cadence™

Part Developer Tutorial

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1

Introduction

Part Developer is used to create parts. Its suite of features include:

- An Integrated Development Environment (IDE)
- Support for all part types
- Ability to create parts from PDFs
- Ability to import data from a variety of data formats, such as:
  - Capture
  - EDA XML
  - Si2 PinPak XML
  - Comma-Separated Value (CSV) file
  - Synopsis PTM model
  - Verilog model
  - VHDL model
- Ability to do engineering change order (ECO) updates from supported data formats
- Ability to export data in a variety of formats, such as:
  - Capture
  - EDA XML
  - Comma-Separated Value (CSV) file
- Creation and maintenance of part log and version information
- Interface Comparator, an easy-to-use tool for correcting part errors
- Powerful graphics-editing capabilities

This tutorial teaches you how to use Part Developer to quickly and effectively create and modify library parts.

Audience Profile

The intended audience profile for this tutorial includes users who maintain and modify digital libraries for design entry.

Pre-Requisites

The tutorial assumes familiarity with the following products:

- Project Manager
- Allegro Design Entry HDL
- PCB Symbol Editor

Important

This tutorial provides step-by-step instructions on how to use Part Developer. For a detailed explanation of the features, see *Part Developer User Guide*.

How to Use This Tutorial

This tutorial provides a hands-on exercise for creating and modifying library parts. To gain the most from this tutorial, you should try out all the steps as documented in the tutorial. The tutorial is based on data provided through parts and datasheets in various formats, such as PDF, XML, and CSV.

Using the Samples

The tutorial works with the samples that are installed along with the software. The samples are stored in the following location:

<your_install_dir>/doc/pdv_tut/tutorial_data

This directory has the following subdirectories that are required for the successful completion of the tutorial.

Directory	Contents
`datasheets`	Contains the datasheets used in the tutorial
`import_files`	Contains the files for use in import procedures
`library_project`	Contains the project files `library_project.cpm` and `dp_proj.cpm` and the libraries `my_lib` and `dp_lib` used in the tutorial

Before starting the tutorial, do the following:

- Copy the samples to a local directory to which you have write permission.

  For the commands specified in the tutorial, you need to replace `your_work_area` with the name of the local directory in which you have copied the samples.

- Unset the `CDS_SITE` environment variable on your computer if it is set.
- Set the value of `CDS_LEGACY_SYMBOL_EDITOR` environment variable to `1` on your computer.

2

Getting Started

In this section, you will learn the following:

- What a part is
- Types of parts
- Part creation methodology
- How to open an existing library project

Part Definition

Parts usually correspond to physical objects in a PCB, such as gates, chips, and connectors, which come in packages, such as DIP and SOIC. Normally, each of these packages has one or more functions repeated one or more times. These functions are represented graphically through symbols. The symbols are used in Design Entry HDL while the packages are used in Allegro PCB Editor.

In the HDL environment, a part is a collection of one or more of the following views:

- Package
- Symbol
- Simulation (mapfiles and wrappers)
- Part Table File

Note: For detailed explanations about the views of a part, see *Design Entry HDL Libraries Reference*.

Using Part Developer, you can easily create the views of a part.

Part Types

Parts can be classified into three types: symmetrical, asymmetrical, and split.

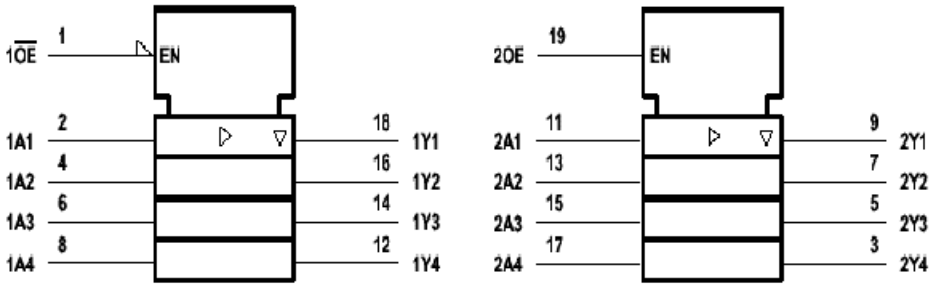
Symmetrical Parts

A part that has only one logical function repeated one or more times in a package is called a symmetrical part. For example, LS00 with four independent 2-input NAND gates is a symmetrical part.

In the context of the `chips.prt` implementation, a symmetrical part has the same logical pin list across all slots. This implies that all logical pins are present in all slots of the part.

Asymmetrical Parts

An asymmetrical part is a part in which multiple functions are present in a package. For example, LS241, an 8-slot part, with two kinds of functionality, is an asymmetrical part. The first four slots in such a package have the pin list A, Y, OE*, VCC, and GND, and the second four slots have the pin list A, Y, OE, VCC, and GND.



In the context of the `chips.prt` implementation, an asymmetrical part has different pin lists across the slots.This implies that all the logical pins are not present in all the slots of an asymmetrical part. The slots in which a pin is not present are represented by 0 in the `chips.prt` file.

An asymmetrical part has multiple symbols, where each symbol represents one functionality. For example, LS241 has two symbols, each representing a specific function.

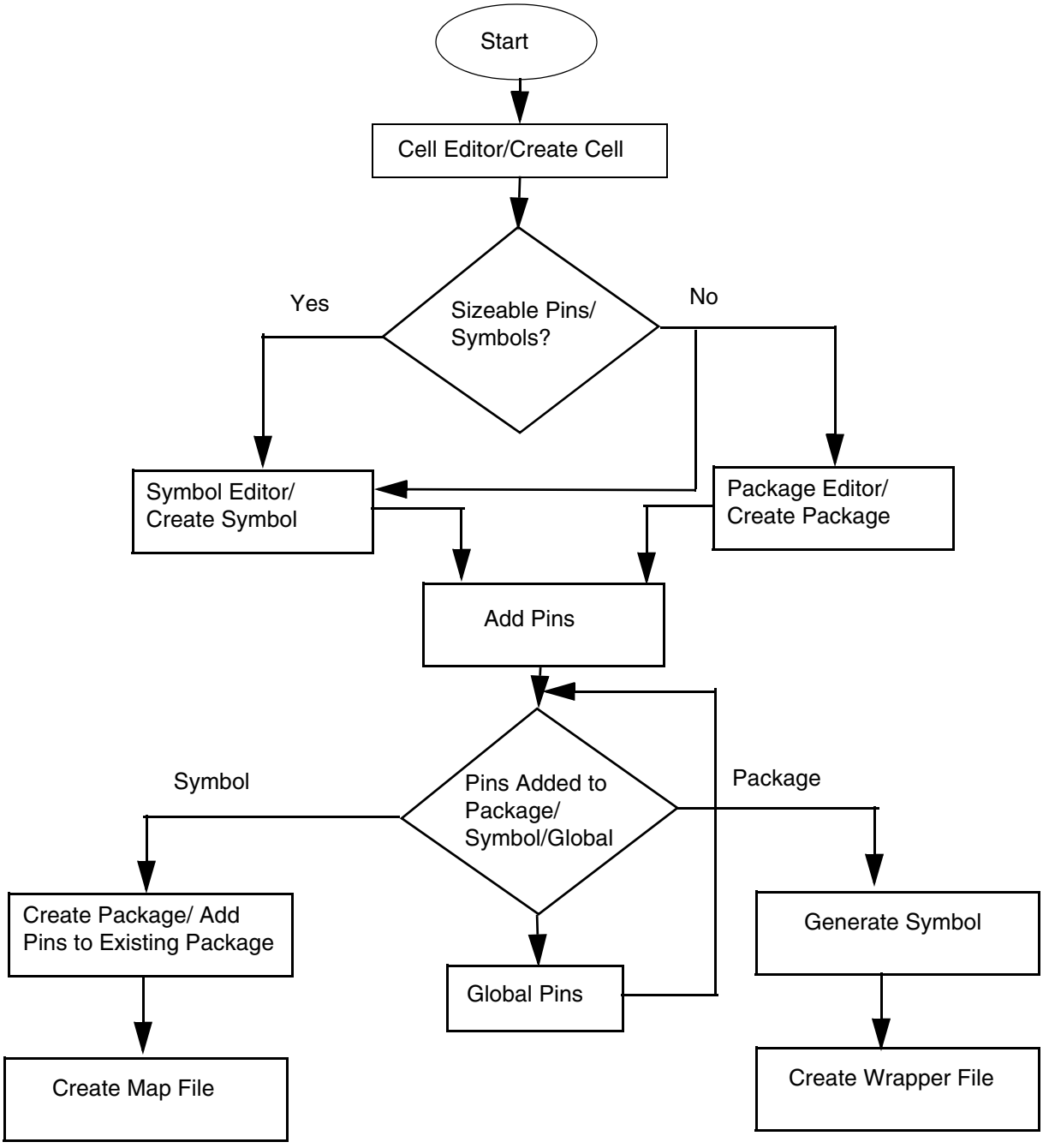
Split Parts

A split part is a special case of an asymmetrical part. This part consists of a package in which logical pins are split across multiple slots. Split parts are useful for creating symbols for large pin-count devices. In a split part, each symbol represents a different function. The difference is that while in an asymmetrical part it is possible that a symbol represents multiple slots, a split part has one symbol representing only one slot.

To create and use split parts, you need to add either the `SPLIT_INST` and `$LOCATION` properties or the `SPLIT_INST_NAME` property on the symbol or the chips. This can be done through *Tools – Setup*. For more information about these properties, see *PCB Systems Properties Reference*.

Part Creation Methodology

The methodology to be followed while creating parts is as follows:



As displayed, the part creation process begins with creating a new cell in a selected library followed by the logical pin entry. Logical pin entry can be done in one of the following ways:

- Using the Add Pin dialog. You open this dialog box from within the Package or the Symbol Editor. You can add all the pins for a part through this dialog box.
- Add logical pins directly to a package using the *Logical Pins* grid of the Package Editor.
- Add logical pins directly to a symbol using the *Logical Pins* grid of the Symbol Editor.

Important

To make a sizeable symbol, you need to enter sizeable logical pins using the Add Pin dialog accessed through the Symbol Editor. This is required because `SIZE` is a pin-level property applicable on a symbol pin.

After pins are added, you create packages or symbols. Packages can be created using the Package Editor. The Symbol Editor is used to create symbols. The wrappers and mapfiles can be created after symbols and packages are created. The Verilog/VHDL map/wrapper file editors are used to create wrappers and map files.

Starting the Tool

Part Developer can be launched from the following:

- Project Manager
- Command prompt
- Library Explorer

You will use Project Manager to launch Part Developer.

1. Type the following command at the command prompt:

   ```
   projmgr
   ```

   The *Cadence Product Choices* dialog box appears.

2. Select the *Allegro Managed Library Authoring* license and click *OK*.

   Note: If you want Project Manager to use the selected license every time you launch Part Developer, select the *Use As Default* check box.

   Project Manager opens.

   Note: Project Manager enables you to create both library and design projects. To know more about how to create library and design projects, see *Project Manager User Guide* and *Library Explorer User Guide*.

You will now open the library project located at *<your_work_area>*/tutorial_data/library_project.

3. To open an existing library project, click *Open Project*.

   The Open Project dialog box appears.

4. Browse to *<your_work_area>*/tutorial_data/library_project, select the tutorial_project.cpm project file, and click *Open*.

   The *Allegro ManagedLibrary Authoring* page opens in Project Manager.

5. Click *Part Developer* to launch Part Developer on the selected project.

   Part Developer opens.

Summary

In this section, you learned about the definition of a part, different part types, and the part creation methodology. You also learned how to open a library project in Project Manager and launch Part Developer in the project.

3

Creating a Flat Part

Objective

To become familiar with the steps in creating a single-slot flat part.

In this section, you will learn to do the following:

- Set up Part Developer
- Specify the logical and physical pin information
- Create packages:
  - Understand several techniques in Part Developer for the quick development of parts and the views
  - Access Allegro footprints to specify the `JEDEC_TYPE` property
  - Use filters
  - Extract pin numbers from the Allegro footprint
  - Move global pins from the *Logical Pins* grid to the *Global Pins* grid
  - Verify the part with the selected footprint
- Create symbols

Overview

The `n87c196nt` part is used to describe the steps in creating a flat part. The datasheet (`n87c196nt.pdf`) is available at `<your_inst_dir>/doc/pdv_tut/tutorial_data/datasheets`. It is a 68-pin part and comes in the PLCC package.

A partial snapshot of the datasheet is displayed below:

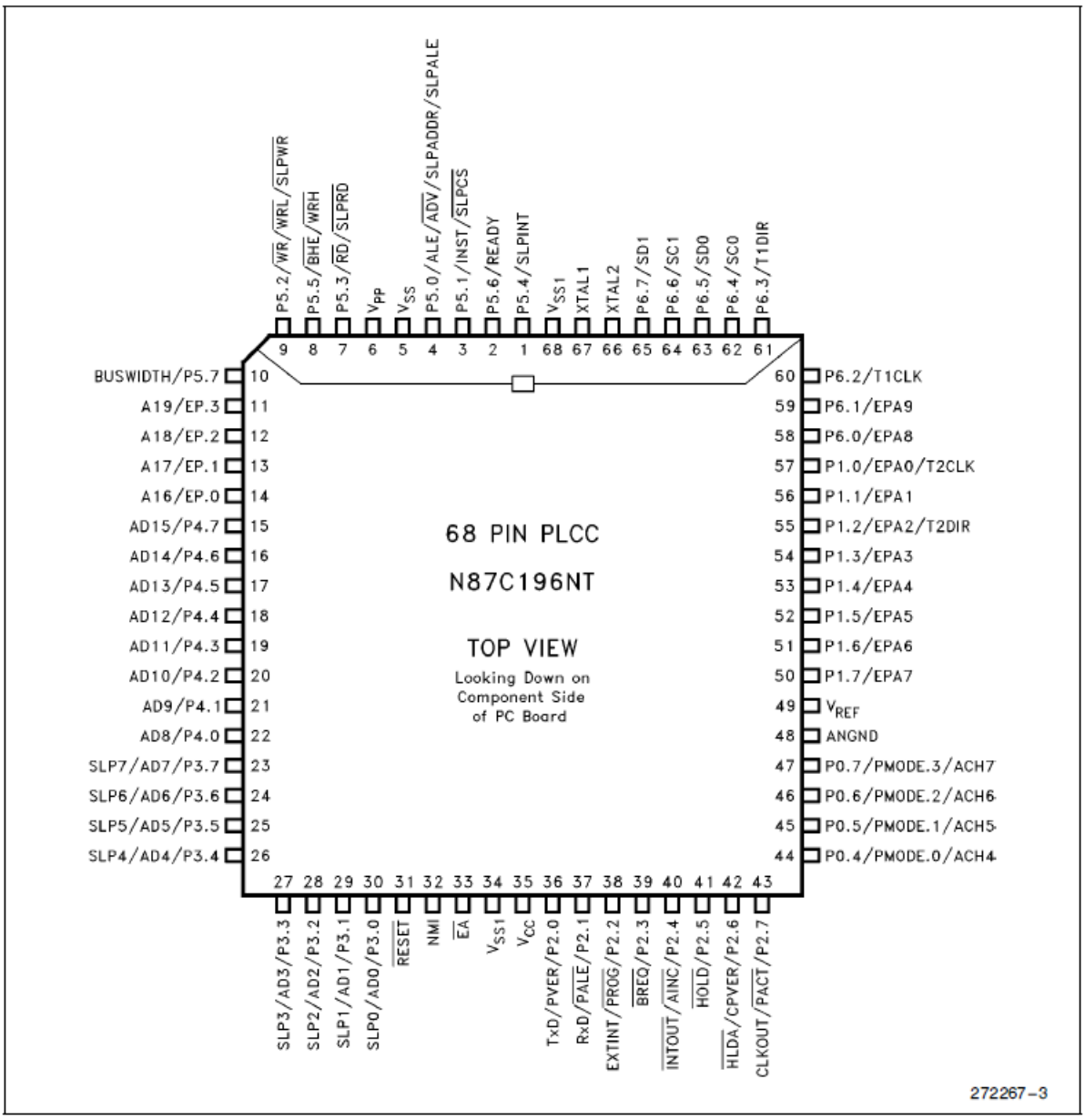


Figure 3. 68-Pin PLCC Package Diagram

Setting Up Part Developer

The first step toward creating a part is to set up Part Developer to provide default values for various fields, such as input and output loads, and user-defined properties to packages and

symbols. For more information, see the *Configuring Part Developer* section in *Part Developer User Guide*.

Task Overview

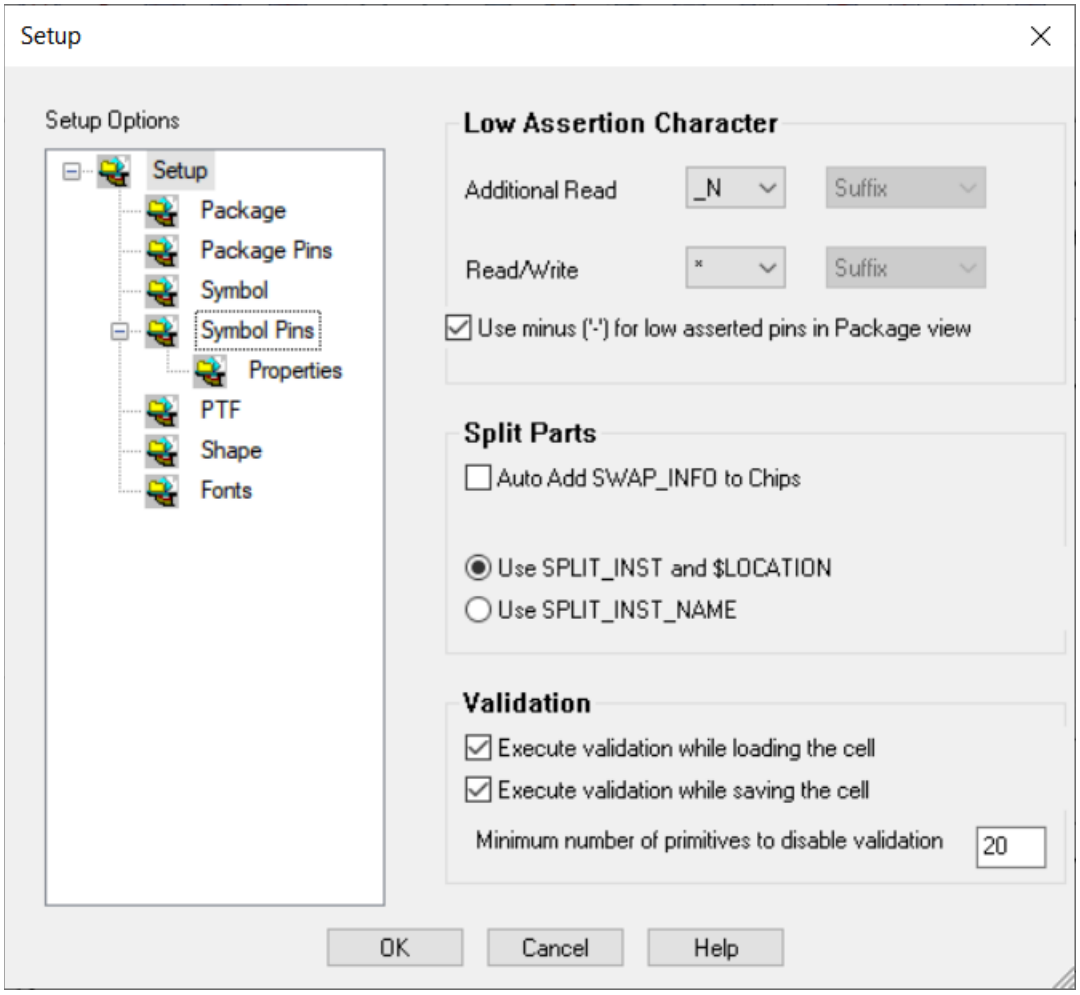
Set up Part Developer to do the following:

- Associate and display a property called `Library_Name` with the value `my_library` for all packages and symbols.
- All the packages should have a property called `PACKAGE_CREATOR` with the value: `?`
- Symbols should display the pin text in 0.08 inches.
- Set value of the PSMPATH variable for determining the path to the footprint files.

