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# CYCLONE Programmers

## User Manual





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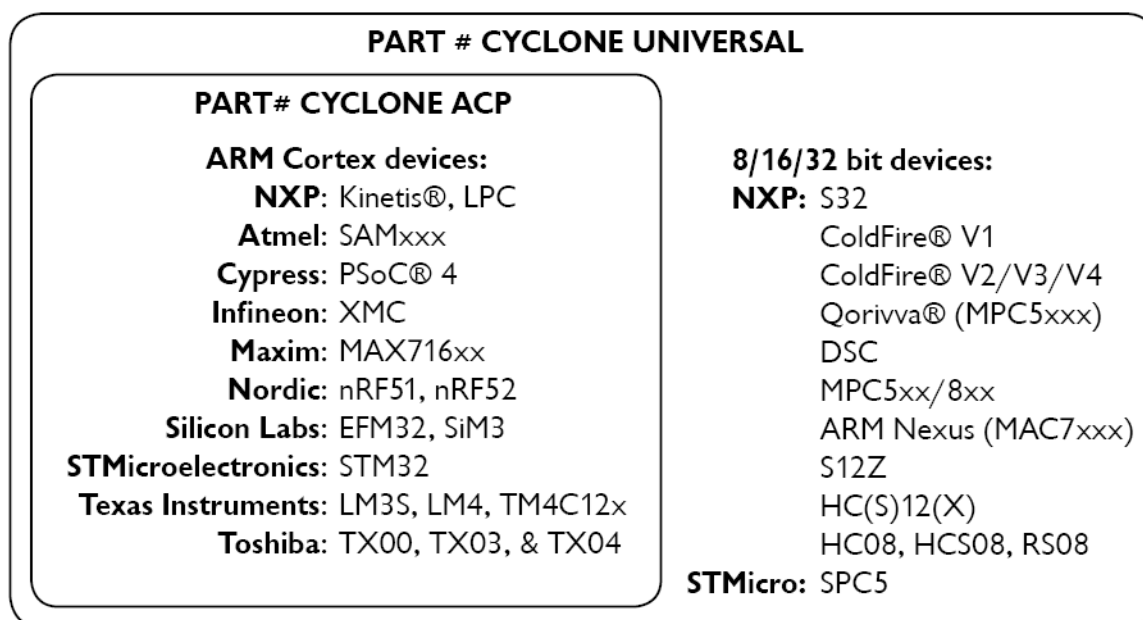
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# 1 INTRODUCTION

PEmicro's **CYCLONE** production programmers are powerful, fast, and feature rich in-circuit programming solutions. PEmicro offers two models which have the same feature set and only vary by the devices supported.

The CYCLONE\_ACP supports a wide variety of ARM Cortex devices.

The CYCLONE\_UNIVERSAL supports those ARM Cortex devices as well as the following NXP device families: Kinetis, LPC, S32, Qorivva (MPC5xxx), MPC5xx/8xx, DSC, S12Z, RS08, S08, HC08, HC(S)12(X), and Coldfire.



**Figure 1-1: CYCLONE Supported Architectures**

**CYCLONE** programmers are designed to withstand the demands of a production environment. They are Stand-Alone Programmers (SAP) that can be operated manually or used to host automated programming. In manual SAP mode the Cyclone is operated using the touchscreen LCD Menu and/or the Start button. Host-controlled SAP mode, for automated programming, is accomplished using either a command line utility, RS232 protocol, UDP protocol, or the Cyclone Automated Control DLL.

P&E also offers **CYCLONE FX** programmers which include enhanced speed, storage, security, and other features that make them an incredibly powerful and versatile solution. For more information, visit [pemicro.com/cyclone](http://pemicro.com/cyclone).

## 1.1 Feature Overview/Comparison

See **CHAPTER 17 - CYCLONE FEATURE OVERVIEW / COMPARISON** for a **CYCLONE** feature overview and comparison with the **CYCLONE** programmers.

## QUICK START GUIDE FOR SAP OPERATION

Stand-Alone Programming (SAP) is the most common use of the **CYCLONE**. This quick-start guide illustrates how easy it is to begin using the Cyclone for stand-alone programming.

You are encouraged to read this manual in its entirety for a complete description of all features specific to your Cyclone, many of which are beyond the scope of this quick-start guide.

### Step 1. Install Software

The first step is to install the accompanying software. This will install all of the applications and drivers that can be used to configure/control the **CYCLONE**.

Once the installation is complete and the PC has been rebooted you may begin to configure the Cyclone for SAP operation.

### Step 2. Hardware Setup

- a. Configure the target power management scheme

Power management is configured by setting jumpers that are revealed by opening the access panel on the Cyclone's left side. The corresponding settings are conveniently illustrated on the rear label of Cyclone. No jumpers are installed by default. You may wish to refer to **Section 3.22 - Target Power Management**.

- b. Connect the Cyclone to your PC

Select the appropriate communications interface (Serial, USB or Ethernet) and connect the Cyclone to your PC. If you wish to use the Ethernet port you will need to configure the corresponding network settings before use, either through the touchscreen LCD menu or via the software utility *ConfigureIP*. The Ethernet port will not function properly until this configuration is complete. You may wish to refer to **CHAPTER 9 - ETHERNET CONFIGURATION**.

- c. Power up the Cyclone.

