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Cyclone MAX User Manual



CYCLONEMAXUM



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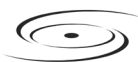
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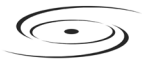
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CYCLONE MAX



1 INTRODUCTION

The Cyclone MAX is a versatile tool that can be used for the programming, debugging, and testing of microprocessor-based hardware. It can be controlled interactively via a Host PC, or operate independently of the PC in stand-alone mode. The Cyclone MAX can also be configured and operated via Serial, USB, and Ethernet communication interfaces. When in stand-alone mode, its programming functions can be initiated directly through user input buttons, or by using those same buttons to make selections from the LCD menu.

The Cyclone MAX is able to debug and program a variety of processor architectures using the target hardware's Background Debug Mode (BDM) or JTAG ports.

• **Supported Architectures**

- Power Architecture BDM (MPC5xx/8xx)
- Qorivva (MPC55xx/56xx)
- ColdFire V2/3/4 (MCF52xx/53xx/54xx)
- Kinetis ARM
- ARM Nexus (MAC7xxx Automotive Family)

In addition to the versatility of being able to debug and program the aforementioned processor families, and the ability to function in stand-alone mode, the Cyclone MAX includes these other features:

• **Multiple Communications Interfaces**

- Ethernet 10/100 baseT
- USB 1.1
- Serial Baud 115200, no parity, 8 data bits, 1 stop bit.

• **Onboard and CompactFlash Storage**

- Onboard storage of 7 Megabytes. Stores the image to be



programmed, programming algorithm, and any configuration settings.

- CompactFlash storage available with purchase of CompactFlash activation license.
- Multiple images may be saved using the onboard or CompactFlash (when activated) storage.

- **Multi-Voltage Operation**

- Automatically detects and caters to target voltages ranging from 1.8 to 5 Volts.

- **LCD Menu**

- Allows simple, menu-based control of the configuration and function of the Cyclone MAX.

In short, the Cyclone MAX is an all-in-one solution for debugging, programming, and testing of your hardware.



2 GETTING STARTED

Stand-alone programming is the most common use of the Cyclone MAX, therefore this section provides a simple quick-start guide to 1) configuring the Cyclone MAX with data, and 2) using it in stand-alone mode to program the flash of a target system. The user is encouraged to read this manual in its entirety for a complete description of the full feature set of the Cyclone MAX.

2.1 Software Installation

The first step is to install the accompanying software. This will install all of the applications and drivers that will be used to configure/control the Cyclone MAX. Once the installation is complete and the PC has been rebooted you may begin to configure the unit for operation.

2.2 Image Creation Utility

If you plan to use the Serial or USB ports for communication, then the Cyclone MAX can be used right out of the box. If you wish to use the Ethernet port, however, you will need to configure the corresponding IP numbers before use. The Ethernet port will not be functional until this configuration is complete. Please read **Section 8 - ETHERNET PORT CONFIGURATION** for more information about the Cyclone IP Setup Utility.

Once you have connected the Cyclone MAX to the PC via either a Serial, USB, or Ethernet cable, you can launch the Cyclone MAX Image Creation Utility in order to create a SAP image. A "SAP" Image, or Stand-Alone Programming Image, is a self-contained image of programming algorithms, programming procedures, and program data. Once the SAP Image has been created, it can be transferred to the Cyclone MAX or saved to disk for later use. The Cyclone MAX uses SAP Images to perform stand-alone programming of target devices



Figure 2-1: Cyclone Image Creation Utility

- (1) Provides a list of available functions that the user may select and add to the programming sequence.
- (2) This window is where the programming steps are sequenced.
- (3) This button moves selected programming functions into the sequence window.
- (4) Displays the processor architecture and the corresponding interface port on the Cyclone MAX.



