# DSTINIs400/DSTINIs-00x Sockets Evaluation Board

www.maxim-ic.com

## GENERAL DESCRIPTION

The TINI® sockets boards are motherboards designed to host the corresponding TINI evaluation module. The combination of the two boards allows full evaluation of the features of the target microprocessor. To evaluate the DS80C400, you only need to order the DS80C400-KIT. To evaluate the DS80C410 or DS80C411, you must order both the DSTINIm410# and the DSTINIs400# and use them together. The DSTINIm410# is used to evaluate both the DS80C410 and DS80C411.

Although various boards support different evaluation modules, the most popular is the DSTINIs400#. It includes a 144-pin SODIMM connector and provides 1-Wire®, CAN 2.0B, serial, and a 10/100 Ethernet PHY for connecting the DSTINIm400# or DSTINIm410# to the physical world.

The DSTINIm400# and DSTINIm410# are designed as modules to be plugged into the 144-pin SODIMM connector on the DSTINIs400#. All are fully assembled and, when used together in the correct combinations, they form a complete evaluation system for the network microcontroller. The DSTINIm400# and DSTINIm410# modules include the DS80C400 and DS80C410 network microcontrollers, a real-time clock, 1MB flash, 1MB static RAM, and support for an external Ethernet PHY for connecting to a wide variety of networks.

Detailed information about the initial setup process and use of the TINI platform is contained in *Application Note 612: Getting Started with the TINIm400 (DS80C400) Verification Module.*

## ORDERING INFORMATION

| PART | INPUT VOLTAGE* | USED WITH MODULE | DIMENSIONS |
|---|---|---|---|
| DSTINIs400 | Replaced with DSTINIs400# | | |
| DSTINIs400# | 5V DC regulated | DSTINIm400 | 12cm x 10cm |
| DSTINIs-005 | 5V DC regulated | DSTINI1-1MG, DSTINI1-512 | 16cm x 10cm |
| DSTINIs-006 | 9V to 18V DC | DSTINI1-1MG, DSTINI1-512 | 16cm x 10cm |

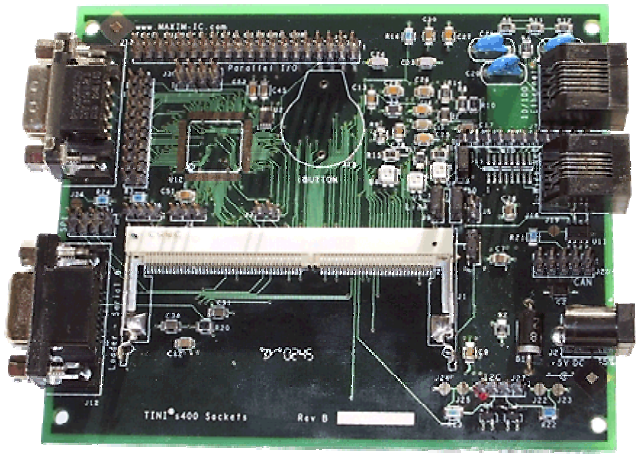
***Note:*** *The DSTINIm400 is an evaluation board and is only tested to prototype standards. It is not tested for use in a production product.*

**The user must supply an external power supply.*

*# Denotes a RoHS-compliant device that may include lead that is exempt under the RoHS requirements.*

## FEATURES

- **Hosts the TINI Runtime Environment in Validated Hardware Design (in Conjunction with the DSTINIm400)**
- **10/100 Base-T Ethernet Port**
- **Two Serial Ports**
- **Dual 1-Wire Network Ports**
- **CAN 2.0B Port**
- **5.0V Single-Supply Operation (DSTINIm400)**
- **Fully Assembled and Tested Design**



## COMPONENT LIST

| DESIGNATION | QTY | DESCRIPTION |
|---|---|---|
| C1 | 1 | 47pF capacitor (1206) |
| C2, C4, C5, C6 | 4 | 47µF tantalum capacitors (3528-21) |
| C3, C7, C9, C13, C15, C26, C28, C30, C38 | 9 | 100nF capacitors (1206) |
| C12, C14, C17, C19, C25, C27, C29, C33, C37 | 9 | 10nF capacitors (1206) |
| C8 | 1 | 220nF, 16V capacitor (1206) |
| C10, C31, C32, C34, C35, C36 | 6 | 1.0µF capacitors (1206) |
| C11 | 1 | 4.7µF capacitor (1206) |

