

EX DIMM Module User Guide

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1. Introduction

1.1 Purpose of This Manual

This manual describes the installation, operation, and functional specifications of the EX DIMM Module. Within this manual there are various notes to help you fully utilize all the features found on the module. Additional data sheets and reference documents for components on the EX DIMM Module can be found on the **GC-DEV-01** CD.

Suggestions and corrections are always welcome.

1.2 Manual Notations

Notes

Additional information may be inserted at various points to help clarify or expand on a topic. The note may also indicate a helpful hint or suggestion. Here is an example of a note:

Note: The Serial Port 0 can be configured for RS485.

Caution

There may be some operations that require special precautions or observance to safety procedures. In such cases, you will see a CAUTION sign and detailed information.



CAUTION. Use anti-static mats and grounded wrist-bands to prevent static damage.

Stop

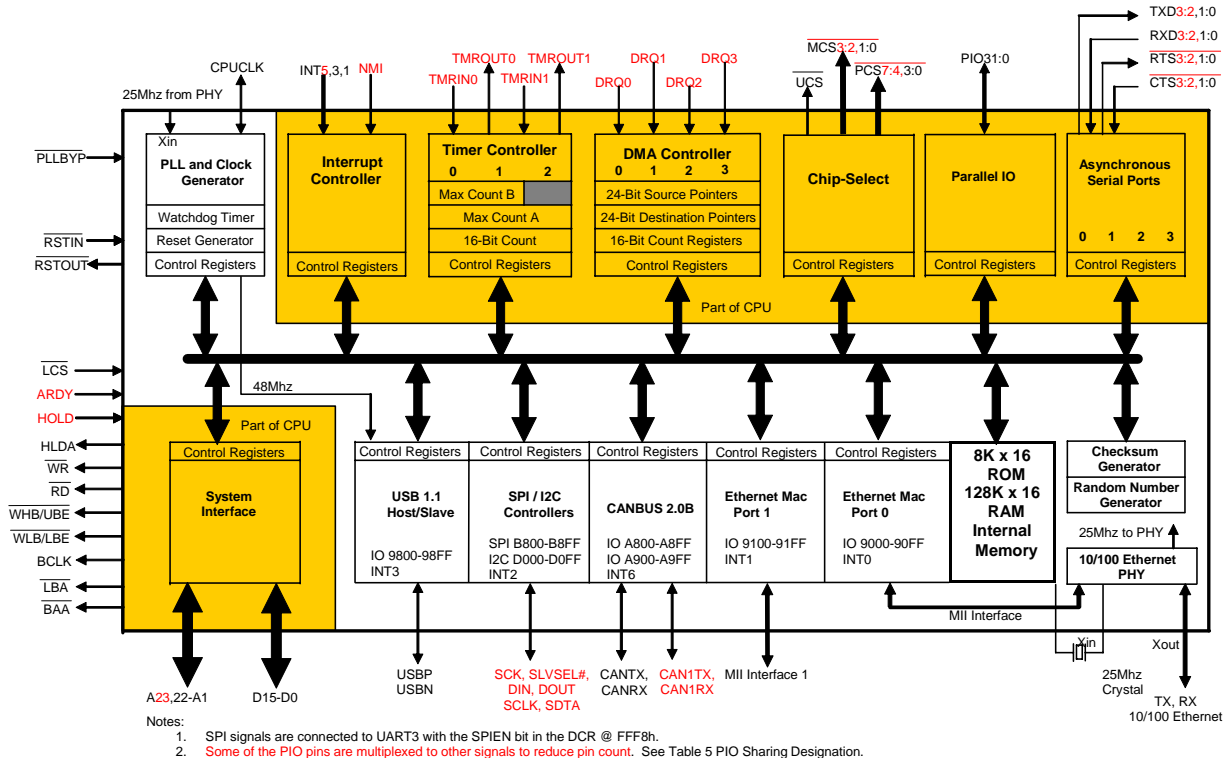
In special circumstances, it might be possible to damage a circuit component or other electrical device. In this case, a STOP sign will appear and the precautions listed in bold text. Please observe these warning to prevent damage to the evaluation board or other system components.



STOP. DO NOT CONNECT THIS CABLE WITH THE POWER ON.