- (5) Displays the pinout configuration for the selected architecture.
- (6) Allows the user to set the BDM Shift Frequency by selecting from the drop-down box.
- (7) Allows the user to set the Reset Delay.
- (8) The “Store Image To Cyclone” button allows the user to store the current image on the Cyclone MAX.
- (9) The “Store Image To Disk” button allows the user to store the current image on their hard drive. The Manage Image Utility can be used to configure the Cyclone with one or more images.

At this stage you are simply configuring the Cyclone with the appropriate data file and programming procedure. Actual programming of the target hardware occurs later.

Once the information required in Areas 1-4 is complete, you may configure the Cyclone MAX by clicking the “Store Image to Cyclone” button.

After the image has been saved, you can program a target by simply pressing the “Start” button on the Cyclone MAX. This will begin the sequence that was specified in **Area 3** (in this example: erase, blank check, program, verify programmed data).

The complete functionality of the Cyclone MAX and its accompanying utilities is beyond the scope of this **Getting Started** section. Please read further to learn more about the full feature set and operation of the Cyclone MAX. For a detailed description of the Cyclone MAX Configuration Utility, please refer to **Section 4 - STAND-ALONE PROGRAMMER CONFIGURATION**.

Another option is to save the SAP Image to disk. This allows you to transfer the image to several different Cyclones, or conversely to transfer several images to one Cyclone. The utility that allows you to transfer multiple images to the Cyclone MAX (or its accompanying CompactFlash card) is called the Manage Images Utility.

2.3 Manage Images Utility

Once the programming images have been created and saved to the disk using the Create Image utility, they may then be loaded collectively onto the Cyclone. The Manage Images utility, shown in **Figure 2-2**, allows the Cyclone to store and manage multiple images in the Cyclone’s internal memory. If you have purchased a CompactFlash activation license it will also allow you to store and manage multiple images on any compatible CompactFlash cards



that are loaded into the Cyclone's CompactFlash port.