Steps

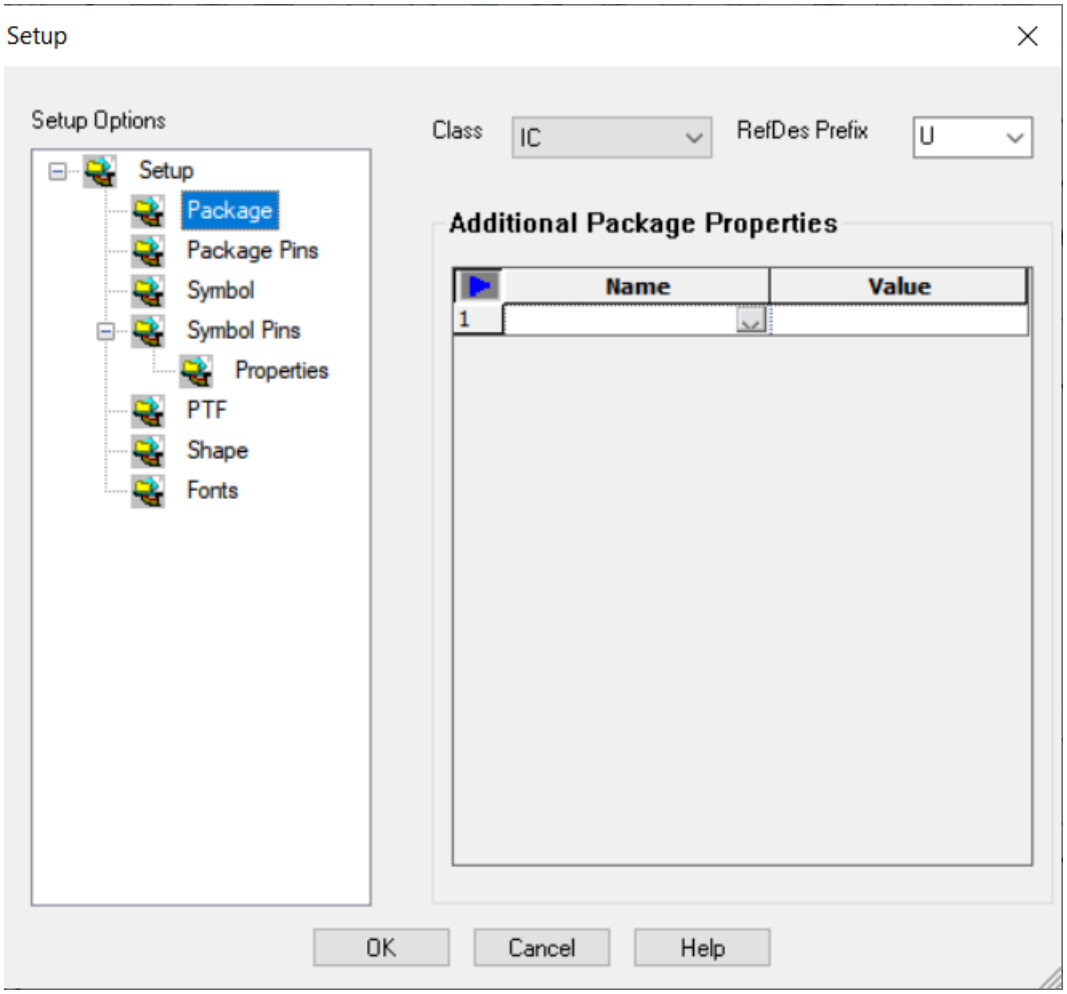
1. Choose *Tools – Setup*.

The *Setup* dialog box appears.



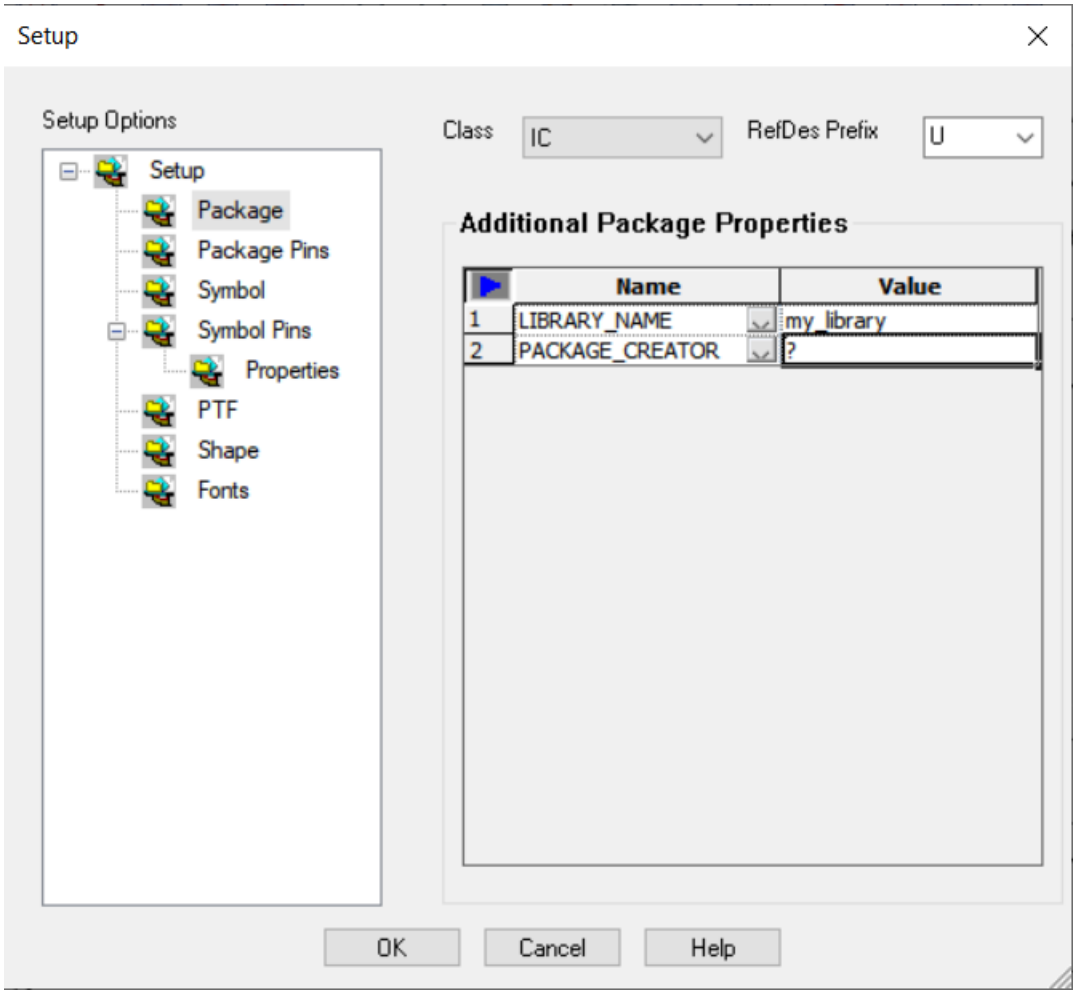
2. Click on the *Package* node in the *Setup Options* tree.

The *Package* options appear in the Setup dialog box.



3. Type `LIBRARY_NAME` and `my_library` in the *Name* and *Value* columns, respectively.
4. Press Ctrl + I to create a blank row in the *Additional Package Properties* grid.
5. Type `PACKAGE_CREATOR` and `?` in the *Name* and *Value* columns, respectively.

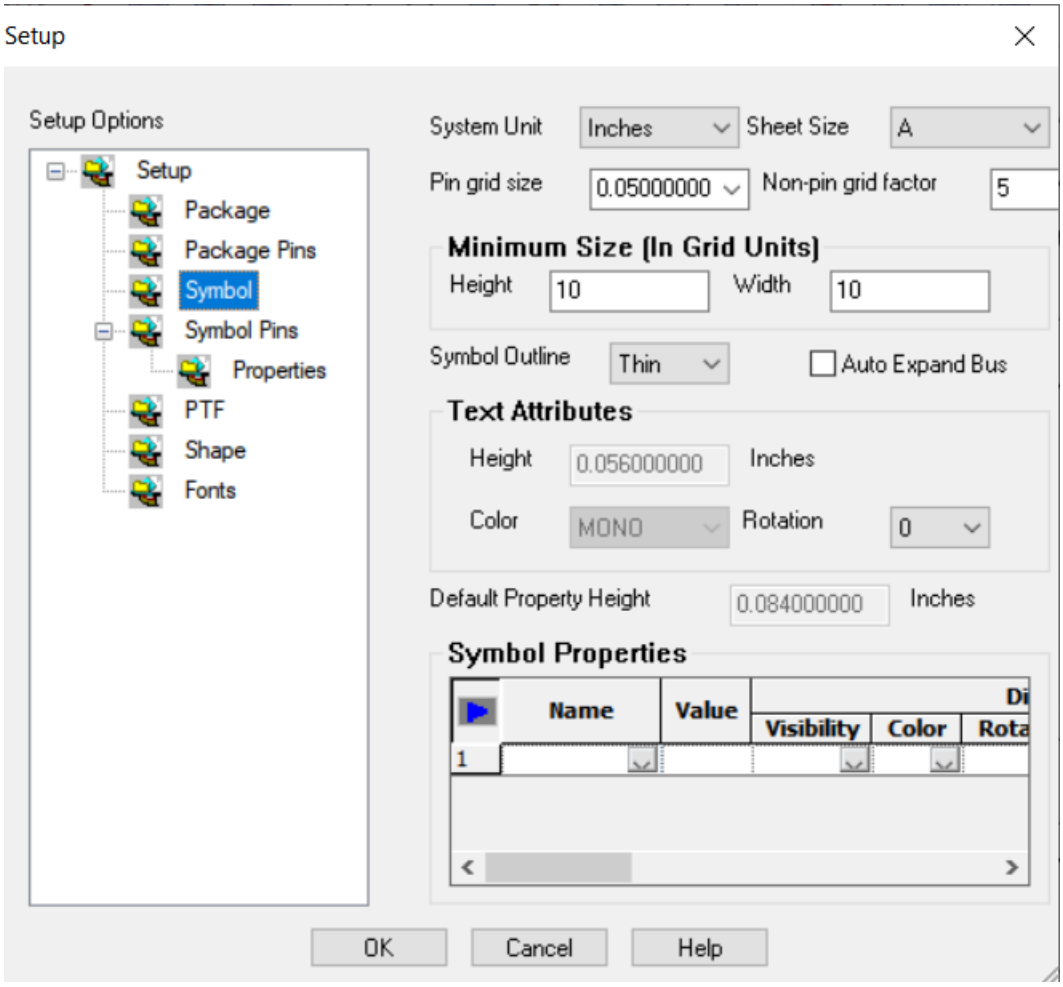
The *Package* panel should appear as follows:



Next, you need to add the `LIBRARY_NAME` property to the symbols and configure the symbol pin text to display pin text in 0.08 inches.

6. Click on the *Symbol* node in the *Setup Options* tree.

The *Symbol* panel appears in the Setup dialog box.



7. Type `LIBRARY_NAME` and `my_library` in the *Name* and *Value* columns, respectively, in the *Symbol Properties* grid.

   Next, you need to determine the display parameters.

8. Select *Both* in the *Visibility* column to ensure that both the property name and its value are visible in the symbol.

9. Select *Mono* in the *Color* field.

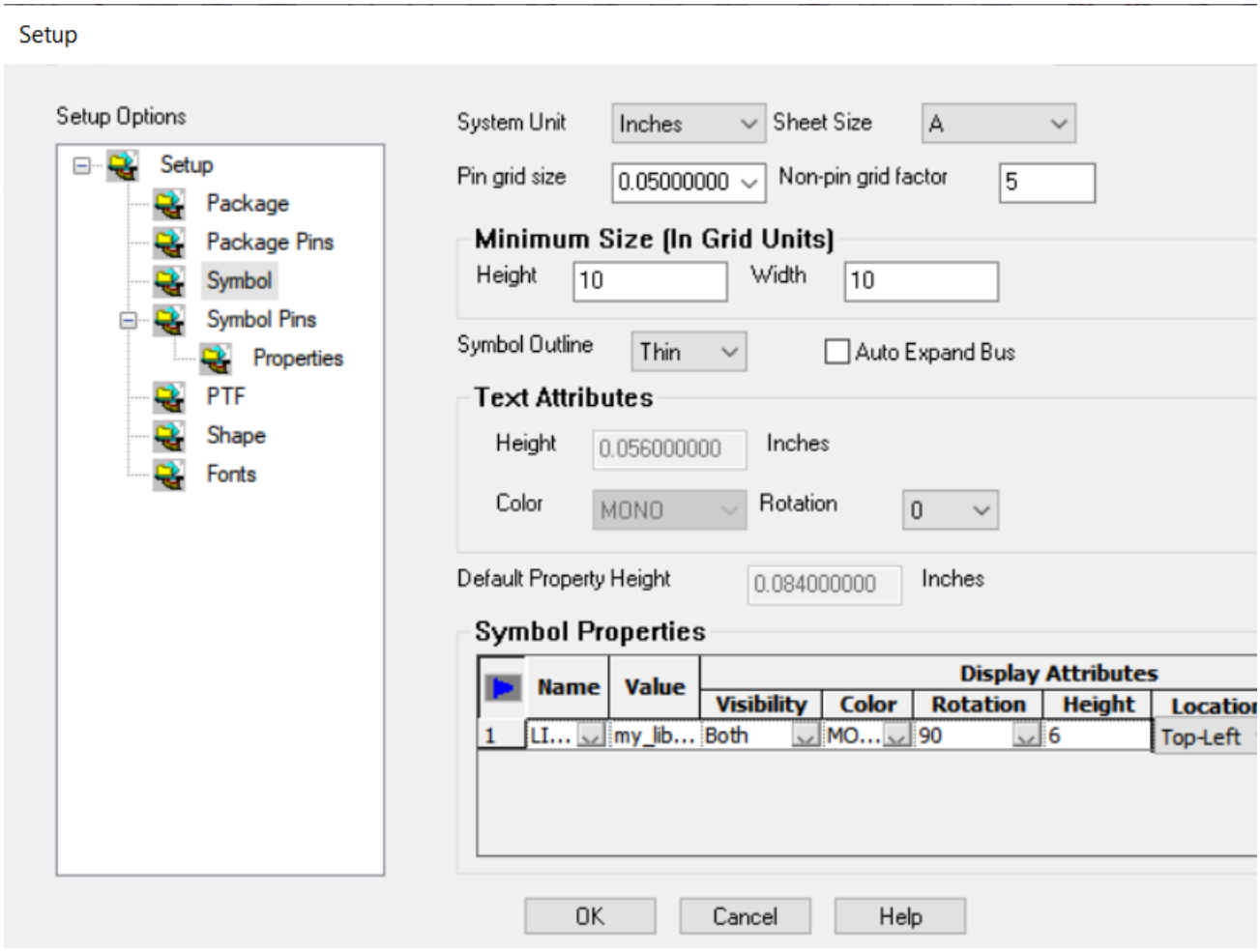
10. Select 90 in the *Rotation* field.

    This ensures that the property is displayed at an angle of 90 degrees to the symbol.

11. Select *Top-Left* in the *Location* field.

    This ensures that the property is displayed in the top-left corner of the symbol.

The filled *Symbol* panel is as follows:

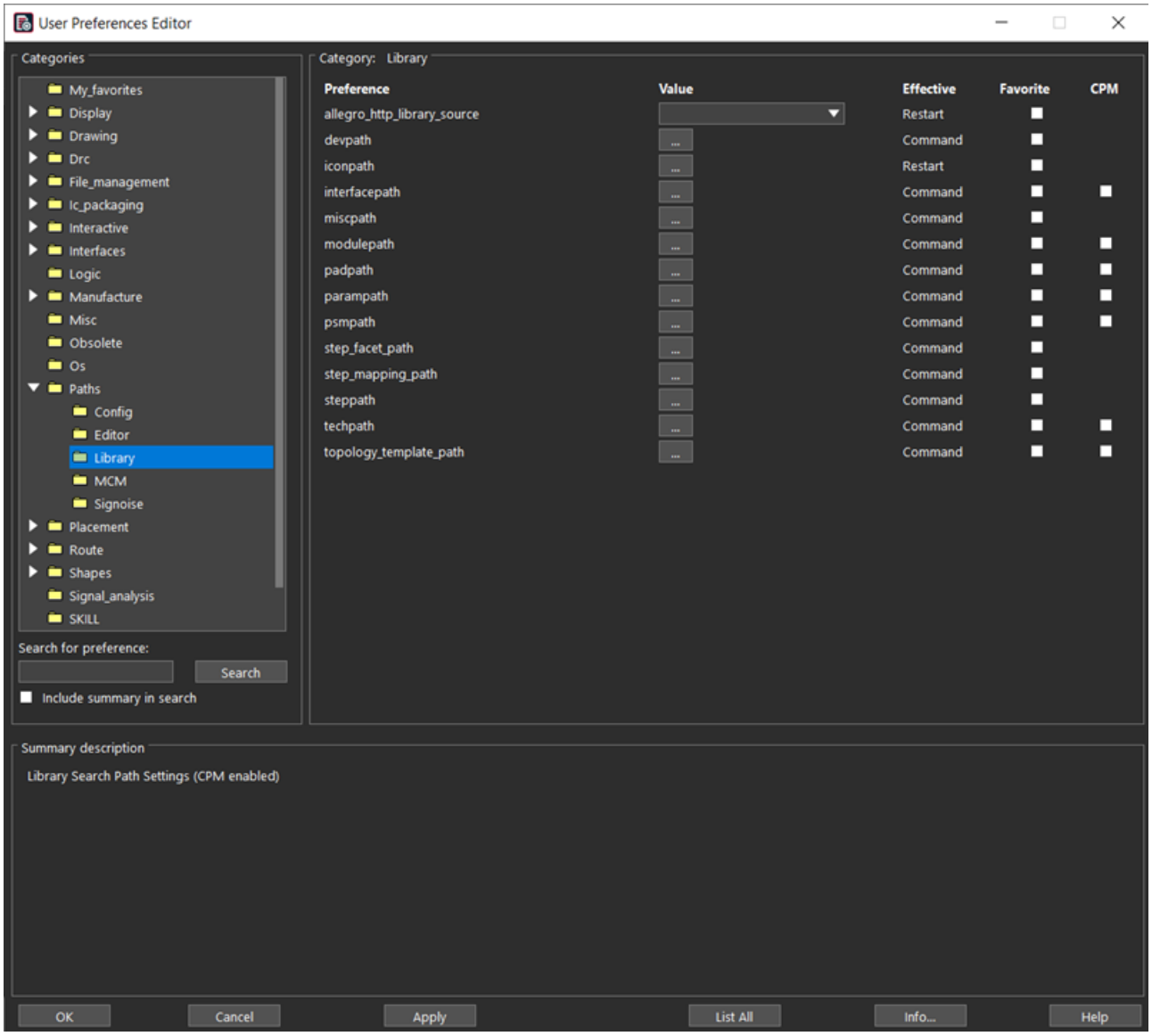


12. Click *OK*.

13. Choose *Tools – PCB Editor Setup*.

The *User Preferences Editor* dialog box is displayed.

14. Choose *Paths – Library* in the *Categories* list.



15. Click the button corresponding to *psmpath* in the *Value* column.
psmpath Items dialog box is displayed.

16. Click the *New (Insert)* button to add a new row.
A new row is added to the *Directories* list.

17. Add the following path to the *symbols* folder and click *OK*:

```
<your_install_dir>/share/pcb/pcb_lib/symbols
```

18. Click *OK* again to close the *User Preferences Editor* dialog box.

Next, you will create the part.

