**




**Figure B-85. MSP-FET Bottom View**

### B.42.2.3 MSPDS UART Backchannel Activation Commands

The MSP-FET supports two different backchannel UART modes, one with flow control and one without. The different modes can be selected by opening the corresponding COM port with a dedicated baud rate. See Table B-44 for the specific baud rates for each command.

**NOTE:** The baud rates used by these commands cannot be used for communication.

If none of the specified commands are transferred before setting the communication baud rate, communication starts with these default settings: 3.3-V target $V_{CC}$, no flow control mechanism.

**Table B-44. UART Backchannel Activation Commands**

| Baud Rate | Command |
|---|---|
| 9620 | Set all backchannel UART pins to high impedance – no current flow into target device |
| 9621 | Configure backchannel UART communication without handshake (default start behavior) |
| 9622 | Configure backchannel UART communication with handshake |
| 9623 | Voltage configuration command.<br>When this command is received, target $V_{CC}$ is set to 3300 mV. After target $V_{CC}$ is configured, it is switched through to the target device. |


Copyright © 2009–2016, Texas Instruments Incorporated

### B.42.2.4 MSPDS MSP Target BSL Activation Commands

The MSP-FET can be used for communication with the target device BSL through the $I^2C$ and UART protocols. The activation of the different protocols is equivalent to the MSP-FET backchannel UART. See Table B-45 for command details. In MSP-FET BSL communication mode, flow control is not available, because this is not supported by the MSP target device BSL.

**UART BSL:** The MSP-FET BSL UART mode supports the following baud rates: 9600, 14400, 19200, 28800, 38400, 56000, 57600, and 115200. For the BSL UART, 8 + 1 + even parity is used.

**$I^2C$ BSL:** The MSP-FET is always the $I^2C$ master, and the target device BSL is always the $I^2C$ slave. 7-bit $I^2C$ addressing mode is used with a fixed $I^2C$ slave address of 0x48.

**NOTE:** If the MSP-FET is configured to support BSL communication, debugger functionality is disabled. To switch to debugger mode, either perform a power cycle (unplug the USB cable) or configure the baud rate to 8001.

**Table B-45. MSP Target BSL Activation Commands**

| Baud Rate | Command |
|---|---|
| 9620 | Set all UART or $I^2C$ pins to high impedance – no current flow into target device |
| 9601 | BSL entry sequence and power up 3.3 V (UART BSL) |
| 100000 or 100001 | BSL entry sequence and power up 3.3 V ($I^2C$ BSL) |
| 400000 or 400001 | BSL entry sequence and power up 3.3 V ($I^2C$ BSL) |
| 9623 | Power up 3.3 V |
| 8001 | Activate debugger |