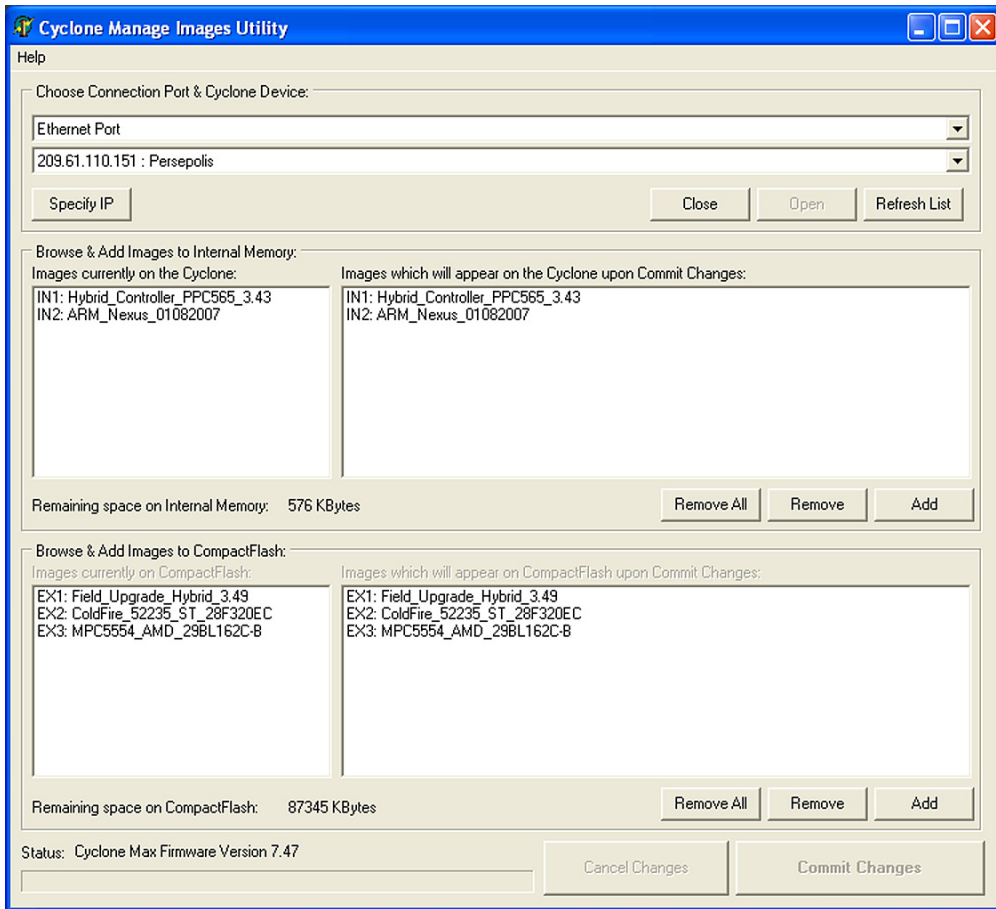


Figure 2-2: Manage Images Utility

Upon opening a selected Cyclone MAX, the user is provided in the top left panel with a list of the images currently on the unit's internal memory. If the CompactFlash license has been activated, a list of images on any connected CompactFlash card will also be displayed in the bottom left panel. The panels to the right can be used to add or delete additional images by using the Add and Remove buttons beneath each panel.



CYCLONE MAX



Once the images that you wish to load appear in the panels to the right, you must press “Commit Changes” to load the Cyclone accordingly. No changes made to the Cyclone MAX until the “Commit Changes” button is pressed.

Note: Any images that are already stored on the Cyclone MAX or CompactFlash can only be removed by using the “Remove All” button.



3 CYCLONE MAX HARDWARE

This section describes the various ports and inputs of the Cyclone MAX.

3.1 Power Source

The Cyclone MAX requires a regulated 6V DC Center Positive power supply with 2.5/5.5mm female plug. The Cyclone MAX receives its power from the power jack located on the side of the unit.



Figure 3-1: Power Jack

3.2 Serial (RS232) Communications Port

The Cyclone MAX provides a DB9 Female connector for communication with a host computer through the Serial (RS232) Port. Communication takes place at a fixed baud rate of 115200 Baud, 8 Data bits, No Parity, and 1 Stop Bit.

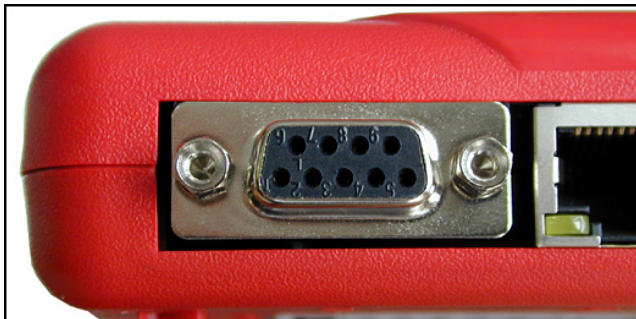


Figure 3-2: Serial Port

3.3 USB 1.1 Communications Port

The Cyclone MAX provides a USB connector for communicating with a PC via the Universal Serial Bus port. The Cyclone MAX is a USB 1.1 compliant device.

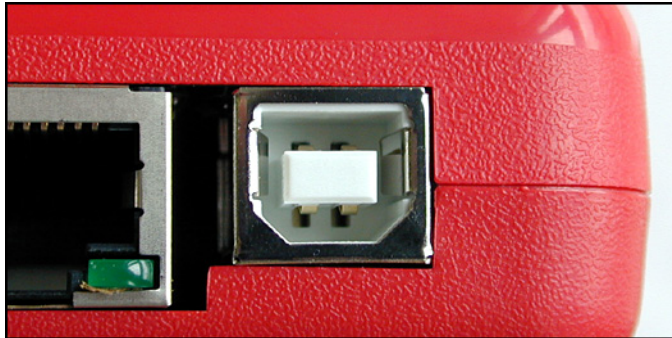


Figure 3-3: USB Port

3.4 Ethernet Communications Port

The Cyclone MAX provides a standard RJ45 socket for communication with a host computer through the Ethernet Port. The Ethernet Port of the Cyclone MAX is a 10/100 baseT port.

