



DS80C400 (DSTINIm400) Networked Microcontroller Evaluation Kit

www.maxim-ic.com

GENERAL DESCRIPTION

The DSTINIm400 is a fully assembled and tested circuit board that evaluates the DS80C400 network microcontroller. In addition to the DS80C400, the DSTINIm400 includes a real-time clock, 1MB flash, 1MB static RAM, and support for an external Ethernet PHY for connecting to a wide variety of networks. The circuit board is designed as a module to be plugged into a 144-pin SODIMM connector. For evaluation, the DSTINIm400 can be inserted into the DSTINIs400 socket board. The combination of the two boards allows full evaluation of the features of the DS80C400 using an Ethernet network.

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FEATURES

- Hosts the TINI[®] Runtime Environment in Validated Hardware Design
- Industry Standard MII Interface to Connect to a Wide Variety of Network Interfaces Including 10/100 Base-T, Optical, and HomePNA
- Three Hardware Serial Ports
- Integrated 1-Wire[®] Network Master
- CAN2.0B Port
- Real-Time Clock for Time Stamping
- 1MB Flash ROM for Application Storage
- 1MB NV SRAM for Data Storage
- 3.3V Single-Supply Operation
- Fully Assembled and Tested Design

ORDERING INFORMATION

PART	TEMP RANGE	IC PACKAGE
DSTINIm400-144	0°C to +70°C	144 SODIMM

Note: To evaluate the DS80C400, order both a DSTINIm400 and a DSTINIs400.

COMPONENT LIST

DESIGNATION	QTY	DESCRIPTION
U1	1	DS80C400 Network Microcontroller
U2, U3	2	HM62W8512BLTT-7UL 512kB RAM
U4	1	AM29LV081B-70EC 1MB flash
U5, U6	2	MAX6365PKA31 reset controllers
U7	1	MAX1792EQU18 voltage reg
U8	1	DS1672U-33 real-time clock
U9	1	DS2502-E48 IEEE MAC address
Y1	1	14.7456MHz crystal
Y2	1	32kHz crystal
BT1	1	CR1632 3V lithium cell
C1, C2, C3, C4, C5, C8, C9, C10, C11, C12, C13, C14, C17, C18	14	0.1µF, ±20%, 10V ceramic capacitor (0805)

DESIGNATION	QTY	DESCRIPTION
C6, C7	2	27pF, ±20%, 50V C0G ceramic capacitor (0805)
C15	1	1.0µF, ±20%, 10V ceramic capacitor (1206)
C16	1	4.7µF, ±20%, 10V ceramic capacitor (1206)
C19, C20	2	47µF, ±20%, tantalum capacitor (C)
DN1	1	BAT54S diode (SOT23)
DS1	1	SML-LX23SRC Lumex LED
Q1, Q3	2	BSS84 P-Channel FET (SOT23)
Q2	1	2N7002 N-Channel FET (SOT23)
R1, R4, R7, R8	4	10kΩ, ±5% resistor (0805)
R2	1	1.5kΩ, ±5% resistor (0805)
R3	1	1kΩ, ±5% resistor (0805)
R5	1	2.2kΩ, ±5% resistor (0805)
R6	1	10Ω, ±5% resistor (0805)