- **Four High Performance Serial Ports**
with RS232/422/485 RTS/CTS and DMA support with baud rate support up to 230K
- **1M byte of Internal Flash Memory (optional)**
for program / data storage
- **256K bytes of SRAM**
internal zero wait state memory
- **16K bytes of boot ROM**
that allows for local or network boot
- **USB, I2C, SPI serial controllers**
for local high speed peripherals
- **Integrated Peripherals**
4 DMA, interrupt controller, 3 timers, and external memory select logic
- **Watchdog-timer and power-on reset logic**
- **External 16M byte addressable memory** SDRAM and high speed burst Flash support
- **32 I/O pins**
for general purpose input/output signals
- **184-Pin BGA**
12mm x 12mm package
- **JTAG interface**
with in-circuit emulator support with breakpoints and trace buffer
- **Industrial temperature specifications**
– 40 to +105 °C

1.4.2 EX Chip Block Diagram



1.4.3 EX DIMM Module Component Locator

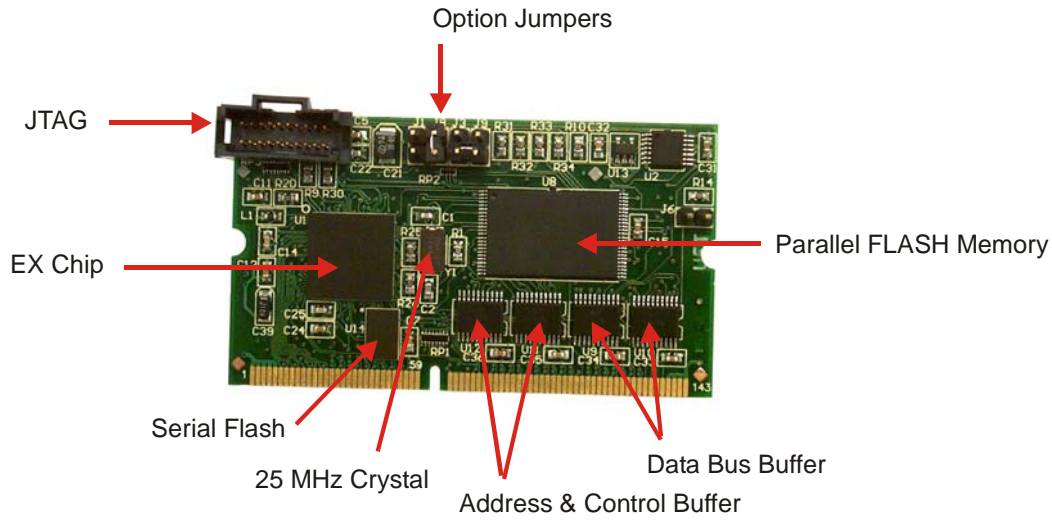


Figure 1 - EX DIMM Components, Top

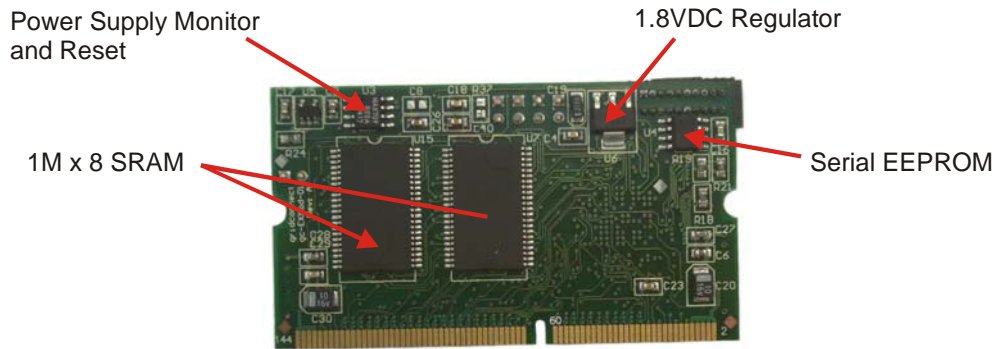
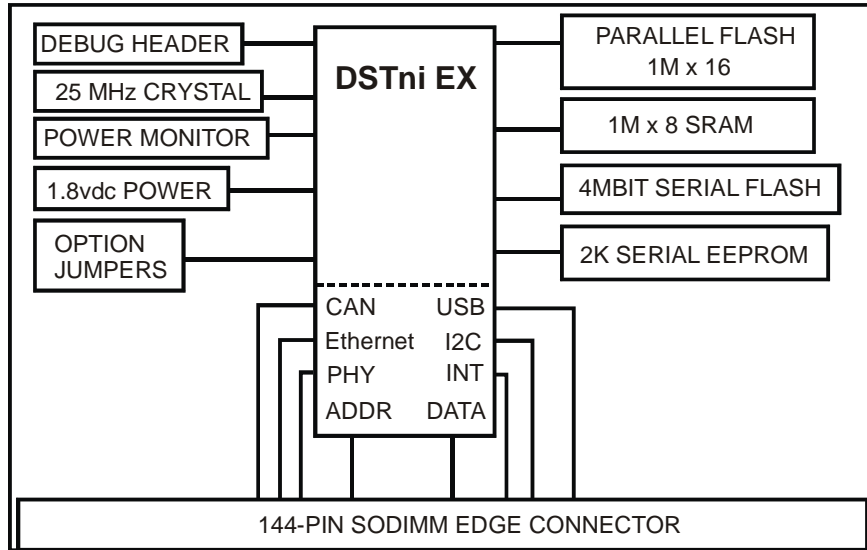


Figure 2 - EX DIMM Components, Bottom

1.4.4 EX DIMM Module Block Diagram

The block diagram show the DSTni EX chip connected to system components such as Flash, SRAM, and Serial EEPROM. The other control circuits within the chip, such as Ethernet and USB, are brought out directly to the edge connector. For detailed information, see the schematic on the support CD.