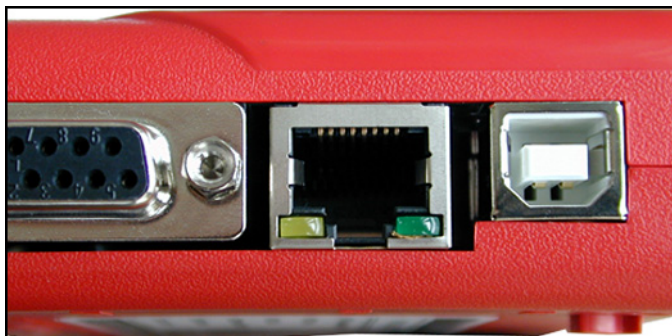


Figure 3-4: Ethernet Port



3.5 PORT A – Reserved

Port A is reserved for future use.

3.6 PORT B – Qorivva (MPC55xx/56xx) Interface

Port B can be used to connect to Qorivva (MPC55xx/56xx) targets. For the physical dimensions of the connector, please see **Section 3.14 - Ribbon Cable with IDC Socket**.

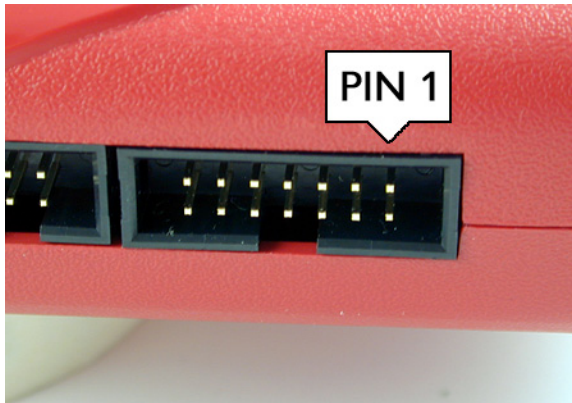


Figure 3-5: Port B - Qorivva Interface

Qorivva Pinout

TDI	1	2	GND
TDO	3	4	GND
TCK	5	6	GND
NC	7	8	NC
RESET	9	10	TMS
VDDE7	11	12	GND
RDY	13	14	JCOMP

3.6.1 BERG14-to-MICTOR38 Optional Connector (PORT B)

P&E offers a 14-pin BERG to 38-pin MICTOR adapter, sold separately, that may be used on Port B of the Cyclone MAX. The P&E part number is



BERG14-TO-MICTOR38.

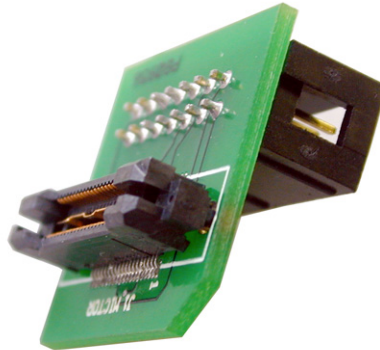


Figure 3-6: BERG14-TO-MICTOR38 Adapter (Sold Separately)

3.7 PORT C – ColdFire Interface & ColdFire Extension Cable

Port C is the interface for the ColdFire MCF52xx/53xx/54xx family of microprocessors. This port connects to the target hardware using either the ColdFire extension cable (for synchronous ColdFire targets) or a standard 26-pin ribbon cable (for asynchronous ColdFire targets). Both cables are provided in the Cyclone MAX package. Please refer to each processor's user manual to identify whether it is a synchronous or asynchronous interface. If you are not sure, or for test purposes, the synchronous cable will work with all 52xx, 53xx, and 54xx targets. For the physical dimensions of the connector, please see **Section 3.14 - Ribbon Cable with IDC Socket**.