### Step 3. Create a SAP Image

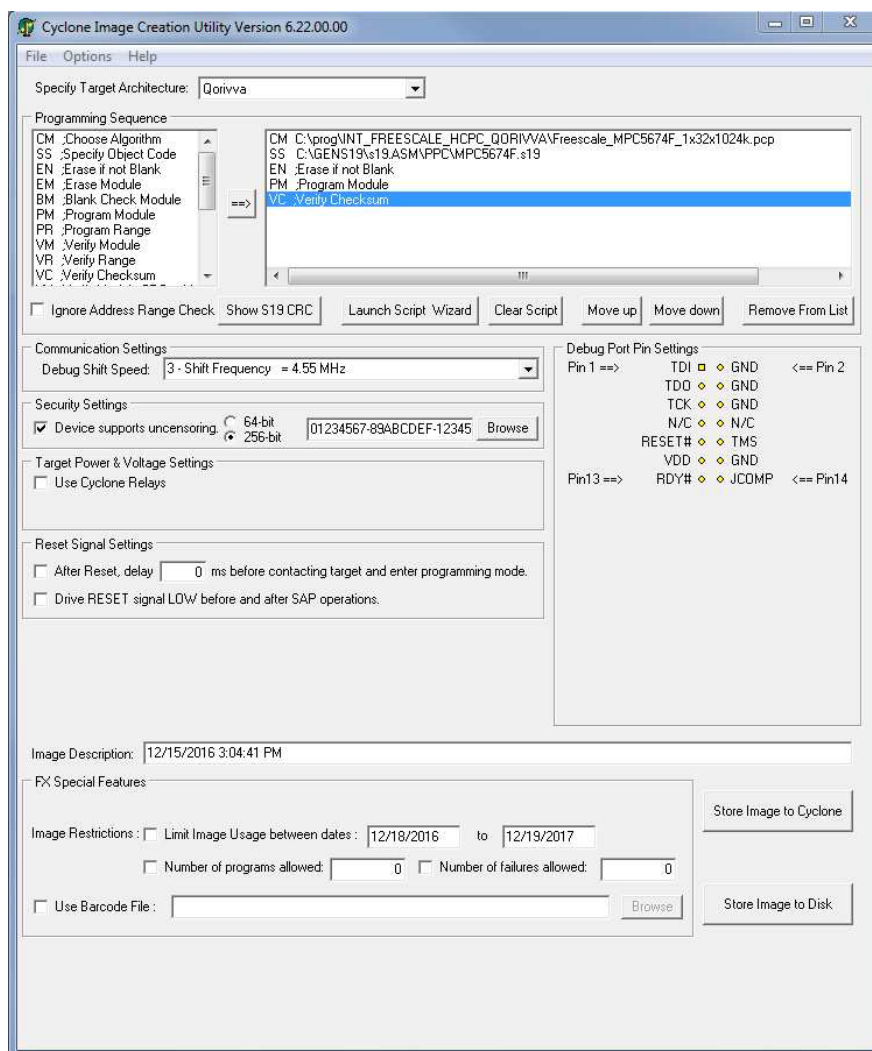
A SAP image, or Stand-Alone Programming image, is a self-sufficient data object containing the Cyclone and target hardware setup information, programming algorithm, programming sequence, and target data. The Cyclone uses these images to perform SAP operations on target devices. Follow these steps to create a SAP image:

- a. Run the *Cyclone Image Creation Utility*

This utility is a GUI designed to help users create architecture/maker-specific SAP images. To run this utility:

From the "Start" menu of your PC, navigate to "All Programs -> PEMicro. From there, select "P&E Cyclone Universal Programmer" or "P&E Cyclone for ARM devices" depending on which specific PEMicro part# you are using, then select -> *P&E Cyclone Universal (or P&E Cyclone for ARM devices) Image Creation Utility*. The utility is shown in **Figure 2-1**. Continue with the steps below to create an image.





**Figure 2-1: Cyclone Image Creation Utility (Qorivva Selected)**

- b. In the Cyclone Image Creation Utility, select your CPU manufacturer and architecture from their respective drop-down lists.
- c. Click the “Launch Script Wizard” button. Follow the pop-up screens to specify a programming algorithm and target object file. The programming algorithm, target object file, and default programming sequence will then show up in the programming sequence listbox.
- d. Specify the auxiliary setup and hardware setup, such as Communication Mode, Communication Rate, Target Power, and Voltage Settings.
- e. Type an Image Description for your SAP image. The default description is a time stamp.
- f. Click the “Store Image to Cyclone” button.
- g. Choose the communication interface, select the Cyclone to which the image will be saved, and then click the “Store Image to Cyclone” button. A backend image configuration utility will pop up and store the image information on the Cyclone. Your SAP image has now been created.

#### **Step 4. Execute SAP Image**

The SAP image stored on your Cyclone can now be programmed to the target with one button press. Once your target is connected to the Cyclone, press the “Start” button of the Cyclone unit and wait for programming operations to finish. During this process, the LCD screen will show the status of operations. Note that the menu option described in **Section 5.2.3.5.3 - Set Progress**

**Details** will allow you to set the Cyclone to display either more or less detailed information about the programming process during programming. Eventually the “Success” or “Error” LED will illuminate, and the LCD screen will display the results.

**Note:** If programming is unsuccessful when using this quick start setup, the user may instead wish to use the included PROG software for their device. The PROG software allows the user to manually walk through the programming procedure step by step, which may help determine which part of setup or programming function is causing difficulty.

### 3 CYCLONE HARDWARE

The following is an overview of the features and interfaces of the **CYCLONE** programmers. Many of these interfaces are labeled on the underside of the plastic case.



Figure 3-1: CYCLONE Top View

#### 3.1 Touchscreen LCD

The LCD Touchscreen displays information about the Cyclone's configuration and the programming process, and also allows the user to navigate the Cyclone's menus. The location of the Touchscreen LCD is shown in **Figure 3-1**.

#### 3.2 LED Indicators

The LED indicators for Error or Success will illuminate depending on the results of the programming process and provide a clear visual indication of the results. The location of the LED Indicators is shown in **Figure 3-1**.

#### 3.3 Start Button

The Start Button can be used to begin the programming process manually, provided that the Cyclone is properly configured. The location of the Start Button is shown in **Figure 3-1**.

#### 3.4 Access Panel

The Access Panel can easily be opened to allow the user to connect/disconnect ribbon cables from the headers, or to configure the Cyclone's Power Jumpers to select one of the available Power Management setups. The location of the Access Panel is shown in **Figure 3-1**; a layout of the headers and jumpers beneath the Access Panel is shown in **Figure 3-4**.

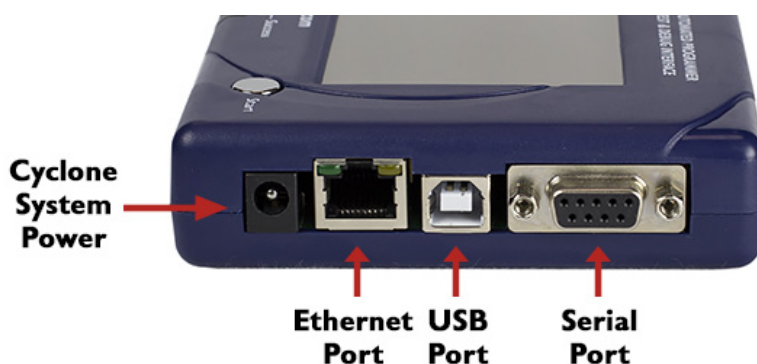


Figure 3-2: CYCLONE Right Side View

### 3.5 Cyclone System Power

The **CYCLONE** programmer requires a regulated 6V DC Center Positive power supply with 2.5/5.5mm female plug. Cyclones derive power from the Power Jack located on the right end of the unit. The location of Cyclone System Power is shown in **Figure 3-2**.