*TINI and 1-Wire are registered trademarks of Maxim Integrated Products, Inc.*

## COMPONENT LIST (continued)

| DESIGNATION | QTY | DESCRIPTION |
|---|---|---|
| C16, C18 | 2 | 270pF capacitor (1206) |
| C20, C21, C22 | 3 | 1nF, 2kV radial capacitors (ceramic disk) |
| C23, C24 | 2 | 27pF capacitors (1206) |
| C40 | 1 | 0.10µF ±10%, 50V capacitor (1206) |
| D1 | 1 | 1N5908 D0-201 |
| D2 | 1 | BAT54 SOT23 |
| D3, D4 | 2 | BAT54S SOT23 |
| J1 | 1 | SODIMM144 Molex 54698-7000 |
| J2 | 1 | 2.5mm center, 5.5mm outside barrel connector |
| J3–J6, J20, J21, J27 | 7 | Dual-row connectors, 0.025 square pins |
| J7 | 1 | RJ-45 modular jack |
| J9, J10, J11 | 3 | 3 x 1-pin headers, 0.1 centers |
| J12 | 1 | DB9 serial female |
| J13 | 1 | DB9 serial male |
| J14 | 1 | Pad jumper |
| J16 | 1 | RJ11 modular jack |
| L1 | 1 | 22µH inductor |
| Q1 | 1 | BSS84 SIPMOS FET SOT23 |
| R1 | 1 | 205kΩ ±1% resistor (1206) |
| R2 | 1 | 121kΩ ±1% resistor (1206) |
| R3 | 1 | 10kΩ ±5% resistor (1206) |
| R4–R7, R8, R10, R11, R12 | 8 | 49.9Ω ±1% resistors (1206) |
| R13, R9 | 2 | 47Ω resistor (1206) |
| R14 | 1 | 22.1kΩ ±1% resistor (1206) |
| R15, R17, R18 | 3 | 220Ω resistors (1206) |
| R16 | 1 | 10kΩ resistor (1206) |
| R19 | 1 | Pad jumper |
| R20 | 1 | 47kΩ resistor (1206) |
| R21 | 1 | 124Ω ±1% resistor (1206) |
| R22, R23 | 2 | 1kΩ resistor (1206) |
| R24 | 1 | 10kΩ resistor (1206) |
| T1 | 1 | BelFuse S558-5999-T7 transformer |
| U1 | 1 | MAX1692 PWM step-down regulator |
| U3 | 1 | Intel LXT972ALC Ethernet PHY |
| U4, U5, U6 | 3 | Dialight 597-7741 LED |
| U7 | 1 | MAX560CAI transceiver |
| U8 | 1 | DS2480B serial 1-Wire line driver |
| U9 | 1 | DS9502 ESD protection diode |
| U11 | 1 | 65HVD230D CAN transceiver |
| Y1 | 1 | 25.000MHz, HC49US |
| Z1, Z2, Z3 | 3 | Ferrite bead, Fair-Rite 2512067007Y3 |
| **UNPOPULATED COMPONENTS** | | |
| J15 | 1 | DS9094F iButton® Clip |
| J18, J28, J29, J30 | 1 | Not used |
| U2 | 1 | MAX1792EUA18 linear regulator |
| U10 | 1 | DS2408 1-Wire 8-channel addressable switch |
| U12 | 1 | Not used |

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## JUMPERS (DSTINIs400)

### Network Boot Jumper (J3)

| JUMPER | CONFIGURATION |
|---|---|
| 1-2 | DS80C400 attempts to boot through Ethernet using DHCP and TFTP |

### DTR Reset Jumper (J14)

| JUMPER | CONFIGURATION |
|---|---|
| 1-2 | DTR reset communicates with the DS80C400 loader application. |

### Quiet Boot Jumper (J5)

| JUMPER | CONFIGURATION |
|---|---|
| 1-2 | DS80C400 boots without sending loader information to serial port. |

**DSTINIs400 Ethernet Configuration Jumpers (J9, J10, J11)**

| AUTO-NEGOTIATION | SPEED (Mbps) | DUPLEX | J9 | J10 | J11 |
|---|---|---|---|---|---|
| Disabled | 10 | Half | 2-3 (L) | 2-3 (L) | 2-3 (L) |
| | | Full | 2-3 (L) | 2-3 (L) | 1-2 (H) |
| | 100 | Half | 2-3 (L) | 1-2 (H) | 2-3 (L) |
| | | Full | 2-3 (L) | 1-2 (H) | 1-2 (H) |
| Enabled | 100 Only | Half | 1-2 (H) | 2-3 (L) | 2-3 (L) |
| | | Full/Half | 1-2 (H) | 2-3 (L) | 1-2 (H) |
| | 10/100 | Half Only | 1-2 (H) | 1-2 (H) | 2-3 (L) |
| | | Full or Half | 1-2 (H) | 1-2 (H) | 1-2 (H) |

# PIN HEADERS

| CONNNECTOR | DESCRIPTION |
|---|---|
| J18 | **Recreated I/O Port.** Latched from 1-Wire bus. Requires installation of DS2408. See schematic. |
| J20 | **CAN Bus.** See schematic for pinout. |
| J21 | **SPI™ Bus.** See schematic for pinout. Alternately provides connection to P5.4–P5.7 |
| J27 | **$I^2C$ Bus.** See schematic for pinout. Alternately provides connection to P1.0 and P1.1. |
| J28, J29, J30 | **Unused.** No user-accessible pins available. |

# QUICK START

## Recommended Equipment

The sockets board requires an external power supply and cables as needed to access the desired features of the board. The 5V DC power supply is mandatory, but the other cables are required only if that feature is to be used. The specific example shown here is for a DSTINIm400#/DSTINIs400# system.