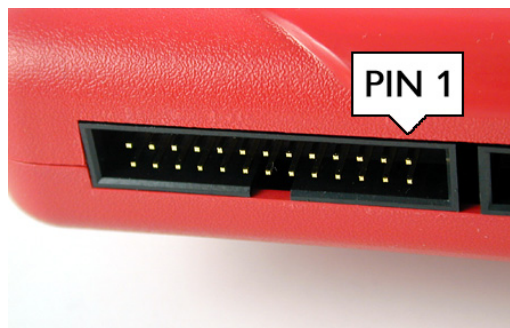


Figure 3-7: Port C - ColdFire Interface



ColdFire Pinout

N/C	1	2	BKPT
GND	3	4	DSCLK
GND	5	6	N/C
RESET	7	8	DSI
VCC	9	10	DSO
GND	11	12	PST3
PST2	13	14	PST1
PST0	15	16	DDATA3
DDATA2	17	18	DDATA1
DDATA0	19	20	GND
N/C	21	22	N/C
GND	23	24	CLK
VCC	25	26	TEA

The ColdFire extension cables, one for Synchronous targets and one for Asynchronous targets, are pictured below:

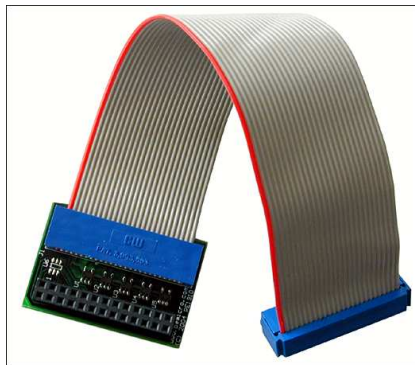


Figure 3-8: ColdFire Extension Cable With Adapter (Synchronous ColdFire Targets)



Figure 3-9: ColdFire Ribbon Cable (Asynchronous ColdFire Targets)

3.8 PORT D – Power Architecture BDM Interface

Port D can be used to connect to Power Architecture BDM (MPC5xx/8xx) targets. For the physical dimensions of the connector, please see **Section 3.14 - Ribbon Cable with IDC Socket**.

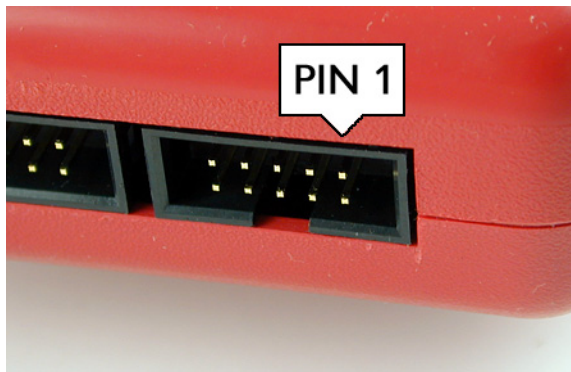


Figure 3-10: Port D - Power Architecture BDM Interface



Power Architecture BDM Pinout

N/C	1	2	SRESET#
GND	3	4	DSCLK
GND	5	6	N/C
HRESET#	7	8	DSDI
VDD	9	10	DSDO

3.9 PORT E – Kinetis & ARM Nexus

Port E can be used to connect to Kinetis and ARM Nexus (MAC7xxx) targets. For the physical dimensions of the connector, please see **Section 3.14 - Ribbon Cable with IDC Socket**. The Cyclone MAX also includes an adapter for users whose Kinetis target header is Mini-10 or Mini-20. A Mini-20 ribbon cable comes with the adapter.