### 3.6 RS232 Communication (Serial Port)

The **CYCLONE** provides a DB9 Female connector to communicate with a host computer through the RS232 communication (115200 Baud, 8 Data bits, No parity, 1 Stop bit). The location of the Serial Port is shown in **Figure 3-2**.

### 3.7 Ethernet Communication

The **CYCLONE** provides a standard RJ45 socket to communicate with a host computer through the Ethernet Port (10/100 BaseT). The location of the Ethernet Port is shown in **Figure 3-2**.

### 3.8 USB Communications

The **CYCLONE** provides a USB connector for Universal Serial Bus communications between the Cyclone and the host computer. The **CYCLONE** is a USB 2.0 **Full-Speed** compliant device. The location of the USB Port is shown in **Figure 3-2**.

### 3.9 Electromechanical Relays

Inside the **CYCLONE** programmer, two electromechanical relays are used to cycle target power. The specifications of the relays are as following:

<b>Maximum switched power:</b>	30W or 125 VA
<b>Maximum switched current:</b>	1A
<b>Maximum switched voltage:</b>	150VDC or 300VAC
<b>UL Rating:</b>	1A at 30 VDC 1A at 125 VAC

PEmicro only recommends switching DC voltages up to 24 Volts.



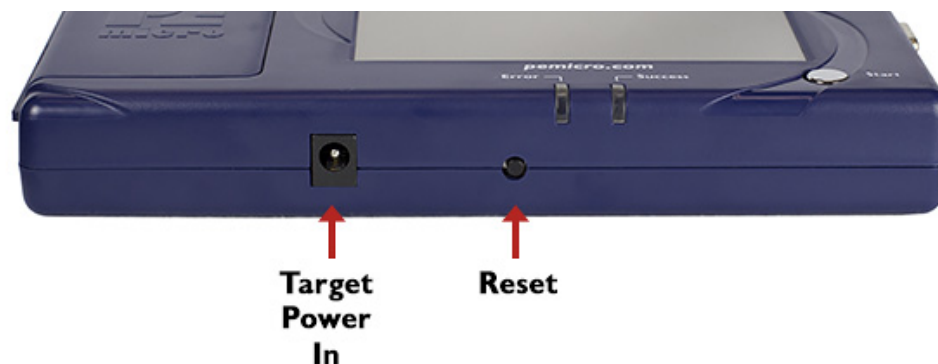


Figure 3-3: CYCLONE Front Side View

### 3.10 Power Connectors

The **CYCLONE** programmers provide a Target Power Supply Input Jack and a Target Power Supply Output Jack with 2.5/5.5 mm Pin Diameter. The power jacks are connected or disconnected by two electromechanical relays. When connected, the Center Pin of the Target Power Supply Input Jack is connected to the Center Pin of the Target Power Supply Output Jack. When disconnected, both terminals of the Target Power Supply Output Jack are connected to GND via a 1W, 100 Ohm resistor. The location of Target Power In is shown in **Figure 3-3**, and the location of Target Power Out is shown in **Figure 3-3**.

### 3.11 Reset Button

The Reset Button performs a hard reset of the Cyclone system. The location of the Reset Button is shown in **Figure 3-3**.



CYCLONE Rear Side View

### 3.12 Optional Oscillator (MON08 Only)

**CYCLONE** programmers with MON08 support (PEmicro Part# CYCLONE\_UNIVERSAL only) provide a software configurable 9.8304MHz or 4.9152 MHz oscillator clock signal to Pin 13 of the MON08 Connector. The user may use this clock signal to overdrive the target RC or crystal circuitry. If this signal is not used, just leave Pin 13 of the target MON08 header unconnected.

Please note that if the target already uses an oscillator as its clock, the Cyclone will NOT be able to overdrive it. The clock should have sufficient drive to be used with a target system even if the target system has an RC circuit or crystal connected.

**Note:**

### 3.13 Cyclone Time / Real Time Clock

**CYCLONE** programmers are equipped with a Real Time Clock (RTC) module designed to keep

accurate timing even when the Cyclone is turned off.

The Date & Time are displayed on the home screen. Date/Time settings can be configured by navigating to the following menu using the touchscreen display:

**Main Menu / Configure Cyclone Settings / Configure Time Settings**

For more information on the available configuration options, see **Section 5.2.3.3 - Configure Time Settings (Cyclone Time / Real Time Clock)**.

### 3.14 Power Jumper Settings

The Power Jumpers must be set differently for various power management options that the **CYCLONE** offers. If the target is being powered independently of the **CYCLONE**, all pins in the Power Jumpers header must instead be left unpopulated. To reveal the Power Jumpers header, lift the access panel on the left end of the **CYCLONE**. The location is indicated as Power Jumpers in **Figure 3-4**. Please see **Section 3.22 - Target Power Management** for the correct jumper settings for the Cyclone's power management options. A quick guide to these settings is also located on the underside label of the **CYCLONE**.

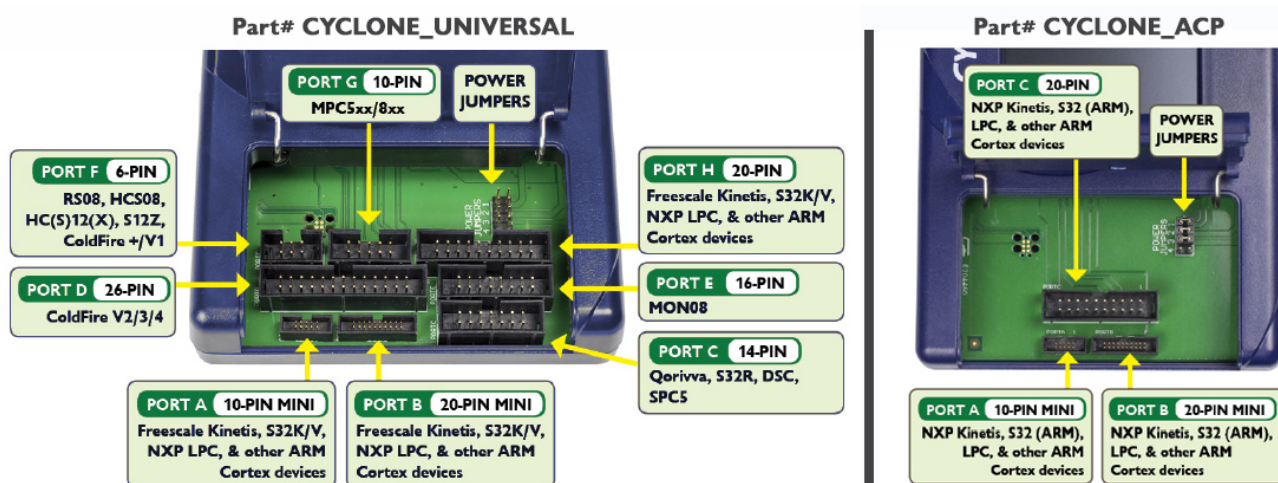
### 3.15 Debug Connectors

When purchasing a **CYCLONE** programmer, the user is able to choose between two part numbers, each corresponding to a different level of device support. See the sticker on the underside of the Cyclone to determine the PEmicro part# for your specific **CYCLONE** programmer.