QUICK START

Recommended Equipment

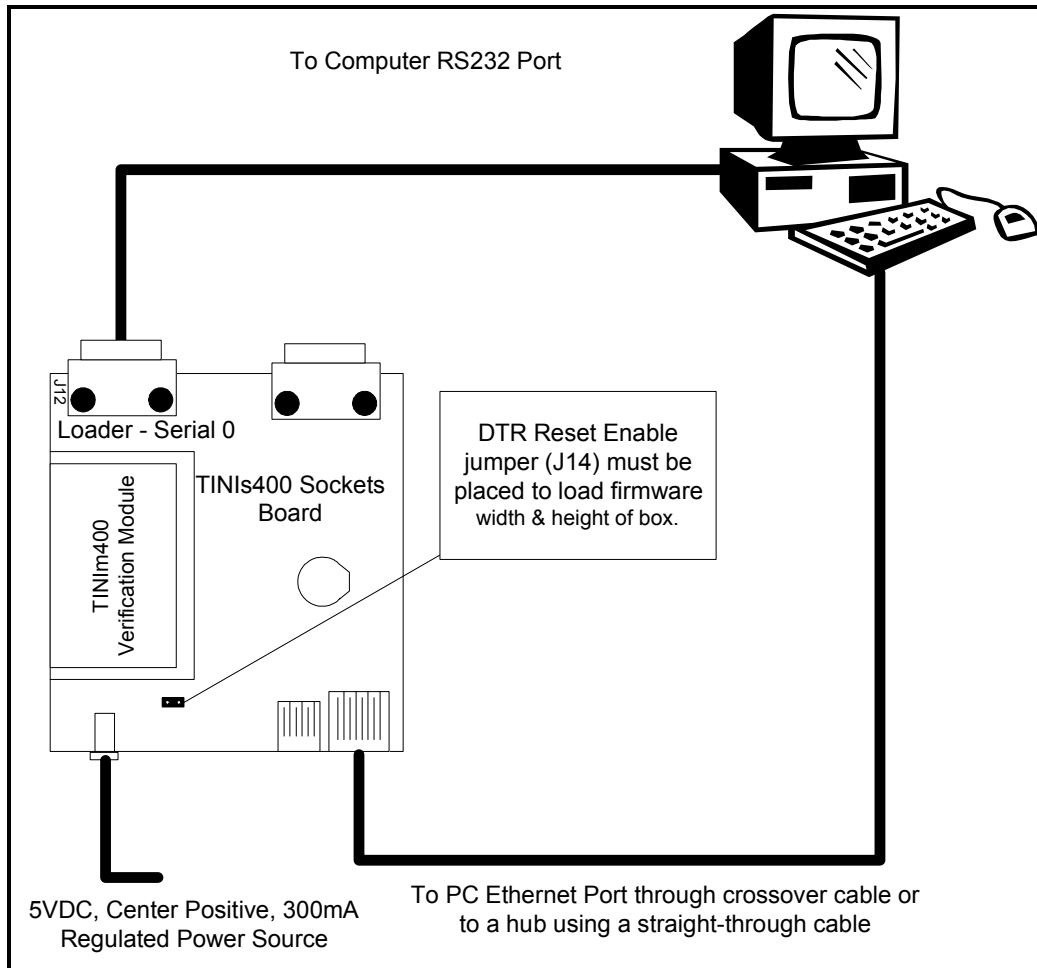
The minimum hardware and software requirements are:

- TINI Hardware Requirements
TINIm400 Verification Module or equivalent
TINIs400 Sockets Board or equivalent
- TINI Software Requirements
[TINI Software Development Kit](#) Version 1.1 or later
[JDK \(Java™ Development Kit\)](#) from Sun Microsystems or equivalent¹
[Java Communications API](#) from Sun Microsystems or www.rxtx.org
- Development System Requirements
Operating system meeting requirements of the JDK from Sun Microsystems
1 RS-232 (COM) port—115200 baud recommended
[RS-232C serial cable DB9 male to DB9 female](#): Radio Shack Catalog Number 26-117 or equivalent
[Crossover Ethernet cable](#): For direct connection to a host computer, use a crossover Ethernet cable such as the Radio Shack Catalog Number 950-0368 or equivalent. To connect to a router or hub, use a straight-through Ethernet cable.
[5V DC power supply](#) capable of supplying 150mA: Radio Shack Catalog Number 900-2740 or equivalent (center positive)

Procedure

- 1) Prior to beginning, verify power is not connected to the TINIs400 sockets board.
- 2) Insert the TINIm400 Verification Module into the 144-pin connector on the TINIs400 sockets board.
- 3) Verify the jumper labeled as DTR Reset (J14) is placed on the sockets board.
- 4) Attach an RS-232 serial cable to the connector labeled “Loader–Serial 0” on the TINIm400 sockets board as shown in [Figure 1](#).
- 5) Connect the serial cable to a serial port on your PC.
- 6) Next, attach the crossover Ethernet cable between the PC and the TINIs400 sockets board.
- 7) **Note:** *If the TINI sockets board is not being connected directly to a network interface card, but instead to a separate network port on a hub or switch, a straight through Ethernet patch cable should be used.*
- 8) Connect the power adapter to your TINIs400 sockets board as shown in [Figure 1](#). A center positive 5V DC regulated power supply must be used with the TINIs400 sockets board. Other sockets boards may have different power requirements. Refer to the sockets board documentation for more information.
- 9) Plug the power adapter into a wall socket.

¹The TINI Software Development Kit has been extensively tested with JDK1.3 from Sun Microsystems. Later versions of the JDK should work in the same manner. Check the documentation for your version of the JDK to verify the installation procedure.

Figure 1. Typical Hardware Setup

SOFTWARE SETUP

First, download and install the Java Development Kit and Java Communications API from Sun Microsystems. Installation instructions and example applications are included in both packages. You should verify correct installation by running the `BlackBox` example provided with the Java Communications API.

Loading the TINI Runtime Environment

Download the TINI Software Development Kit from www.maxim-ic.com/TINI. The download file should be unzipped to a location of your choice on your hard drive (<TINI SDK Install Dir>).

To begin using the TINIm400 Verification Module, the TINI runtime environment must first be loaded into the flash of the verification module. Loading the runtime environment requires executing a program called `JavaKit`. Application binaries are loaded through the serial port of the TINI verification module.