Copyright © 2009–2016, Texas Instruments Incorporated

### B.42.3 Schematics

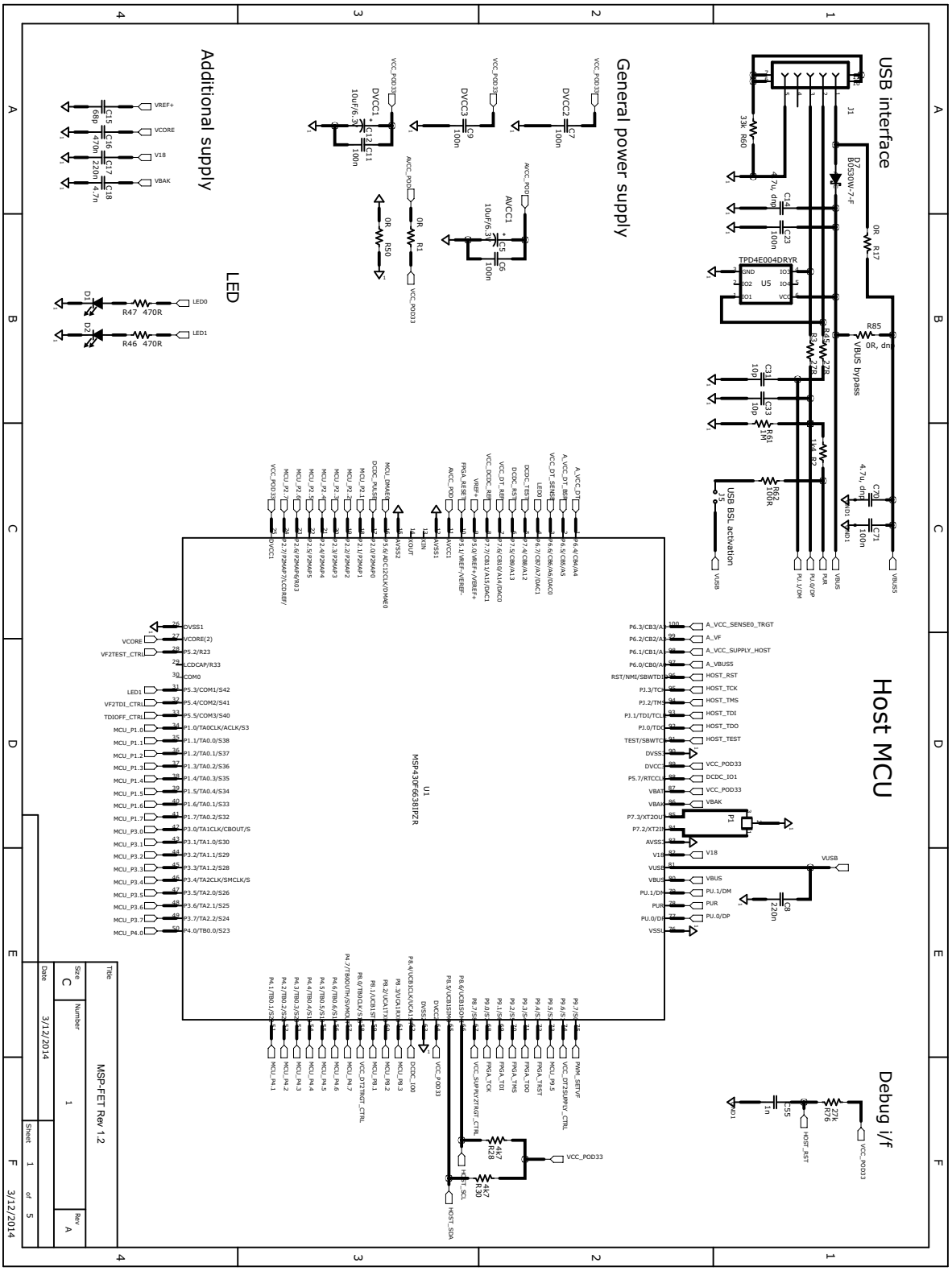



**Figure B-86. MSP-FET USB Debugger, Schematic (1 of 5)**



Copyright © 2009–2016, Texas Instruments Incorporated

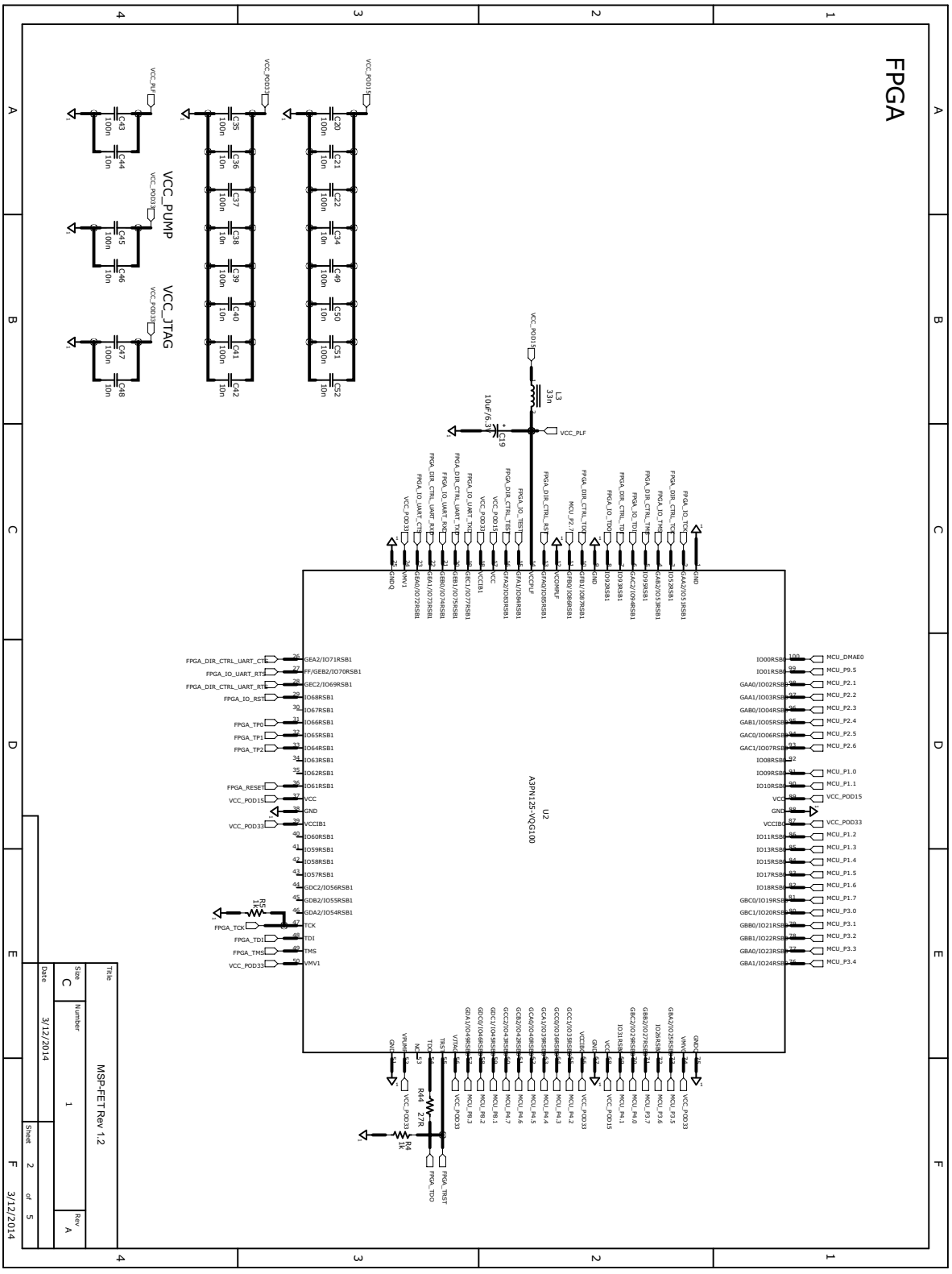



**Figure B-87. MSP-FET USB Debugger, Schematic (2 of 5)**


Copyright © 2009–2016, Texas Instruments Incorporated

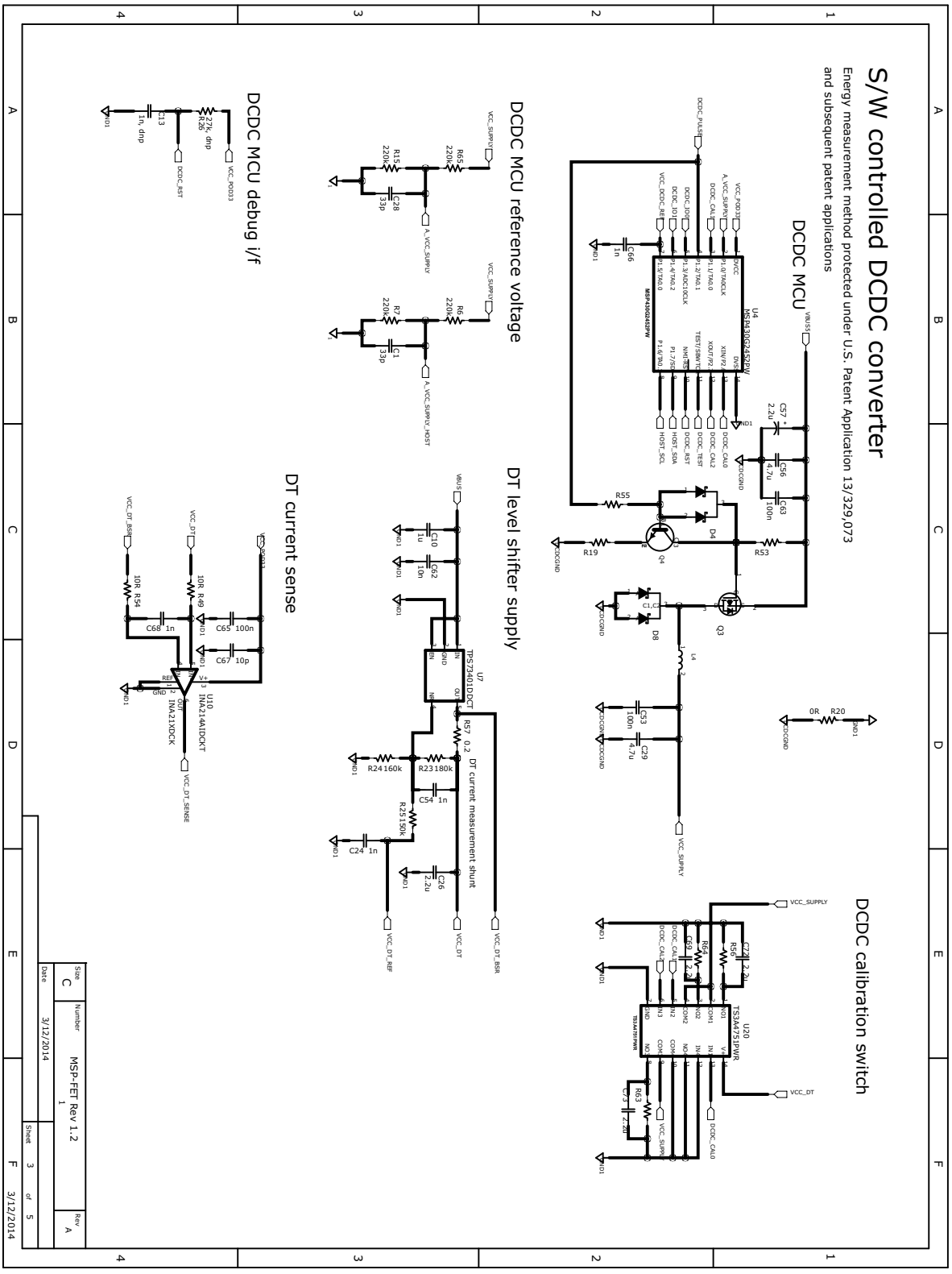



**Figure B-88. MSP-FET USB Debugger, Schematic (3 of 5)**



Copyright © 2009–2016, Texas Instruments Incorporated

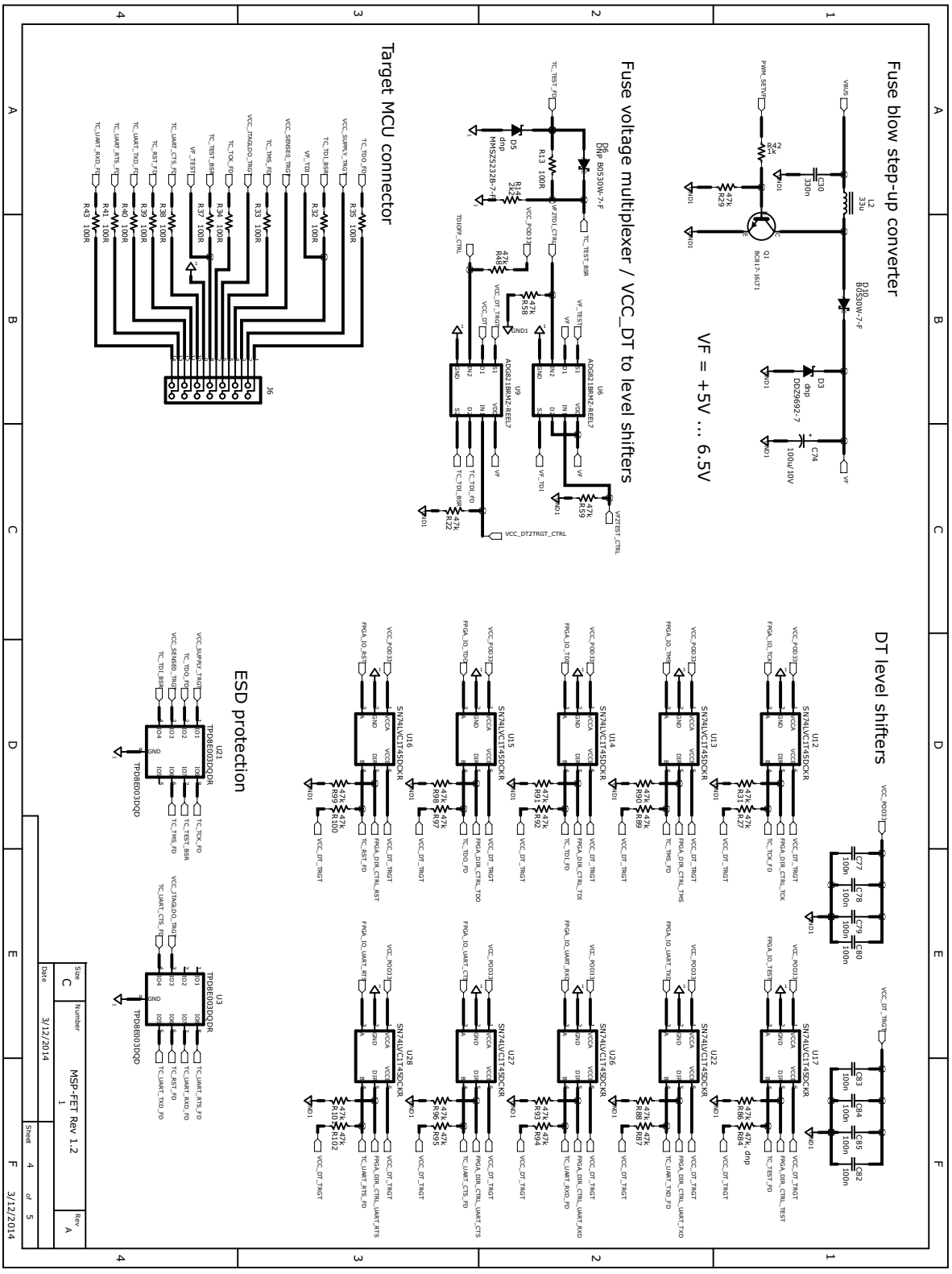



**Figure B-89. MSP-FET USB Debugger, Schematic (4 of 5)**


Copyright © 2009–2016, Texas Instruments Incorporated

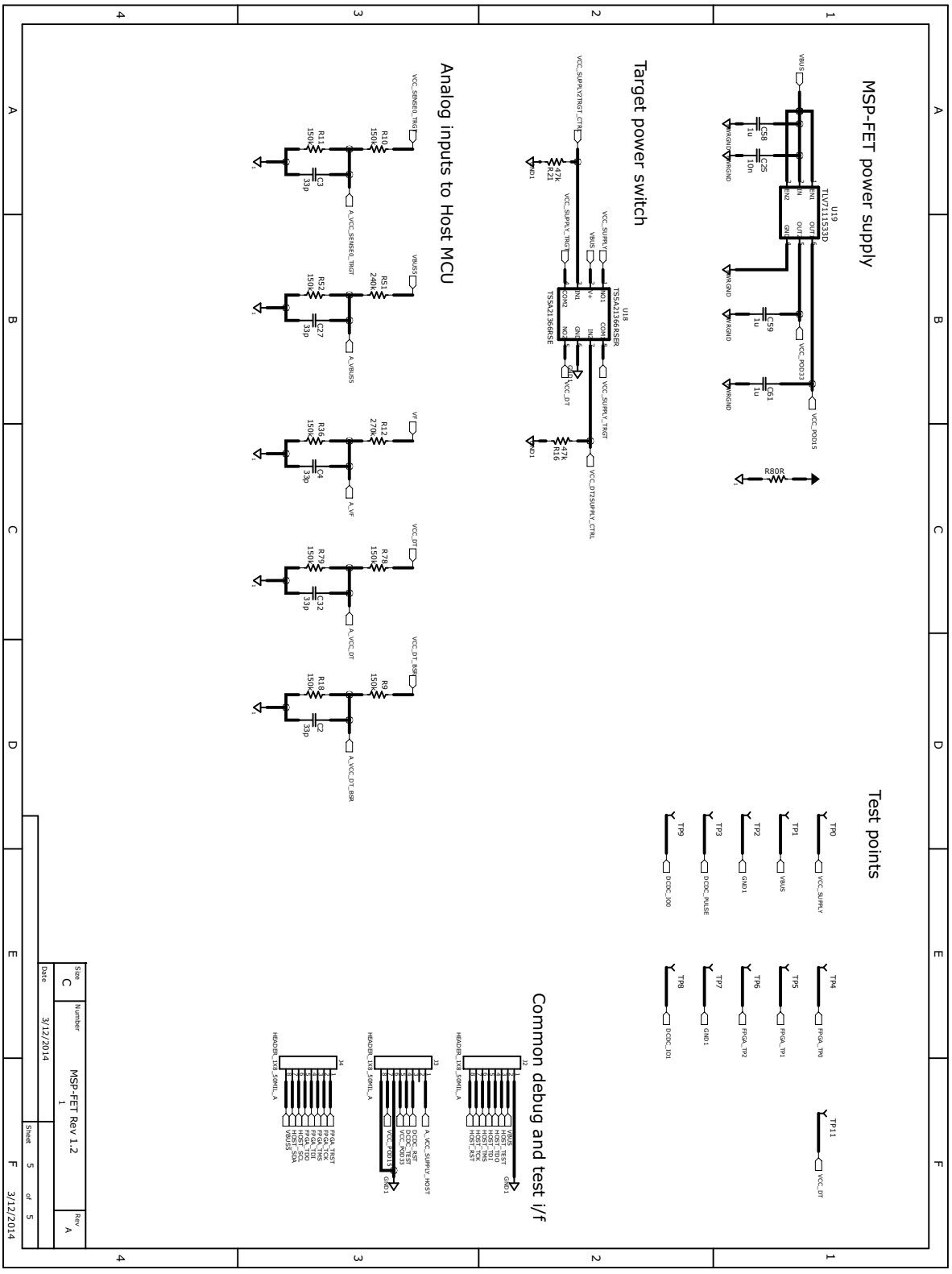



**Figure B-90. MSP-FET USB Debugger, Schematic (5 of 5)**



Copyright © 2009–2016, Texas Instruments Incorporated

### B.42.4 Layout

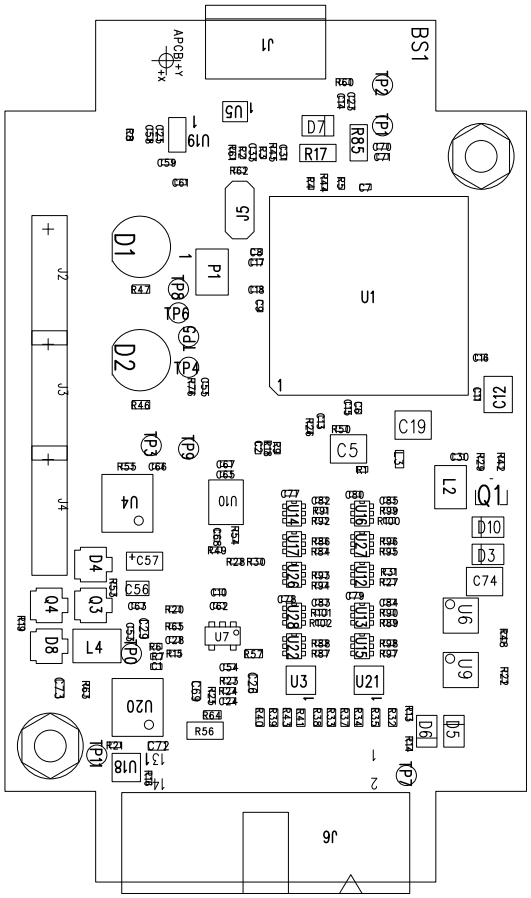



Figure B-91. MSP-FET USB Debugger, PCB (Top)

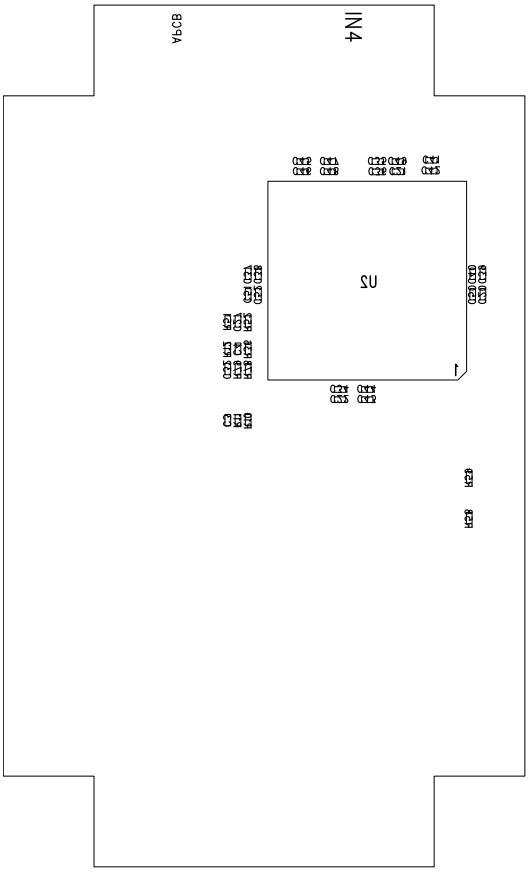



Figure B-92. MSP-FET USB Debugger, PCB (Bottom)

### B.42.5 LED Signals

The MSP-FET shows its operating states using two LEDs, one green and one red. Table B-46 lists all available operation modes. An ○ or ○ icon indicates that the LED is off, an ● or ● icon indicates that the LED is on, and an ✹ or ✹ icon indicates that the LED flashes.

**Table B-46. MSP-FET LED Signals**

| Function | Power LED | Mode LED |
|---|---|---|
| MSP-FET not connected to PC, or MSP-FET not ready; for example, after a major firmware update. Connect or reconnect MSP-FET to PC. | ○ | ○ |
| MSP-FET connected and ready | ● | ○ |
| MSP-FET waiting for data transfer | ● | ● |
| Ongoing data transfer | ● | ✹ |
| An error has occurred; for example, target $V_{CC}$ overcurrent. Unplug MSP-FET from target, and cycle the power off and on. Check target connection, and reconnect MSP-FET. | ○ | ● |