**PEmicro Part# CYCLONE\_ACP** supports ARM Cortex devices only, so this programmer provides one shrouded, un-keyed, 0.100-inch pitch dual row 0.025-inch square header, and two shrouded, keyed 0.050-inch pitch dual row mini headers.

**PEmicro Part# CYCLONE\_UNIVERSAL** supports ARM Cortex devices and additionally supports target connections to many 8-/16-/32-bit NXP architectures, so this programmer provides six shrouded, un-keyed, 0.100-inch pitch dual row 0.025-inch square headers, and two shrouded, keyed 0.050-inch pitch dual row mini headers.

To reveal the headers and connect/disconnect ribbon cables, lift the access panel on the left end of the Cyclone. Each header is designated for one or more specific target architectures, as indicated in **Figure 3-4**.



**Figure 3-4: Target Headers & Power Jumpers (CYCLONE\_UNIVERSAL vs. CYCLONE\_ACP)**

Mechanical drawings are shown below whose dimensions are representative of the pin size and spacing of these headers.

**Note:** The number of pins depicted in the mechanical drawings may differ from the Cyclone headers; the drawings are provided simply to demonstrate pin size and spacing.

0.100" Dual Row, 0.025" Square Header

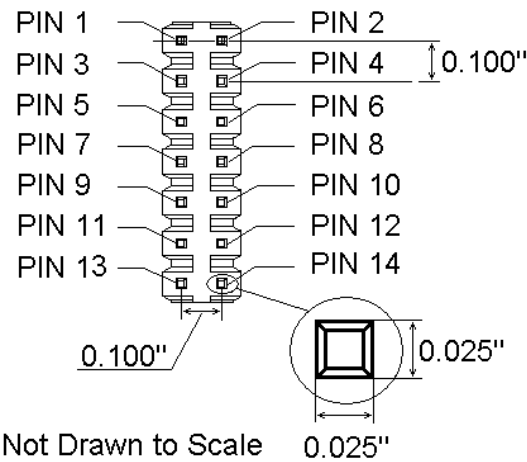


Figure 3-5: 20-Pin Un-Keyed Header Dimensions

0.050" Dual Row, 0.016" Square Header

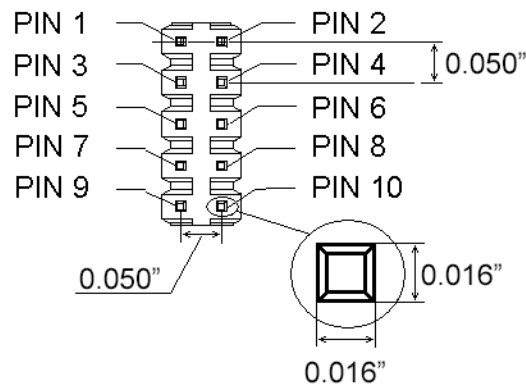


Figure 3-6: Mini 10-Pin and Mini 20-Pin Keyed Header Dimensions

### 3.16 Target Headers For Part# CYCLONE\_ACP

PEmicro Part# CYCLONE\_ACP features 3 ports labeled A-C.

#### 3.16.1 PORT A: 10-Pin Keyed Mini Connector (Kinetis, S32 (ARM), other PEmicro-Supported ARM devices)

The Cyclone provides a keyed 10-pin 0.050-inch pitch double row connector for ARM targets. The location of the this header is indicated as PORT A in **Figure 3-4**. The 10-pin keyed mini connector pin definitions for JTAG mode are as follows:

##### 10-Pin Keyed Mini Connector JTAG Mode Pin Assignments

PIN 1 - TVCC	TMS - PIN 2
PIN 3 - GND	TCK - PIN 4
PIN 5 - GND	TDO - PIN 6
PIN 7 - NC	TDI - PIN 8
PIN 9 - NC	RESET - PIN 10

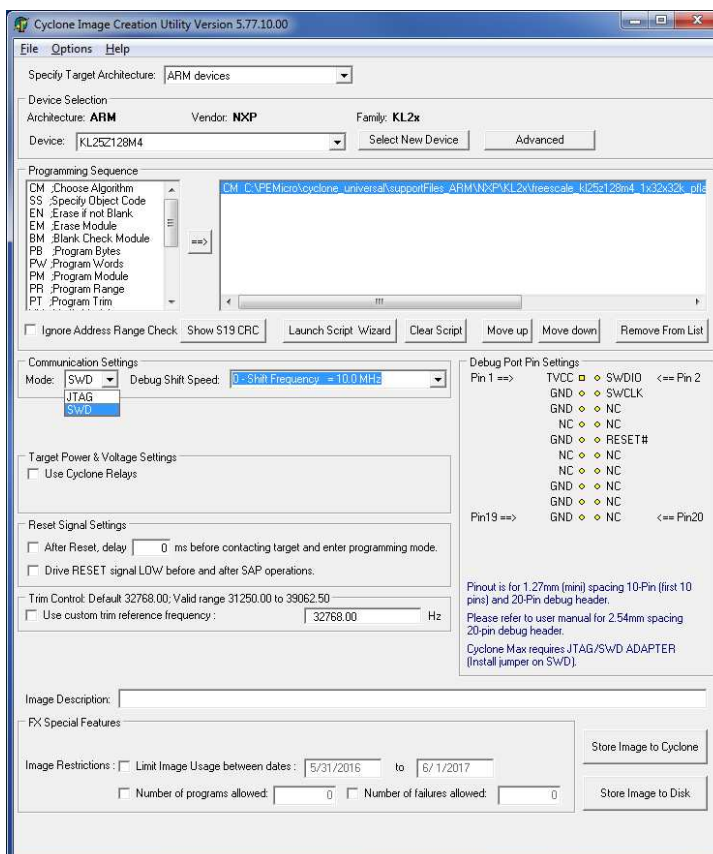
**CYCLONE** programmers also support SWD Mode. This replaces the JTAG connection with a clock and single bi-directional data pin.