Running JavaKit

- 1) To run JavaKit, open a command shell or DOS prompt on your PC. Change to the <TINI SDK Install Dir>\bin directory.
- 2) Next, type `java -classpath tini.jar JavaKit -400 -flash 40` at the command prompt and press Enter to run the JavaKit application. If you have the Java Development Kit and the Java Communications API properly installed, JavaKit should appear on the screen.
- 3) Select the port name where the TINI Verification Module is attached. Press the Open Port button. The default baud rate of 115200 should be used on all platforms where it is supported.
- 4) After opening the port, press the Reset button. The loader prompt should be displayed on the JavaKit screen ([Figure 2](#)).
- 5) If the message is not displayed, verify the cable connections and check that the correct port name is selected. If everything appears to be attached correctly, read the `Running_JavaKit.txt` file contained in the TINI SDK for more detailed information.
- 6) At the JavaKit prompt, type **B0** and press Enter, followed by **F0** and Enter. This clears the RAM of the TINI Verification Module. Any time a new runtime environment is loaded the memory should be cleared.
- 7) Now click on the File menu in JavaKit and select `Load File`. A file dialog appears on the screen. Browse to the <TINI SDK Install Dir>\bin directory and select the `tini_400.tbin` file and click the Open button. `Load Complete` is displayed on the screen when the firmware is loaded, this can take up to 30 seconds.
- 8) To load the command shell, click on the File menu and select `Load File` again. Select the `slush_400.tbin` file and click on the Open button. When `Load Complete` appears, slush has been successfully loaded into the flash of the TINIm400 Verification Module.
- 9) Press the reset button and the JavaKit loader prompt shown in [Figure 2](#) is displayed.
- 10) At the JavaKit prompt, type `E` and hit Enter. Slush begins booting and text similar to that shown in [Figure 3](#) prints on the JavaKit screen.
- 11) Press Enter and a slush login prompt is displayed. Type in the username `root` and press Enter. The initial password is `tini`.
- 12) You should now be logged into slush. To view a list of valid shell commands, type `help` at the command prompt. Detailed information on specific commands, such as `dir`, can be obtained by typing `help`, followed by the command.