| Firmware update in progress. Do not disconnect MSP-FET while both LEDs are blinking. | ✹ | ✹ |
| FPGA update in progress. Do not disconnect MSP-FET while both LEDs are blinking rapidly. | ✹ | ✹ |



Copyright © 2009–2016, Texas Instruments Incorporated

### B.42.6 JTAG Target Connector

Figure B-93 shows the pinout of the JTAG connector.

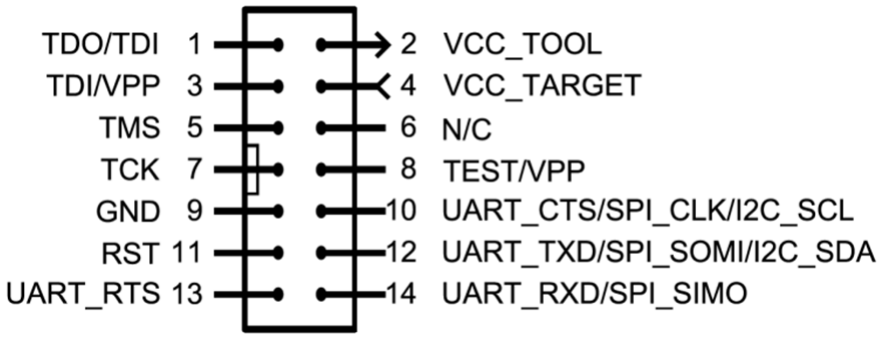



**Figure B-93. JTAG Connector Pinout**

**Table B-47. JTAG Connector Pin State by Operating Mode**

| Pin | Name | After Power-Up | When JTAG Protocol is Selected | When Spy-Bi-Wire Protocol is Selected |
|---|---|---|---|---|
| 1 | TDO/TDI | Hi-Z, pulled up to 3.3 V | In, TDO | In and Out, SBWTDIO |
| 2 | VCC_TOOL | 3.3 V | $V_{CC}$ | $V_{CC}$ |
| 3 | TDI/VPP | Hi-Z, pulled up to 3.3 V | Out, TDI | Hi-Z, pulled up to $V_{CC}$ |
| 4 | VCC_TARGET | In, external $V_{CC}$ sense | In, external $V_{CC}$ sense | In, external $V_{CC}$ sense |
| 5 | TMS | Hi-Z, pulled up to 3.3 V | Out, TMS | Hi-Z, pulled up to $V_{CC}$ |
| 6 | N/C | N/C | N/C | N/C |
| 7 | TCK | Hi-Z, pulled up to 3.3 V | Out, TCK | Out, SBWTCK |
| 8 | TEST/VPP | Out, Gnd | Out, TEST | Hi-Z, pulled up to $V_{CC}$ |
| 9 | GND | Ground | Ground | Ground |
| 10 | UART_CTS/SPI_CLK/I2C_SCL | Hi-Z, pulled up to 3.3 V | Out, Target UART Clear-To-Send Handshake input | Out, Target UART Clear-To-Send Handshake input |
| 11 | RST | Out, $V_{CC}$ | Out, RST | Out |
| 12 | UART_TXD/SPI_SOMI/I2C_SDA | Hi-Z, pulled up to 3.3 V | In, Target UART TXD output | In, Target UART TXD output |
| 13 | UART_RTS | Hi-Z, pulled up to 3.3 V | In, Target UART Ready-to-Send Handshake output | In, Target UART Ready-to-Send Handshake output |
| 14 | UART_RXD/SPI_SIMO | Hi-Z, pulled up to 3.3 V | Out, Target UART RXD input | Out, Target UART RXD input |


Copyright © 2009–2016, Texas Instruments Incorporated

Figure B-94 shows the state of each pin in the connector after power-up.