Creating the n87c196nt Part

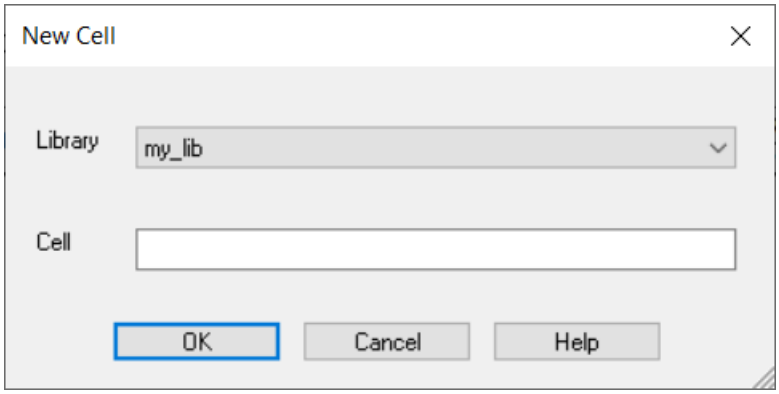
Task Overview

Create the n87c196nt part in the `my_lib` library.

Steps

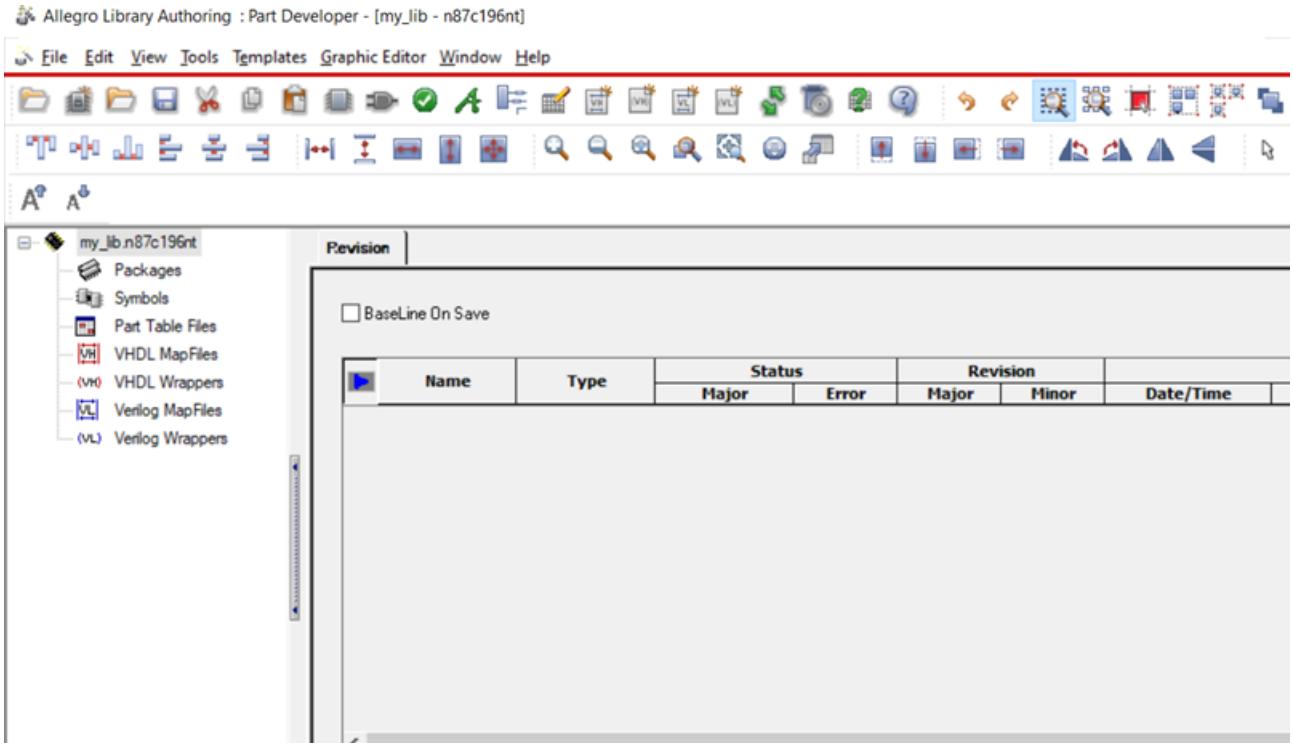
1. Choose *File – New – Cell*.

   The New Cell dialog box appears.



2. Select the `my_lib` library.
3. Type `n87c196nt` in the *Cell* field and click *OK*.

The part `n87c196nt` appears in the Cell Editor.



Next, you enter the logical and physical pins.

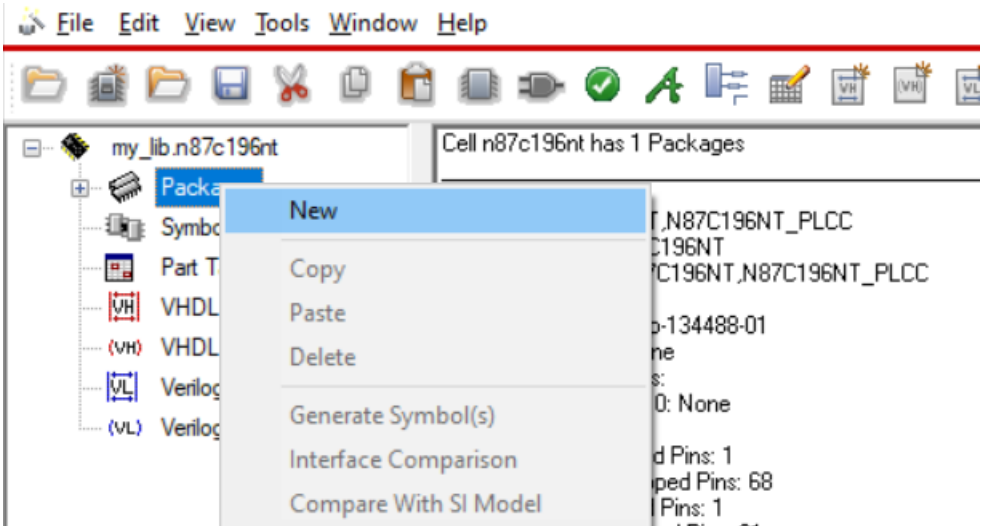
First, you create either a package or a symbol. In creating a package first, you have the benefit of specifying the logical and physical pins and the footprint information and doing the logical-to-physical pin mapping in a single step. Creating symbols is useful when you want to enter sizeable pins.

You will create the package first because `n87c196nt` does not have any sizeable pins.

Creating a Package

Create a package to facilitate pin entry.

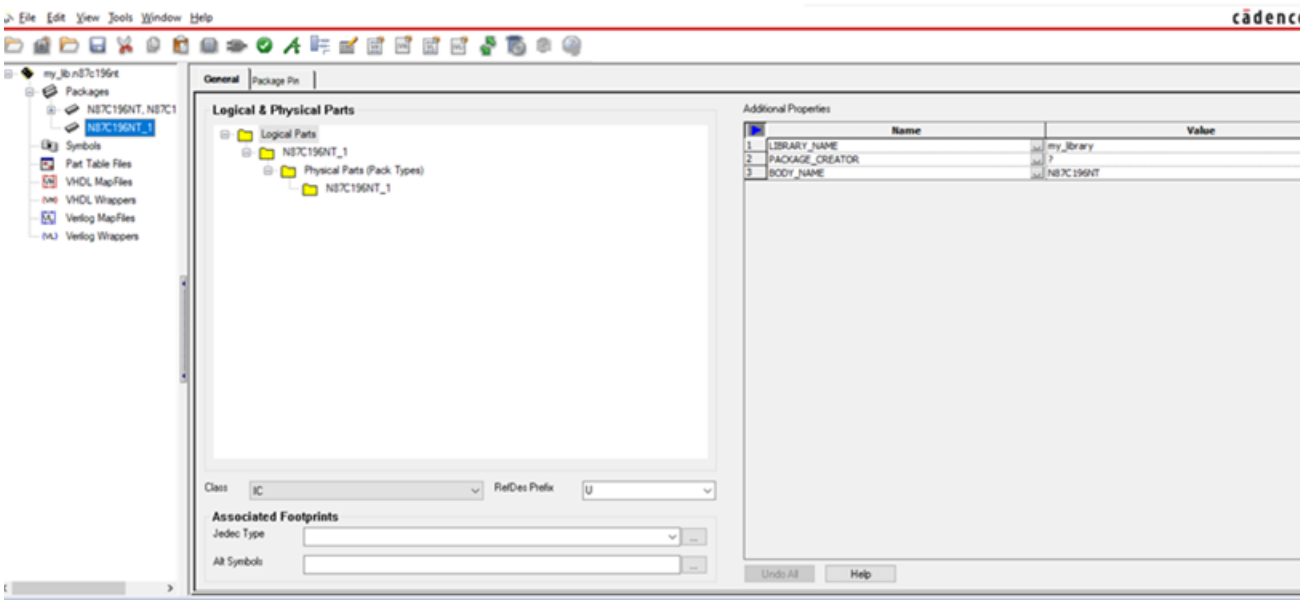
1. Right-click the *Packages* entry in the cell tree and select *New*.



A new package is created. By default, the package name has the same name as the cell name.

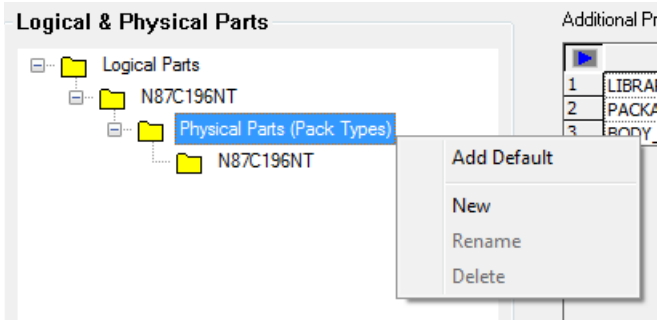
On the *General* tab, the *Logical* & *Physical Parts* tree shows the logical and physical parts. A logical part defines the logical pins for a part and is mapped to one or more physical parts. A physical part consists of the logical-to-physical pin mapping and a set of physical properties. Each primitive entry in the *chips* file represents a physical part. The name of a physical part is either the same as the logical part or the logical part name suffixed by a package type. The default physical part has the same name as the logical part. The packages that are valid for the specified *PART_NAME* appear under the *Pack_Type* entry of the tree.

For more information about logical and physical parts, see the section *How Packager-XL Selects and Names Parts* in *Packager-XL Reference*.

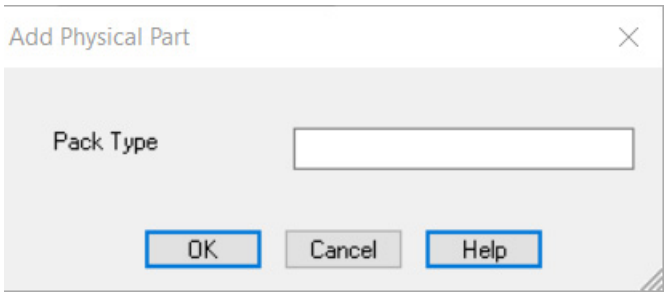


Note that the properties that you have specified in *Setup* appear in the *Additional Properties* grid.

2. Because the PLCC package has the same pin configuration as the default package, right-click the *Physical Parts (Pack Types)* entry in the *Logical & Physical Parts* tree and select *New*.

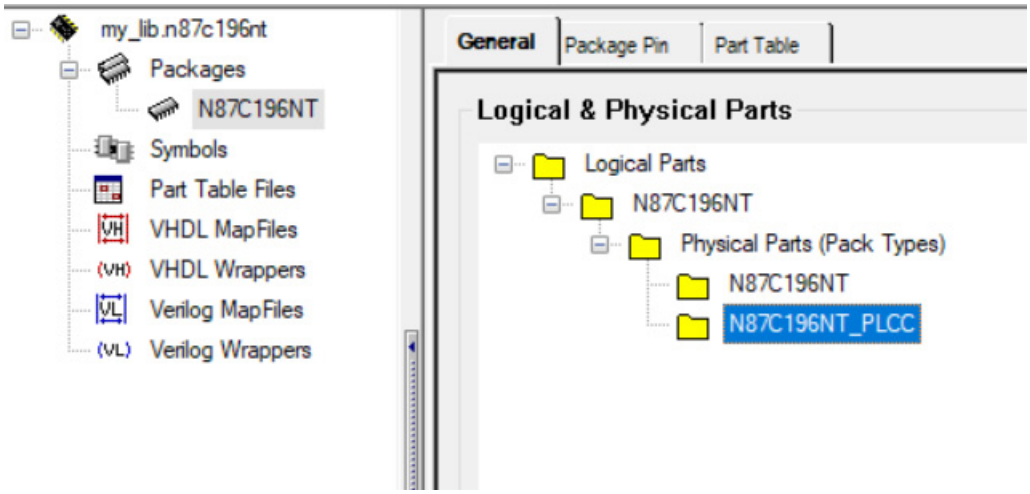


The *Add Physical Part* dialog box appears.



3. Specify `PLCC` in the *Pack Type* field and click *OK*.

   The new package appears in the *Logical & Physical Parts* tree.



Next, you need to enter the logical pins.

Entering the Logical Pins

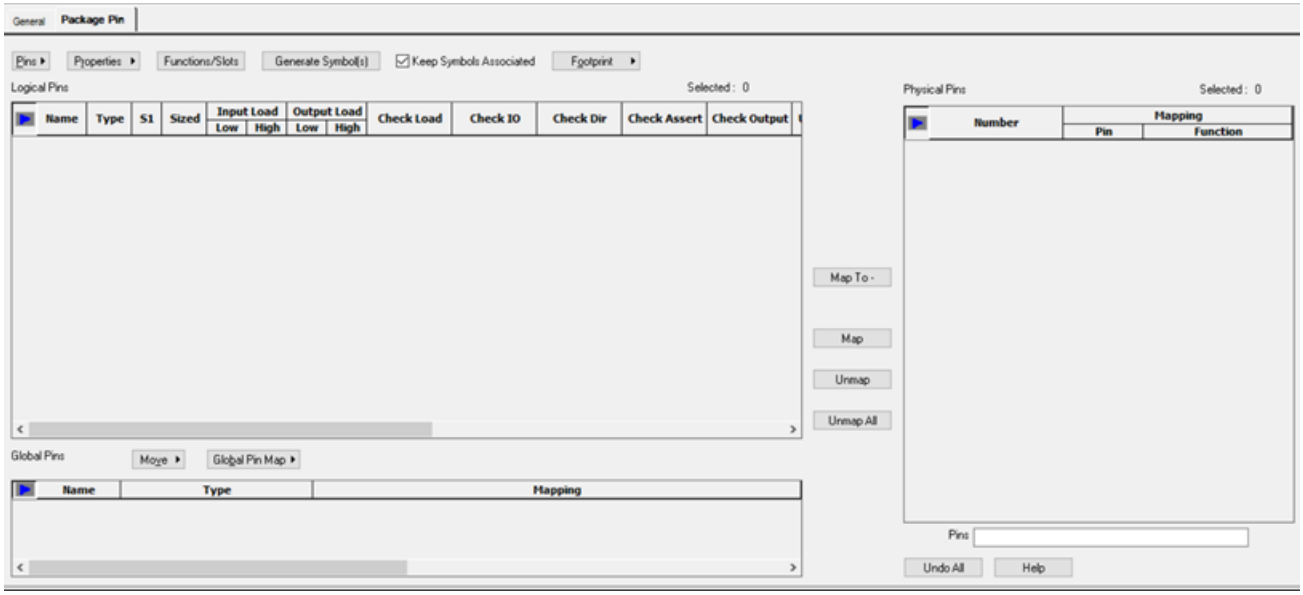
Task Overview

Enter the logical pins as per the datasheet.

Steps

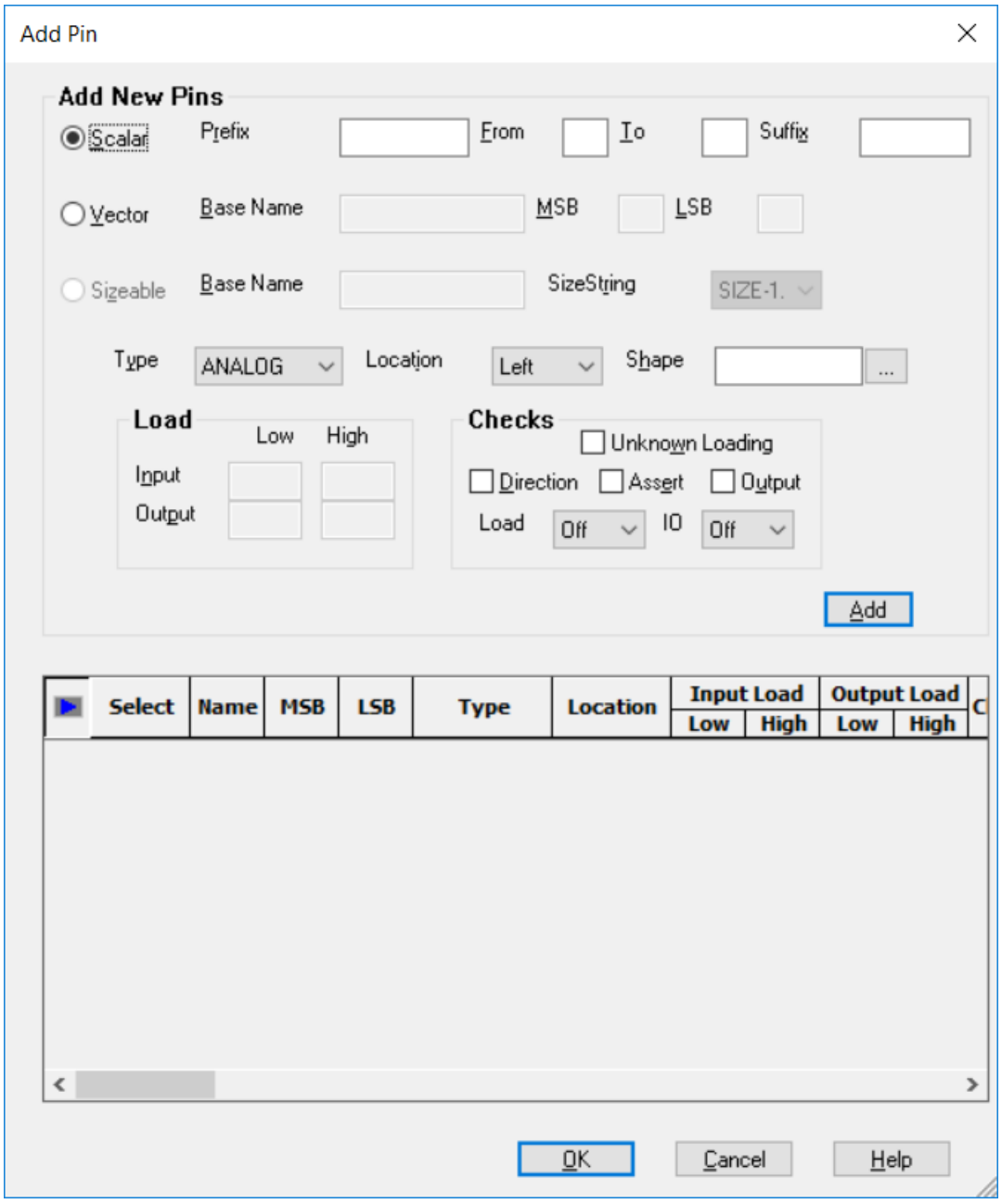
1. Click the *Package Pin* tab.

The *Package Pin* tab appears.



2. To add logical pins, choose *Pins – Add*.

The *Add Pin* dialog box appears.