### Hardware:

5V DC Power Supply

Input Voltage: per customer requirements
Output Voltage: 5V DC ±10%
Output Current: >150mA
Polarization: Positive Center
Output Plug Type: 2.5mm I.D. x 5.5mm O.D. x 12mm female (P-6)
Example: Digi-Key (www.digikey.com) part number T309-P6P-ND (110V input), 5V DC power

### Ethernet Cable:

Note: There are two types of Ethernet cable. For connection to a router or hub, use a standard "straight-through" Ethernet cable. For direct connection to an Ethernet port on the back of a PC, use a "crossover" Ethernet cable. A crossover cable is specially made for two-computer networking. These cables can be purchased from almost any computer or electronics store.

Example (straight-through): Radio Shack (www.radioshack.com) Cat 5E (3ft) Network Cable, part number 278-1763

Example (crossover): Radio Shack Cat 5E (3m) Crossover Cable, part number 278-2011

### RS-232C Serial Cable (DB9 Male to DB9 Female):

This cable is straight-through, not a null-modem (crossover). These cables can be purchased from any computer or electronics store.

### Important Note Regarding U12

Component U12 is not placed on the product as supplied by Maxim, nor is it available for sale from Maxim. Inclusion of this component and related circuitry in the schematic is intended to demonstrate one method to add I/O expansion capability to the DSTINIs400, but the implementation details are left to the user; any modification of the product is not guaranteed or supported by Maxim. For more information on the possible uses of component U12, refer to *Application Note 3664: Expanding TINI's I/O Capability* and *Application Note 3412: TINIs400 External Serial Port Reference Design*.

## MORE INFORMATION

TINI platform details can be found at www.maxim-ic.com/TINI. The *TINI Specification and Developer's Guide* (Addison-Welsey, 2001) is an invaluable resource when developing with the TINI platform. Download a free copy from our website at www.maxim-ic.com/TINIguide.

## ADDITIONAL RESOURCES

For detailed information about the initial setup and use of the TINI platform, refer to *Application Note 612: Getting Started with the TINIm400 (DS80C400) Verification Module at* www.maxim-ic.com/AN612.

DS80C400 Network Microcontroller Data Sheet: www.maxim-ic.com/DS80C400

DS80C410 Networked Microcontroller Data Sheet: www.maxim-ic.com/DS80C410

DS80C400 Evaluation Kit (DS80C400-KIT): www.maxim-ic.com/DS80C400-KIT

DSTINIm400 Networked Microcontroller Evaluation Board: www.maxim-ic.com/DSTINIm400

DSTINIm410 Networked Microcontroller Evaluation Board: www.maxim-ic.com/DSTINIm410

Microcontroller Website: www.maxim-ic.com/microcontrollers

*SPI is a trademark of Motorola, Inc.*

## REVISION HISTORY

| REVISION DATE | DESCRIPTION | PAGES CHANGED |
|---|---|---|
| 100906 | Updated the *Component List*. | 1, 2 |
| | Replaced the Auto Negotiation Jumper (J9), 10/100Mb Ethernet Jumper (J10), and Full-Duplex Jumper (J11) sections with the *DSTINIs400 Ethernet Configuration Jumpers (J9, J10, J11)* section. | 3 |
| 121406 | Added "#" to the end of DSTINIs400 references | 1, 3 |
| | Updated *Ordering Information* table and added note that the DSTINIm400 is only tested to prototype standards. | 1 |
| 070507 | Changed the *DTR Reset Jumper (J4)* to *DTR Reset Jumper (J14)* section. | 2 |
| 061608 | In the *Component List*, changed the description for C2, C4, C5, C6; added "(ceramic disk)" to C20, C21, C22 description. | 1, 2 |



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Title: TINIm400 Socket Board: TINI Module Connector