1.4.5 EX DIMM Module Components

The EX DIMM Module contains the following components:

- DSTni-EX 184BGA microprocessor
- 144-pin gold plated edge connector
- Power Monitor and Power fail reset circuit
- 25 MHz Crystal
- 1M x 8bit SRAM
- 1M x 16 Parallel Flash (29LV160)
- 2K Serial EEPROM (see data sheet)
- 4Mbit (2048 pages of 264 Bytes) Serial Flash
- Debug Header
- 1.8VDC 800 ma regulated CPU power supply
- Parallel Flash Write Protect jumper
- Boot Configuration option jumpers
- Data Buffers
- Address and Control Buffers

1.5 Development Board

The Development Board (DVB) is a complete development platform for testing hardware and software components of a DSTni EX/LX design project or projects based on other CPU platforms. The Development Board allows you to snap in a SODIMM CPU module for fast development and testing.

Here is a picture of a DVB with a DSTni-EX SODIMM module. For more information about the Development Board, see the user manual on the support CD.

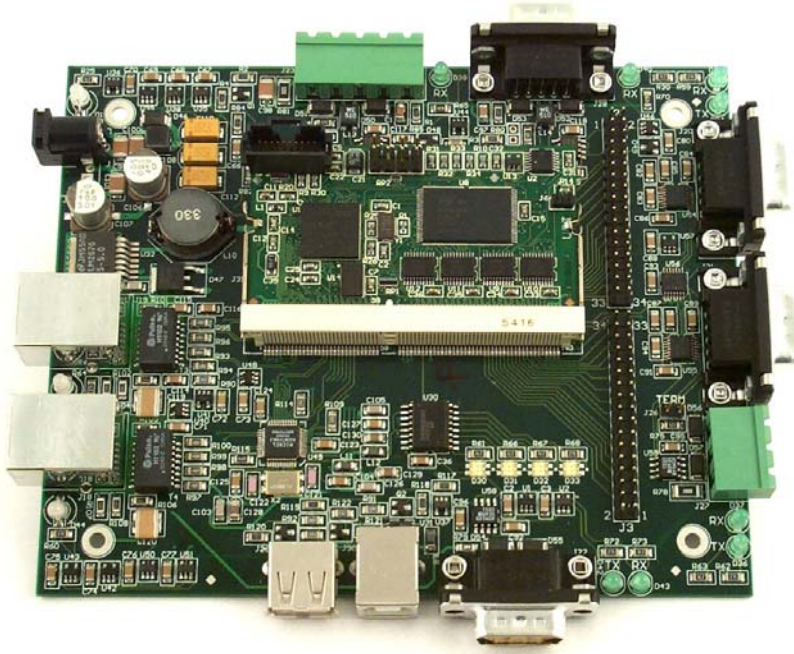


Figure 3 Development Board

1.5.1 DVB Block Diagram

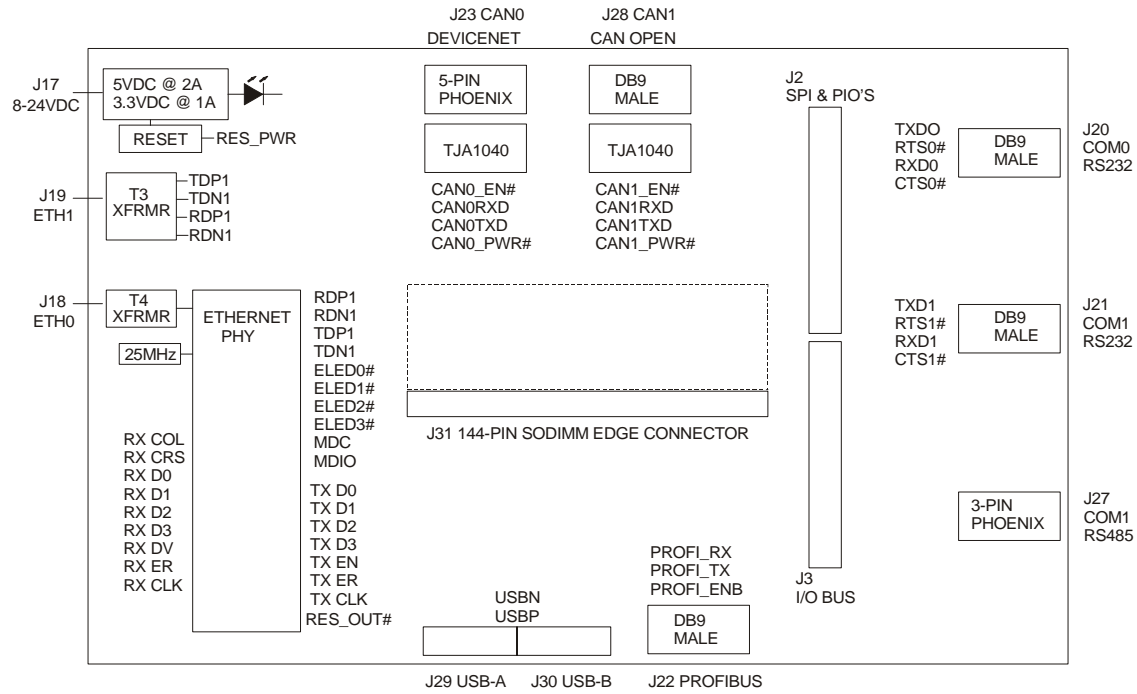


Figure 4 Development Board Block Diagram

2. Installation

This section contains the basic steps necessary to install and test the EX DIMM Module.

2.1.1 EX DIMM Module

The EX DIMM Module contains all the components necessary for an embedded CPU project, including SRAM, Serial Flash, Parallel Flash, Power Monitor and Reset, and the DSTni EX Microprocessor.

The EX DIMM Module kit should contain the following items:

EX DIMM Module in protective wrapper
Software support CD
[ADP Debugger Adapter and power supply \(optional\)](#)

The software support CD contains user manuals, DSTni OS, demos, etc. Some of the contents of the CD are:

- DSTni-EX Data Book
- DSTni-EX Evaluation Module Manual
- DSTni-EX Evaluation Module Schematics
- EX/LX Development Board User Manual
- EX/LX Development Board Schematics
- More....

*Package contents subject to change.

2.1.2 Handling Precautions



CAUTION. Use anti-static mats and grounded wrist-bands to prevent static damage.

Use caution when handling circuit boards and other electronic components. The boards are packed in anti-static bags to protect them during shipping. The use of anti-static mats is highly recommended when working with the development board.