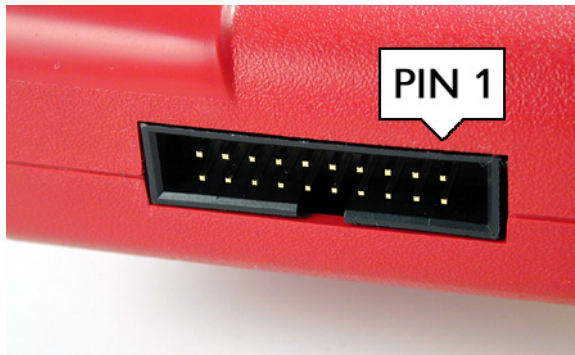


Figure 3-11: Port E- ARM Nexus

ARM Nexus Pinout

TVCC	1	2	N/C
TRST#	3	4	GND
TDI	5	6	GND
TMS	7	8	GND
TCK	9	10	GND
N/C	11	12	GND
TDO	13	14	GND
RESET#	15	16	GND
N/C	17	18	GND
N/C	19	20	GND

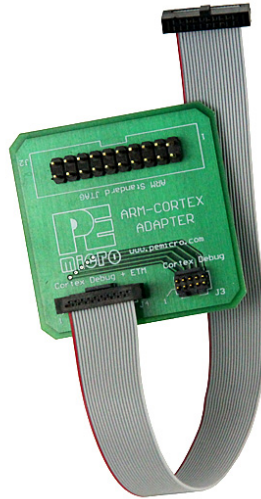


Figure 3-12: Kinetis Mini-10 and Mini-20 Adapter

PORT F - MINI 20		PORT G - MINI 10	
Kinetis		Kinetis	
TVCC 1	▪ ▪ 2 NC	TVCC 1	▪ ▪ 2 NC
GND 3	▪ ▪ 4 TCK	GND 3	▪ ▪ 4 TCK
GND 5	▪ ▪ 6 TDO	GND 5	▪ ▪ 6 TDO
NC 7	▪ ▪ 8 TDI	NC 7	▪ ▪ 8 TDI
GND 9	▪ ▪ 10 <u>RESET</u>	GND 9	▪ ▪ 10 <u>RESET</u>
NC 11	▪ ▪ 12 NC		
NC 13	▪ ▪ 14 NC		
GND 15	▪ ▪ 16 NC		
GND 17	▪ ▪ 18 NC		
GND 19	▪ ▪ 20 NC		

Figure 3-13: Kinetis Mini-10 and Mini-20 Pinouts



3.10 PORT F – Reserved

Port F is reserved for future use by P&E. Do not connect to this port.

3.11 CompactFlash Port

The CompactFlash port can be activated by purchasing a CompactFlash Activation License from P&E. The CompactFlash port accepts Type I CompactFlash cards. This allows the user to store programming images that are, individually or collectively, larger than the Cyclone's internal memory (7MB). It also makes swapping programming images much more quick and convenient. A 128MB CompactFlash card (shown below) is included with activation.





Figure 3-14: CompactFlash Port

Purchase of the CompactFlash activation license unlocks the CompactFlash panels in the included Manage Images utility. Programming images may then be managed on the CompactFlash in exactly the same way as they are in the Cyclone's internal memory. Please see **Section 2.3 - Manage Images Utility** for more information about using Manage Images.

3.12 Cyclone MAX Buttons

There are five (5) buttons on the top of the Cyclone MAX which are used for stand-alone programming and to navigate the LCD menus. They are specified as follows:



<u>Button</u>	<u>Function</u>
START / 	Start executing the tasks pre-configured into the Cyclone MAX. Menu Mode: Navigate upwards in LCD menu.
AUX / 	Perform auxiliary function (stand-alone verification). Menu Mode: Navigate downwards in LCD menu.
MENU / [SELECT]	Displays LCD Menu (enters Menu Mode). Menu Mode: Select highlighted item in LCD menu.
CANCEL	Cancel the tasks being executed and go back to the standby state.
RESET	Hardware reset of the Cyclone MAX.