Size: B | Document Number: TINIs400 | Rev: C

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J1 DIMM144

GND1 GND2 VCC3 VCC4 nRstIn A16 nRam2En A15 A8 A14 A9 A13 A17 A11 A20 A10 nPSEN A19 A6 D4 D3 D5 D6 D7 nFlashEn D2 A0 D1 A4 D0 P1.4 A3 P1.5 A2 nRam1En A1 P1.3 A12 P1.2 P1.6 P1.1 P1.7 P1.0 nRstOut nEA CRS TxEn COL RxEr RxDV MDC MDIO GND52 GND53 TxD.3 TxD.2 TxD.1 TxD.0 GND58 GND59 TxClk RxClk GND62 GND63 RxD.0 RxD.1 RxD.2 RxD.3 GND68 GND69 NC70 P3.0 ALE P3.1 P5.3 P3.2 nPCE1 NC77 nPCE3 P3.3 nPCE0 NC81 nPCE2 nWr nRd NC84 P5.2 NC86 NC88 NC89 NC90 NC91 NC92 NC93 NC94 P5.1 P5.0 nCE3 A18 nCE2 nCE1 nCE0 P6.7 P6.6 A21 nCE7 nCE6 nCE5 nCE4 NC107 NC108 A5 NC109 A6 NC111 NC112 A7 NC114 NC115 Local1W NC117 vPullup NC119 NC120 NC121 NC122 NC123 NC124 NC125 NC126 NC127 NC128 NC129 NC130 NC131 NC132 NC133 NC134 NC135 NC136 NC137 NC138 NC139 NC140 VCC141 VCC142 GND143 GND144

VCC3 V33 nRstIn A16 A17 A20 A19 nPSEn A1 A2 A3 P15 A0 P14 D0 D1 D2 D3 D4 D5 D6 D7 D[7:0] CRS COL MDIO MDC RxD[3:0] RxER RxDV RxClk TxD[3:0] TxClk TxEn nRstOut P10 P11 P12 P13 P14 P15 P16 P17

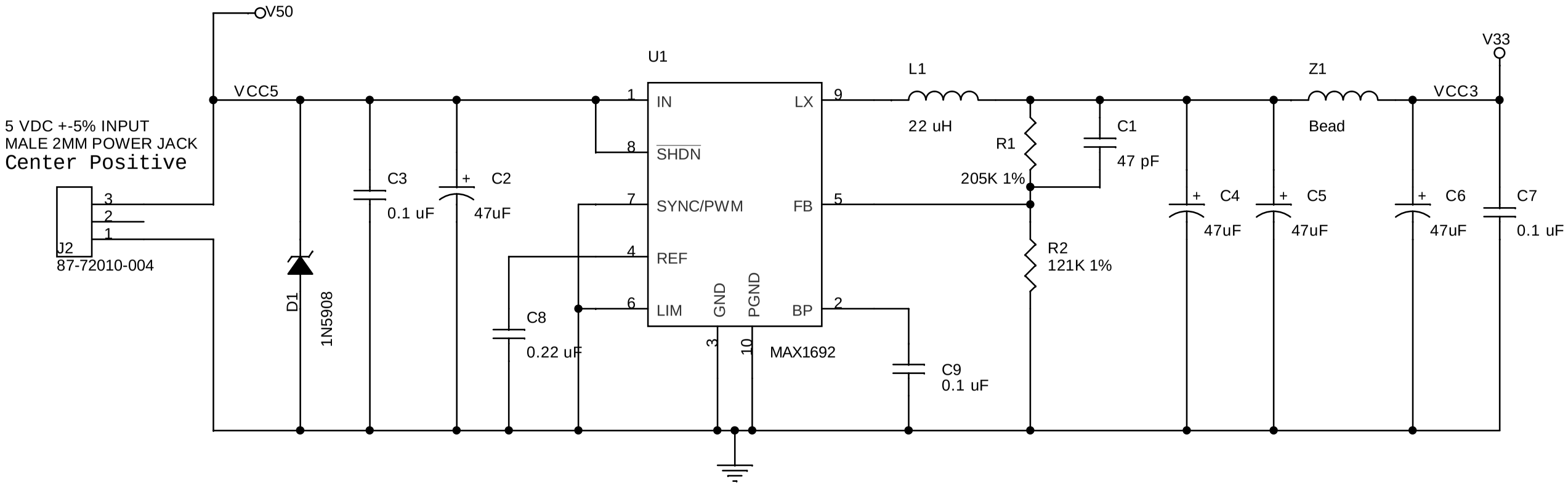
nRstIn A16 A17 A20 A19 nPSEn A1 A2 A3 P15 A0 P14 D0 D1 D2 D3 D4 D5 D6 D7 D[7:0] CRS TxEn COL RxEr RxDV MDC MDIO RxD0 RxD1 RxD2 RxD3 TxClk RxClk TxD3 TxD2 TxD1 TxD0 P30 P31 P53 P32 nPCE1 P12 P16 P11 P17 P10 nRstOut