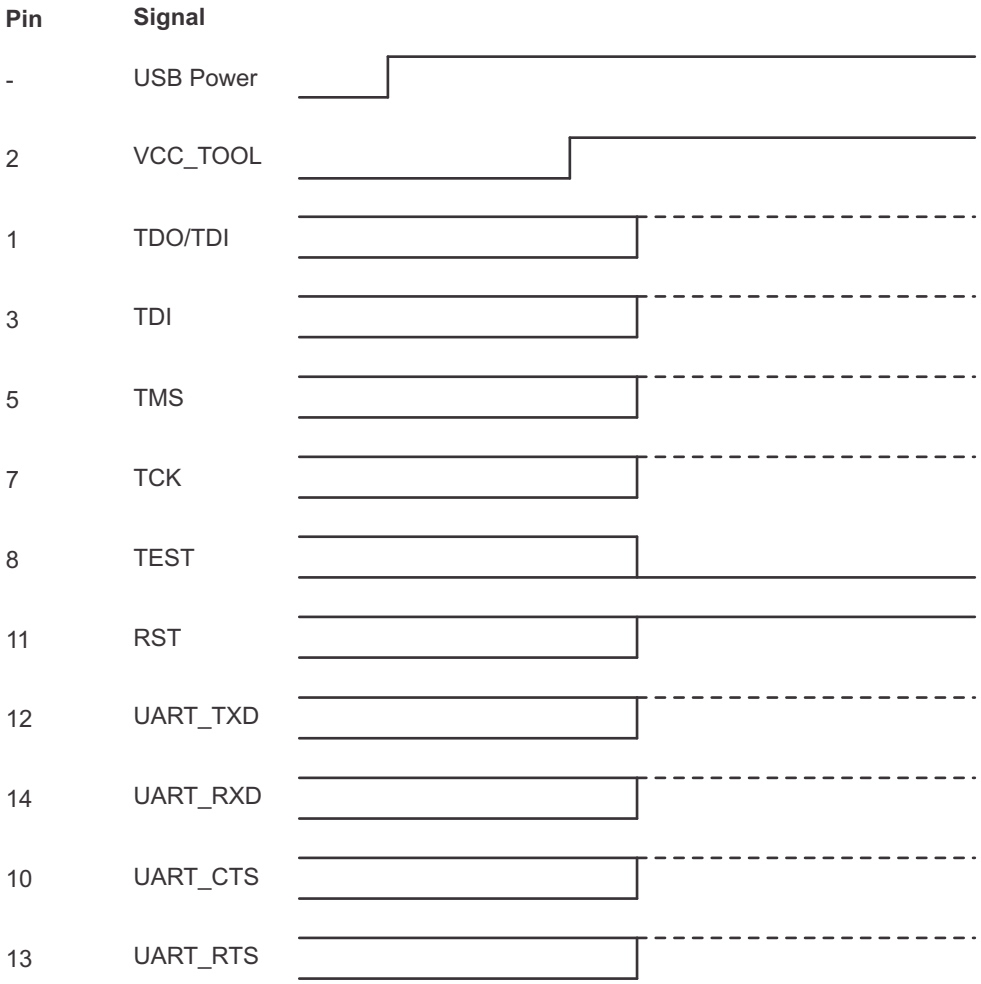



**Figure B-94. Pin States After Power-Up**


Copyright © 2009–2016, Texas Instruments Incorporated

### B.42.7 Specifications

Table B-48 shows the physical and electrical specifications of the MSP-FET.

**Table B-48. Specifications**

| | | |
|---|---|---|
| **Mechanical** | | |
| Size (without cables) | 80 mm x 50 mm x 20 mm | |
| **Interfaces** | | |
| USB interface | USB 2.0, full speed | |
| Target interface | JTAG 14-pin | See Table B-47 for pinout |
| JTAG cable length | 20 cm (max) | |
| **JTAG and Spy-Bi-Wire Interface, Electrical** | | |
| Power supply | USB powered, 200 mA (max) | |
| Target output voltage VCC_TOOL | 1.8 V to 3.6 V | Selectable in 0.1-V steps. VCC_TOOL available from JTAG pin 2. |
| Target output current | 100 mA (max) | Current supplied through JTAG pin 2 |
| Target output overcurrent detection level | 160 mA (max) | |
| JTAG signal overcurrent detection level | 30 mA (max) | Total current supplied through JTAG pins 1, 3, 5, 7, 8, 10, 11, 12, 13, 14 |
| External target supply | Supported (1.8 V to 3.6 V) | Connect external target voltage VCC_TARGET to JTAG pin 4. JTAG and SBW signals are regulated to external target voltage ±100 mV. |
| Fuse blow | Supported | For devices with poly-fuse |
| **JTAG and Spy-Bi-Wire Interface, Timing** | | |
| JTAG clock speed | 8 MHz (max) | Protocol speed selectable by software |
| Spy-Bi-Wire clock speed | 8 MHz (max) | Protocol speed selectable by software. System limitations due to external RC components on reset pin (SBWTDIO) might apply. |
| **JTAG and Spy-Bi-Wire Interface, Speed** | | |
| Flash write speed (JTAG) | Up to 20 kB/sec | |
| Flash write speed (Spy-Bi-Wire) | Up to 7 kB/sec | |
| FRAM write speed (JTAG) | Up to 50 kB/sec | |
| FRAM write speed (Spy-Bi-Wire) | Up to 14 kB/sec | |
| **EnergyTrace™ Technology** | | |
| Target output current accuracy | ± 2%, ± 500 nA | For target output voltage = 1.8 V to 3.6 V, target output current <75 mA and USB voltage = 5 V constant during and after calibration |

### B.42.8 MSP-FET Revision History

Revision numbers are printed on the PCB and are stored in nonvolatile memory in firmware. Table B-49 shows the revision history of the MSP-FET.

**Table B-49. MSP-FET Revision History**

| Revision | Date | Comments |
|---|---|---|
| Revision 1.2 | March 2014 | Initial release |