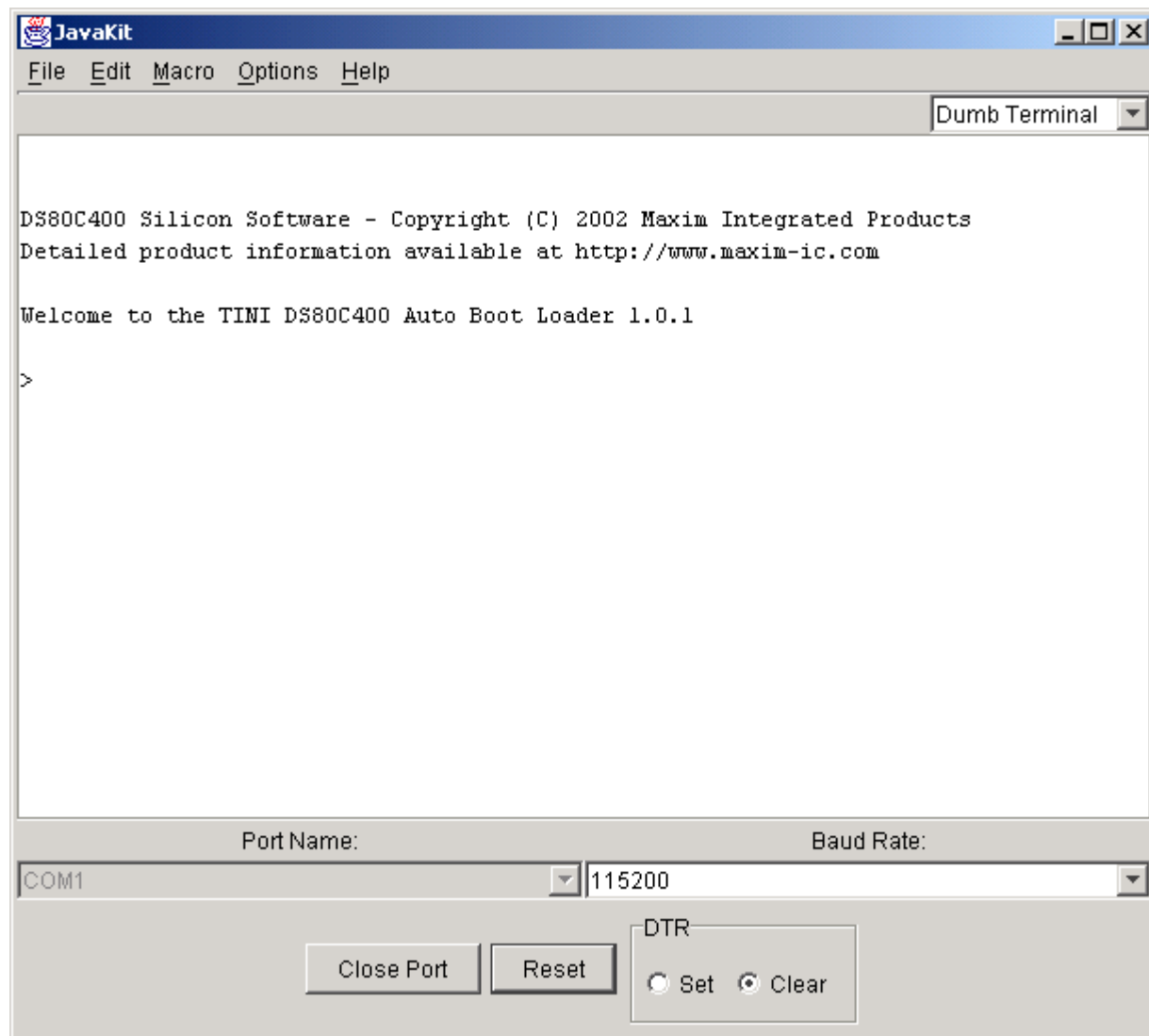
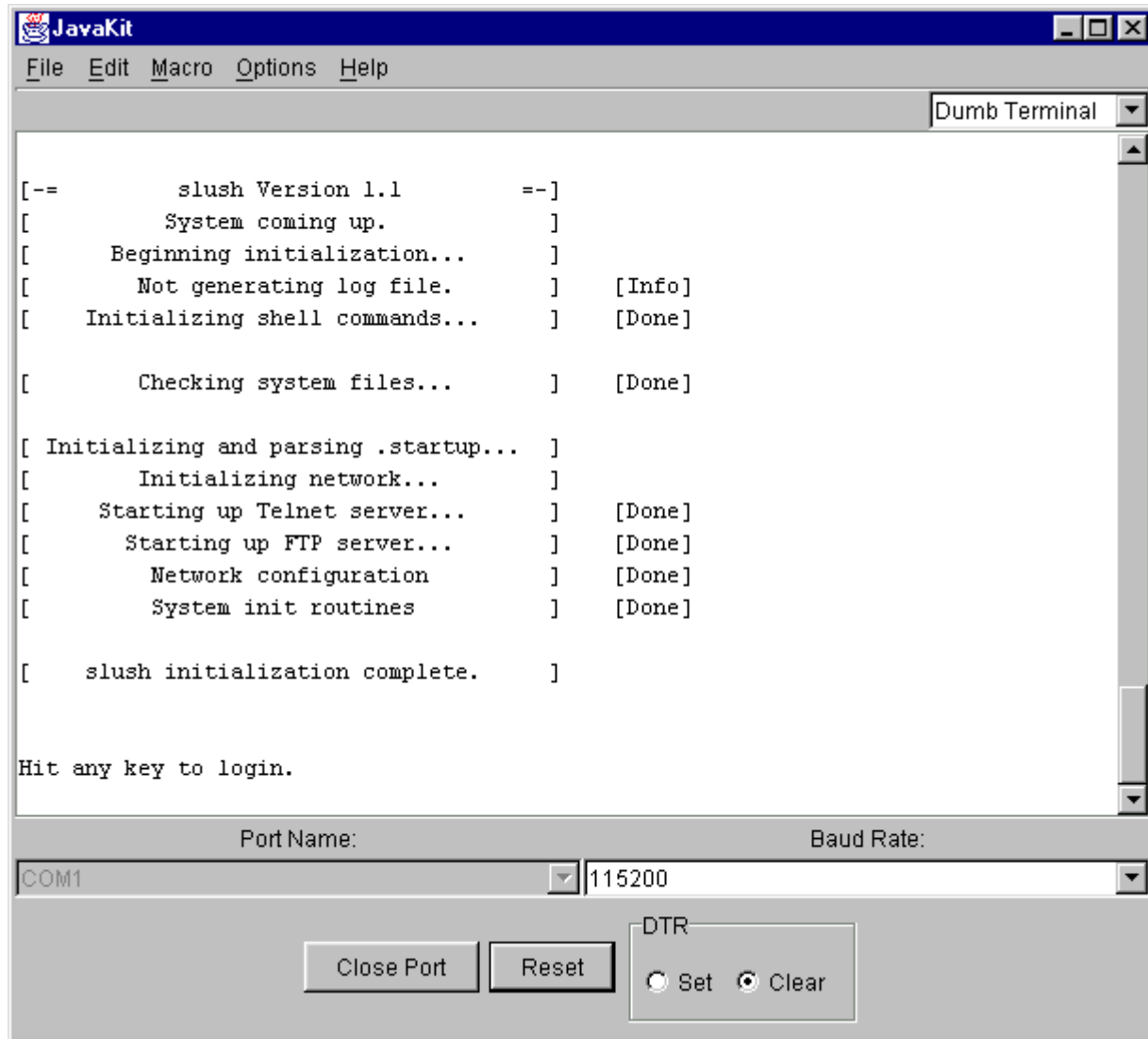
Figure 2. JavaKit Loader Prompt

Figure 3. Slush Login Prompt

NETWORK SETUP

One of the primary features of the TINI platform is its ability to access the network. The slush command to configure network access is `ipconfig`². Typing `ipconfig -h` at the command prompt displays detailed configuration options. The `-h` option can be used with any slush command to view options.