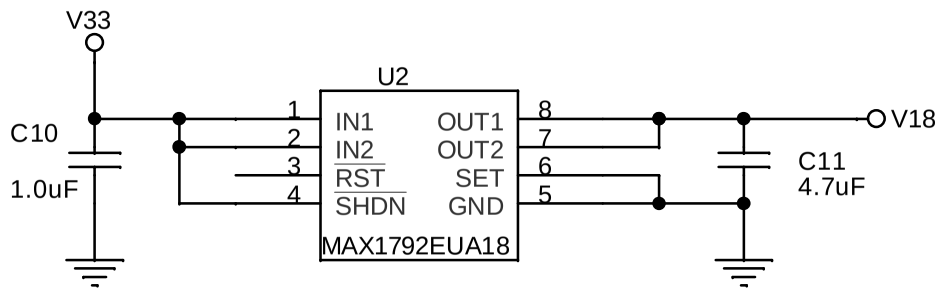
A18 P50 P51 P52 P53 P33 P32 P31 P30 nPCE3 nPCE2 nPCE0 nRd nWr ALE P66 P67 P50 P51 P52 P53 P33 P32 P31 P30 nPCE[3:0]

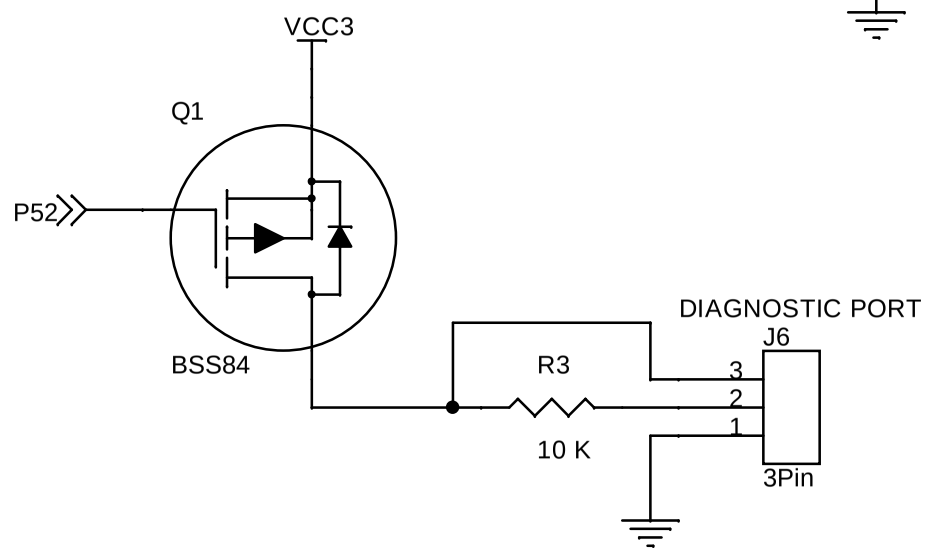
A21 nCE7 nCE6 nCE5 nCE4 nCE3 nCE2 nCE1 nCE0 nCE[7:3] Local1W V50

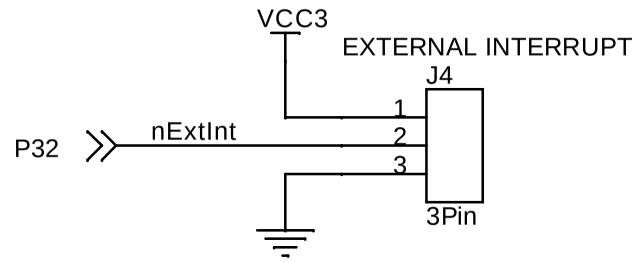
P10 P11 P12 P13 P14 P15 P16 P17

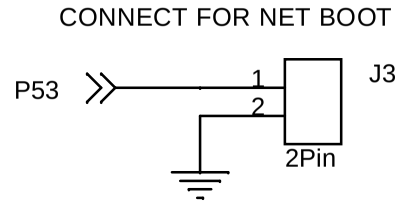
nRstOut TxEn TxClk TxD[3:0] RxClk RxDV RxER RxD[3:0] MDC MDIO COL CRS