Copyright © 2009–2016, Texas Instruments Incorporated

## B.43 MSP-FET430UIF

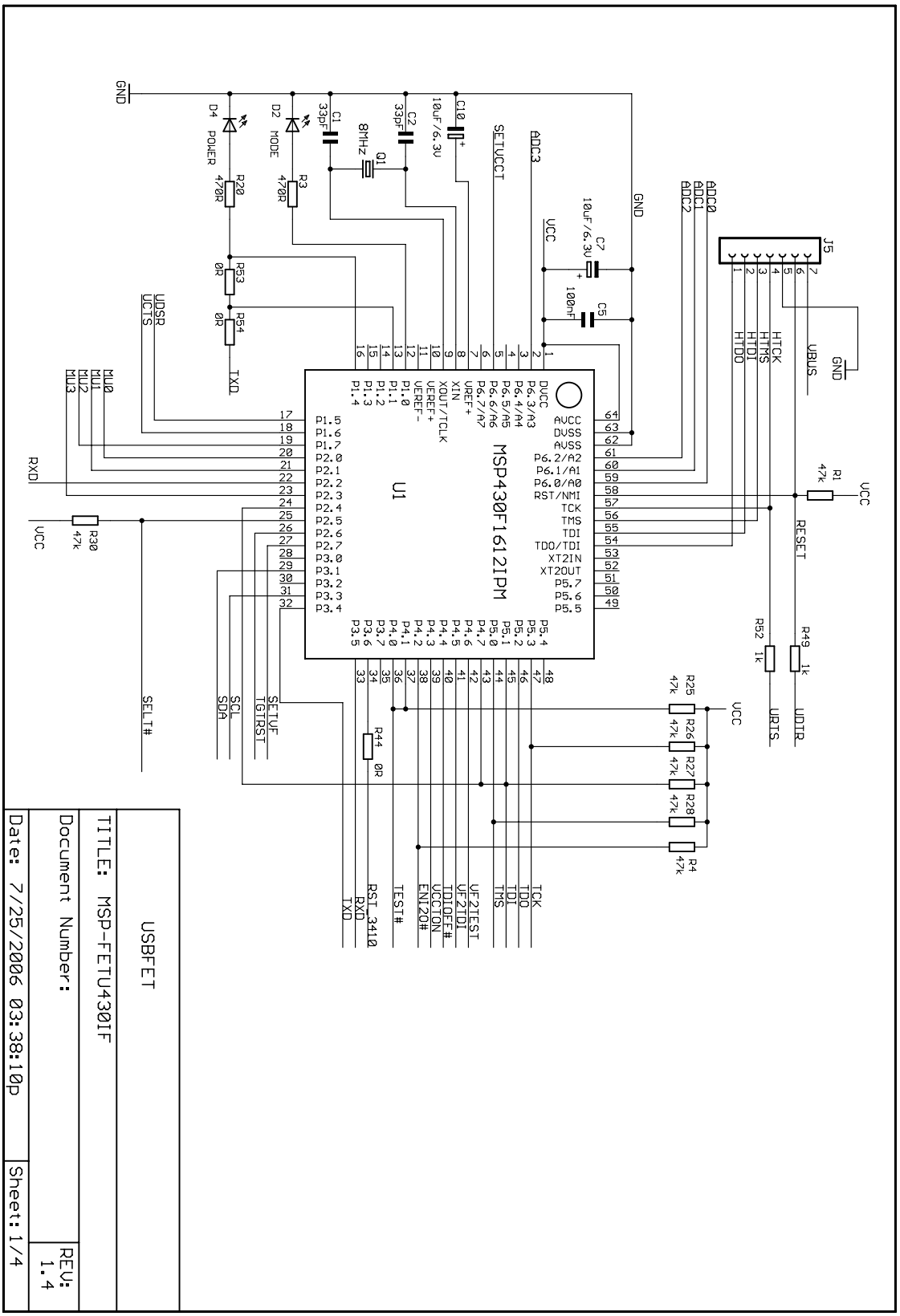



**Figure B-95. MSP-FET430UIF USB Interface, Schematic (1 of 4)**


Copyright © 2009–2016, Texas Instruments Incorporated

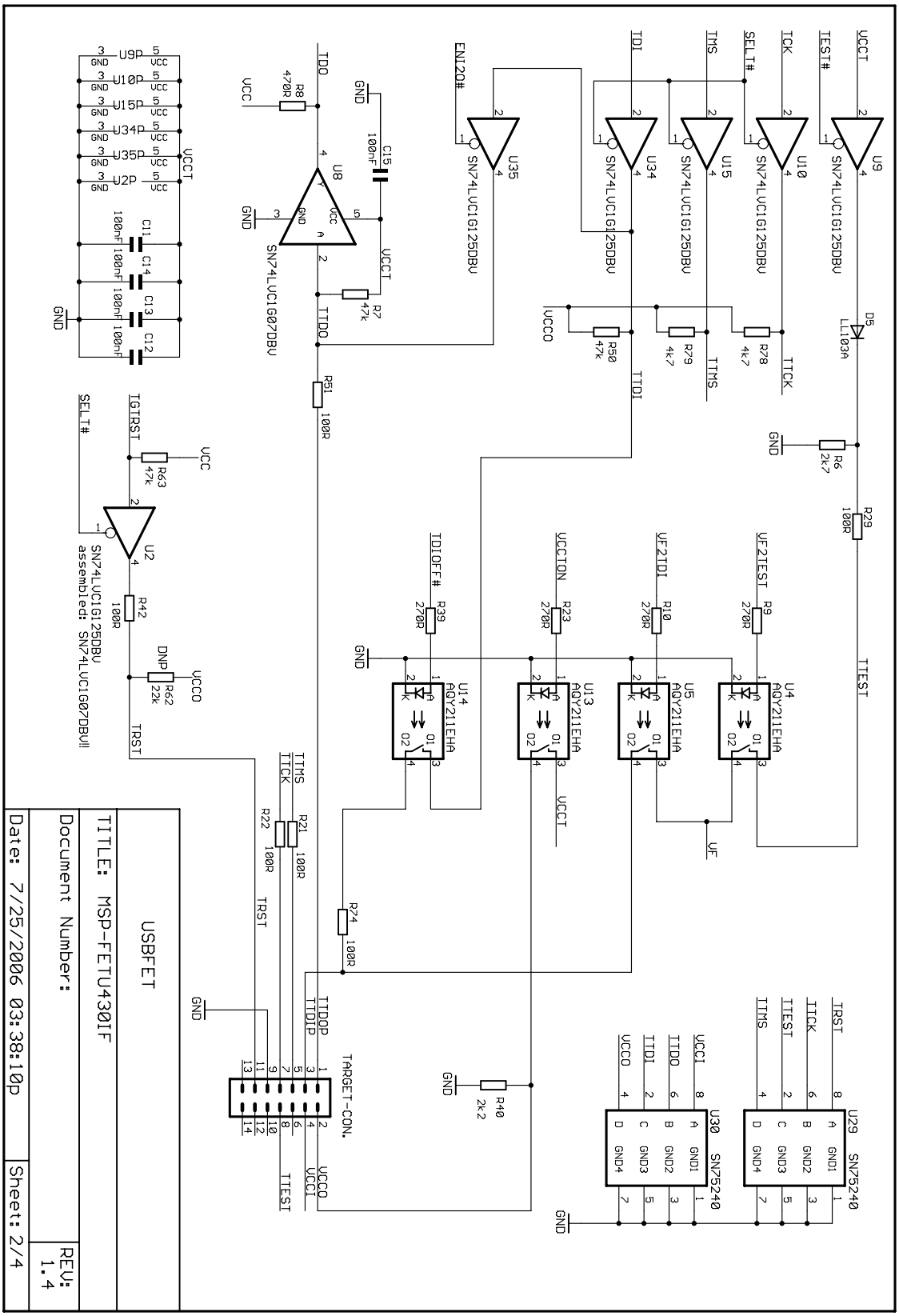



**Figure B-96. MSP-FET430UIF USB Interface, Schematic (2 of 4)**



Copyright © 2009–2016, Texas Instruments Incorporated

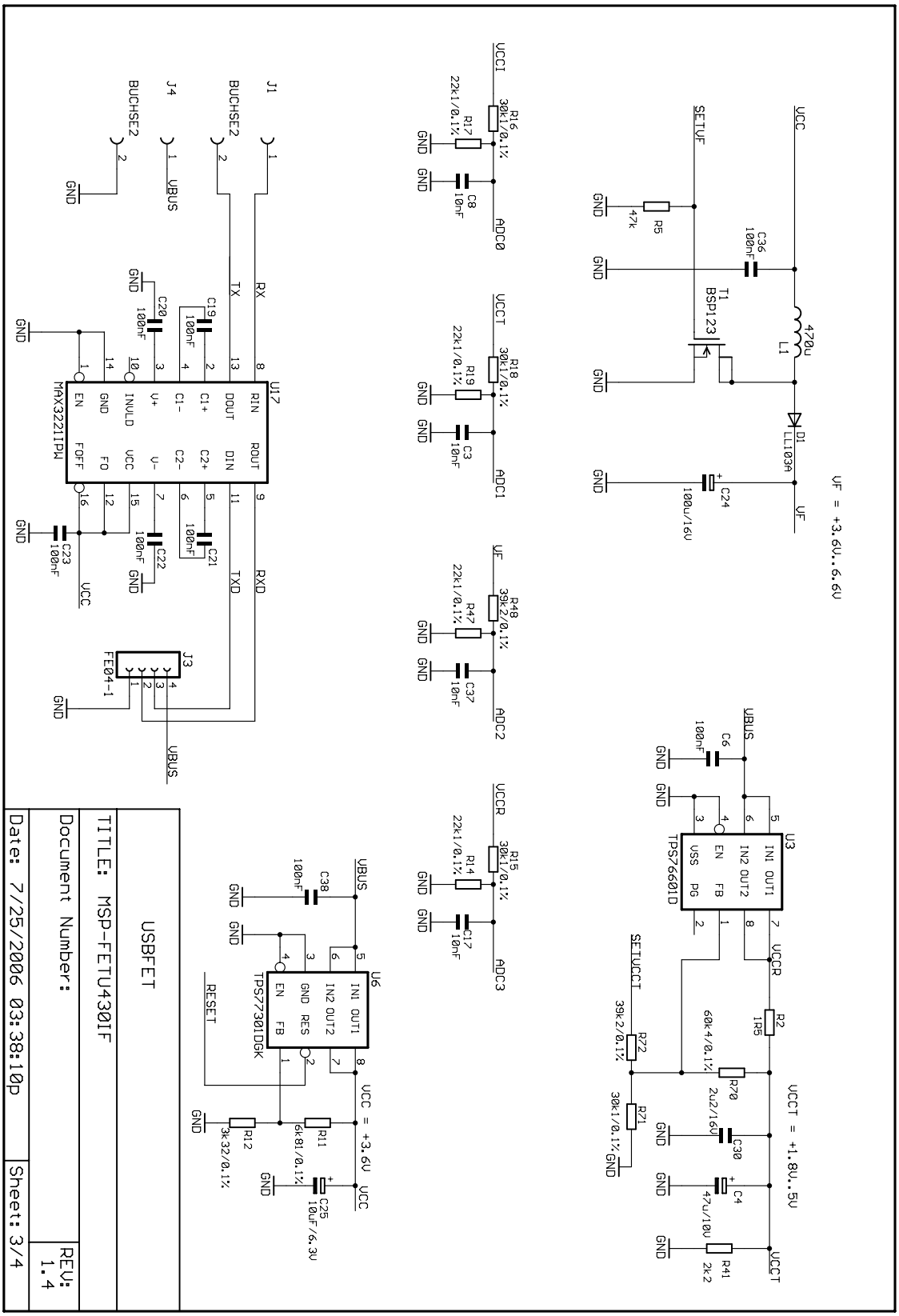



**Figure B-97. MSP-FET430UIF USB Interface, Schematic (3 of 4)**


Copyright © 2009–2016, Texas Instruments Incorporated

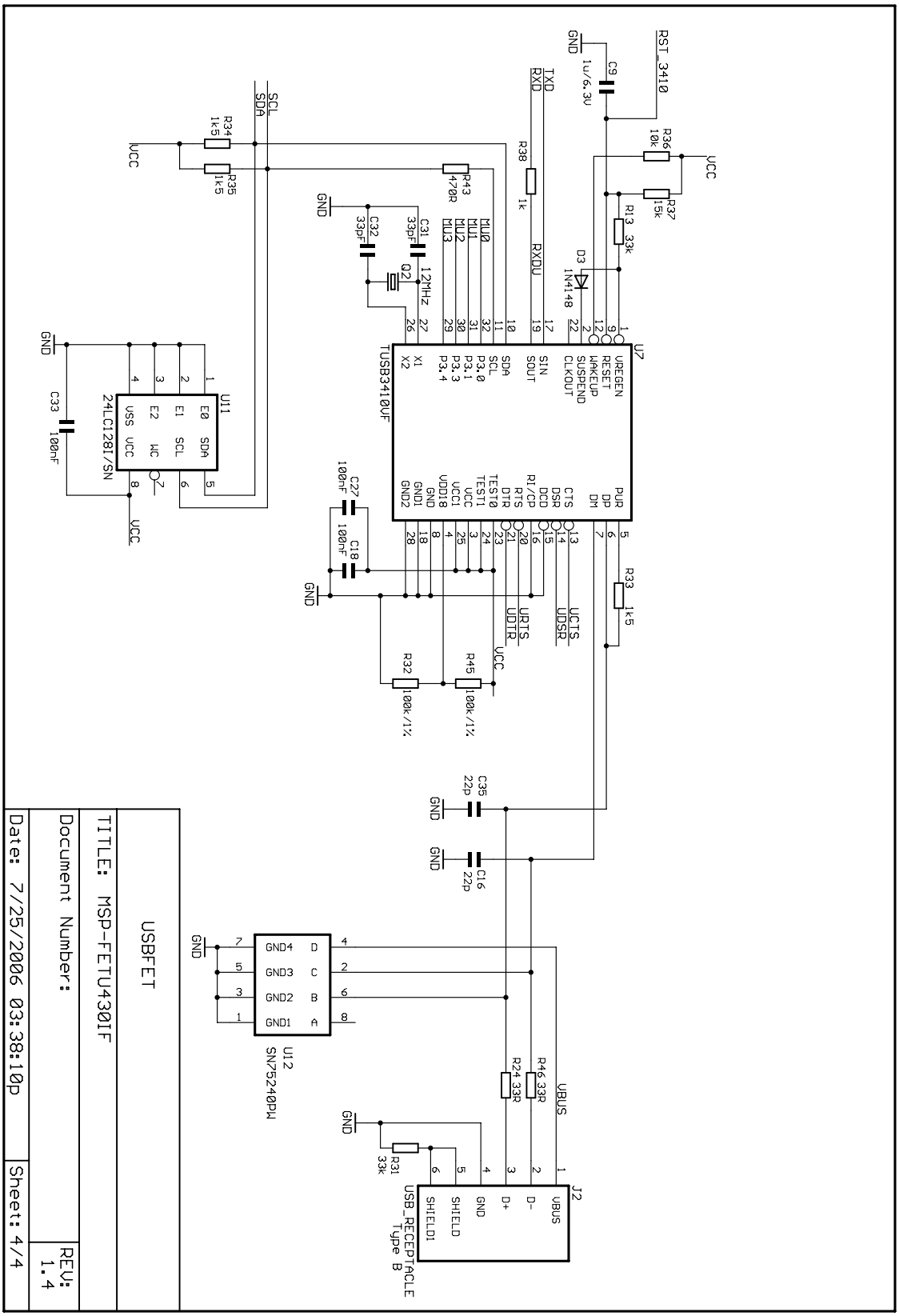



**Figure B-98. MSP-FET430UIF USB Interface, Schematic (4 of 4)**



Copyright © 2009–2016, Texas Instruments Incorporated

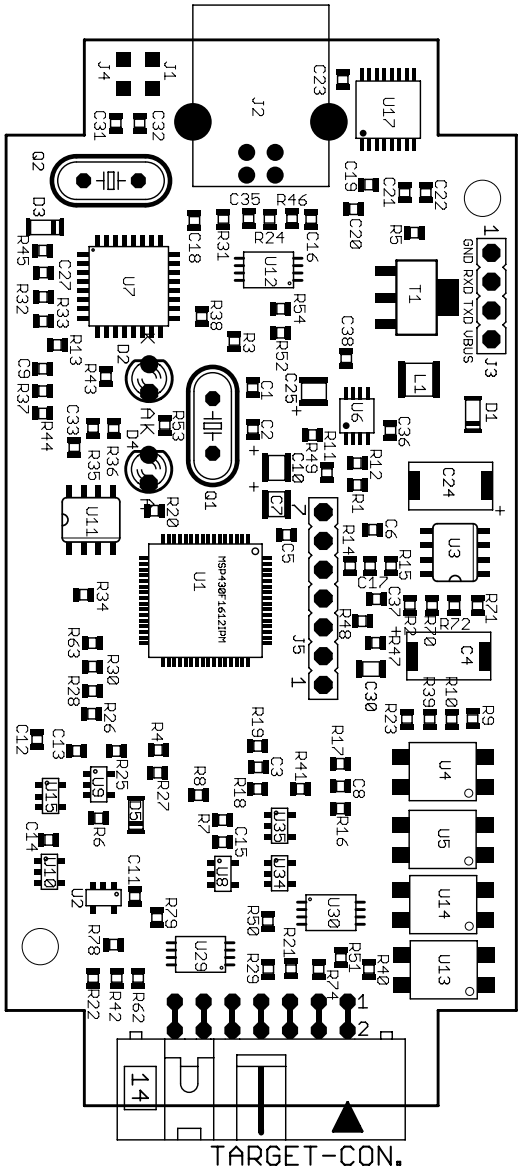



**Figure B-99. MSP-FET430UIF USB Interface, PCB**


Copyright © 2009–2016, Texas Instruments Incorporated