The simplest method of connecting to the network is with DHCP, assuming it is supported on your network. To enable DHCP, type `ipconfig -d` and press Enter. Once the TINI Verification Module has successfully leased a network address, a message is displayed on the slush prompt indicating success as in [Figure 4](#).

²The DS80C400 ROM supports IPv6 for networking. By default, it is always on and configured automatically.

Figure 4. DHCP Network Configuration

```

JavaKit
File Edit Macro Options Help
Dumb Terminal

DHCP Enabled      : false
Mailhost         :
Restore From Flash: Disabled

TINI /> ipconfig -d
Warning:  This will disconnect any connected network users
and reset all network servers.

OK to proceed? (Y/N): y
[ Thu Mar 14 12:45:59 GMT 2002 ] Message from System: FTP server stopped.
[ Thu Mar 14 12:46:00 GMT 2002 ] Message from System: Telnet server stopped.

TINI />
[ Thu Mar 14 12:46:01 GMT 2002 ] Message from System: DHCP leased an IP.
[ Thu Mar 14 12:46:01 GMT 2002 ] Message from System: Telnet server started.
[ Thu Mar 14 12:46:01 GMT 2002 ] Message from System: FTP server started.

Port Name: COM1 Baud Rate: 115200
Close Port Reset DTR
 Set  Clear

```

If your network does not support DHCP, then it is necessary to use a static IP address. First, you must get a valid network address and subnet mask from the network administrator. To set the IP address to a static value, use `ipconfig -a x.x.x.x -m y.y.y.y`, where the IP address is denoted by `x.x.x.x` and the subnet is `y.y.y.y`. For example, to set your IP address to 192.168.0.1 with a subnet of 255.255.255.0, type `ipconfig -a 192.168.0.1 -m 255.255.255.0` at the slush command prompt and press Enter.

A good way to test your network settings is to use the ping command. Either attempt to ping the TINI Verification Module from the host computer or ping the host computer from the TINI Verification Module using the slush ping command.

Running Your First Application

The TINI SDK contains many example applications. Each example application has batch files for compiling and converting it to a binary file for execution on the TINI Runtime Environment. A very simple application included with the TINI SDK is `Blinky`. This application blinks an LED (DS1) on the TINIm400. To transfer the application to your TINIm400, open a command prompt on your host computer and change to the `<TINI SDK Install`

Dir>\examples\Blinky\bin directory. This directory contains a file called `Blinky.tini`. From the command prompt on the host computer type `ftp`. The commands below will connect to the TINI and transfer the `Blinky.tini` file to the TINI400's file system. Replace the IP address used below with the IP address you set earlier in slush. The default password for `ftp` and `telnet` on the TINI Runtime Environment is *tini*.

```
ftp> open 192.168.0.1
Connected to 192.168.0.1.
220 Welcome to slush. (Version 1.1) Ready for user login.
User (192.168.0.1:(none)): root
331 Password Required for root
Password:
230 User root logged in.
ftp> bin
200 Type set to Binary
ftp> put Blinky.tini
200 Command successful.
150 BINARY connection open, putting Blinky.tini
226 Closing data connection.
ftp: 514 bytes sent in 0.00Seconds 514000.00Kbytes/sec.
ftp> bye
221 Goodbye
```

The file now exists in the TINI file system. Next, connect to your TINI400 using `telnet` on your PC. Verify the existence of the `Blinky.tini` file using the `slush` command `ls`. To run the `Blinky.tini` file, type `java Blinky.tini` followed by `Enter`. The `Blinky` program executes and the LED should begin a steady blink.