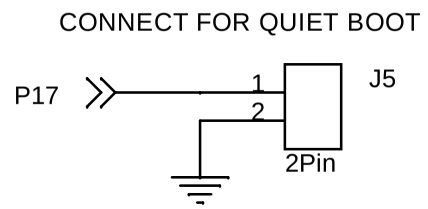


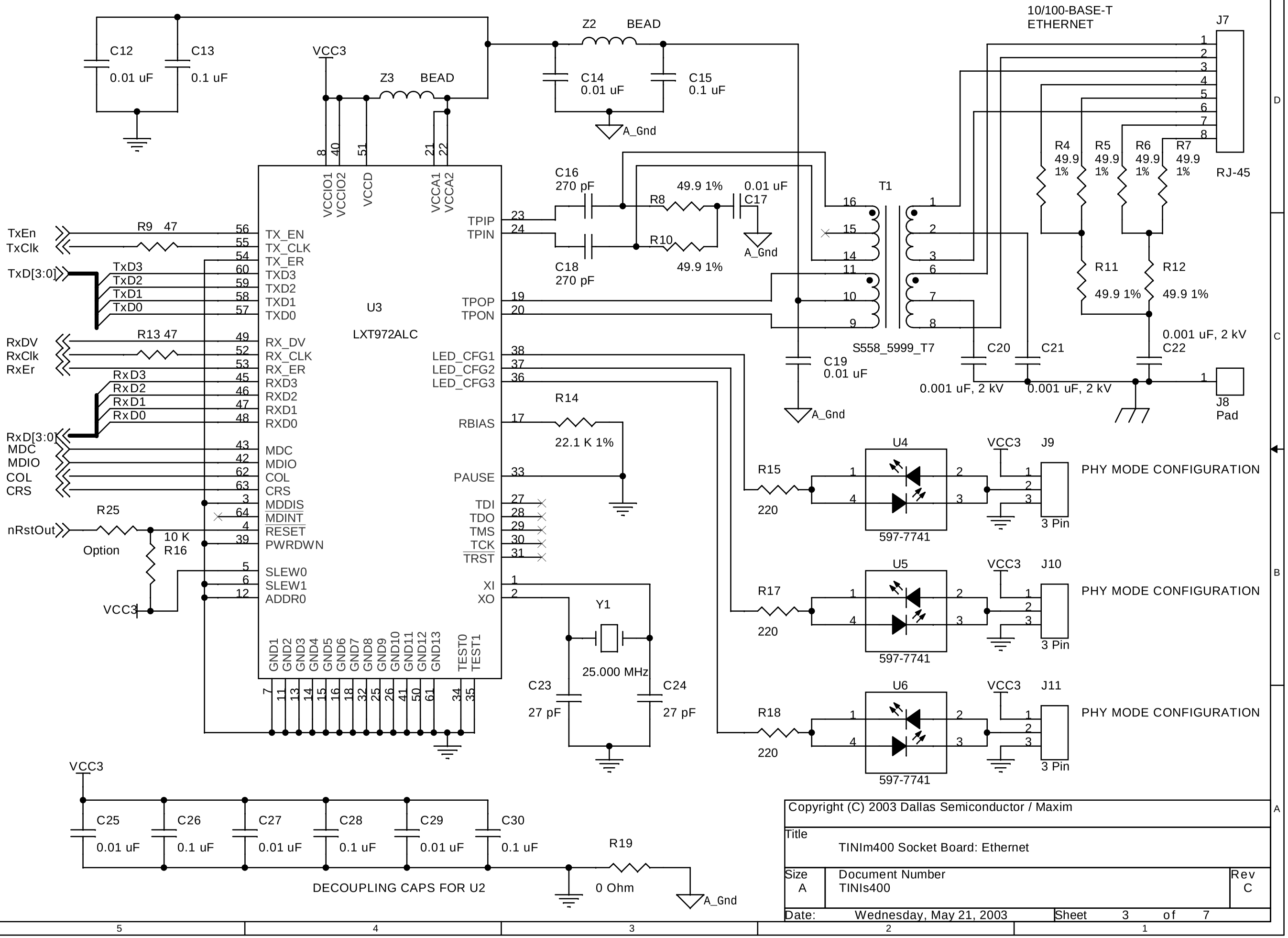




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Title
TINIm400 Socket Board: Power and Internals