The technical difference between anti-static (static dissipative) and conductive mats is the speed at which the static electricity is removed. Faster static removal speed is not an indication of a superior product. To the contrary, removal of static electricity too quickly can actually damage circuit boards. Anti-static mats rated at 10^7 - 10^9 ohms allows effective static charge removal at a non-damaging flow rate.

2.1.3 Setup

The first step in the setup procedure is to unpack the module and check for damage, loose components, etc.

2.1.4 DIMM Module and Connector

The EX DIMM Module is designed to comply with the physical standards for a SDRAM Module using a 144 position 8mm profile DIMM socket.

The profile for the SODIMM module and the dimensional drawings for the connector are described in the AMP drawing 390322, located on the support CD. The profile drawing provides details for the layout of the pads for the 144-pin connector and all critical dimensions of the connector. You will need this drawing in order to design a circuit board for use with the EX DIMM Module.

The part number is AMP/Tyco 390322-1.

A sketch of the 144-pin connector is shown below. The EX DIMM Module is held in the connector by a lever on each side of the connector. There is an area under and around the connector designated to be free of components or circuit traces. Refer to the AMP drawing for details.

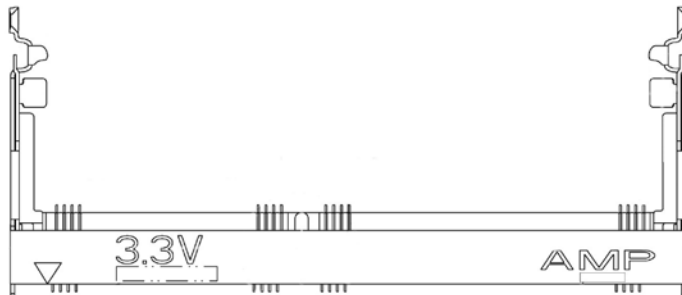


Figure 5 - SODIMM Connector

2.1.5 Install CPU Module

This section describes how to install an EX DIMM Module. The instructions show how the module is installed in the EX Development Board, which uses the required SODIMM connector.

Step 1: Ground yourself.

Static electricity can damage your module and other board parts. You need to ground yourself to avoid "shocking" the CPU DIMM Module or other electronic circuits. The EX DIMM module should be handled on an anti-static mat. If you have wrist straps designed to dissipate static, you should wear them. If you don't have wrist straps, here is the easiest way to ground yourself:

- Turn off all power supplies to the DIMM connector.
- Briefly touch a grounded surface.
- Plant your feet and don't walk around. If you do need to walk around, ground yourself again before touching any of the electronic parts.

Step 2: Install your CPU module.

- Take the CPU module out of its anti-static bag and hold it by the edges.
- Locate the notch in the row of metal pins at the bottom of your module and align it with the key in the DIMM connector.
- Hold the module at a 45-degree angle to the slot and slide it into place.



Line up notch
The notch in the module fits into a key in the connector.