##### 10-Pin Keyed Mini Connector SWD Mode Pin Assignments

PIN 1 - TVCC	TMS/SWDIO - PIN 2
--------------	-------------------

PIN 3 - <b>GND</b>	<b>TCK/SWCLK</b> - PIN 4
PIN 5 - <b>GND</b>	<b>NC</b> - PIN 6
PIN 7 - <b>NC</b>	<b>NC</b> - PIN 8
PIN 9 - <b>NC</b>	<b>RESET</b> - PIN 10

SWD Mode is selected from the “Communication Mode” drop-down box in the Cyclone Image Creation Utility:



**Figure 3-7: Communications Mode Selection**

### 3.16.2 PORT B: 20-Pin Keyed Mini Connector (Kinetis, S32 (ARM), other PEmicro-Supported ARM devices)

The Cyclone provides a keyed 20-pin 0.050-inch pitch double row connector for ARM targets. The location of the this header is indicated as PORT B in **Figure 3-4**. The 20-pin keyed mini connector pin definitions for JTAG mode are as follows:

#### 20-Pin Keyed Mini Connector JTAG Mode Pin Assignments

PIN 1 - <b>TVCC</b>	<b>TMS</b> - PIN 2
PIN 3 - <b>GND</b>	<b>TCK</b> - PIN 4
PIN 5 - <b>GND</b>	<b>TDO</b> - PIN 6
PIN 7 - <b>NC</b>	<b>TDI</b> - PIN 8
PIN 9 - <b>NC</b>	<b>RESET</b> - PIN 10
PIN 11 - <b>NC</b>	<b>NC</b> - PIN 12
PIN 13 - <b>NC</b>	<b>NC</b> - PIN 14
PIN 15 - <b>GND</b>	<b>NC</b> - PIN 16
PIN 17 - <b>GND</b>	<b>NC</b> - PIN 18
PIN 19 - <b>GND</b>	<b>NC</b> - PIN 20

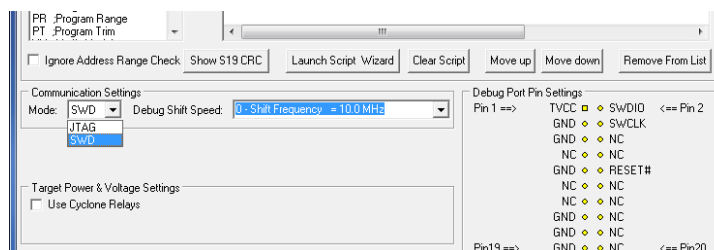
**CYCLONE** programmers also support SWD Mode. This replaces the JTAG connection with a clock and single bi-directional data pin.

#### 20-Pin Keyed Mini Connector SWD Mode Pin Assignments



PIN 1 - <b>TVCC</b>	<b>TMS/SWDIO</b> - PIN 2
PIN 3 - <b>GND</b>	<b>TCK/SWCLK</b> - PIN 4
PIN 5 - <b>GND</b>	<b>NC</b> - PIN 6
PIN 7 - <b>NC</b>	<b>NC</b> - PIN 8
PIN 9 - <b>NC</b>	<b>RESET</b> - PIN 10
PIN 11 - <b>NC</b>	<b>NC</b> - PIN 12
PIN 13 - <b>NC</b>	<b>NC</b> - PIN 14
PIN 15 - <b>GND</b>	<b>NC</b> - PIN 16
PIN 17 - <b>GND</b>	<b>NC</b> - PIN 18
PIN 19 - <b>GND</b>	<b>NC</b> - PIN 20

SWD Mode is selected from the “Communication Mode” drop-down box in the Cyclone Image Creation Utility:



**Figure 3-8: Communications Mode Selection**

### 3.16.3 PORT C: 20-Pin Debug Connector (Kinetis, S32 (ARM), other PEmicro-Supported ARM devices)

The Cyclone provides a 20-pin 0.100-inch pitch double row connector for ARM targets. The location of the this header is indicated as **PORT H** in **Figure 3-4**. The 20-pin standard connector pin definitions for JTAG mode are as follows:

#### 20-Pin Standard Connector JTAG Mode Pin Assignments

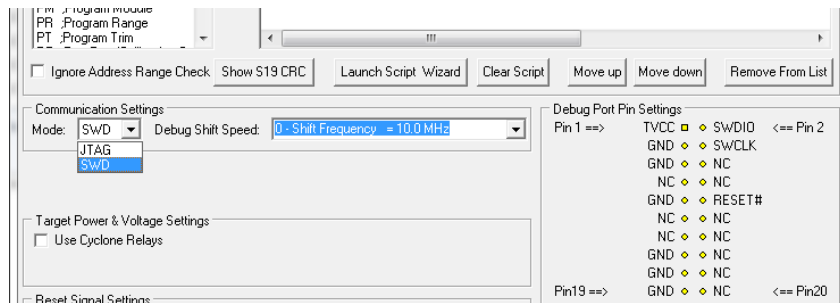
PIN 1 - <b>TVCC</b>	<b>NC</b> - PIN 2
PIN 3 - <b>TRST or NC</b>	<b>GND</b> - PIN 4
PIN 5 - <b>TDI</b>	<b>GND</b> - PIN 6
PIN 7 - <b>TMS</b>	<b>GND</b> - PIN 8
PIN 9 - <b>TCK</b>	<b>GND</b> - PIN 10
PIN 11 - <b>NC</b>	<b>GND</b> - PIN 12
PIN 13 - <b>TDO</b>	<b>GND</b> - PIN 14
PIN 15 - <b>RESET</b>	<b>GND</b> - PIN 16
PIN 17 - <b>NC</b>	<b>GND</b> - PIN 18
PIN 19 - <b>NC</b>	<b>GND</b> - PIN 20

**CYCLONE** programmers also support SWD Mode. This replaces the JTAG connection with a clock and single bi-directional data pin.

#### 20-Pin Standard Connector SWD Mode Pin Assignments

PIN 1 - <b>TVCC</b>	<b>NC</b> - PIN 2
PIN 3 - <b>TRST or NC</b>	<b>GND</b> - PIN 4
PIN 5 - <b>NC</b>	<b>GND</b> - PIN 6
PIN 7 - <b>TMS/SWDIO</b>	<b>GND</b> - PIN 8
PIN 9 - <b>TCK/SWCLK</b>	<b>GND</b> - PIN 10
PIN 11 - <b>NC</b>	<b>GND</b> - PIN 12
PIN 13 - <b>NC</b>	<b>GND</b> - PIN 14
PIN 15 - <b>RESET</b>	<b>GND</b> - PIN 16
PIN 17 - <b>NC</b>	<b>GND</b> - PIN 18
PIN 19 - <b>NC</b>	<b>GND</b> - PIN 20

SWD Mode is selected from the “Communication Mode” drop-down box in the Cyclone Image Creation Utility:



**Figure 3-9: Communications Mode Selection**

### 3.17 Target Headers For Part# CYCLONE\_UNIVERSAL

PEmicro Part# CYCLONE\_UNIVERSAL features 6 ports labeled A-H.