### B.43.1 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 SN74LVC1G125DBV to SN74LVC1G07DBV

**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 1.4a (January 2006)

- R62: not populated


Copyright © 2009–2016, Texas Instruments Incorporated

## B.44 MSP-FET430PIF

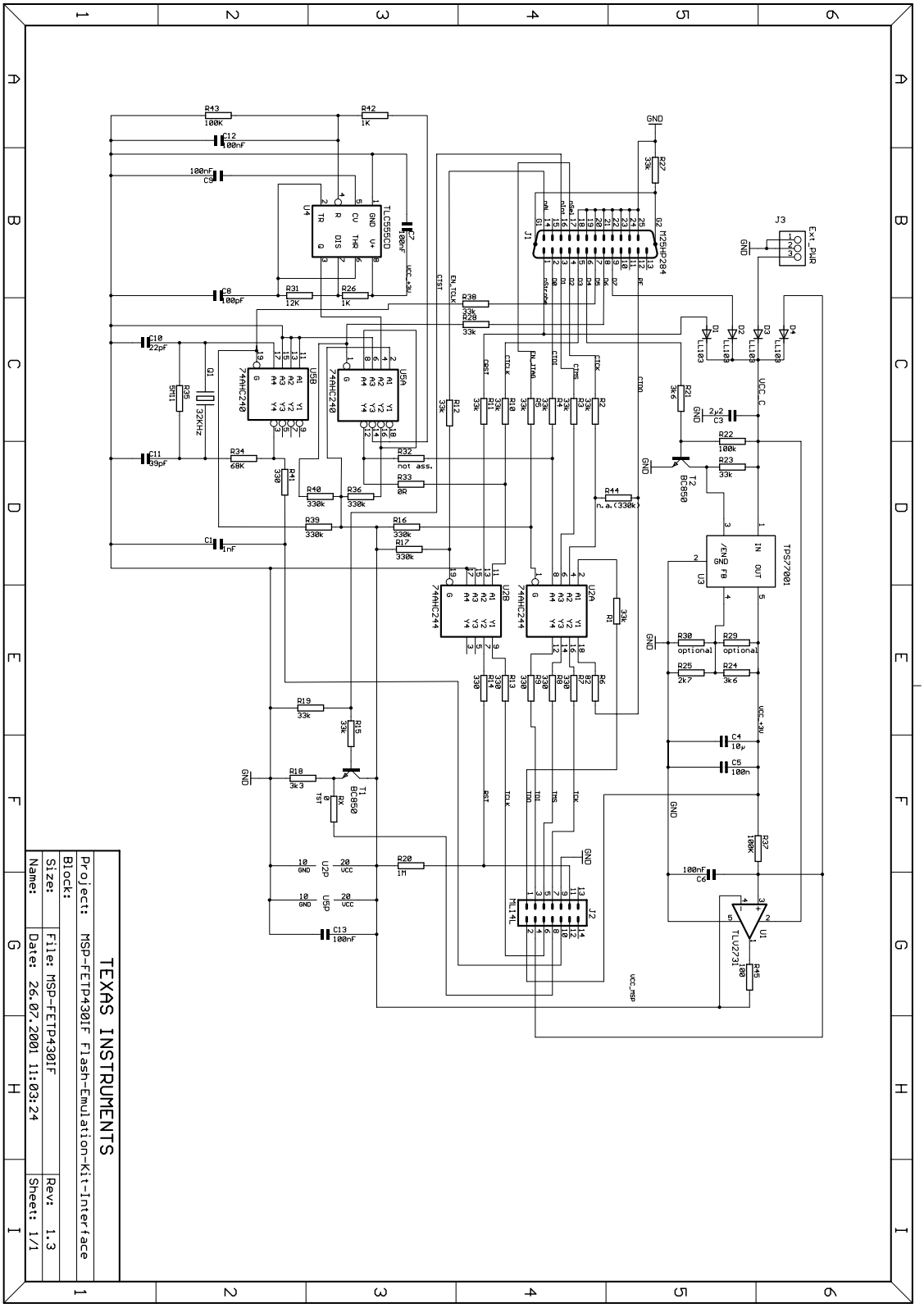



**Figure B-100. MSP-FET430PIF FET Interface Module, Schematic**


Copyright © 2009–2016, Texas Instruments Incorporated

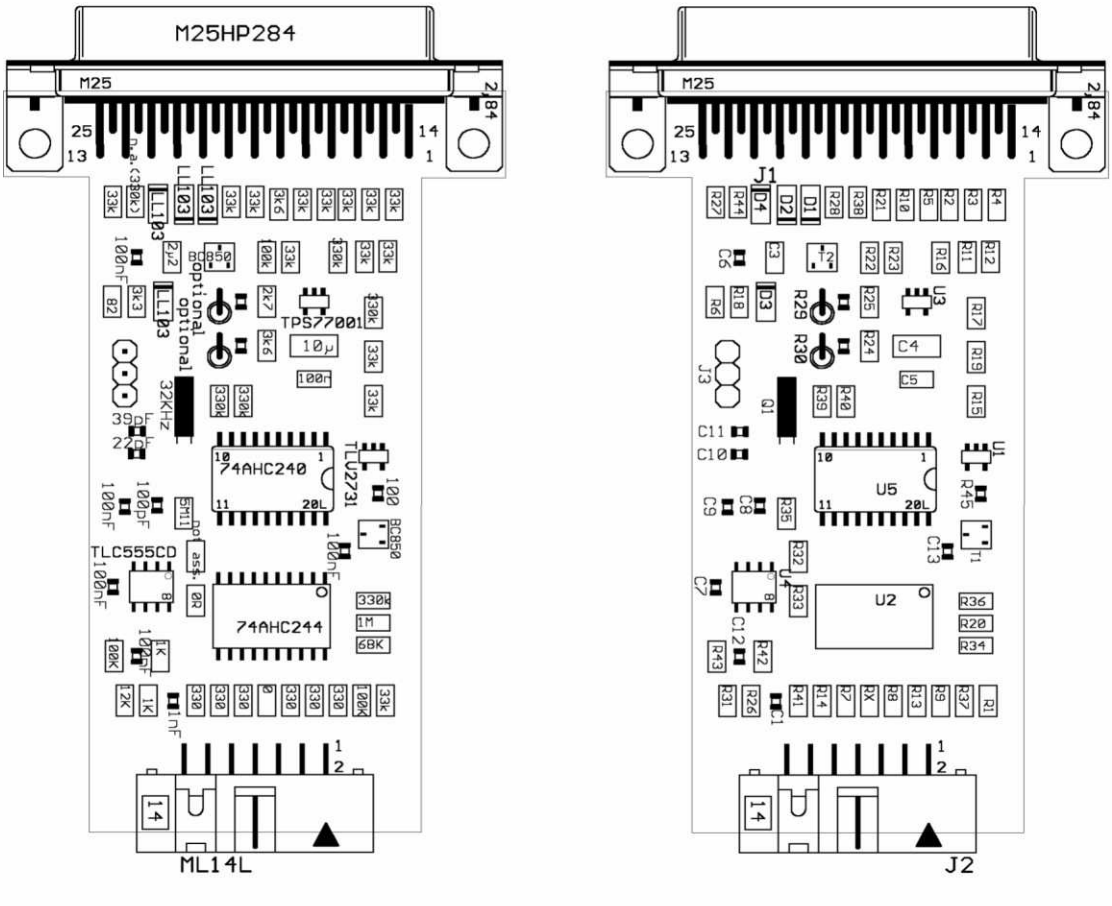



**Figure B-101. MSP-FET430PIF FET Interface Module, PCB**



Copyright © 2009–2016, Texas Instruments Incorporated

# 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
- eZ430-RF2780
- eZ430-RF2560
- MSP-WDSxx "Metawatch"
- LaunchPad (MSP-EXP430G2)
- MSP-EXP430FR5739
- MSP-EXP430F5529

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

**Topic** **Page**

**C.1 Hardware Installation ..... 186**


Copyright © 2009–2016, Texas Instruments Incorporated

## C.1 Hardware Installation

Table C-1 shows the USB VIDs and PIDs used in MSP430 tools.