TINI PLATFORM INFORMATION

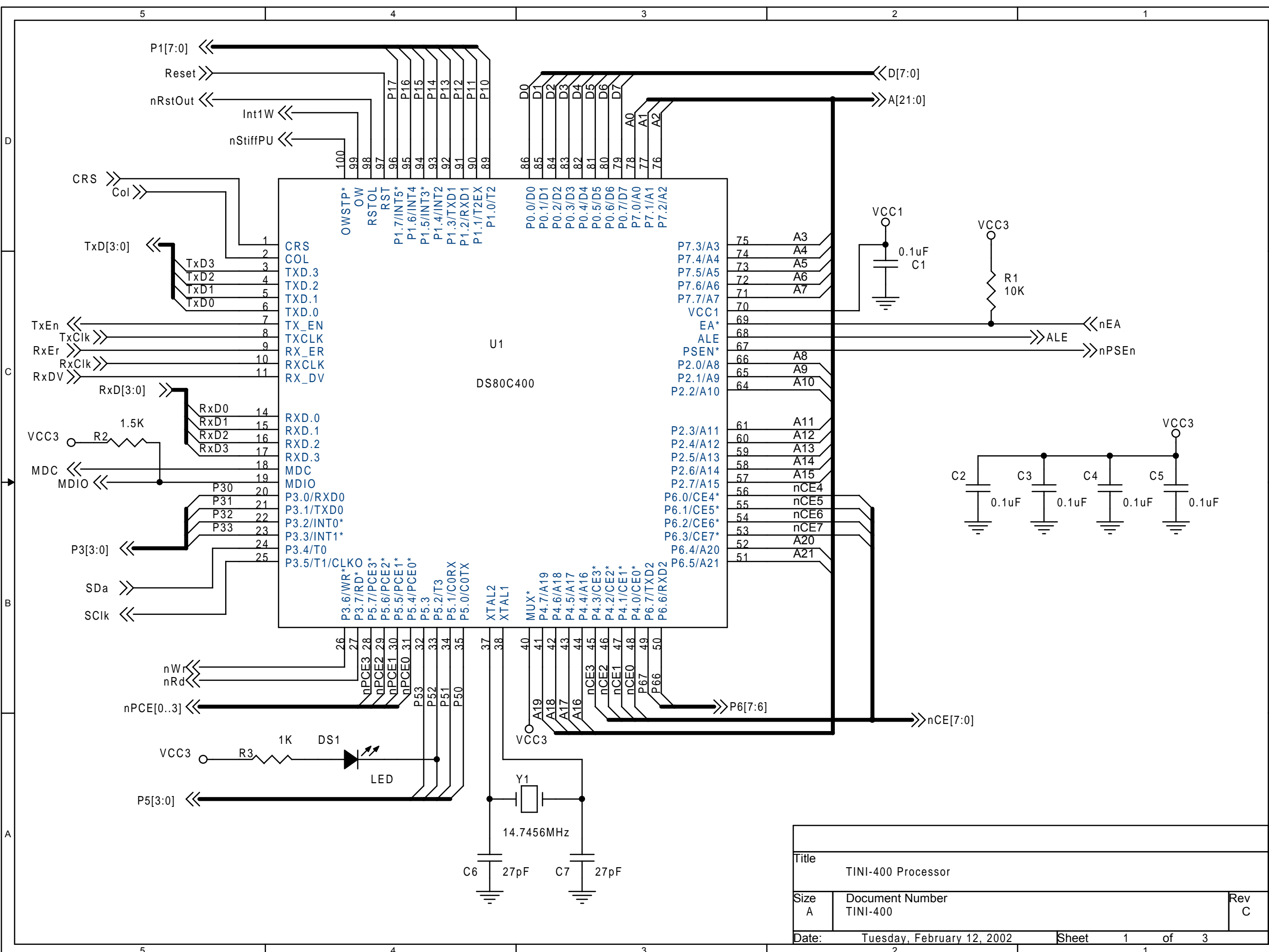
TINI platform details can be found at www.maxim-ic.com/TINI. The *TINI Specification and Developer's Guide* is an invaluable resource when developing with the TINI platform and can be downloaded from our website. Chapter 2 is dedicated to getting started applications with the TINI platform and includes a detailed description of building and running several small-example applications.