#### 3.17.1 PORT A: 10-Pin Keyed Mini Connector (Kinetis, S32 (ARM), other PEmicro-Supported ARM devices)

The Cyclone provides a keyed 10-pin 0.050-inch pitch double row connector for ARM targets. The location of this header is indicated as PORT A in **Figure 3-4**. The 10-pin keyed mini connector pin definitions for JTAG mode are as follows:

##### 10-Pin Keyed Mini Connector JTAG Mode Pin Assignments

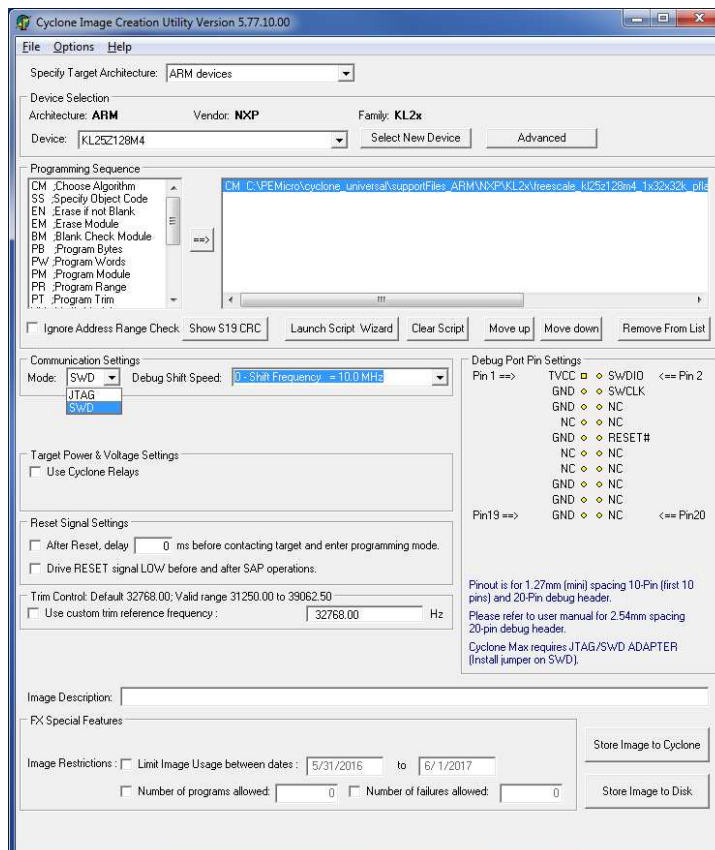
PIN 1 - TVCC	TMS - PIN 2
PIN 3 - GND	TCK - PIN 4
PIN 5 - GND	TDO - PIN 6
PIN 7 - NC	TDI - PIN 8
PIN 9 - NC	RESET - PIN 10

**CYCLONE** programmers also support SWD Mode. This replaces the JTAG connection with a clock and single bi-directional data pin.

##### 10-Pin Keyed Mini Connector SWD Mode Pin Assignments

PIN 1 - TVCC	TMS/SWDIO - PIN 2
PIN 3 - GND	TCK/SWCLK - PIN 4
PIN 5 - GND	NC - PIN 6
PIN 7 - NC	NC - PIN 8
PIN 9 - NC	RESET - PIN 10

SWD Mode is selected from the “Communication Mode” drop-down box in the Cyclone Image Creation Utility:



**Figure 3-10: Communications Mode Selection**

### 3.17.2 PORT B: 20-Pin Keyed Mini Connector (Kinetis, S32 (ARM), other PEmicro-Supported ARM devices)

The Cyclone provides a keyed 20-pin 0.050-inch pitch double row connector for ARM targets. The location of the this header is indicated as PORT B in **Figure 3-4**. The 20-pin keyed mini connector pin definitions for JTAG mode are as follows:

#### 20-Pin Keyed Mini Connector JTAG Mode Pin Assignments

PIN 1 - TVCC	TMS - PIN 2
PIN 3 - GND	TCK - PIN 4
PIN 5 - GND	TDO - PIN 6
PIN 7 - NC	TDI - PIN 8
PIN 9 - NC	RESET - PIN 10
PIN 11 - NC	NC - PIN 12
PIN 13 - NC	NC - PIN 14
PIN 15 - GND	NC - PIN 16
PIN 17 - GND	NC - PIN 18
PIN 19 - GND	NC - PIN 20

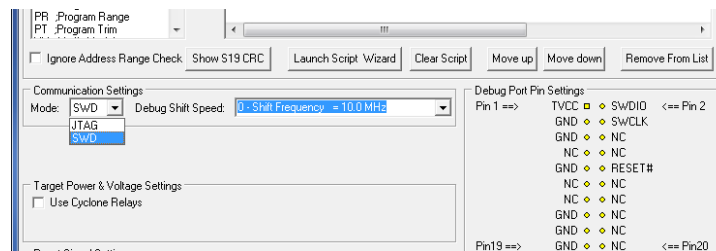
**CYCLONE** programmers also support SWD Mode. This replaces the JTAG connection with a clock and single bi-directional data pin.

#### 20-Pin Keyed Mini Connector SWD Mode Pin Assignments

PIN 1 - TVCC	TMS/SWDIO - PIN 2
PIN 3 - GND	TCK/SWCLK - PIN 4
PIN 5 - GND	NC - PIN 6
PIN 7 - NC	NC - PIN 8
PIN 9 - NC	RESET - PIN 10
PIN 11 - NC	NC - PIN 12
PIN 13 - NC	NC - PIN 14

PIN 15 - **GND**  
 PIN 17 - **GND**  
 PIN 19 - **GND**  
 NC - PIN 16  
 NC - PIN 18  
 NC - PIN 20

SWD Mode is selected from the “Communication Mode” drop-down box in the Cyclone Image Creation Utility:



**Figure 3-11: Communications Mode Selection**

### 3.17.3 PORT C: 14-Pin Debug Connector (Qorivva, SPC5, DSC, S32 (Power))

The Cyclone provides a standard 14-pin 0.100-inch pitch dual row 0.025-inch square header for Qorivva (MPC5xxx), DSC (MC56F8xxx), S32R, or STMicroelectronics' SPC5 targets. The location of the this header is indicated as PORT C in **Figure 3-4**.