Enter the pin information as given in the datasheet into Part Developer. Open `n87c196nt.pdf`, available at `<your_inst_dir>/doc/pdv_tut/tutorial_data/datasheets` and go to the Pin Descriptions table.

The first few pins in the Pin Descriptions table are power pins. To enter a power pin, select *POWER* in the *Type* drop-down list box.

3. Enter `VCC` in the *Prefix* field and click *Add*.

   Similarly, add `Vss`, `Vss1`, `VREF`, `VPP`, and `ANGND` as power pins.

Important

Note that the Pin Descriptions table has multiple entries for the Vss1 power pin. In Part Developer, you need to enter the name only once in the logical pins list. Later, you can map multiple physical pins to a power pin.

4. Next, to enter an input pin, select *INPUT* from the *Type* drop-down list box.
5. Enter `XTAL1` in the *Prefix* field and click *Add*.
6. The next couple of pins in the Pin Descriptions table are output pins. To enter an output pin, select *OUTPUT* from the *Type* drop-down list box.
7. Enter `XTAL2` in the *Prefix* field box and click *Add.*

   Similarly, add P2.7 as an output pin.

8. RESET, the next pin in the table, is an active low input pin. To add an active low input pin, select *INPUT* from the *Type* drop-down list box.
9. Enter `RESET` in the *Prefix* field.
10. To make a pin active low, enter * in the *Suffix* field and click *Add*.

    Similarly, add all the pins up to P5.6 specified in the Pin Descriptions table of the datasheet.

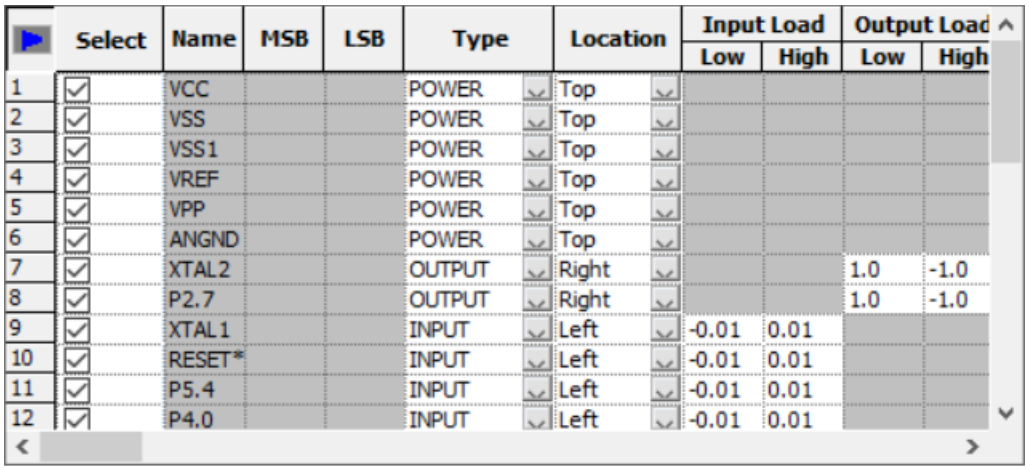
11. The `P5.4` pin is a *BIDIR* pin. To add pins such as these, enter `P5.4` in the in the *Prefix* field, *BIDIR* in the *Type* drop-down list and click *Add*.

    Similarly, add pins P6.2 and P6.3 as BIDIR pins.

12. The `EPA0-9` pins are *BIDIR* pins. To add pins such as these, enter `EPA` in the *Prefix* field, `0` in the *From* field, and `9` in the *To* field.
13. Select *BIDIR* in the *Type* drop-down list box and click *Add*.

    Similarly, enter all the pins as specified in the datasheet.

The filled *Add Pin* dialog box should appear as follows (displayed partially):

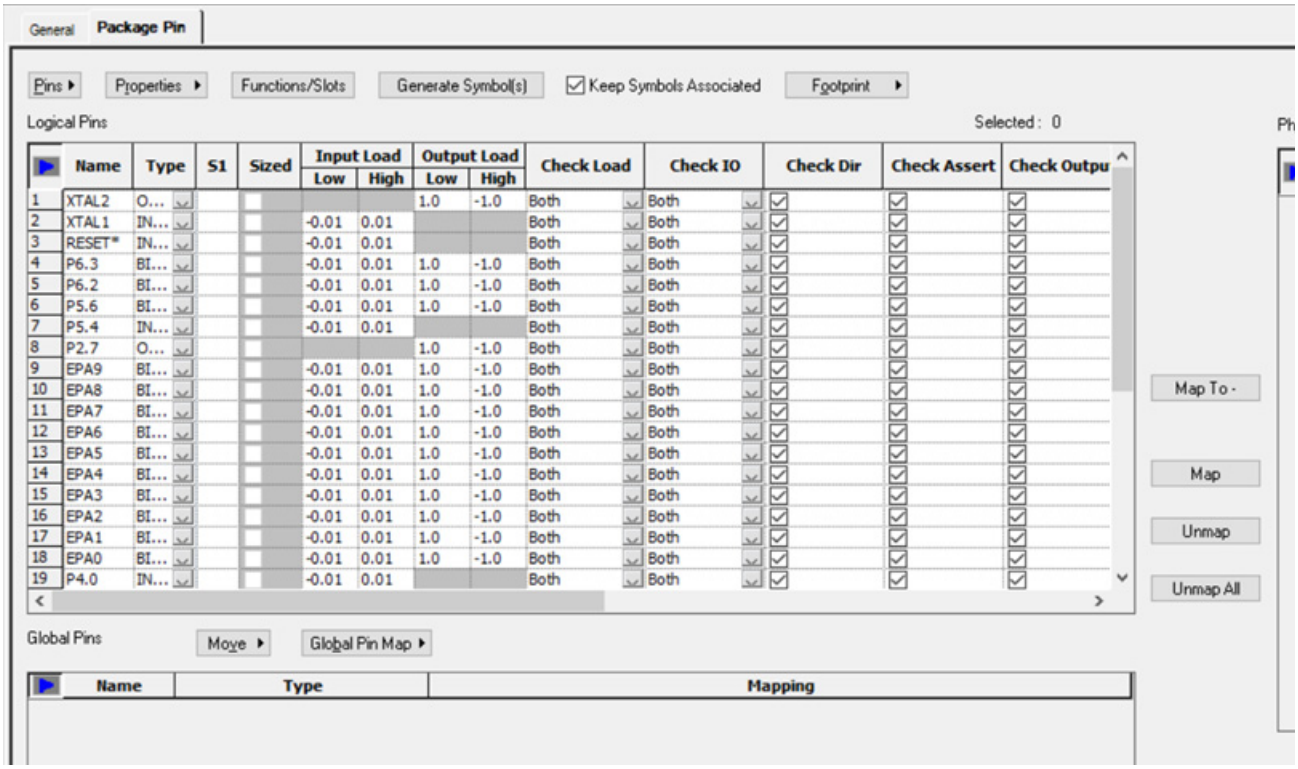


	Select	Name	MSB	LSB	Type	Location	Input Load		Output Load	
							Low	High	Low	High
1	☑	VCC			POWER	Top				
2	☑	VSS			POWER	Top				
3	☑	VSS1			POWER	Top				
4	☑	VREF			POWER	Top				
5	☑	VPP			POWER	Top				
6	☑	ANGND			POWER	Top				
7	☑	XTAL2			OUTPUT	Right			1.0	-1.0
8	☑	P2.7			OUTPUT	Right			1.0	-1.0
9	☑	XTAL1			INPUT	Left	-0.01	0.01		
10	☑	RESET*			INPUT	Left	-0.01	0.01		
11	☑	P5.4			INPUT	Left	-0.01	0.01		
12	☑	P4.0			INPUT	Left	-0.01	0.01		

Note that by default, the check box in the *Select* column is selected for all pins. This implies that all the pins will get added to the package.

14. Click *OK*.

The pins appear in the *Logical Pins* grid of the Package Editor.



	Name	Type	S1	Sized	Input Load		Output Load		Check Load	Check IO	Check Dir	Check Assert	Check Outpu
					Low	High	Low	High					
1	XTAL2	O...					1.0	-1.0	Both	Both	☑	☑	☑
2	XTAL1	IN...			-0.01	0.01			Both	Both	☑	☑	☑
3	RESET*	IN...			-0.01	0.01			Both	Both	☑	☑	☑
4	P6.3	BI...			-0.01	0.01	1.0	-1.0	Both	Both	☑	☑	☑
5	P6.2	BI...			-0.01	0.01	1.0	-1.0	Both	Both	☑	☑	☑
6	P5.6	BI...			-0.01	0.01	1.0	-1.0	Both	Both	☑	☑	☑
7	P5.4	IN...			-0.01	0.01			Both	Both	☑	☑	☑
8	P2.7	O...					1.0	-1.0	Both	Both	☑	☑	☑
9	EPA9	BI...			-0.01	0.01	1.0	-1.0	Both	Both	☑	☑	☑
10	EPA8	BI...			-0.01	0.01	1.0	-1.0	Both	Both	☑	☑	☑
11	EPA7	BI...			-0.01	0.01	1.0	-1.0	Both	Both	☑	☑	☑
12	EPA6	BI...			-0.01	0.01	1.0	-1.0	Both	Both	☑	☑	☑
13	EPA5	BI...			-0.01	0.01	1.0	-1.0	Both	Both	☑	☑	☑
14	EPA4	BI...			-0.01	0.01	1.0	-1.0	Both	Both	☑	☑	☑
15	EPA3	BI...			-0.01	0.01	1.0	-1.0	Both	Both	☑	☑	☑
16	EPA2	BI...			-0.01	0.01	1.0	-1.0	Both	Both	☑	☑	☑
17	EPA1	BI...			-0.01	0.01	1.0	-1.0	Both	Both	☑	☑	☑
18	EPA0	BI...			-0.01	0.01	1.0	-1.0	Both	Both	☑	☑	☑
19	P4.0	IN...			-0.01	0.01			Both	Both	☑	☑	☑

Name	Type	Mapping

Next, you need to specify the physical pins. Physical pins can be entered in one of the two ways:

- Manually
- By specifying a footprint and then extracting the pins from the footprint

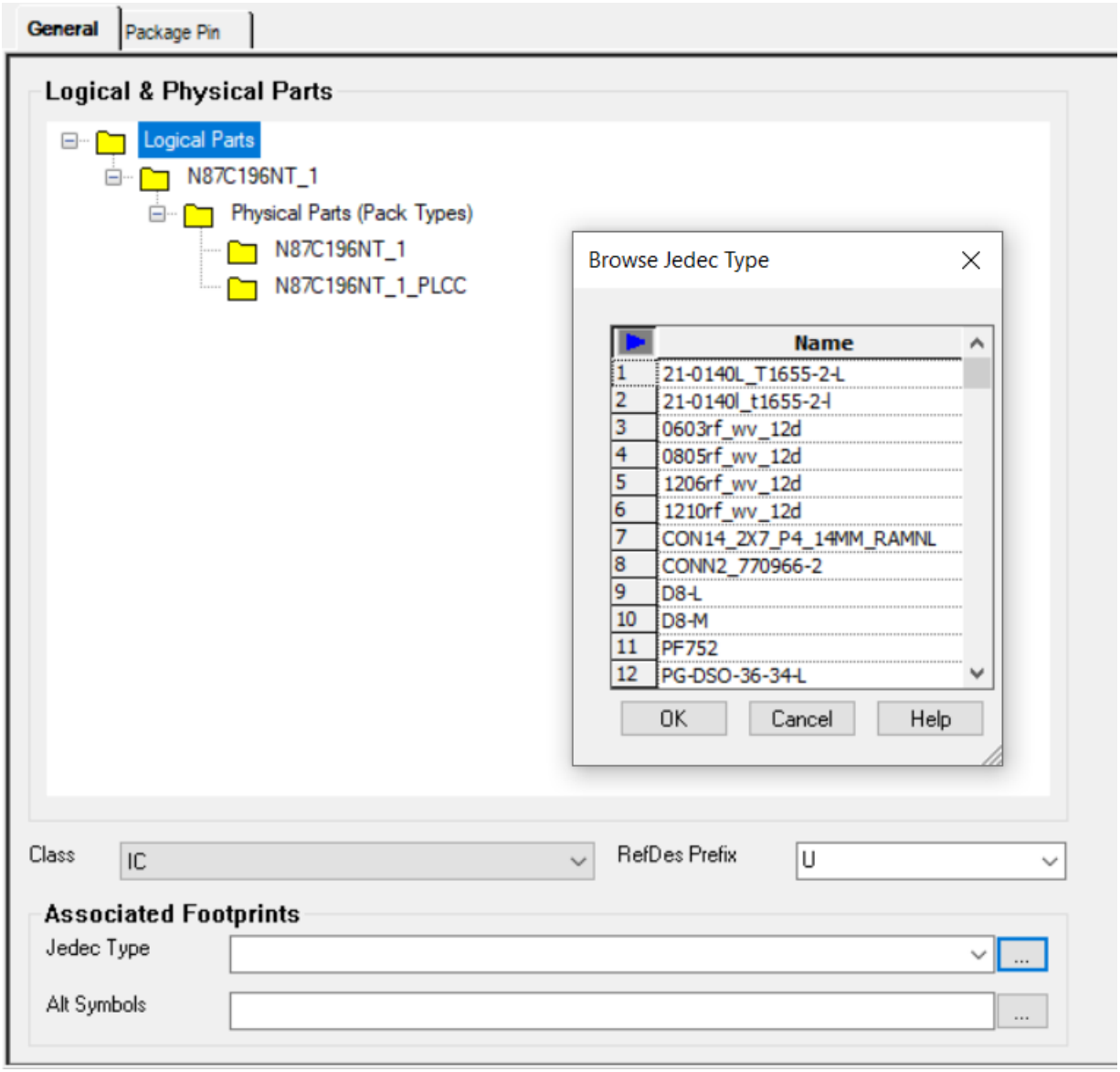
We will be using the second option to add the physical pins.

Specifying the Footprints

Specify the JEDEC_TYPE and ALT_SYMBOLS properties for the package.

1. Click on the *General* tab.
2. To specify the JEDEC_TYPE, click on the browse button next to the *Jedec Type* field in the *Associated Footprints* group box.

The *Browse Jedec Type* dialog box appears.



As you can see, this is a big list and you need to scroll down to get to the required data. To view only selected set of footprints, you can set filters.

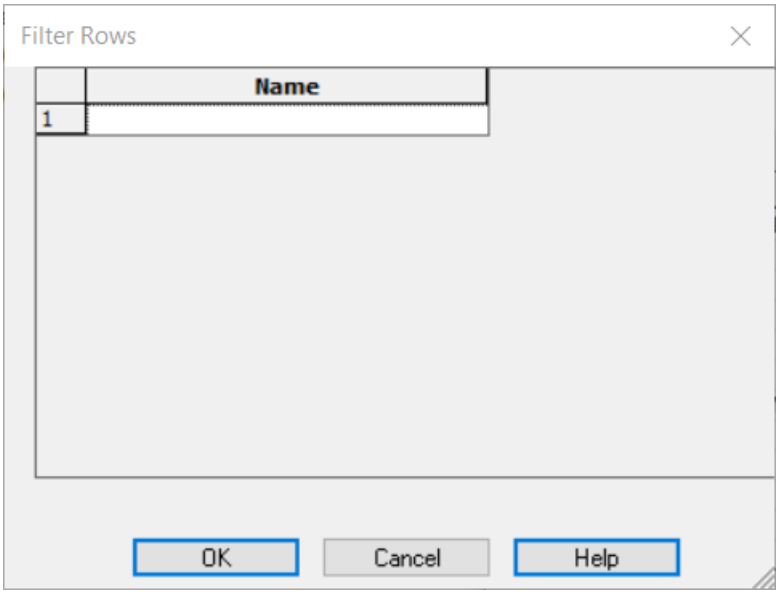
Important

Filters can be set in any of the grids, such as *Logical Pins*, *Physical Pins,* and so on.

Setting a Filter

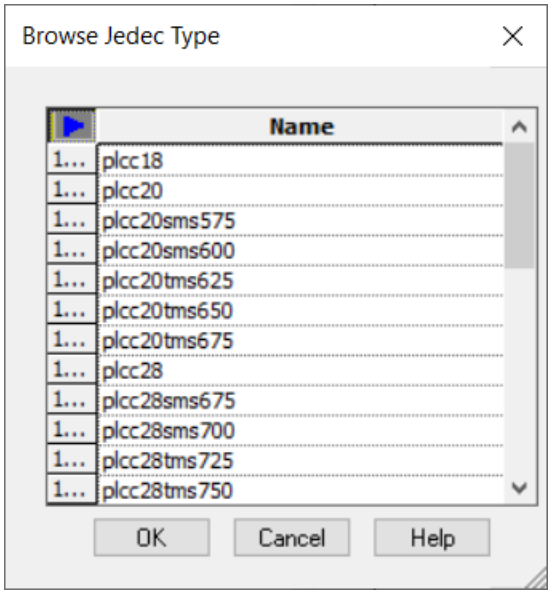
1. Right-click any one of the rows in the *Browse Jedec Type* dialog box and select *Filter Rows*.

   The Filter Rows dialog box appears.



2. Enter `PLCC*` in the *Name* column and click *OK*.

   The Browse Jedec Type dialog box displays only the PLCC footprints.



3. Select *plcc68* and click *OK*.
4. Similarly, select the Alt_Symbols for the part.

Note: To remove filter, you need to right-click the filtered grid and select the *Unhide All Rows* options.

Next, you will extract the physical pins from the footprint.

Entering Physical Pins

Task Overview

Extract physical pin information from the footprint.

Steps

1. Click on the *Package Pin* tab.

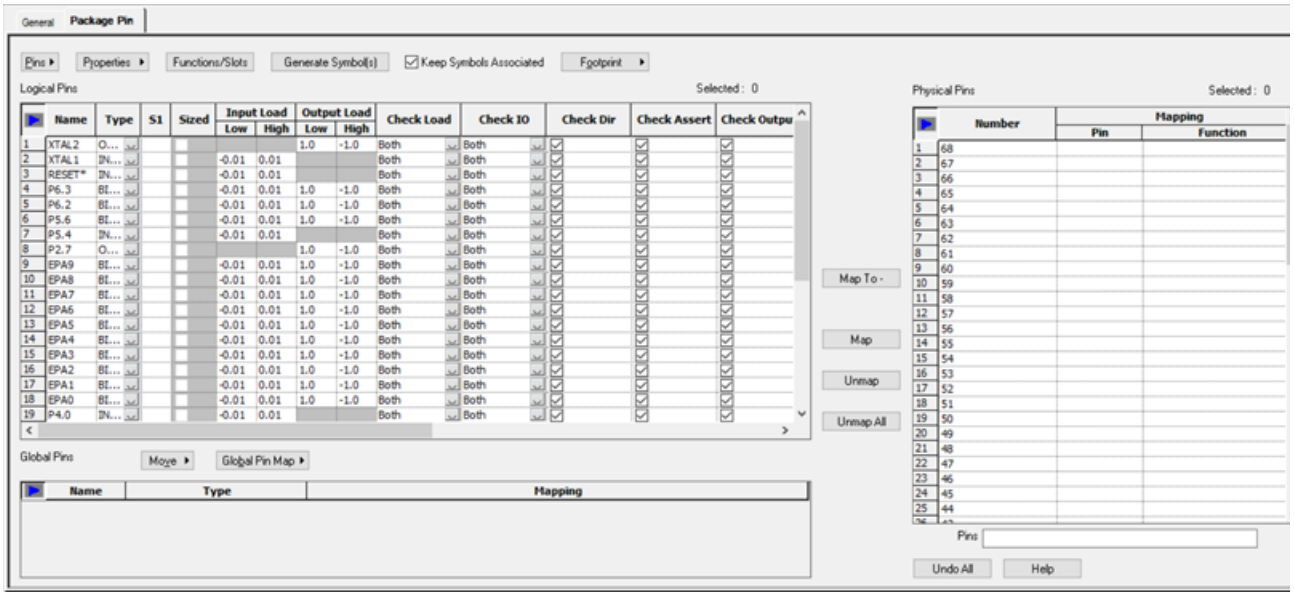
   The *Package Pin* tab appears.