- Press the top of the module down until it is lying flat against the motherboard and you hear it snap into place.
- Small side clips should snap around the module.



Press module into place.
Module should lay flat.

2.1.6 Apply Power

The EX DIMM Module requires a well regulated 3.3VDC power supply. Power and ground are supplied to the module through the 144-pin DIMM connector. Ground is supplied through 11 pins and +3.3VDC is supplied through 9 pins. See the schematic diagram for power and ground pin designations.

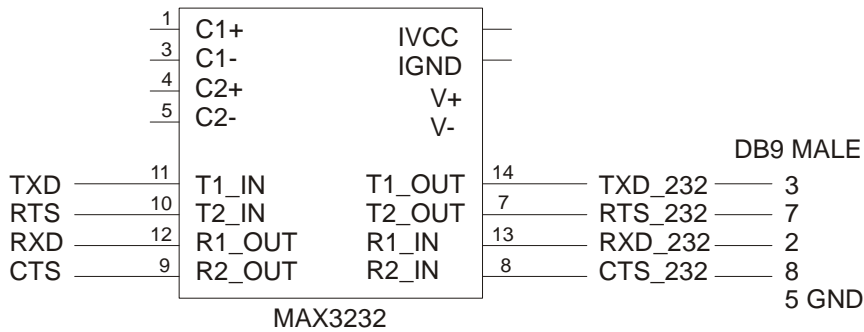
When the EX DIMM Module is secure in the connector, apply +3.3VDC to the module. If you are using the EX Development Board, apply power to the development board.

2.1.7 Power-Up Mode

When power is applied to the module, the bootstrap program starts and runs through a series of tests. A complete description of the [Bootstrap operation can be found in a later section](#).

2.1.8 Connect to Serial Port 0 (COM0)

The EX DIMM Module does not have a connector for an RS232 port but provides signals to the 144-pin connector for two serial ports. The signals are RXD, TXD, RTS, and CTS. The following drawing shows a typical method of generating RS232 signals from the EX chip serial interface. Note that all the circuit components are not shown. Refer to the EX Development Board for details of the circuit.



The EX Development Board contains an RS232 converter and DB9 Male connector for COM0 and COM1.

Software may be loaded via Serial Port 0 (COM0) either for immediate execution or for storage to non-volatile memory.

The cable provided in the kit is a generic 9-pin null-modem cable. Connect one end to COM0 and the other to an unused port on your computer.

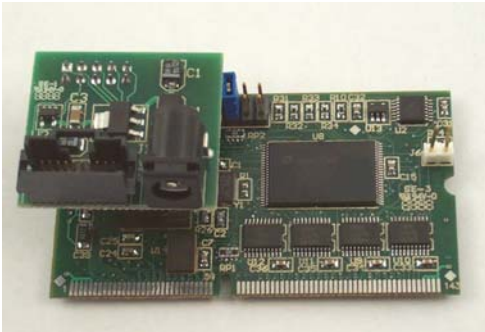
Before going any further, you should understand how the Bootstrap works. This is software permanently built into the chip. Please review the [DSTni-EX Bootstrap User Guide, 800-500-100](#).

The next chapter gives detailed instructions in using a COM program to make a connection between the EX Development board and your PC. If you are using a different serial interface, the procedure is basically the same. Sample scripts are provided to download sample programs.

2.1.9 Target Connection for JTAG

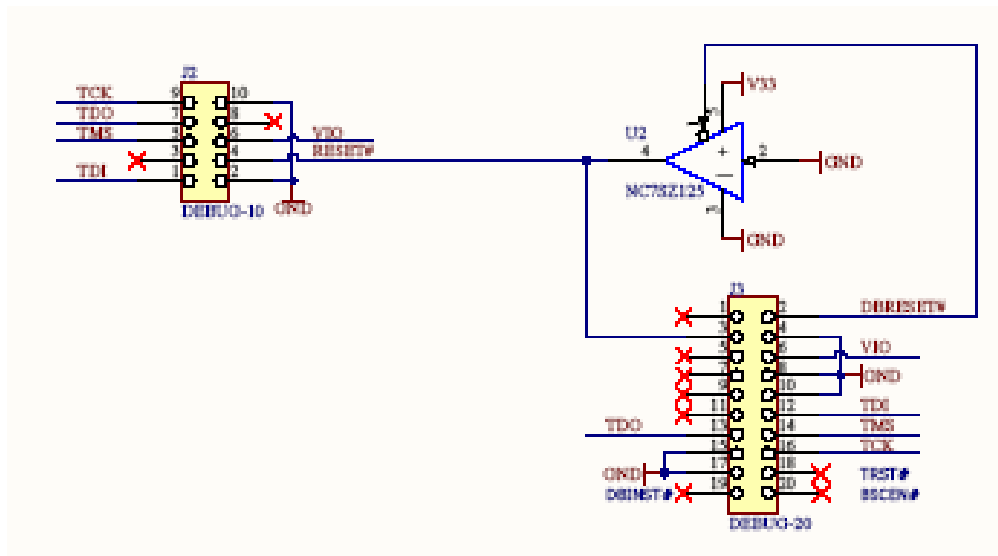
The current First Silicon Solutions Debugger uses a 20-pin header. The new System Navigator from First Silicon Solutions will use a 10-position flat ribbon cable with standard 0.100" square post headers. The EX DIMM Module is designed to work with the new System Navigator and the 0.100" header. To accommodate owners of older model debuggers, the ADP-01 adapter is used. The adapter allows you to connect an older model FS2 debugger with a 20-pin header to the EX DIMM module 10-pin header.