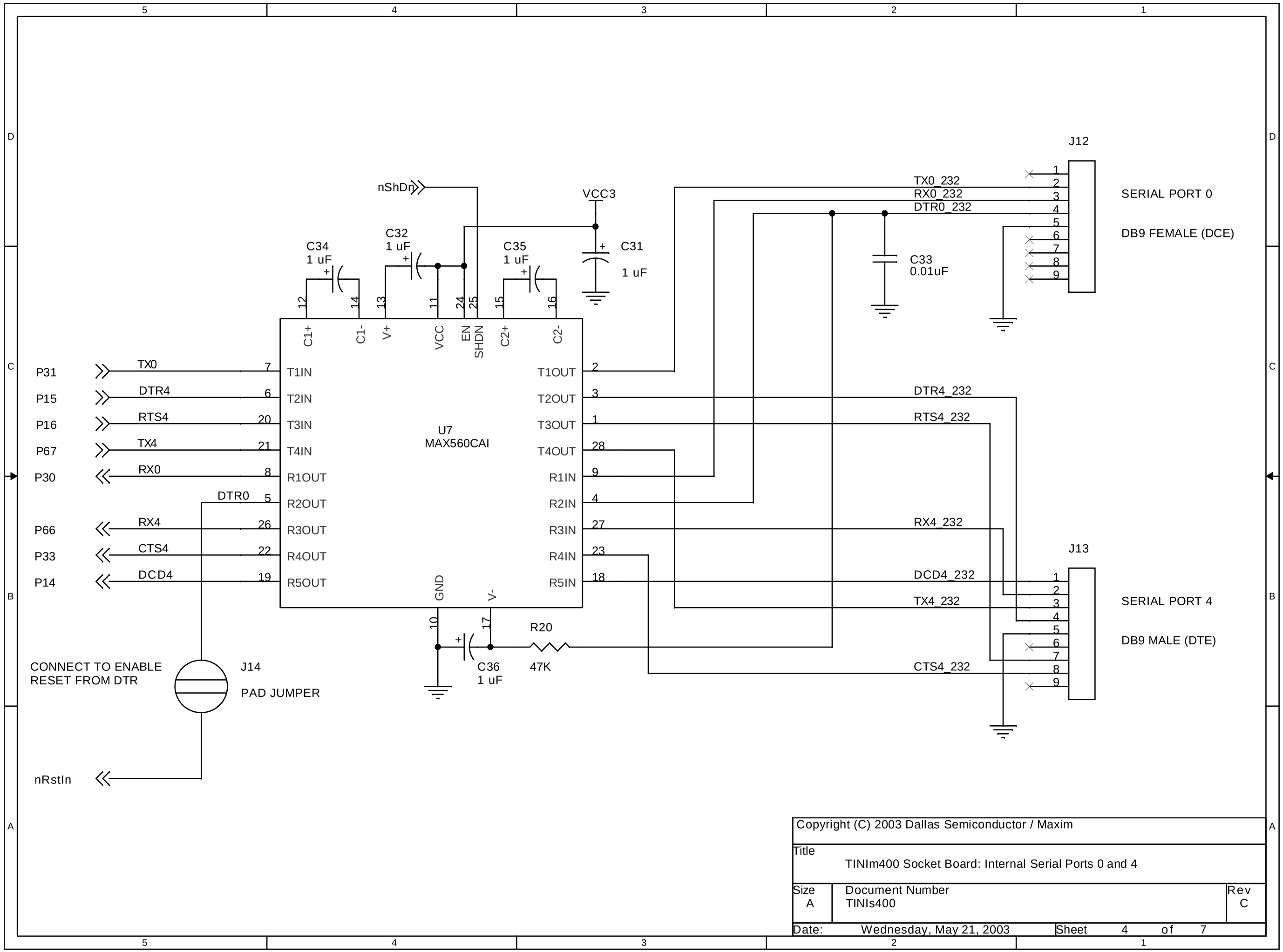
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|---|---|---|
| Title: TINIm400 Socket Board: Ethernet | | |
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| | | |
|---|---|---|
| Title: TINIm400 Socket Board: Internal Serial Ports 0 and 4 | | |
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J15