2. Select *Footprint – Extract from Footprint*.

   The Part Developer message box appears. This message box states that all physical pins that exist in the package but are not available in the selected footprint will be deleted.

3. Because there are no existing physical pins, click *Yes*.

The physical pins get extracted from the footprint and appear in the *Physical Pins* grid. Note that the pin numbers are not sorted.



4. To sort the physical pins, click on the *Number* column heading.

   Note that the power pins are listed in the *Logical Pins* grid. This implies that when a symbol is generated from the package, the power pins will be visible in the symbol. To avoid that, you need to move the pins to the *Global Pins* grid. The pin types that are considered global pins are as follows:

   - ❑ POWER
   - ❑ GROUND
   - ❑ NC

Moving Pins from Logical Pins to Global Pins

Task Overview

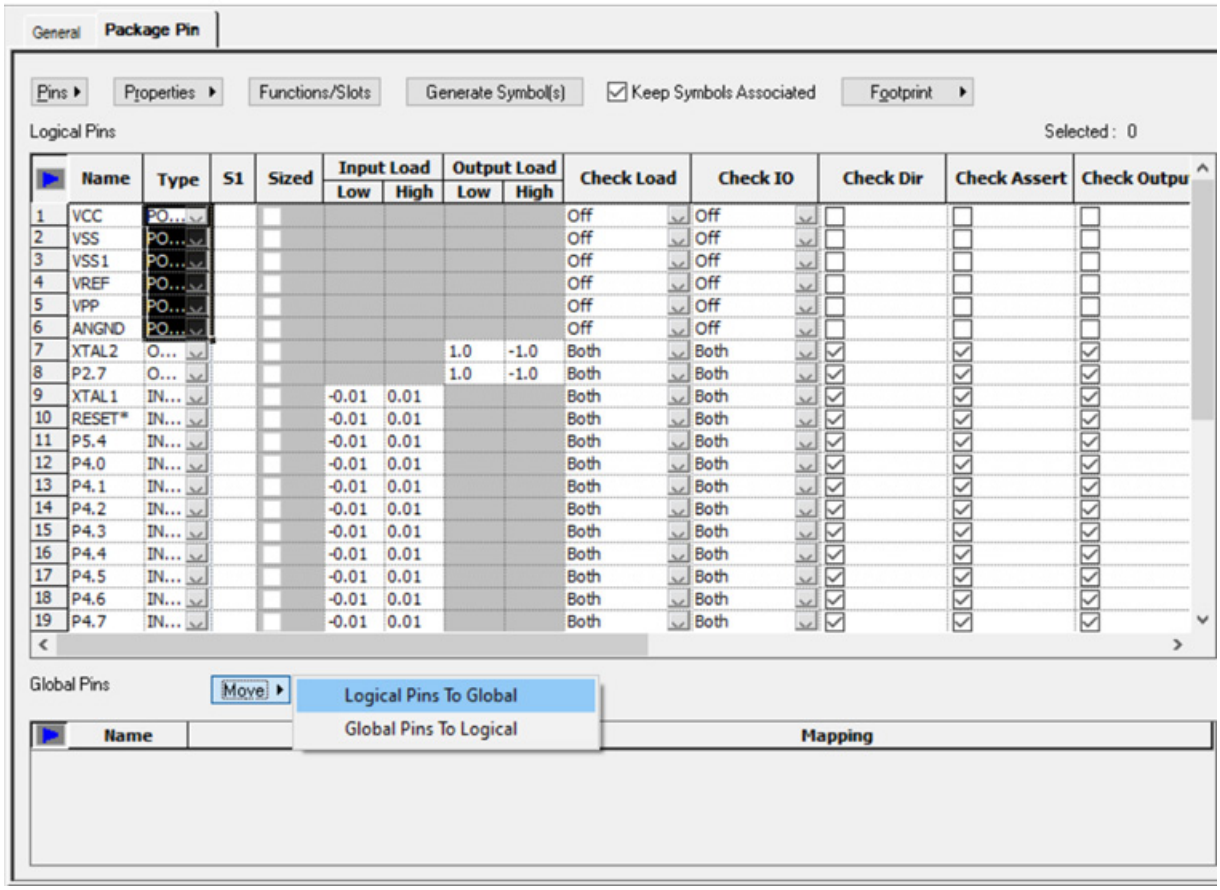
Move the power pins to the *Global Pins* grid.

Steps

1. Click on the *Type* heading to sort the pins by their type.

2. Select all the power pins and select *Move – Logical Pins to Global*.

   The selected power pins move to the *Global Pins* grid.



Next, you need to do the logical-to-physical and global-to-physical pin mapping.

Pin Mapping

Task Overview

Do logical-to-physical and global-to-physical pin mappings.

Steps

The general method to map physical pins with logical pins is to select the slots in which the logical pins are present and then select the pins from the *Physical Pins* list, and click *Map*. The mapping is done in the order in which the logical and physical pins were selected.

Because n87c196nt is a flat part, there is only one slot. Therefore, for all the pin mappings will be done for the slot S1.

For global-to-physical pin mapping, you need to select the required global pins and corresponding physical pins, and click *Map*. It is possible to map one global pin to more than one physical pin.

1. As per the datasheet, physical pin 1 is mapped to logical pin P5.4. Therefore, select *1* in the *Physical Pins* list and slot S1 for logical pin *P5.4* in the *Logical Pins* list, and click *Map*.

   The physical pin 1 is mapped to the logical pin P5.4.

   Next, we will map multiple pins in a single step.

2. Select the slots next to pins P5.6, P5.1, and P5.0 and then select physical pins 2,3, and 4 and click *Map*. The pins get mapped in the order in which the slots were selected.

   The next two physical pins are mapped to power pins.

Important

Unlike logical pins, global pin mapping can be done for only one pin at a time. This is because one global pin can be mapped to multiple physical pins.

3. Select *VSS* in the *Global Pins* grid and 5 in the *Physical Pins* grid and click *Map*.

   As you do the pin mappings, the logical and the physical pins grid will keep getting filled up. This can be disconcerting when dealing with a large number of pins. Using an RMB option, you can configure Part Developer to hide the mapped pins.

Hiding Mapped Pins

Task Overview

Hide the mapped pins.

Steps

1. Right-click the *Logical Pins* grid and select *Hide Mapped Pins*.
2. Right-click the *Physical Pins* grid and select *Hide Mapped Pins*.

   The mapped pins are hidden from the *Logical* and *Physical Pins* grids. You may do this as many number of times as required.

Important

The first header of a grid provides a visual indication of whether all the rows and columns are displayed in the grid. If all the rows/columns are visible, the filter viewer appears in blue. In case some rows and columns are hidden, the viewer appears in green.

Continuing Pin Mapping

1. Complete the pin mapping by following the methods mentioned above.
2. Save the part.

   Next, you will create the symbol.

Creating Symbols

A symbol represents a unique function group in a package. There are multiple ways to create symbols for a package.

1. Use the *Generate Symbols* pop-up menu option in the cell tree on the package name or the function group.
2. Use the *Generate Symbol(s)* button on the *Package Pin* tab of the Package Editor.

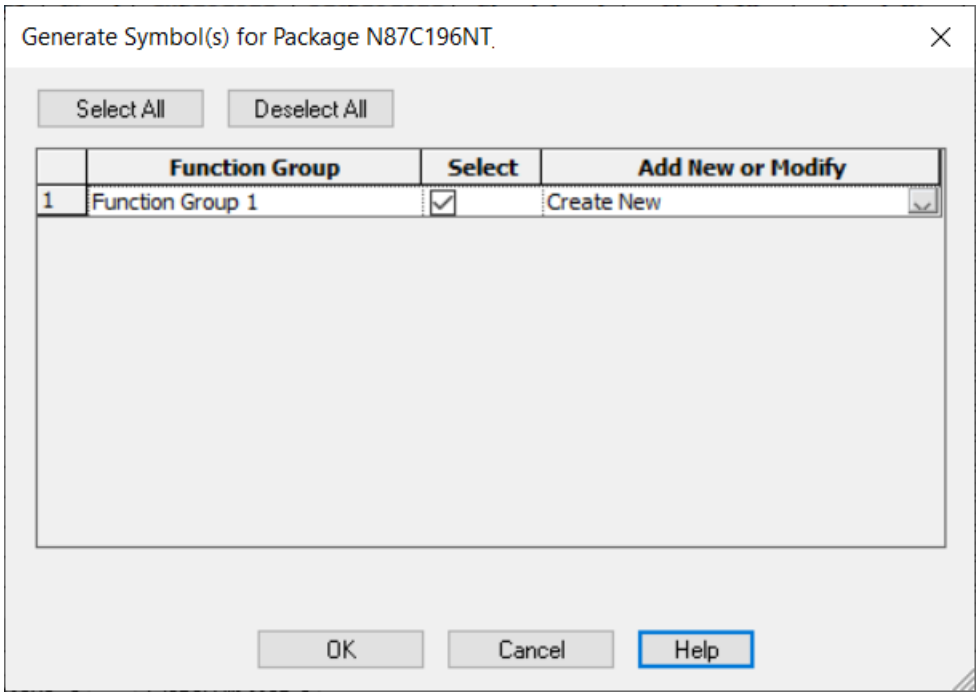
Task Overview

Create the symbol using the *Generate Symbol(s)* button in the *Package Pin* tab of the Package Editor.

Steps

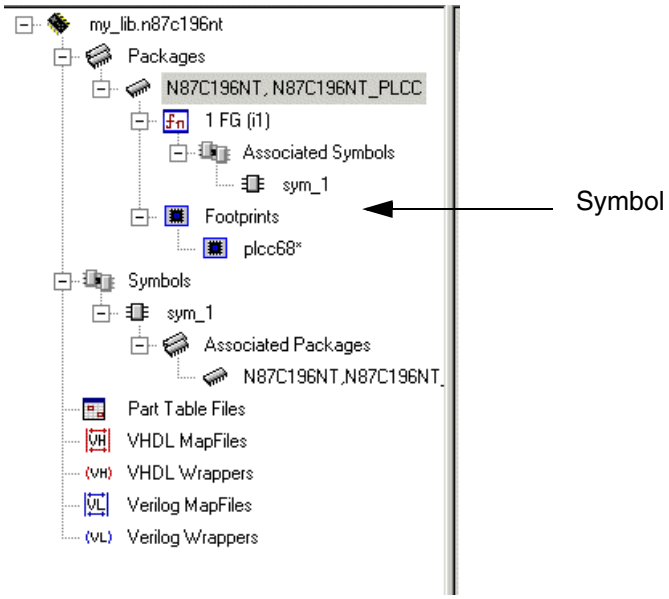
1. Click *Generate Symbol(s)*.

The Generate Symbol(s) for Package N87C196NT dialog box appears.



2. Click *OK*.

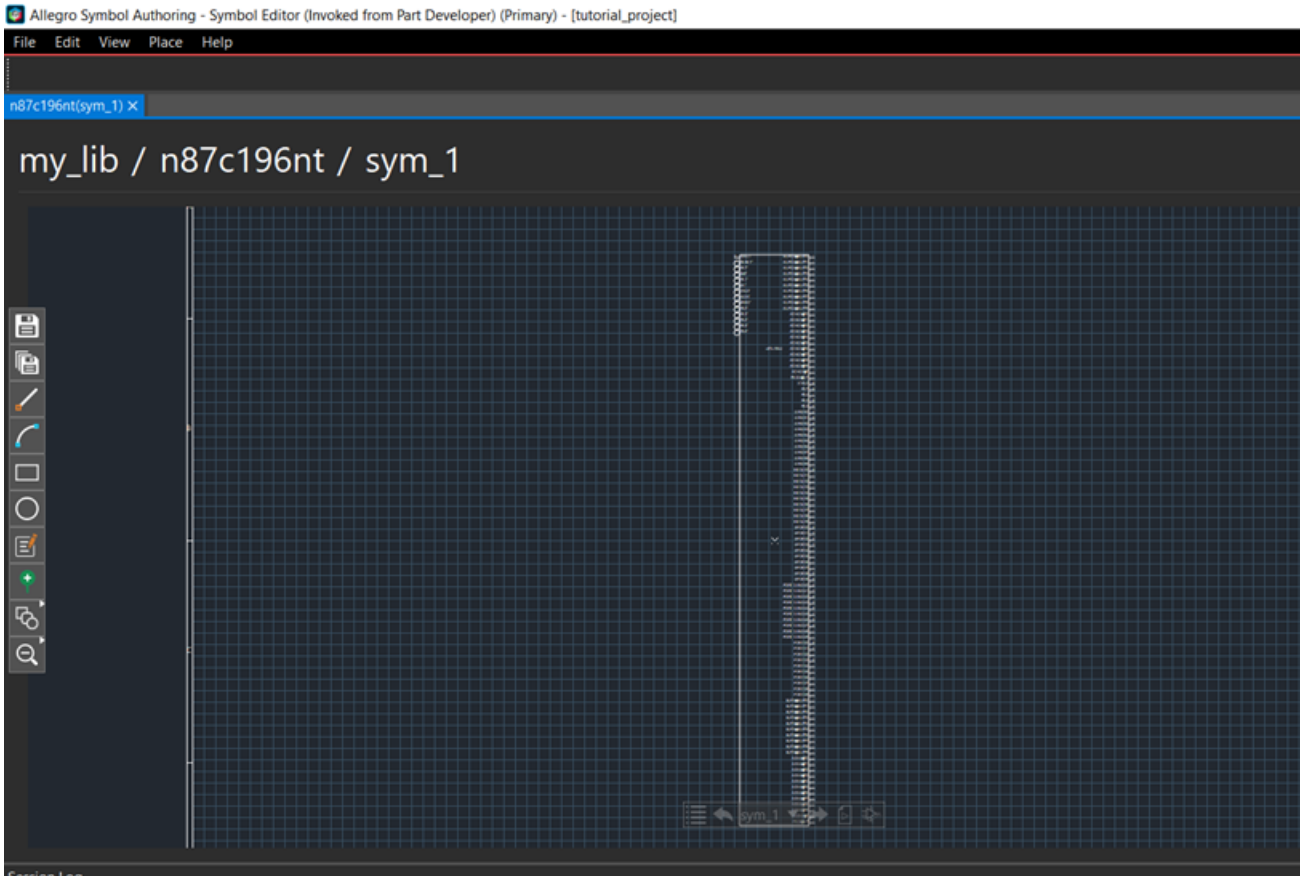
The symbol is created and appears in the cell tree.



3. To view the symbol, right-click *sym_1* and choose *Edit(In Symbol Editor)* from the pop-up menu.

You can also open the symbol in Symbol Editor by selecting sym_1 and then clicking *Edit in Symbol Editor* in the *Symbol Pins* tab.

The *Symbol Editor* window is displayed with the symbol layout on the canvas.



Summary

This completes the task of creating a single-slot flat part.

4

Creating Parts from CSV Files

Objective

To become familiar with the steps in creating parts by importing data from a CSV file.

In this section, you will:

- Understand the CSV file format from which data can be imported into Part Developer
- Import data from a CSV file

Overview

Part Developer can import part information stored in a comma-separated value (.csv) file and create packages and symbols from it.

The entries in the CSV file must be in the name-value pair format.

By default, the following header keywords are supported:

- package_name
- assertion_char
- assertion
- jedec_type
- pin_name
- pin_number
- pin_type
- pin_location
- pin_position

- load_setupfile
- symbol
- pin_shape
- diff_pair_pins_pos
- diff_pair_pins_neg

Important

The minimum of headers required are as follows:

- `pin_name` and `pin_number` for flat parts
- `pin_name`, `pin_number`, and `symbol` for multi-section parts

Important

If required, you can change the header keywords according to your specifications. See the *Configuring the Predefined Headers for CSV Import* section in the *Advanced Tasks* section in the *Part Developer User Guide*.

The CSV File Format

The package and symbol information is determined in the following way:

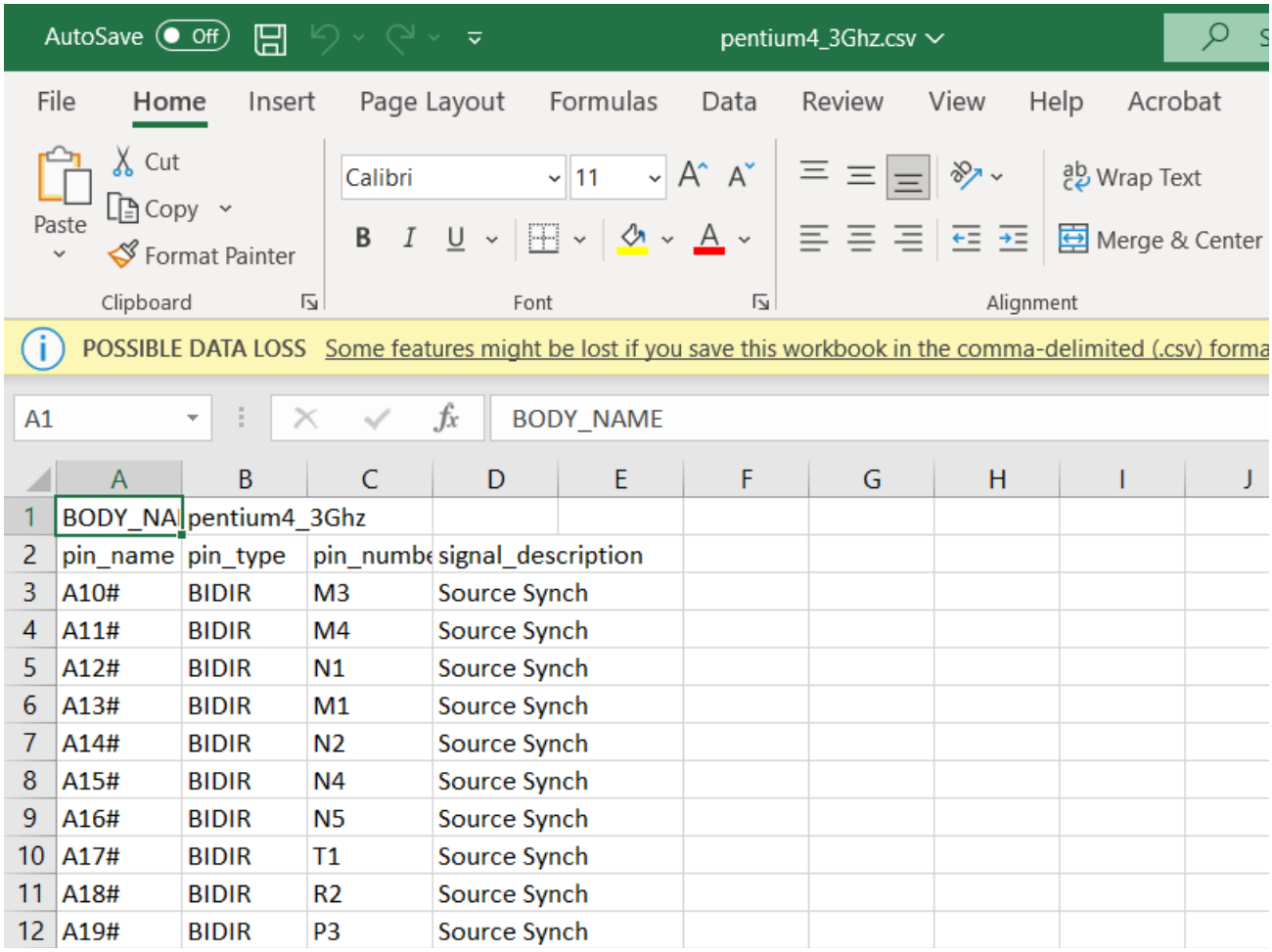
- The `package_name` entry is used to derive the name of the package. If this entry is missing, the cell name is used for the package name. You can create equivalent packages (aliases) by specifying comma-separated values, such as 7400_DIP, 7400_CCC, and so on.
- The `assertion_char` entry is used to determine which pins will be treated as low-asserted. If this entry is present, the values specified in the *Read/Write* and *Additonal Read* fields in *Setup* are ignored.
- The `assertion` entry is used to determine whether a pin is low-asserted or not. The values that will determine the low assertion are specified using the `Import_Csv_LowassertFlag` directive. By default, the values `L` and `Low` are specified.
- The `jedec_type` entry is used to determine the value of the JEDEC_TYPE property.
- The `load_setupfile` entry is used to determine the location of the project file from which to read the setup values. The setup values of the current project will be ignored.