**Table C-1. USB VIDs and PIDs Used in MSP430 Tools**

| Tool | USB VID | USB PID | INF File Name |
|---|---|---|---|
| eZ430-F2013 | 0x0451 | 0xF430 | usbuart3410.inf |
| eZ430-RF2500 | 0x0451 | 0xF432 | 430CDC.inf |
| eZ430-RF2780 | 0x0451 | 0xF432 | 430CDC.inf |
| eZ430-RF2560 | 0x0451 | 0xF432 | 430CDC.inf |
| MSP-WDSxx "Metawatch" | 0x0451 | 0xF432 | 430CDC.inf |
| eZ430-Chronos | 0x0451 | 0xF432 | 430CDC.inf |
| MSP-FET430UIF(1) | 0x2047 | 0x0010 | msp430tools.inf |
| MSP-FET | 0x2047 | 0x0204 | msp430tools.inf |
| eZ-FET | 0x2047 | 0x0203 | msp430tools.inf |
| LaunchPad (MSP-EXP430G2) | 0x0451 | 0xF432 | 430CDC.inf |
| MSP-EXP430FR5739 | 0x0451 | 0xF432 | 430CDC.inf |
| MSP-EXP430F5529 | 0x0451 | 0xF432 | 430CDC.inf |

(1) The older MSP-FET430UIF used with IAR versions before v5.20.x and CCS versions before v5.1 has VID 0x0451 and PID 0xF430. With the firmware update, it is updated to the 0x2047 and 0x0010, respectively.

1. Before connecting of the USB Debug Interface with a USB cable to a USB port of the PC the one of IDEs (CCS or IAR) should be installed. The IDE installation isntalls also drivers for USB Debug Interfaces without user interaction. After IDE installation the USB Debug Interface can be connected and will be ready to work within few seconds.
2. The driver can be also installed manually. After plug in the USB Debug Interface to USB port of the PC the Hardware Wizard starts automatically and opens the "Found New Hardware Wizard" window.
3. Select "Install from a list or specific location (Advanced)" (see Figure C-1).

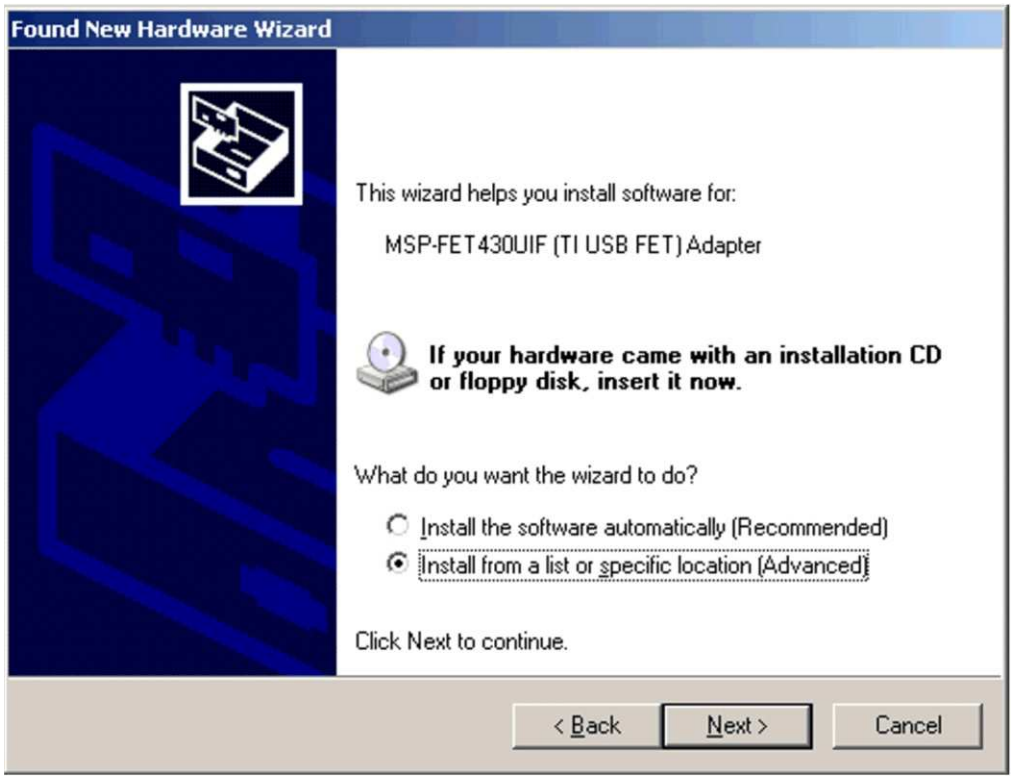



**Figure C-1. Windows XP Hardware Wizard**


Copyright © 2009–2016, Texas Instruments Incorporated

4. Browse to the folder where the driver information files are located (see Figure C-2).
   For CCS, the default folder is: c:\ti\ccsv5\ccs_base\emulation\drivers\msp430\USB_CDC, or
   c:\ti\ccsv5\ccs_base\emulation\drivers\msp430\USB_FET_XP_XX, or
   c:\ti\ccsv5\ccs_base\emulation\drivers\msp430\USB_eZ-RF depending of firmware version of the tool.
   For IAR Embedded Workbench, the default folder is: <Installation Root>\Embedded Workbench x.x\430\drivers\TIUSBFET\eZ430-UART, or
   <Installation Root>\Embedded Workbench x.x\430\drivers\<Win_OS>.

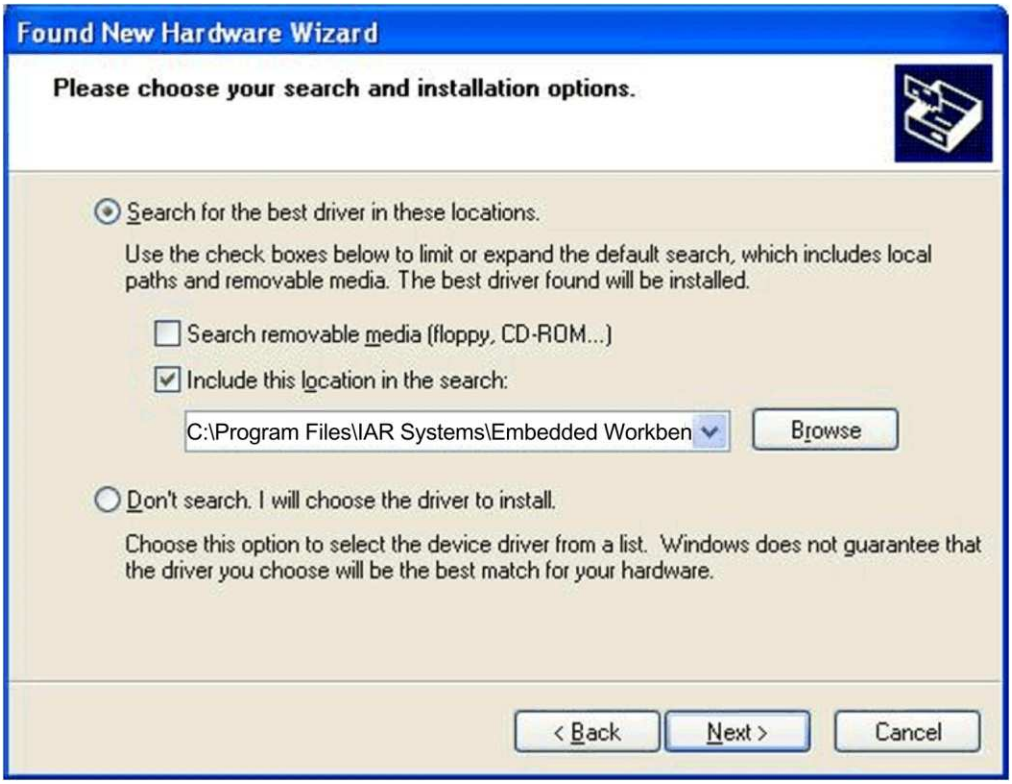



**Figure C-2. Windows XP Driver Location Selection Folder**

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


Copyright © 2009–2016, Texas Instruments Incorporated

6. The wizard installs the driver files.
7. The wizard shows a message that it has finished the installation of the software USB Debug Interface.
8. The USB debug interface is installed and ready to use. The Device Manager lists a new entry as shown in Figure C-3, Figure C-4, or Figure C-5.