Install the ADP Module on the EX DIMM module as shown in the following picture.



Connect the 9VDC power supply included with the module.

Note: the pin numbers on the DEBUG header in the following drawing are shown for the FEMALE connector on the adapter board.



The pinout of the target connector is described in the following table.

Pin	Signal	I/O	Active	Comments
1	TCK	O	H	JTAG test clock
2,10	GND			Signal reference. Both pins must be connected.
3	TDO	I	H	JTAG test data output
4	NC			Probe does not connect to this pin.
5	TMS	O	H	JTAG test mode select
6	VIO	I	--	Used by probe to configure output driver level and determine target power-on state.
7	NC			No connection
8	RESET	I/O	H/L	Bidirectional reset. Asserted from probe to force target reset and asserted by target to indicate an OCI reset.
9	TDI	O	H	JTAG test data input

3. Getting Started

3.1 COM 7.2

COM 7.2 is a serial communication (terminal emulator) program from TGL Micro, which allows you to transfer files between intelligent devices using many different protocols. **The program is included with the software CD.** Additional support or information can be obtained from:

TGL Microsystems
PO Box 422
Morristown MN 55052
E-Mail: support@tglmicro.com
WEB: www.tglmicro.com
Phone: 612-810-5803/507-685-4678
FAX: 507-685-2111

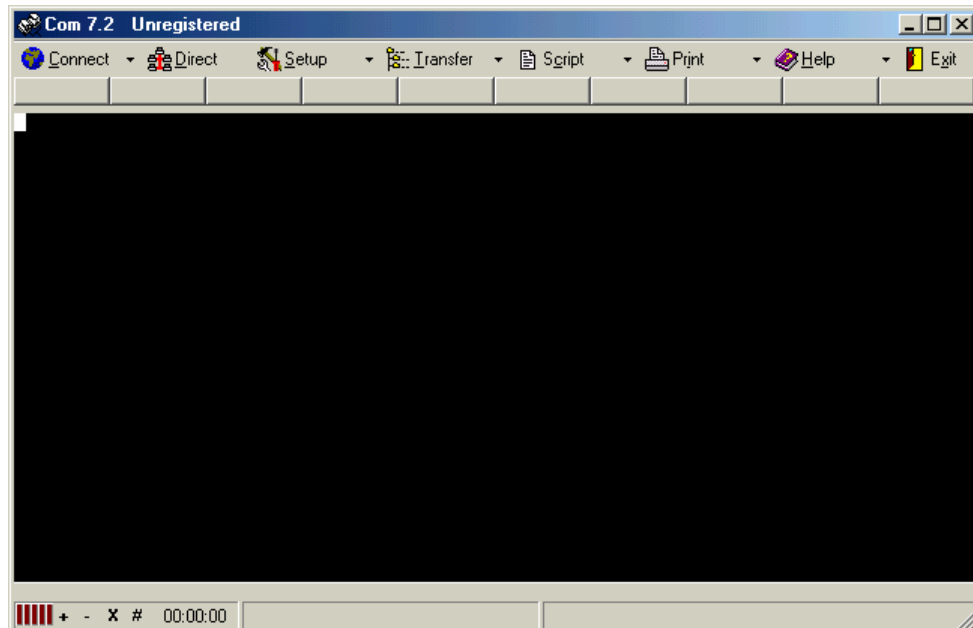
3.1.1 Communication Software Installation

Load the software CD and use the *Browse the CD* button to locate the `\toolkit\Installs\COM` folder. Double-click `com-72.exe` to install the software. The CD contains several binary download and script files that can be used with COM 7.2.

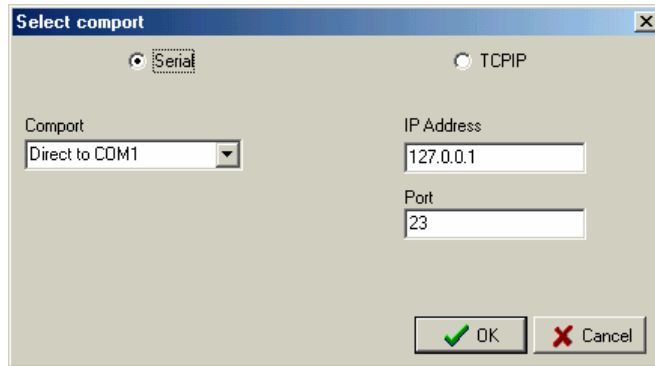
3.1.2 Running COM 7.2

To establish a communication link with the board, follow these steps.