- Entries under the `pin_name` column are used as pin names.
- Entries under the `pin_number` column are used as pin numbers.
- Entries under the `pin_type` column are used as pin types.
- Entries under the `output_load` column are used as the output load values for a pin type.
- Entries under the `pin_location` column are used to determine the pin location for specific pin types.
- Symbols are created only if the symbol entry is present in the header line that describes the pins.
- Entries under the `pin_position` field determines the position of the pin from the origin. This will appear as the value of the *Position* property in the Symbol Editor.
- All name-value pair entries before the `pin_number`, `pin_name`, `pin_type`, and `symbol` headings are imported as additional package properties.

Importing Data from a CSV File

The `pentium4_3Ghz.csv` file in the `<your_inst_dir>/doc/pdv_tut/tutorial_data/datasheets` location will be used in this section to demonstrate the steps involved in importing data from a CSV file.

A part of the CSV file is displayed below:



	A	B	C	D	E	F	G	H	I	J
1	BODY_NA	pentium4_3Ghz								
2	pin_name	pin_type	pin_numbe	signal_description						
3	A10#	BIDIR	M3	Source Synch						
4	A11#	BIDIR	M4	Source Synch						
5	A12#	BIDIR	N1	Source Synch						
6	A13#	BIDIR	M1	Source Synch						
7	A14#	BIDIR	N2	Source Synch						
8	A15#	BIDIR	N4	Source Synch						
9	A16#	BIDIR	N5	Source Synch						
10	A17#	BIDIR	T1	Source Synch						
11	A18#	BIDIR	R2	Source Synch						
12	A19#	BIDIR	P3	Source Synch						

As displayed, the CSV file has the following fields:

- pin_name
- pin_type
- pin_number
- a pin property called signal_description

  Note: The `signal_description` property is not used by any downstream tools. It has been used in the tutorial to demonstrate some of the features of Part Developer.

You will now import the CSV file and create the part.

Task Overview

Import the pentium3_4GHz.csv file into Part Developer. The cell to be created is `pentium3_4GHz` in the `my_lib` folder.

Steps

1. Choose *File – Import and Export*.

   The Import and Export wizard appears.

2. Choose *Import Comma Separated Value (.csv) file* and click *Next*.

   The Select Source page appears.

3. Browse to the <*your_work_area*>`/tutorial_data/datasheets` location and open the `pentium4_3GHz.csv` file.

4. Click *Next*.

   The *Select Destination* page appears. The names of the cell and destination library are seeded by default. The name of the cell is the same as that of the CSV file.

5. Select `my_lib` in the *Select the destination Library* field.

6. Click *Next*.

   The *Preview of Import Data* page appears. This page gives you a preview of the part that is being created from the CSV data.

7. Click *Finish*.

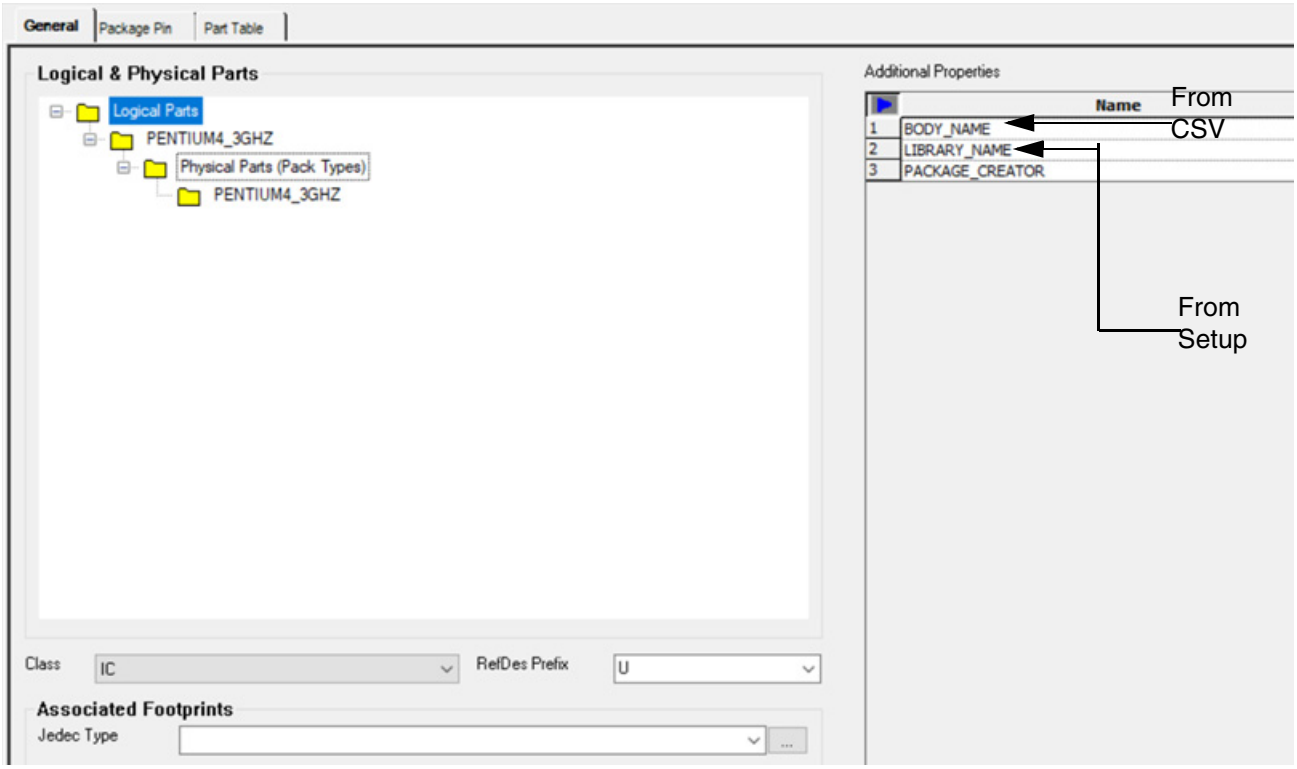
   The part is created and loaded in the Cell Editor.

8. Select the *PENTIUM4_3GHZ* package in the cell tree.

   The Package Editor loads the package.

9. Click on the *General* tab.

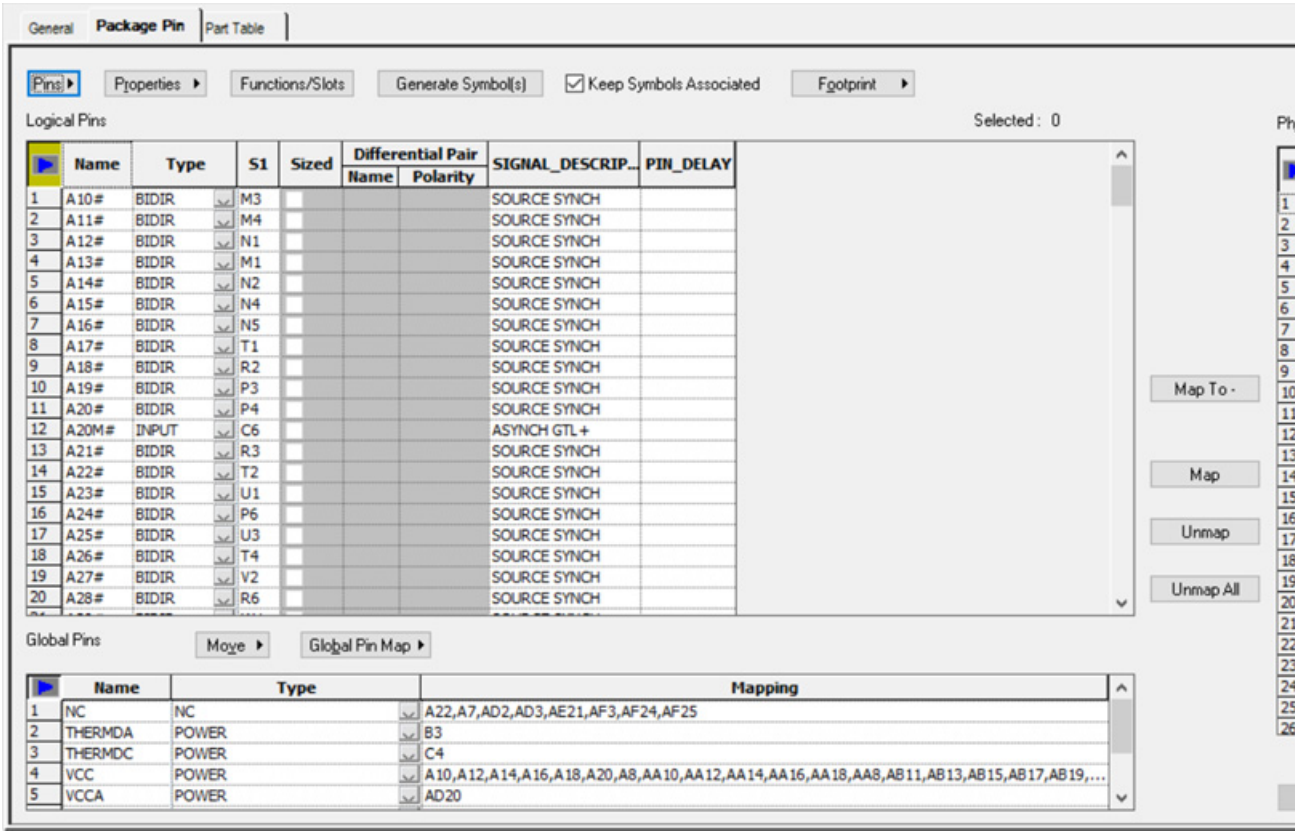
The *General* tab appears.



Note that the `BODY_NAME` entry in the CSV file appears as a package property. Also Note that the `LIBRARY_NAME` and `PACKAGE_CREATOR` properties, which were added in Setup in the previous section, also get added to the package.

10. Click on the *Package Pin* tab.

The *Package Pin* tab appears.

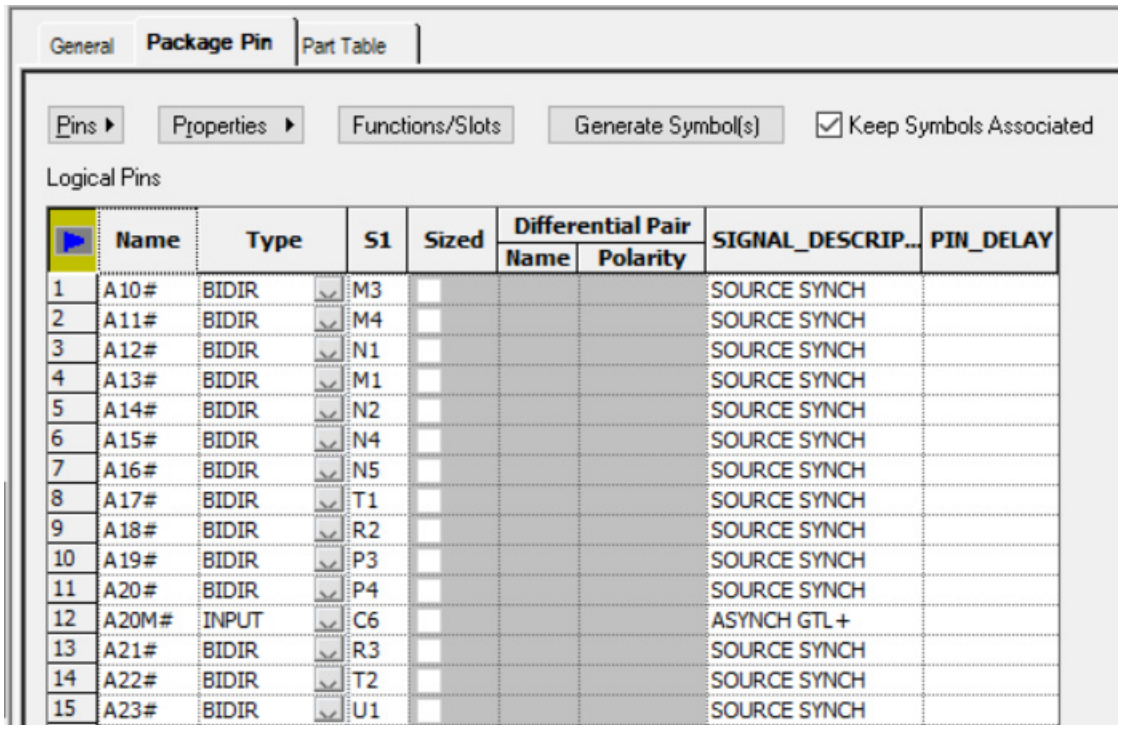


Note that the pin names, types, and mappings are added as specified in the CSV file.

Next, you will ensure that the `SIGNAL_DESCRIPTION` pin property has also been added.

11. Right-click anywhere in the *Logical Pins* grid and select *Hide Load Cols*.

The load columns get hidden, and you can see the SIGNAL_DESCRIPTION property.



	Name	Type	S1	Sized	Differential Pair		SIGNAL_DESCRIP...	PIN_DELAY
					Name	Polarity		
1	A10#	BIDIR	M3				SOURCE SYNCH	
2	A11#	BIDIR	M4				SOURCE SYNCH	
3	A12#	BIDIR	N1				SOURCE SYNCH	
4	A13#	BIDIR	M1				SOURCE SYNCH	
5	A14#	BIDIR	N2				SOURCE SYNCH	
6	A15#	BIDIR	N4				SOURCE SYNCH	
7	A16#	BIDIR	N5				SOURCE SYNCH	
8	A17#	BIDIR	T1				SOURCE SYNCH	
9	A18#	BIDIR	R2				SOURCE SYNCH	
10	A19#	BIDIR	P3				SOURCE SYNCH	
11	A20#	BIDIR	P4				SOURCE SYNCH	
12	A20M#	INPUT	C6				ASYNCH GTL+	
13	A21#	BIDIR	R3				SOURCE SYNCH	
14	A22#	BIDIR	T2				SOURCE SYNCH	
15	A23#	BIDIR	U1				SOURCE SYNCH	

12. Choose *File – Save* to save the part.

Summary

In this section, you learned about importing data from a CSV file to create a part.

5

Creating Split Parts

Objective

To become familiar with the steps in creating split parts.

In this section, you will learn:

- About the methodology for creating split parts
- How to create a split part by adding multiple slots
- How to create symbols for each slot

Overview

Parts are typically split for reasons such as:

- To reflect the way part functionality is used in a schematic.
- To display large pin-count parts better.

Methodology for Creating Split Parts

The following methodology should be followed for creating split parts:

1. Decide whether to use the SPLIT_INST and $LOCATION properties or the SPLIT_INST_NAME property for the split part.
2. Create the package with a single slot.
3. Do the logical-to-physical pin mapping for the first slot.
4. Create the necessary slots.
5. Distribute the pins across the slots.

The advantages of the above method are:

- It is easy to do mappings for a single slot.
- After distributing the pins, the slots that are left unmapped are automatically marked as -. This results in the pin number 0 getting added in `chips.prt` to the slots where the logical pin is not present.

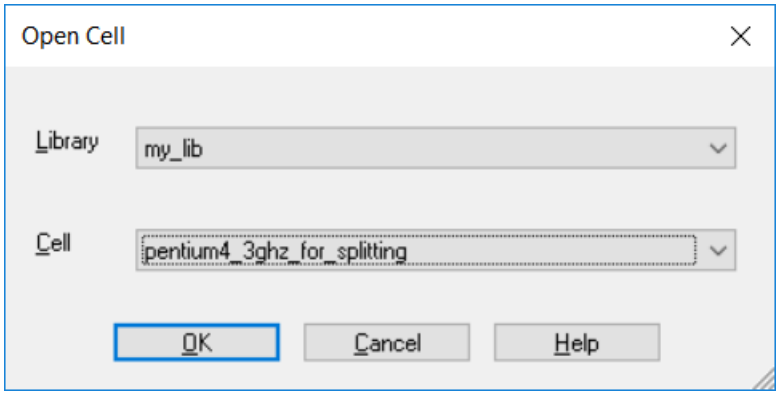
Task Overview

Split the `pentium4_3GHz _for_splitting` part in the `my_lib` library into four parts and create symbols for each part. Each slot should have 50 pins each.

Steps

1. Choose *File – Open – Cell*.

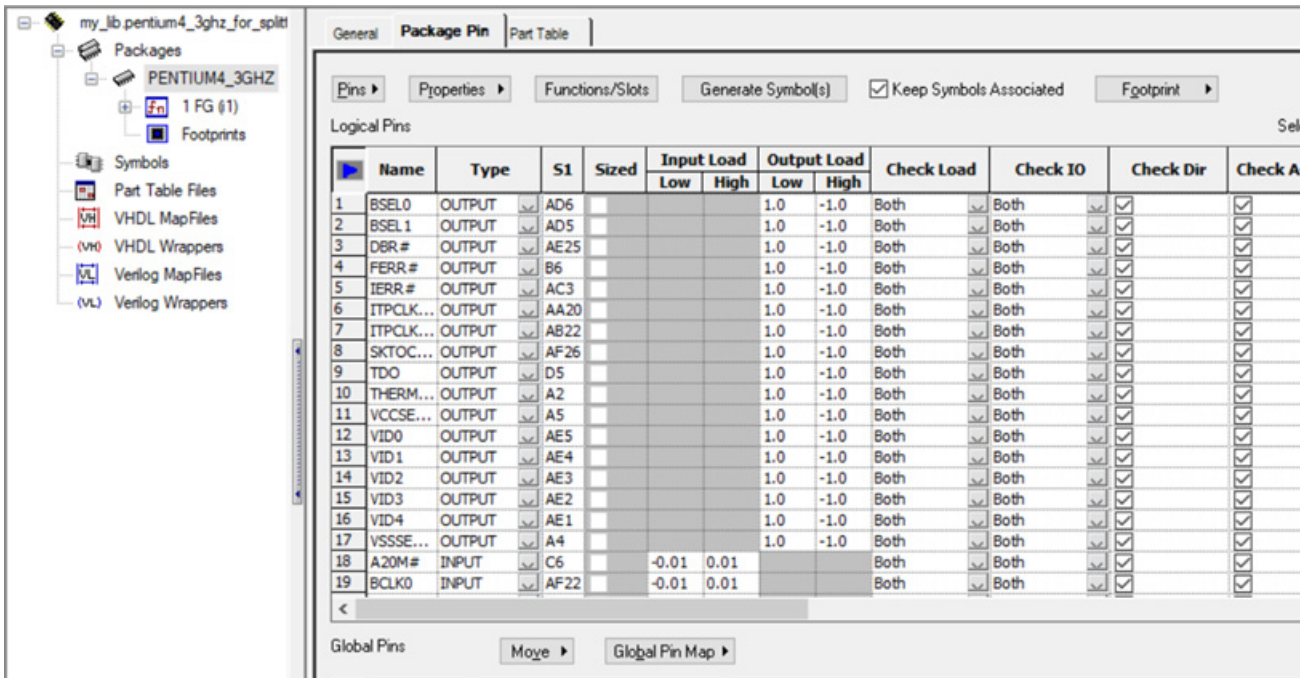
   The Open Cell dialog box appears.