3.13 LEDs

Eight LEDs are used to provide programming and Cyclone MAX status:

1. Power – Indicates power has been supplied to Cyclone MAX
2. Ready – The Cyclone MAX is ready to perform programming functions
3. Image – Indicates the presence of one or more images on board.
4. Erase – Erasing of target flash is in progress
5. Program – Programming of target flash is in progress
6. Verify – Verifying of target flash is in progress
7. Error – An error occurred during programming
8. Success – Programming functions completed successfully

3.14 Ribbon Cable with IDC Socket

The Cyclone MAX provides several standard 0.100-inch pitch dual row 0.025-inch square headers (Ports A-F, as described earlier in **Section 3 - CYCLONE MAX HARDWARE**). A typical layout for one such header is shown below. Using these headers, the Cyclone MAX can communicate with the target through a number of different-sized ribbon cables. Each of the ribbon cables have a 0.100-inch centerline dual row socket IDC assembly (not keyed). The ribbon cables are designed such that the Cyclone MAX Ports and



target BDM Ports must have the same pinout, i.e., Pin 1 of a Cyclone MAX Port is connected to Pin 1 of the target BDM header. Here is an example header:

0.100" Dual Row, 0.025" Square Header

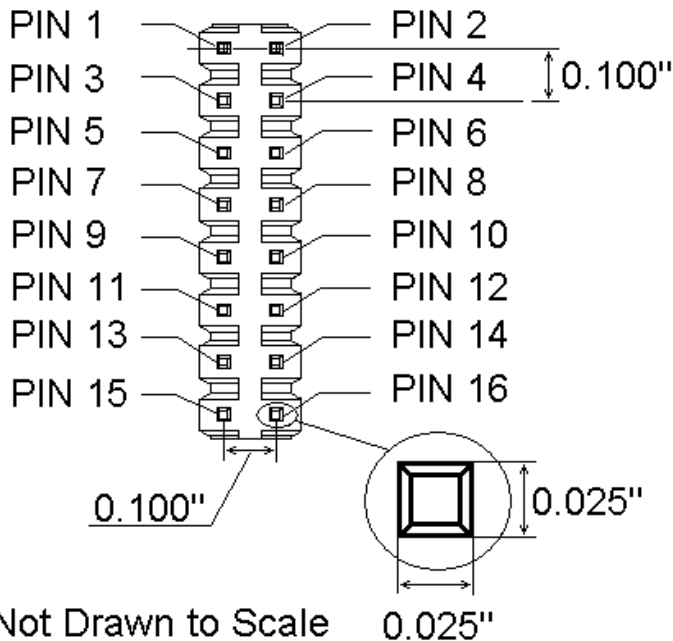


Figure 3-15: Example 16-Pin Header Diagram

The following notes relate to the pinout labels on Cyclone MAX Ports:

- N/C signifies a No Connect. This pertains to pins that are reserved for future use by Freescale or P&E Microcomputer Systems, and should not be connected.
- A signal name ending in # (e.g. RESET#) signifies an active-low signal.



4 STAND-ALONE PROGRAMMER CONFIGURATION

The Cyclone MAX may act as a stand-alone in-circuit programmer for Power Architecture BDM (MPC5xx/8xx), Qorivva (MPC55xx/56xx), ColdFire (MCF52xx/53xx/54xx), and ARM (MAC7xxx) targets. A simple user interface, the Cyclone Image Creation Utility, is provided for configuring the Cyclone MAX.

4.1 Cyclone MAX Image Creation Utility

The Cyclone MAX does not require a target to be connected when it is being configured. However, the Cyclone MAX must be powered on (indicated by the “Ready” LED), and either the PC Serial port, USB port, or Ethernet port must be connected to the Cyclone MAX. **Figure 4-1** shows the configuration dialog with an example configuration. The configuration details are explained below.