Connect a COMM port on your host computer to serial port 0 (COM0) on the development board. Start COM 7.2. The main menu will appear.



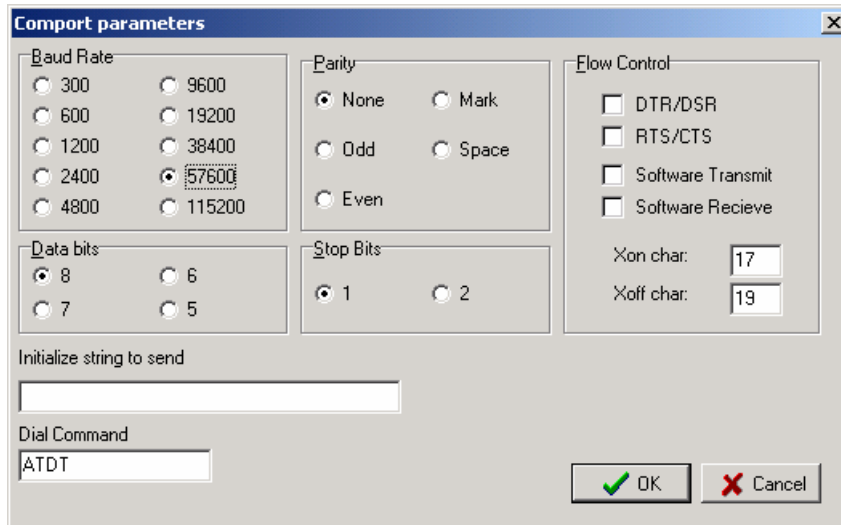
Click the **Direct** button to display the *Select comport* dialog box.



Click the Serial checkbox and select an unused COM port (on your PC) from the drop-down list. Click OK to display the *Comport parameters* dialog box.

NOTE

Scripts are written to use **COM1** on your PC. If you use a different COM port, you will have to edit the script files. Click the Script button to display the Execute Script dialog box. Click the Edit script button and look for **all** INITPORT instructions. Change the COM setting, save and exit. Click Ok to run the script.



Note: The EX Module uses 57600 and the LX Module uses 19200.

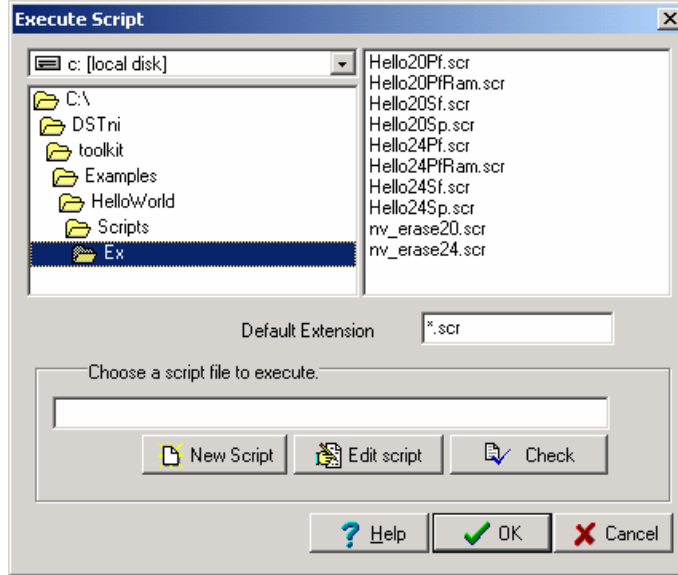
Make sure you select **57600 Baud Rate for the EX Module or 19200 for the LX Module** and turn off the RTS/CTS option. You should also remove the Initialize string. Click OK to return to the main menu.

A message will appear indicating you are connected to the selected COM port.

3.2 EX Dimm Module Tests

This section will guide you through testing the EX DIMM CPU module connected to the Development Board.

Click the **Script** button to display the *Execute Script* dialog box.



Locate the script directory at **C:\DSTni\toolkit\Examples\HelloWorld\Scripts\Ex**. Remember to use the Edit script button if you have a COM port setting other than COM1.

NOTE

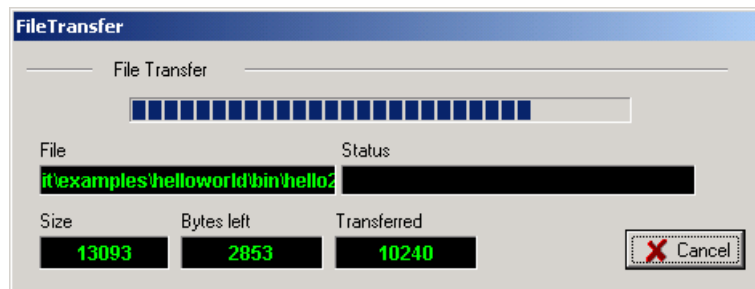
The following tests assume the EX or LX module is jumpered for 24-bit mode.