2. Select `pentium4_3GHz _for_splitting` from the *Cell* drop-down list.
3. Click *OK*.

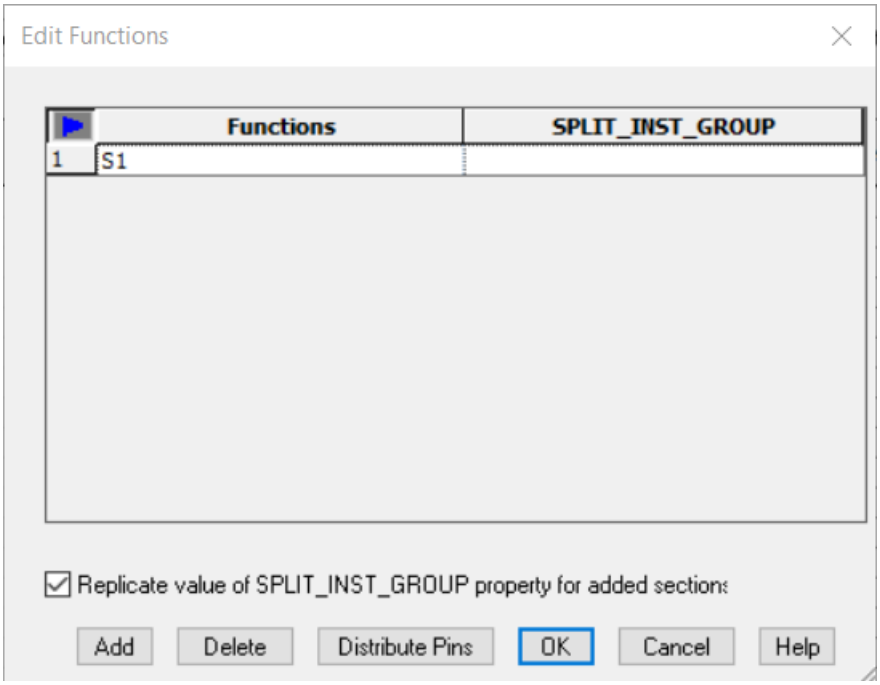
   The part `pentium4_3GHz _for_splitting` loads in the Cell Editor.

4. Select the *PENTIUM4_3GHZ* entry under *Packages* in the cell tree.



5. Click *Functions/Slots*.

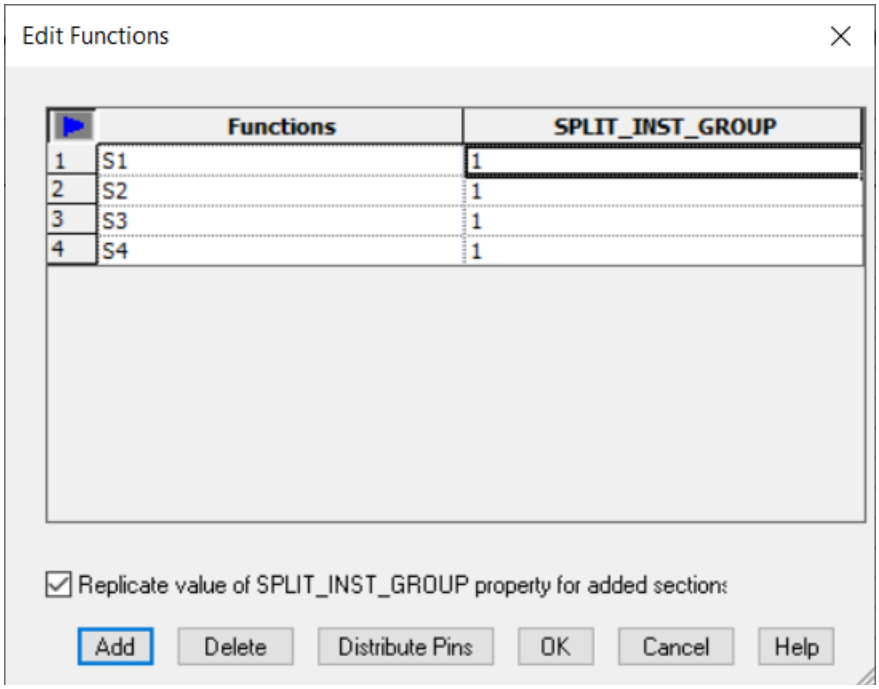
The *Edit Functions* dialogbox appears.



6. Enter `1` in the *SPLIT_INST_GROUP* field. The SPLIT_INST_GROUP property is used for split parts. The value enables Part Developer to determine which slots of a split part combine to form one logical group.
7. To add more slots, click *Add*.

   The *Specify the number of slots* dialog box appears.
8. To create three more slots, type `3` in the *Slot Count* field and click *OK*.

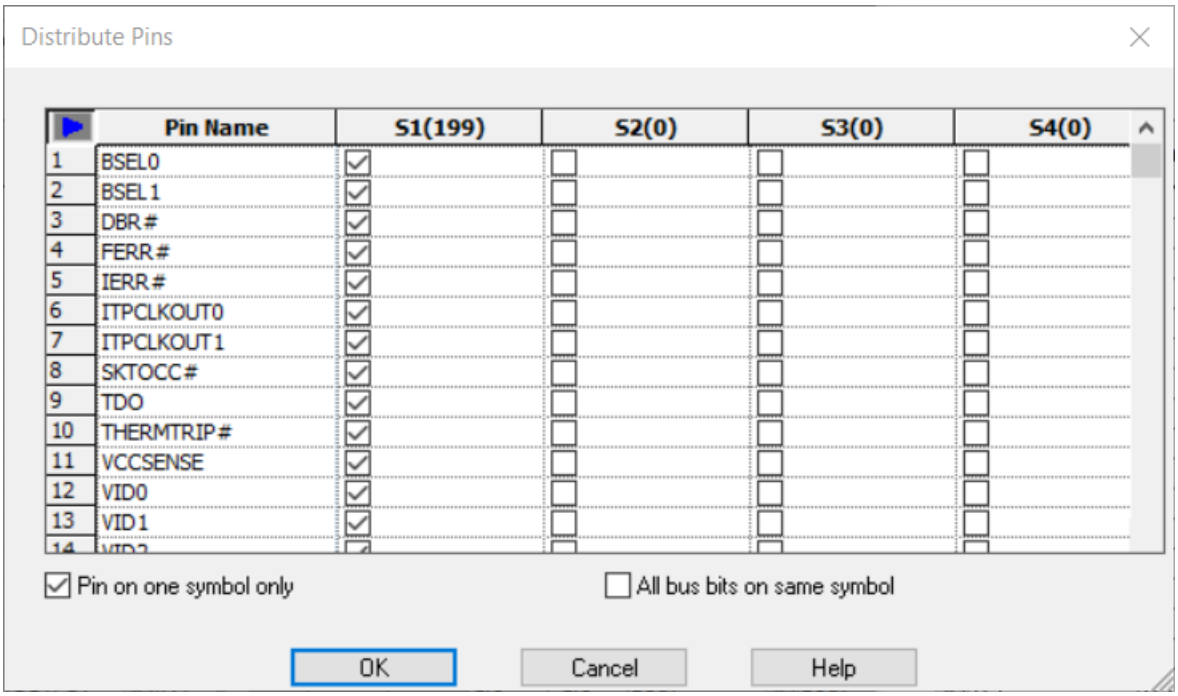
   PDV adds four slots to the *Edit Functions* dialog.



Next, you need to distribute the pins across the four slots.

9. Click *Distribute Pins*.

The *Distribute Pins* dialog appears.

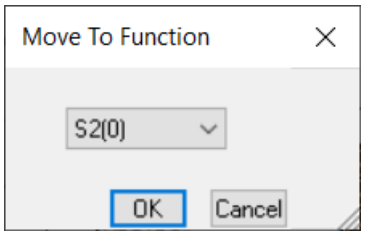


By default, all the 199 logical pins are present in the first slot. You need to distribute these pins across the four slots.

10. Select the cells 51-100 under S1.

11. right-click the selection and choose *Move To*.

The *Move To Function* dialog box appears.

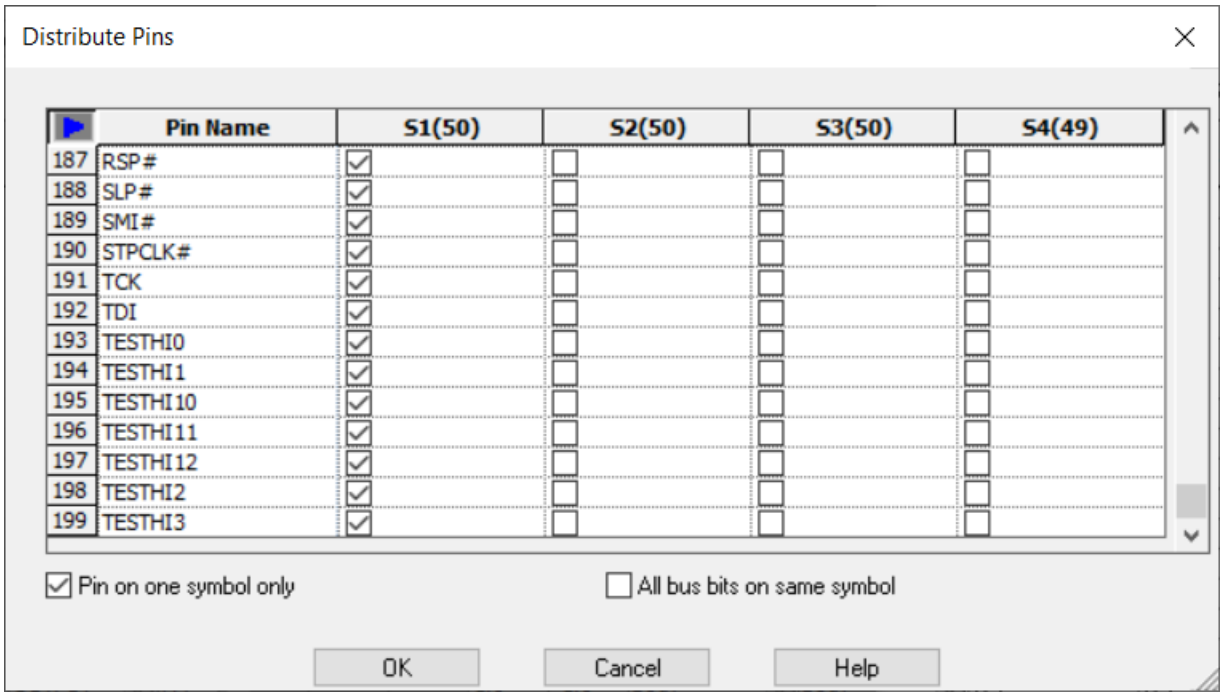


This dialog box displays all the slots other than the slot from which it has been called.

12. Select the slot S2 and click *OK*.
The selected pins are moved to the second slot S2.

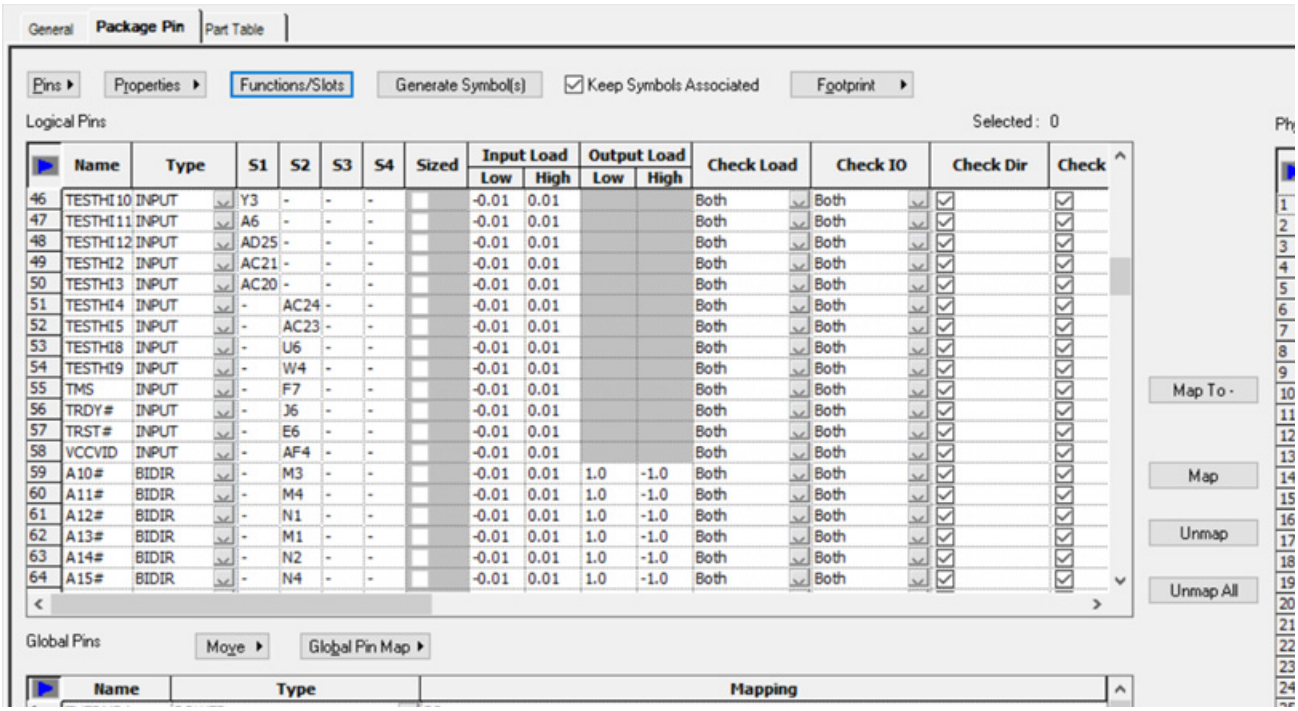
13. Similarly, move pins 101-150 and pins 151-199 to the third and fourth slots, respectively.

After all the pins are distributed, the *Distribute Pins* dialog should appear as follows:



14. Click *OK*.

The pins are distributed across the four slots. The slots in which a logical pin is not present is mapped to –.



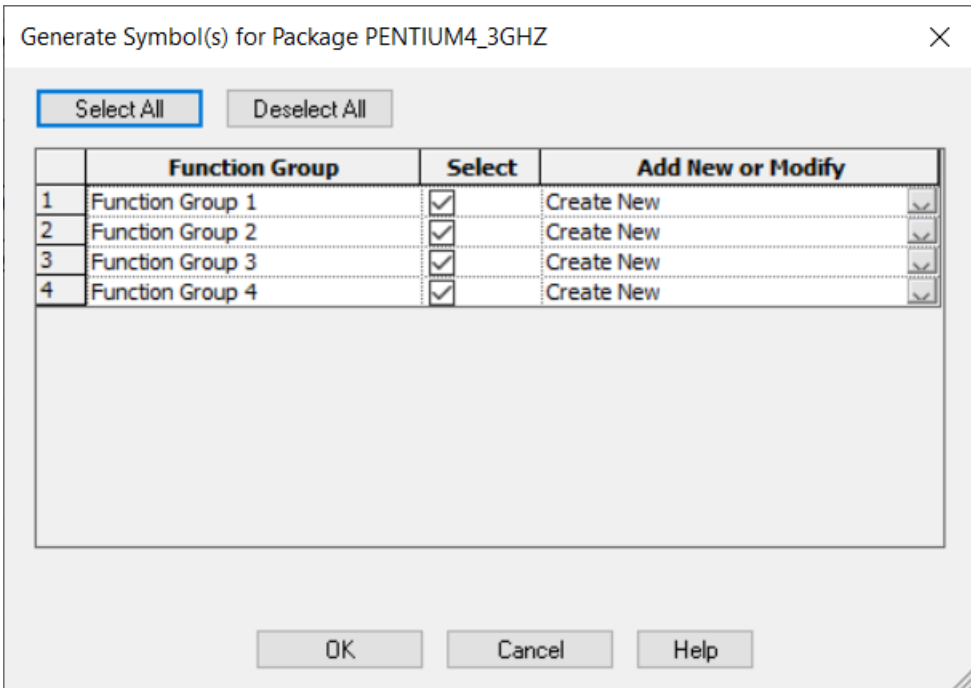
	Name	Type	S1	S2	S3	S4	Sized	Input Load Low	Input Load High	Output Load Low	Output Load High	Check Load	Check IO	Check Dir	Check
46	TESTHI10	INPUT	Y3	-	-	-		-0.01	0.01			Both	Both		
47	TESTHI11	INPUT	A6	-	-	-		-0.01	0.01			Both	Both		
48	TESTHI12	INPUT	AD25	-	-	-		-0.01	0.01			Both	Both		
49	TESTHI2	INPUT	AC21	-	-	-		-0.01	0.01			Both	Both		
50	TESTHI3	INPUT	AC20	-	-	-		-0.01	0.01			Both	Both		
51	TESTHI4	INPUT	-	AC24	-	-		-0.01	0.01			Both	Both		
52	TESTHI5	INPUT	-	AC23	-	-		-0.01	0.01			Both	Both		
53	TESTHI8	INPUT	-	U6	-	-		-0.01	0.01			Both	Both		
54	TESTHI9	INPUT	-	W4	-	-		-0.01	0.01			Both	Both		
55	TMS	INPUT	-	F7	-	-		-0.01	0.01			Both	Both		
56	TRDY#	INPUT	-	J6	-	-		-0.01	0.01			Both	Both		
57	TRST#	INPUT	-	E6	-	-		-0.01	0.01			Both	Both		
58	VCCVID	INPUT	-	AF4	-	-		-0.01	0.01			Both	Both		
59	A10#	BIDIR	-	M3	-	-		-0.01	0.01	1.0	-1.0	Both	Both		
60	A11#	BIDIR	-	M4	-	-		-0.01	0.01	1.0	-1.0	Both	Both		
61	A12#	BIDIR	-	N1	-	-		-0.01	0.01	1.0	-1.0	Both	Both		
62	A13#	BIDIR	-	M1	-	-		-0.01	0.01	1.0	-1.0	Both	Both		
63	A14#	BIDIR	-	N2	-	-		-0.01	0.01	1.0	-1.0	Both	Both		
64	A15#	BIDIR	-	N4	-	-		-0.01	0.01	1.0	-1.0	Both	Both		

Name	Type	Mapping

Next, you will create the symbols for the four slots.

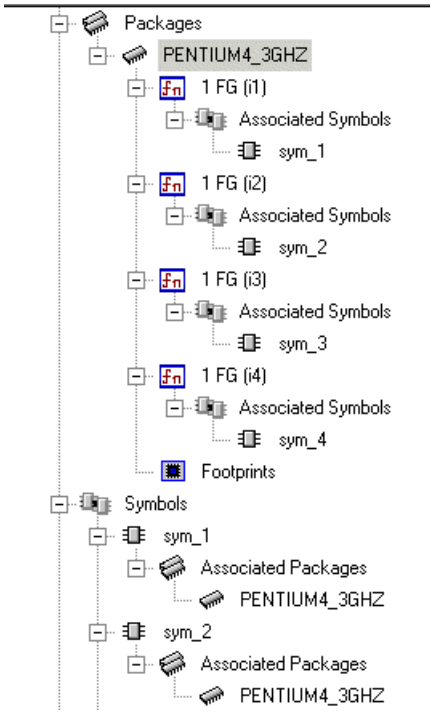
15. Click *Generate Symbol(s)*.

The *Generate Symbol(s) for Package PENTIUM4_3GHZ* dialog box appears.



16. To create symbols for all functions, click *OK*.

The symbols are created for all the function groups.



17. Choose *File – Save* to save the part.

Summary

In this section, you learned how to create split parts.

6

Creating Parts from PDFs

Objective

To become familiar with the steps involved in creating parts from PDFs.