DS80C400 INFORMATION

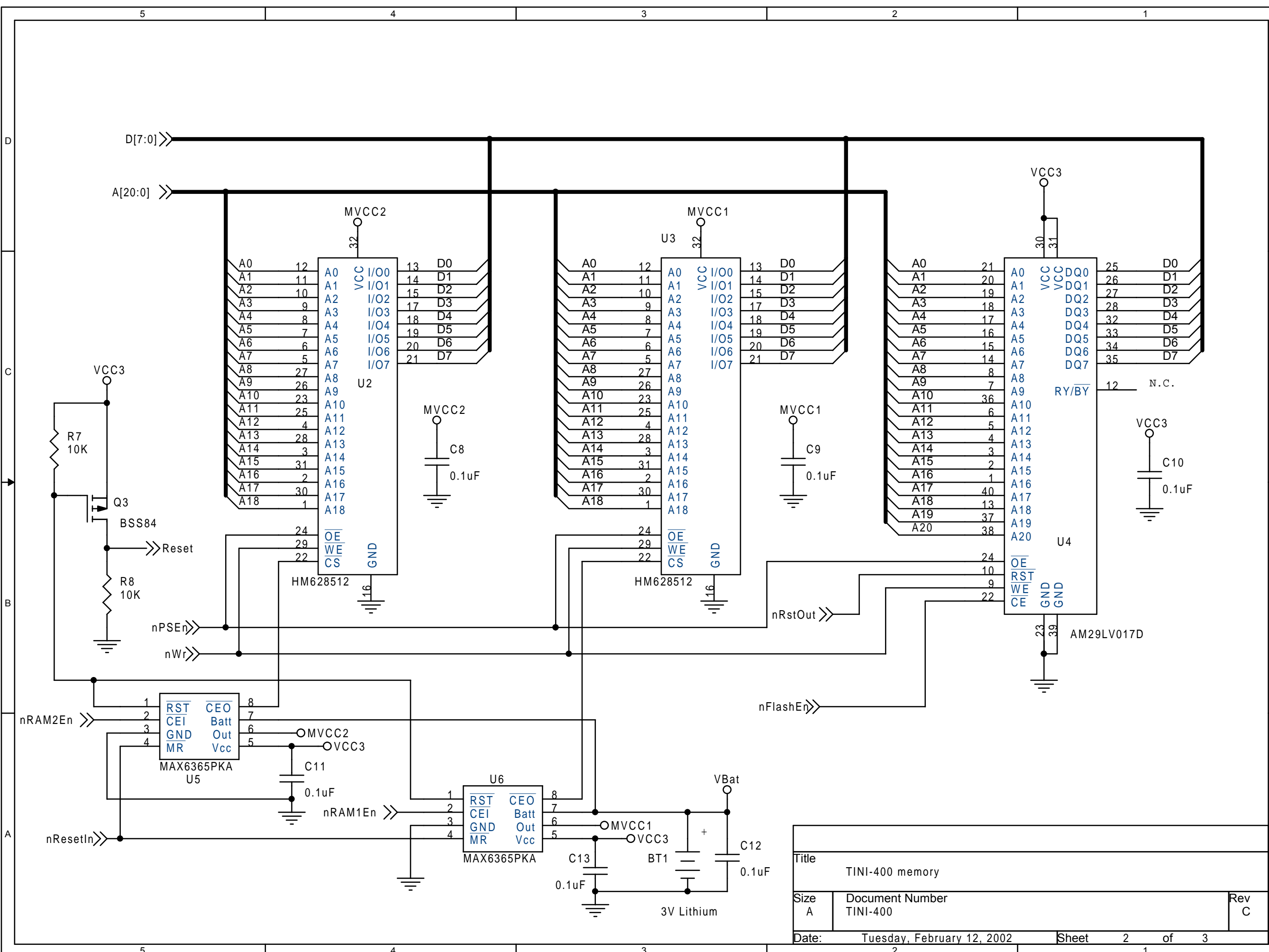
For more information about the DS80C400, please consult the DS80C400 data sheet available on our website, www.maxim-ic.com/microcontrollers.