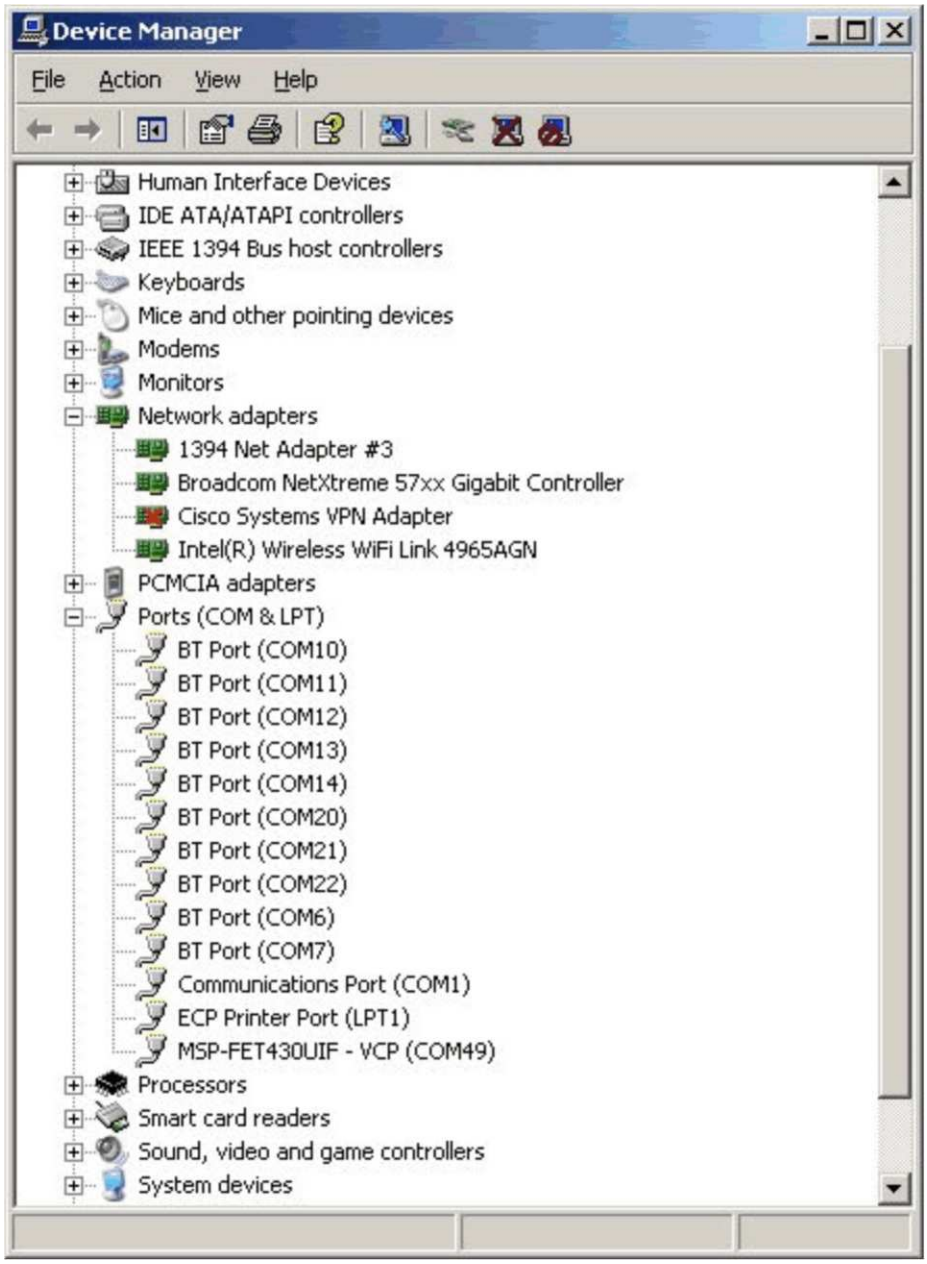



**Figure C-3. Device Manager Using USB Debug Interface using VID/PID 0x2047/0x0010**


Copyright © 2009–2016, Texas Instruments Incorporated

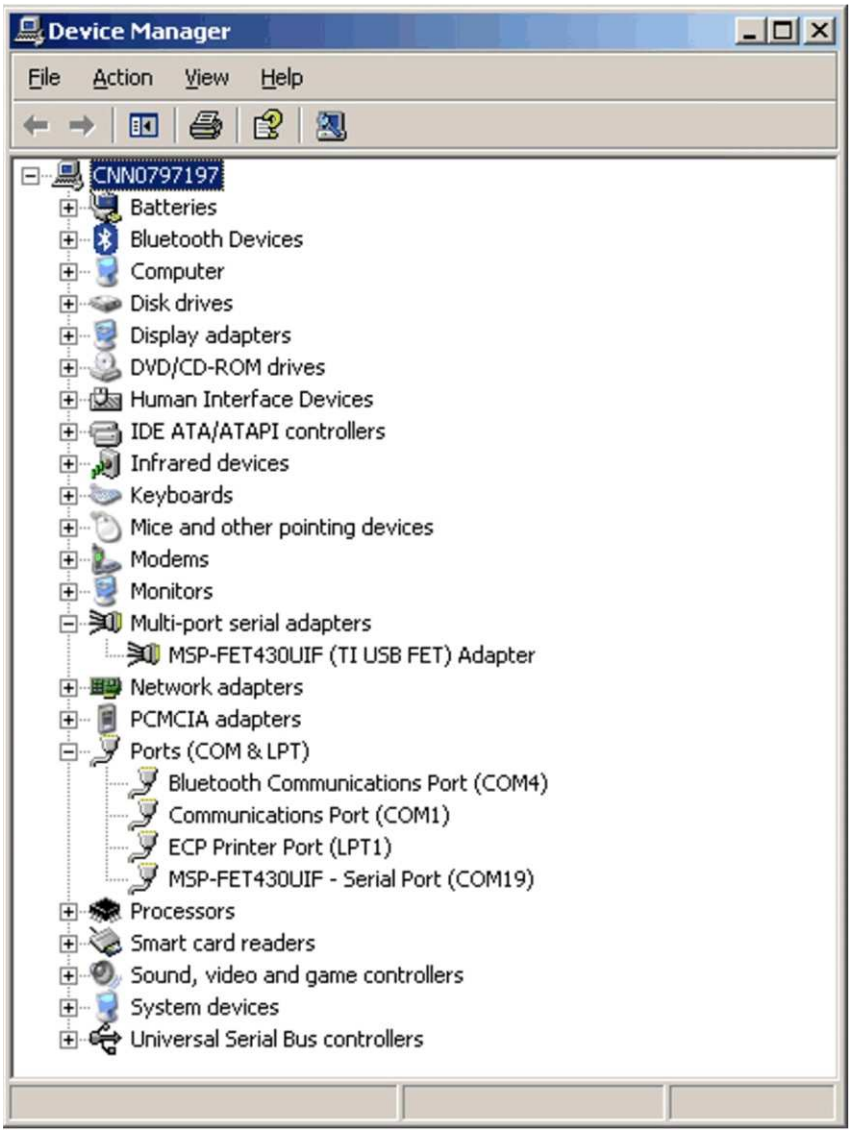



**Figure C-4. Device Manager Using USB Debug Interface with VID/PID 0x0451/0xF430**


Copyright © 2009–2016, Texas Instruments Incorporated

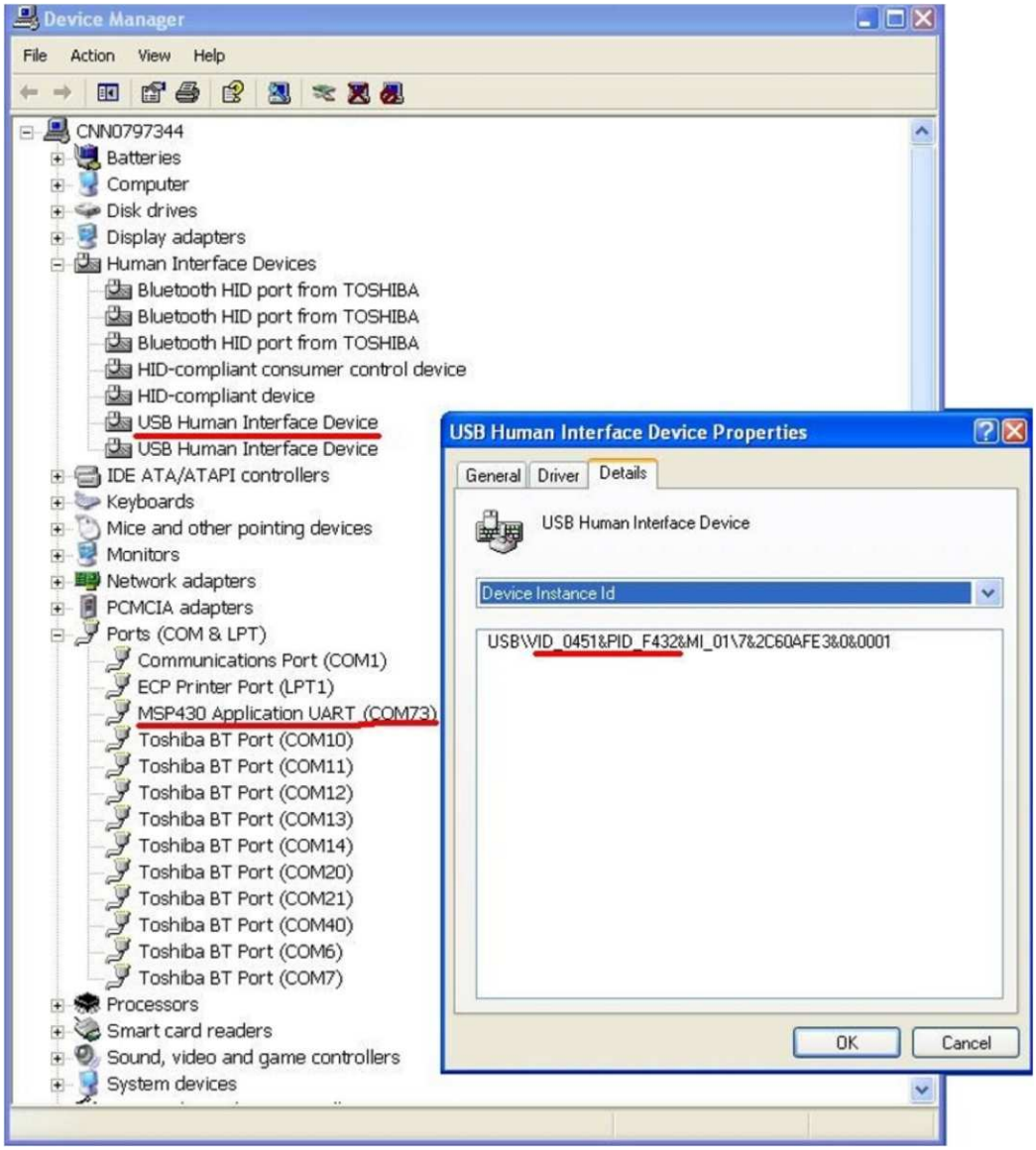



**Figure C-5. Device Manager Using USB Debug Interface With VID/PID 0x0451/0xF432**



Copyright © 2009–2016, Texas Instruments Incorporated

# Revision History

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

**Changes from February 13, 2016 to March 29, 2016** **Page**

- Added MSP-TS430PN80B to Table 1-1, *Individual Kit Contents, MSP-TS430xx* ..... 14
- Added Section B.28, *MSP-TS430PN80B* ..... 117


Copyright © 2009–2016, Texas Instruments Incorporated

## IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as “components”) are sold subject to TI’s terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI’s terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers’ products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers’ products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI’s goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or “enhanced plastic” are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have ***not*** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

| **Products** | | **Applications** | |
|---|---|---|---|
| Audio | www.ti.com/audio | Automotive and Transportation | www.ti.com/automotive |
| Amplifiers | amplifier.ti.com | Communications and Telecom | www.ti.com/communications |
| Data Converters | dataconverter.ti.com | Computers and Peripherals | www.ti.com/computers |
| DLP® Products | www.dlp.com | Consumer Electronics | www.ti.com/consumer-apps |
| DSP | dsp.ti.com | Energy and Lighting | www.ti.com/energy |
| Clocks and Timers | www.ti.com/clocks | Industrial | www.ti.com/industrial |
| Interface | interface.ti.com | Medical | www.ti.com/medical |
| Logic | logic.ti.com | Security | www.ti.com/security |
| Power Mgmt | power.ti.com | Space, Avionics and Defense | www.ti.com/space-avionics-defense |
| Microcontrollers | microcontroller.ti.com | Video and Imaging | www.ti.com/video |
| RFID | www.ti-rfid.com | | |
| OMAP Applications Processors | www.ti.com/omap | **TI E2E Community** | e2e.ti.com |
| Wireless Connectivity | www.ti.com/wirelessconnectivity | | |

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2016, Texas Instruments Incorporated

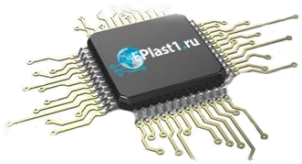
Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.




**Как с нами связаться**

**Телефон:** 8 (812) 309 58 32 (многоканальный)
**Факс:** 8 (812) 320-02-42
**Электронная почта:** org@eplast1.ru
**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.