I-BUTTON CLIP

DS9094F

Local1W

VCC5

D2

BAT54

C37

0.01 uF

C38

0.1 uF

U8

DS2480B

P13

TX1

P12

RX1

XOWIO

U9

DS9502

VCC5

J16

RJ11

EXTERNAL 1-WIRE

J17

nExtInt

Pad Jumper

VCC5

U10

DS2408

C39

47uF

J18

8 I/O LINES WITH STROBE

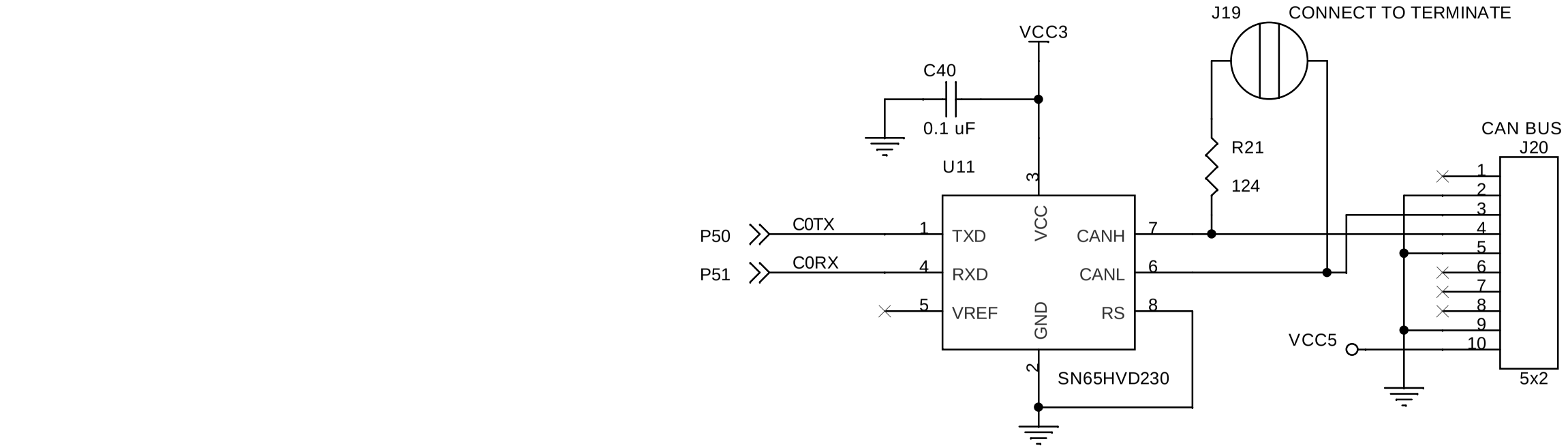
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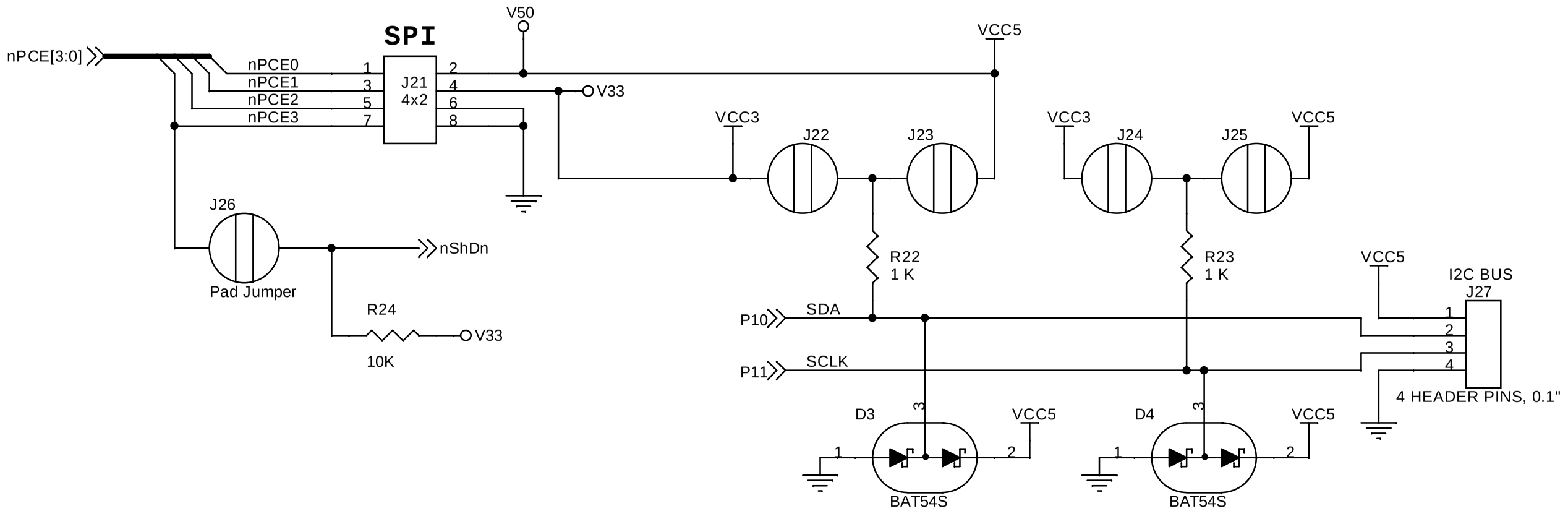
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Title: TINIm400 Socket Board: External 1-Wire Interface and DS2408

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|---|---|---|
| A | TINIs400 | C |

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| | | |
|---|---|---|
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| Title: TINIm400 Socket Board: Other I/O | | |
| Size: A | Document Number: TINIs400 | Rev: C |
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V33
C41 100nF
C42 100nF
C43 100nF
C46 100nF
C47 100nF
C48 100nF
One 100 nF ceramic capacitor for each U1 V33 connection
nRstOut
V18
One 100 nF ceramic capacitor for each U1 V18 connection
C44 100nF
C45 100nF
User I/O
J28
40 Pin dual
U12
XC2C64-7VQ100C
nPSEn
nRd
UIO0
UIO1
D[7:0]
D7
D6
D5
D4
D3
D2
D1
D0
nWr
nCE7
nCE6
nCE5
nCE4
nCE3
nCE[7:3]
ALE
UIO2
UIO3
C49 10nF
Expanded I/O
J29
20 Pin dual
One 10 nF ceramic capacitor for each U1 V18 connection
C53 10nF
C54 10nF
UIO4
A3
A2
A1
A0
A21
A20
A19
A18
A17
A16
nExtInt
P53
P17
UIO5
XIO0
XIO1
TDO
UIO7
UIO6
J30
8Pin
C50 10nF
C51 10nF
C52 10nF
One 10 nF ceramic capacitor for each U1 V33 connection
C55 10nF
C56 10nF
C57 10nF

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Title: Programmable I/O

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