3.2.1 RAM Test

The first test is to download the **Hello World** binary file to RAM. When the download is done, the program in RAM will send “Hello World” messages to Port 0. The program in RAM is then cleared by resetting the board.

If the “Polling...” message appears, cycle the power to the module.

Select **Hello24Sp.scr** and click Ok. This script will download the file **hello24Ram.sdb** to RAM. The following message appears.



When the download is done, you should see the Hello World program sending messages to Port 0.

Press reset on the development board and the messages will stop.

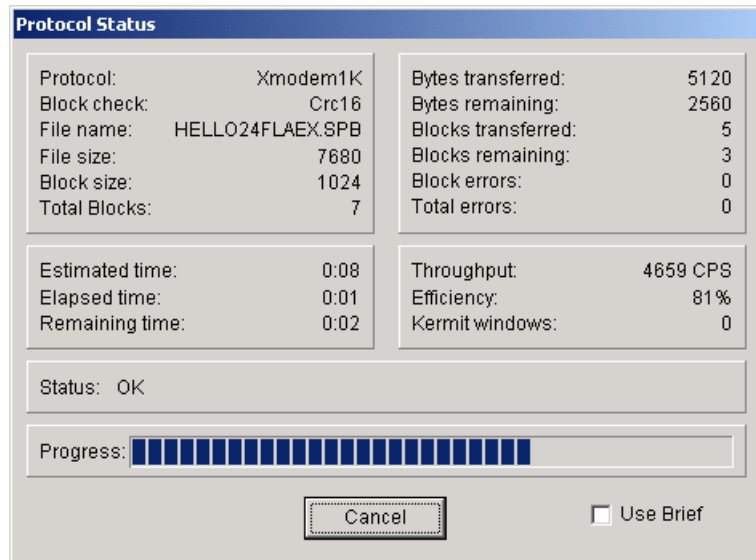
Note: Use the down arrow next to the Connect button to select Hangup, which will disconnect the comm port. Use the Direct button to select the comm port and set the baud rate to 57600.

3.2.2 Flash Test

The next test will download the Hello World binary to Flash. When the module is reset, the program is read from Flash and executed. Each time the reset is pressed, the program is read from Flash again. The program stays in Flash until it is erased. Note the frequency of the messages is much slower than the RAM version.

Click the Script button to display the Execute Script dialog box.

Select **Hello24Pf.scr** and click Ok. This script will erase all sectors and download the file **hello24flaEx.spb** to parallel flash. The following dialog appears during the file download.



When the download is done, a message will tell you to reset the module to see the messages. Reset the module and you will see the Hello World program sending messages to Port 0. Every time you press the reset button, the program executed in Flash. The program stays in Flash until it is erased.

3.2.3 Erase Flash

To erase the Flash, use the script supplied with the Hello World example.

Click the Script button and select **nv_erase24.scr**. Click Ok to start the script. Reset the board and the program to erase parallel flash is loaded. When done, reset the board. The flash is erased and no programs are running. Exit COM 7.2.

NOTE

If the program fails to download and execute, it may be that there is a program running in FLASH that overrides the control of port 0. To overcome this problem, erase the parallel flash, then try the demo download again. Use the utility scripts located in `\DSTni\toolkit\scripts\Ex`. The scripts for the erase programs are:

<code>ldr20_pferase.scr</code>	Erase Parallel Flash, 20-bit mode
<code>ldr24_pferase.scr</code>	Erase Parallel Flash, 24-bit mode

3.2.4 Sample Scripts

Several sample scripts are included with the DSTni-EX CD. Once you install the toolkit software, the sample files are located at C:\DSTni\toolkit\scripts and a folder for EX or LX. The scripts can be modified for use in your own application. Here is a brief description of each script.

ldr20_pferase.scr	Use dstloadr.sdb to erase parallel flash (20-bit mode)
ldr24_pferase.scr	Use dstloadrx.sdb to erase parallel flash (24-bit mode)
ldr20_sferase.scr	Use dstloadr.sdb to erase serial flash (20-bit mode)
ldr24_sferase.scr	Use dstloadrx.sdb to erase serial flash (24-bit mode)
ldr24_dump.scr	Dumps a small block of memory to the terminal.
ldr24_vers.scr	Displays the version of DstLoadr.
s2test20.scr	Use to download a binary image file to serial flash (20-bit mode)
s2test24.scr	Use to download a binary image file to serial flash (24-bit mode)

4. Circuit Details

This section describes some of the circuits on the EX DIMM Module.

5. Technical Support

If you are experiencing a problem that is not described in this manual, please contact Grid Connect at (630) 245-1445.

Our phone lines are open from 8:00AM - 4:30 PM Central Time Monday through Friday excluding holidays.