#### Qorivva, SPC5, or S32 (Power) 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

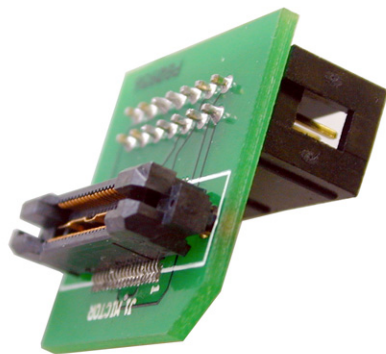
#### DSC Pinout

TDI	1	2	GND
TDO	3	4	GND
TCK	5	6	GND
NC	7	8	NC/KEY
RESET	9	10	TMS
VDD	11	12	GND
NC	13	14	TRST

#### 3.17.3.1 BERG14-to-MICTOR38 Optional Connector

PEmicro offers a 14-pin BERG to 38-pin MICTOR adapter, sold separately, that may be used on Port C of the **CYCLONE**. The PEmicro part number is BERG14-TO-MICTOR38.





**Figure 3-12: BERG14-TO-MICTOR38 Adapter (Sold Separately)**

### 3.17.4 PORT D: 26-Pin Debug Connector (ColdFire V2/3/4)

The Cyclone provides a standard 26-pin 0.100-inch pitch dual row 0.025-inch square header for ColdFire MCF52xx/53xx/54xx family of microprocessors. This port connects to the target hardware using either the ColdFire extension cable for synchronous ColdFire targets such as MCF5272 & MCF5206E (PEmicro part# CABLE-CF-ADAPTER, sold separately), or a standard 26-pin ribbon cable for asynchronous ColdFire targets (included). Please refer to each processor's user manual to identify whether it is a synchronous or asynchronous interface. The location of the this header is indicated as PORT D in **Figure 3-4**.

#### ColdFire V2/3/4 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 3-13: ColdFire Extension Cable With Adapter (PEmicro part# CABLE\_CF\_ADAPTER, for**



**Figure 3-14: ColdFire Ribbon Cable (for asynchronous ColdFire targets, included with Cyclone)**

### 3.17.5 PORT E: 16-Pin Debug Connector (MON08)

The Cyclone provides a 16-pin 0.100-inch pitch double row connector for MON08 targets. The location of this header is indicated as PORT E in **Figure 3-4**. The MON08 header adopts the standard pin-out from MON08 debugging with some modifications. The general pin-out is as follows:

#### MON08 Signals

PIN 1 -	NC	GND	- PIN 2
PIN 3 -	NC	RST	- PIN 4
PIN 5 -	NC	IRQ	- PIN 6
PIN 7 -	NC	MON4	- PIN 8
PIN 9 -	NC	MON5	- PIN10
PIN11 -	NC	MON6	- PIN12
PIN13 -	OSC	MON7	- PIN14
PIN15 -	Vout	MON8	- PIN16

### 3.17.6 PORT F: 6-Pin Debug Connector (RS08, HCS08, HC(S)12(X), S12Z, ColdFire +/V1)

The Cyclone provides a standard 6-pin 0.100-inch pitch dual row 0.025-inch square header for ColdFire V1, S12Z, 68(S)12(X), 68HCS08, and RS08 targets. The location of this header is indicated as PORT F in **Figure 3-4**. The header uses the NXP standard pin configuration, listed here for reference:

#### ColdFire V1, 68(S)12(X), 68HCS08, and RS08 Signals

PIN 1 -	BKGD	GND -	PIN 2
PIN 3 -	NC	RESET -	PIN 4
PIN 5 -	NC	TVCC -	PIN 6

#### S12Z Signals

**Note:**\* indicates optional signal

PIN 1 -	BKGD	GND -	PIN 2
PIN 3 -	PDO*	RESET -	PIN 4
PIN 5 -	PDOCLK*	TVCC -	PIN 6

### 3.17.7 PORT G: 10-Pin Debug Connector (Power MPC5xx/8xx)

The Cyclone provides a standard 10-pin 0.100-inch pitch dual row 0.025-inch square header for

Power MPC5xx/8xx BDM targets. The location of the this header is indicated as PORT G in **Figure 3-4**.

#### Power MPC5xx/8xx BDM Pinout

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

### 3.17.8 PORT H: 20-Pin Debug Connector (Kinetis, S32 (ARM), other PEmicro-Supported ARM devices)

The Cyclone provides a 20-pin 0.100-inch pitch double row connector for ARM targets. The location of the this header is indicated as **PORT H** in **Figure 3-4**. The 20-pin standard connector pin definitions for JTAG mode are as follows:

#### 20-Pin Standard Connector JTAG Mode Pin Assignments

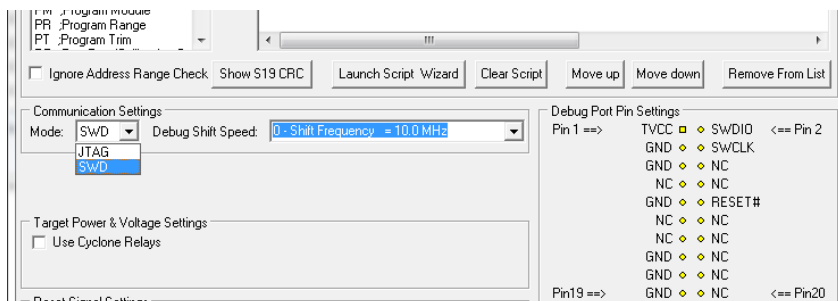
PIN 1 - TVCC	NC - PIN 2
PIN 3 - TRST or NC	GND - PIN 4
PIN 5 - TDI	GND - PIN 6
PIN 7 - TMS	GND - PIN 8
PIN 9 - TCK	GND - PIN 10
PIN 11 - NC	GND - PIN 12
PIN 13 - TDO	GND - PIN 14
PIN 15 - RESET	GND - PIN 16
PIN 17 - NC	GND - PIN 18
PIN 19 - NC	GND - PIN 20

**CYCLONE** programmers also support SWD Mode. This replaces the JTAG connection with a clock and single bi-directional data pin.