ADDITIONAL INFORMATION AND LINKS

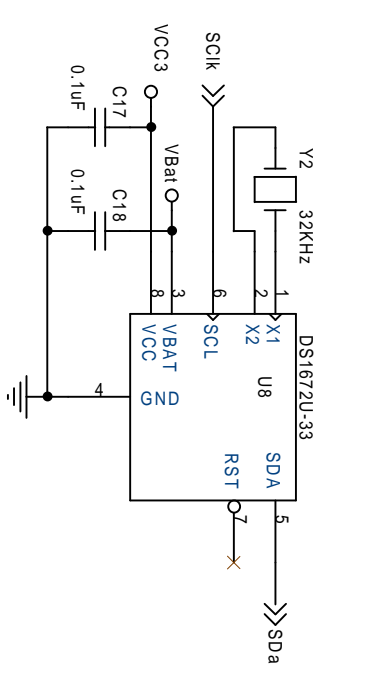
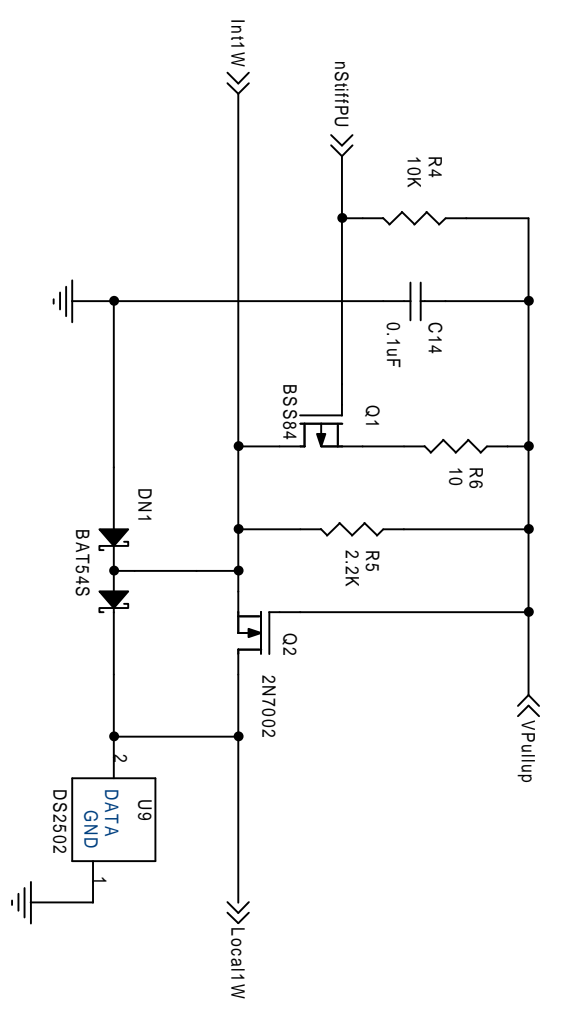
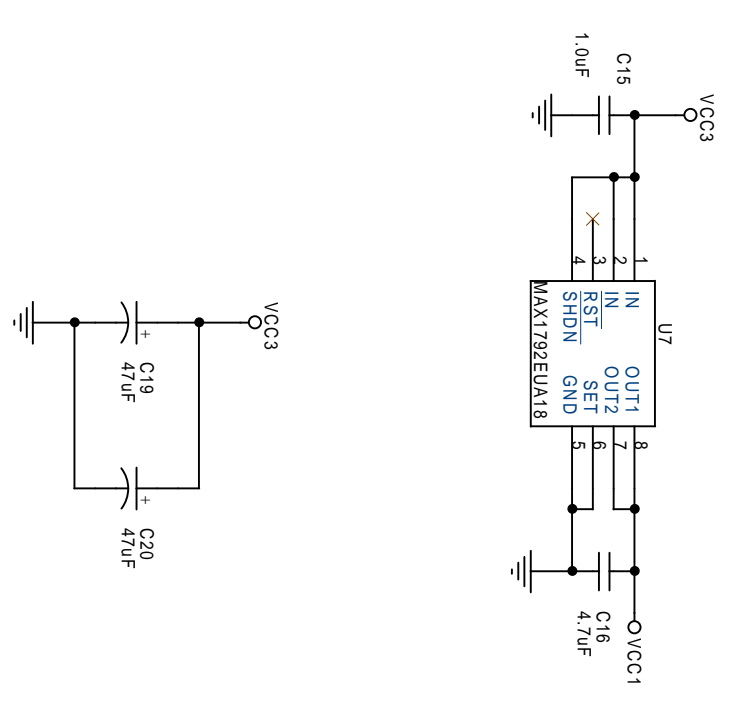
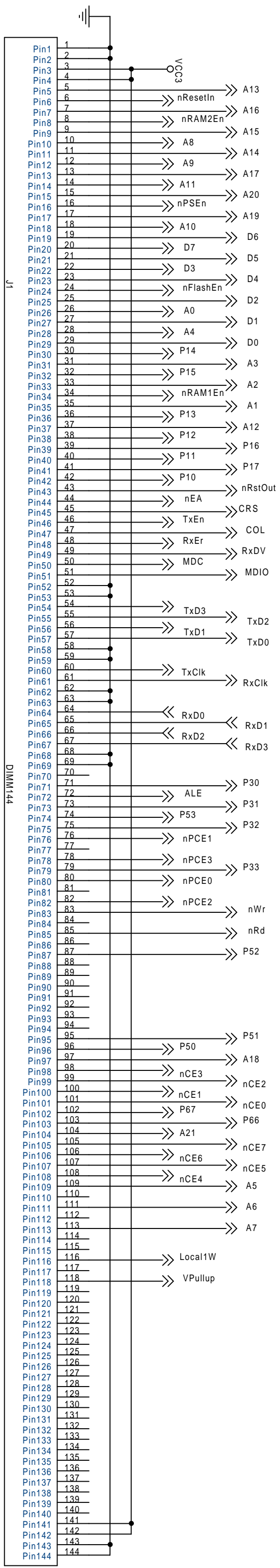
- Java Development Kit, java.sun.com/j2se
- Java Communications API (Java COMM) Windows/Solaris, java.sun.com/products
Linux, www.rxtx.org



Title		
TINI-400 Processor		
Size	Document Number	Rev
A	TINI-400	C
Date:	Tuesday, February 12, 2002	Sheet 1 of 3



Title		
TINI-400 memory		
Size	Document Number	Rev
A	TINI-400	C
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Title	TINI-400 Connector
Size	B
Document Number	TINI-400
Rev	C
Date:	Tuesday, February 12, 2002
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