#### 20-Pin Standard Connector SWD Mode Pin Assignments

PIN 1 - TVCC	NC - PIN 2
PIN 3 - TRST or NC	GND - PIN 4
PIN 5 - NC	GND - PIN 6
PIN 7 - TMS/SWDIO	GND - PIN 8
PIN 9 - TCK/SWCLK	GND - PIN 10
PIN 11 - NC	GND - PIN 12
PIN 13 - NC	GND - PIN 14
PIN 15 - RESET	GND - PIN 16
PIN 17 - NC	GND - PIN 18
PIN 19 - NC	GND - PIN 20

SWD Mode is selected from the “Communication Mode” drop-down box in the Cyclone Image Creation Utility:

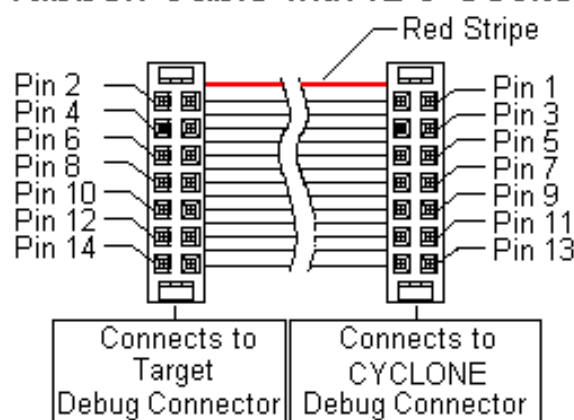


**Figure 3-15: Communications Mode Selection**

### 3.18 Ribbon Cable

**CYCLONE** programmers communicate with the target through ribbon cables. The ribbon cables for standard debug connectors have a 0.100-inch centerline dual row socket IDC assembly (not keyed). The ribbon cables for 10- and 20-pin mini debug connectors have a 0.050-inch centerline dual row socket IDC assembly (keyed). The ribbon cables are designed such that the Cyclone's Debug Connector has the same pinout as the Target Header, i.e., Pin 1 of the Cyclone's Debug Connector is connected to Pin 1 of the Target Header. As an example, **Figure 3-16** sketches the connection mechanism (looking down into the sockets) for a 14-pin ribbon cable. Ribbon cables for other supported architectures use a similar scheme, but may have more or fewer pins.

#### Ribbon Cable with IDC Socket

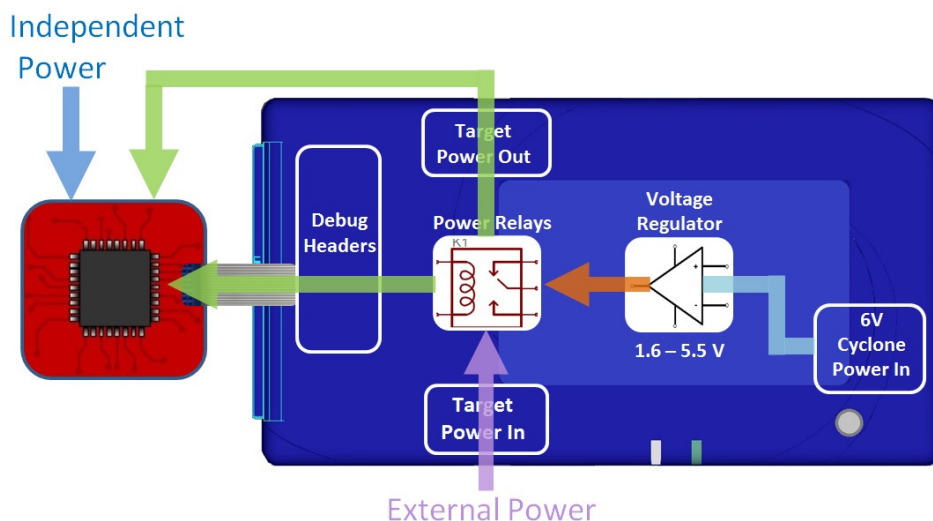


**Figure 3-16: Ribbon Cable Example Diagram, When Looking Into IDC Socket**



## 4 TARGET POWER MANAGEMENT

Different target devices may require different power schemes which depend on the design of the target board, target voltages, and even the device architecture. PEmicro has designed the **CYCLONE** to be capable of powering a target before, during, and after programming. Power can be sourced at many voltage levels from the Cyclone itself, or sourced by an external power supply and switched by the Cyclone.



**Figure 4-1: Five different paths to power a target**

The versatility of the Cyclone power scheme gives the user the utmost flexibility, and includes the following features:

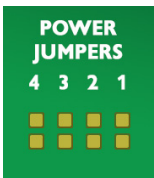
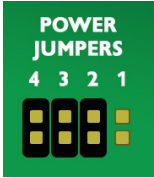
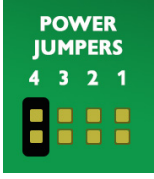
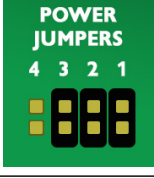
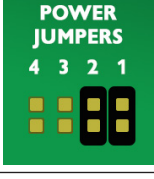
- Provides power through a power jack or through the debug connector
- Provides internally generated voltage from 1.6v-5.5v at up to 500mA
- Switches an external power supply voltage, up to 24V at 1amp
- Selectively powers the target before, during, and after programming
- Powers down the target connections between programming operations
- Uses power switching to aid entry into debug mode for certain targets
- Provides target voltage and current measurement capabilities

If target power is required, each target board may vary where the power is sourced from, externally or internally, and how it is channeled to the target: through the debug header or to a separate connector to the board. Power that is passed through and managed by the Cyclone goes through power relays so it can be power cycled. This is extremely useful because it also allows the power to be off during setup and automatically powered on by the Cyclone for programming. For some devices, the process of entering debug mode requires that the device be powered down and powered back up. Power can also be left in a desired power state, either on or off.

### 4.1 Cyclone Configuration

There are two different places Power Management is configured and they should be **matched**: first, by the **jumpers** on the **CYCLONE**, and second, in the **setup** of the programming image. The Cyclone jumpers are the most important because they are the physical connection to the target. The Cyclone has an easy access panel that reveals debug header connections for a variety of different architectures, and a 2x4 jumper block for configuring power management of the target. The specific location of the jumpers is indicated by the label POWER JUMPERS in **Figure 4-3**. This set of 4 jumpers can be used to set 5 different power management schemes for the target.

**Note:** If these jumpers are not set correctly, the Cyclone will not function as intended..

1	Target is powered independently	
2	Power provided externally (center +) and managed by Cyclone, power out to debug ribbon cable.	
3	Power provided externally (center +) and managed by Cyclone, power out to 2.5 mm output jack (center +)	
4	Power provided by Cyclone, power out to debug ribbon cable	
5	Power provided by Cyclone, power out to 2.5 mm output jack (center +)	

**Figure 4-2: Cyclone Power Schemes & Corresponding Jumper Settings**

The bottom edge of the **CYCLONE** has a Power In jack for externally provided power, and the top edge of the Cyclone has Power Out jack, for when power schemes including these are used (see **Figure 4-3**). One of the provided ribbon cables is connected to the appropriate debug header based on the specific target architecture.



**Figure 4-3: Cyclone Hardware Features: Power Jumpers and Target Headers**

The power settings that are set by the jumpers are a physical connection and take precedence.