In this section, you will learn to:

- Enter pin information directly from a PDF file to the *Logical Pins* grid in the Package Editor.
- Use a spreadsheet to manipulate pin information and then use it to create parts.

Overview

Part Developer helps you create parts from datasheets available in the PDF format. From the datasheet, you can do a text-copy of pin information and paste directly into the *Logical Pins* grid and the *Physical Pins* grid.

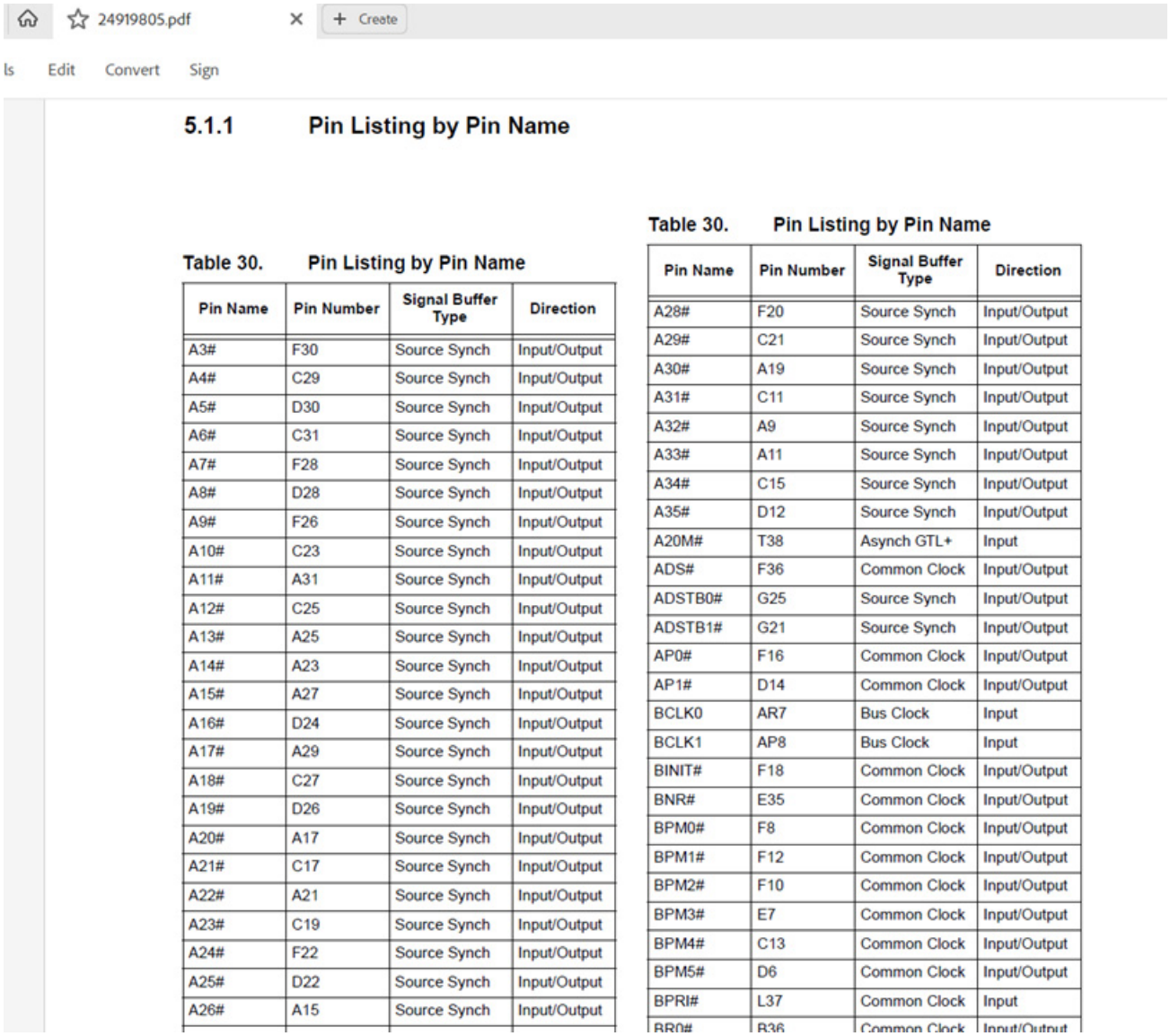
Creating Parts from PDFs

Task Overview

Create the part from the Pentium datasheet (`24919805.pdf`) located in `<your_inst_dir>/doc/pdv_tut/tutorial_data/datasheets`.

Pentium Datasheet

Given below is the relevant portion from the datasheet of the Pentium processor. The pin list is displayed partially.



Pin Name	Pin Number	Signal Buffer Type	Direction
A3#	F30	Source Synch	Input/Output
A4#	C29	Source Synch	Input/Output
A5#	D30	Source Synch	Input/Output
A6#	C31	Source Synch	Input/Output
A7#	F28	Source Synch	Input/Output
A8#	D28	Source Synch	Input/Output
A9#	F26	Source Synch	Input/Output
A10#	C23	Source Synch	Input/Output
A11#	A31	Source Synch	Input/Output
A12#	C25	Source Synch	Input/Output
A13#	A25	Source Synch	Input/Output
A14#	A23	Source Synch	Input/Output
A15#	A27	Source Synch	Input/Output
A16#	D24	Source Synch	Input/Output
A17#	A29	Source Synch	Input/Output
A18#	C27	Source Synch	Input/Output
A19#	D26	Source Synch	Input/Output
A20#	A17	Source Synch	Input/Output
A21#	C17	Source Synch	Input/Output
A22#	A21	Source Synch	Input/Output
A23#	C19	Source Synch	Input/Output
A24#	F22	Source Synch	Input/Output
A25#	D22	Source Synch	Input/Output
A26#	A15	Source Synch	Input/Output

Table 30. Pin Listing by Pin Name

Pin Name	Pin Number	Signal Buffer Type	Direction
A28#	F20	Source Synch	Input/Output
A29#	C21	Source Synch	Input/Output
A30#	A19	Source Synch	Input/Output
A31#	C11	Source Synch	Input/Output
A32#	A9	Source Synch	Input/Output
A33#	A11	Source Synch	Input/Output
A34#	C15	Source Synch	Input/Output
A35#	D12	Source Synch	Input/Output
A20M#	T38	Asynch GTL+	Input
ADS#	F36	Common Clock	Input/Output
ADSTB0#	G25	Source Synch	Input/Output
ADSTB1#	G21	Source Synch	Input/Output
AP0#	F16	Common Clock	Input/Output
AP1#	D14	Common Clock	Input/Output
BCLK0	AR7	Bus Clock	Input
BCLK1	AP8	Bus Clock	Input
BINIT#	F18	Common Clock	Input/Output
BNR#	E35	Common Clock	Input/Output
BPM0#	F8	Common Clock	Input/Output
BPM1#	F12	Common Clock	Input/Output
BPM2#	F10	Common Clock	Input/Output
BPM3#	E7	Common Clock	Input/Output
BPM4#	C13	Common Clock	Input/Output
BPM5#	D6	Common Clock	Input/Output
BPRI#	L37	Common Clock	Input
BR0#	B36	Common Clock	Input/Output

Steps

There are two ways in which you can enter pin information into Part Developer:

- Directly into Part Developer

  This method requires you to individually copy the *Pin Name* and *Pin Number* columns in Part Developer and then manually update the pin type information.

- Copying into Excel/Star Office and then copying the information into Part Developer

This method provides the benefit of copying the entire pin name, type, and mapping information into Part Developer in a single step. The pin type information is also updated automatically.

Tip

Acrobat Reader 5.1 should be used to read the PDF files. It has a *Column Select* option, which ensures pin names that are copied from the PDF are pasted as individual pins in the pin grid. Copying pin information from earlier versions of Acrobat Reader results in all the pin names appearing as a single pin name in the *Logical Pins* grid. To fix this, use the *Edit – Paste Special(Grid) – Convert Whitespaces to NewLine* option when pasting data into Part Developer.

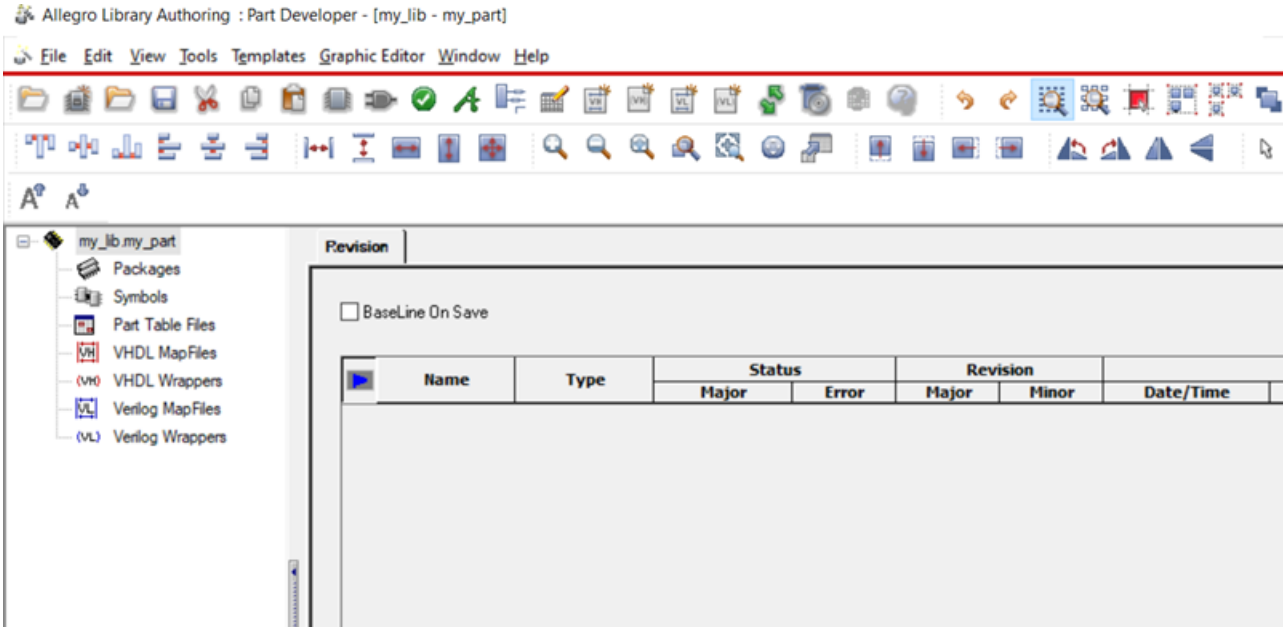
Directly into Part Developer

1. Open the datasheet in Acrobat Reader.
2. Press Alt and drag the mouse cursor vertically to select the *Pin Name* column from the *Pin Listing by Pin Name* table.
3. Press Ctrl + C.
4. Launch Part Developer.
5. Choose *File – Open Project*.

   Open Project dialog box appears.
6. Browse to `<your_work_area>/tutorial_data/library_project`, select the `tutorial_project.cpm` project file, and click *Open*.
7. Choose *File – New – Cell*.

   New Cell dialog box appears.
8. Select `my_lib` from the *Library* drop-down list.
9. Type `my_part` in the *Cell* field.

The part `my_part` appears in the Cell Editor.

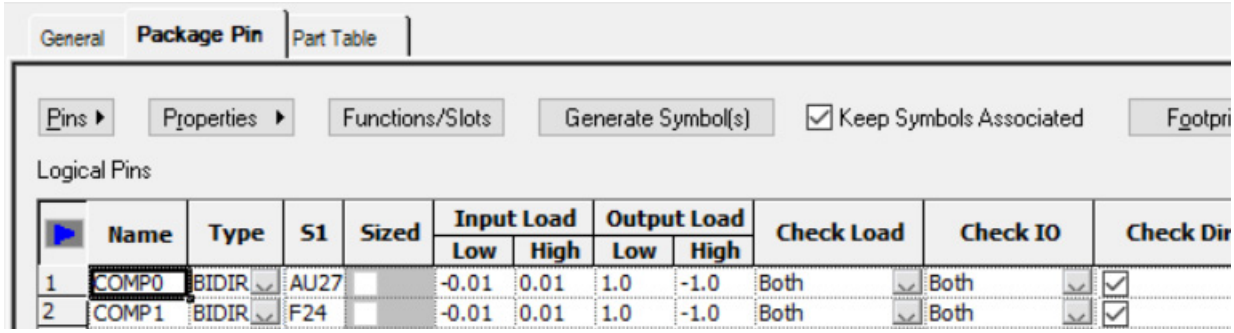


10. Right-click the *Packages* entry in the cell tree and select *New*.
11. Go to the *Package Pin* tab of the Package Editor.
12. Press Ctrl + I to insert a new row in the *Logical Pins* grid.
13. Select the empty cell under the *Name* column and press Ctrl + V to paste the pin names into the *Logical Pins* grid.
    The pin names appear under the *Name* column.

    Next, you need to copy the pin numbers that are mapped to the pin names.
14. Select the *Pin Number* column in the datasheet and press Ctrl + C.
15. Select the first cell under the *S1* column and press Ctrl + V.
    The physical pin numbers are copied into the *Logical Pins* grid. The *Physical Pins* grid is also updated automatically with the pin-mapping information.

    Next, you need to copy the direction information from the PDF into the Type column to determine the pin types. In case the direction is missing in the PDF, you will need to manually determine the pin type in Part Developer.
16. Select the *Direction* column in the datasheet and press Ctrl + C.
17. Select the first cell under the *Type* column and press Ctrl + V.

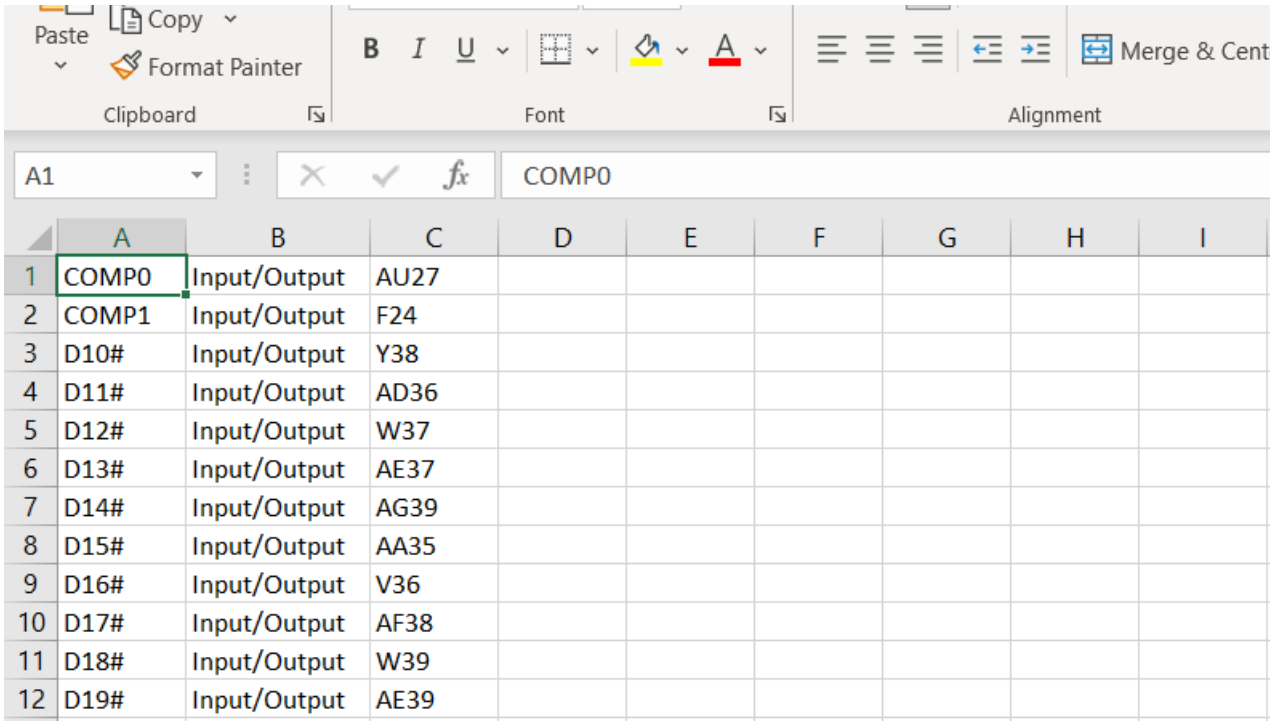
In the datasheet, the direction of the pins is specified as `Input/Output`. However, on copying, the pin type is changed to `BIDIR`. This automatic translation is handled through the entries in the `propfile.prop` file located at `<your_inst_dir>/share/cdssetup/LMAN`. For more information, see the *Advanced Tasks* section in *Part Developer User Guide.*



Copying First into Excel/Star Office and then into Part Developer

1. Open the datasheet in Acrobat Reader.
2. Select the *Column Select Tool* option.
3. Select the *Pin Name* column and press Ctrl + C.
4. Open an Excel or Star Office spreadsheet and press Ctrl + V to paste the data in the first column.
5. Next, copy the *Direction* and *Pin Number* columns and paste into the columns adjacent to the pin names column.

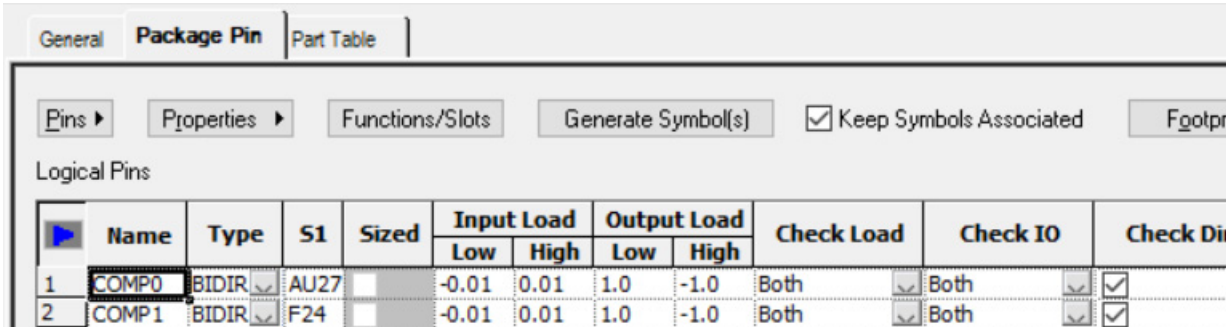
The filled spreadsheet should appear like the one displayed below:



	A	B	C	D	E	F	G	H	I
1	COMP0	Input/Output	AU27						
2	COMP1	Input/Output	F24						
3	D10#	Input/Output	Y38						
4	D11#	Input/Output	AD36						
5	D12#	Input/Output	W37						
6	D13#	Input/Output	AE37						
7	D14#	Input/Output	AG39						
8	D15#	Input/Output	AA35						
9	D16#	Input/Output	V36						
10	D17#	Input/Output	AF38						
11	D18#	Input/Output	W39						
12	D19#	Input/Output	AE39						

6. Select the three columns in the spreadsheet and press Ctrl + C.
7. Press Ctrl + I to insert a blank row in the *Logical Pins* grid.
8. Select the empty cell under the *Name* column in *Logical Pins* grid and press Ctrl + V.

   The pin information along with the pin type and the mapping information is copied into the *Logical Pins* grid. The *Physical Pins* grid is also updated automatically. Note that the `Input/Output` pin type is automatically converted to the `BIDIR` type in the *Logical Pins* grid. This translation is controlled through the `propfile.prop` file located at `<your_inst_dir>/share/cdssetup/LMAN`. For more information, see the *Advanced Tasks* section in *Part Developer User Guide.*



When copying data from PDFs, invalid characters in pin names need to be fixed manually. Part Developer will generate errors if an attempt is made to save a part with invalid characters in pin names.

9. Choose *File – Save* to save the part.

Summary

In this section, you learned to create parts from PDF datasheets.

7

Creating Asymmetrical Parts

Objective

To become familiar with steps involved in creating asymmetrical parts.

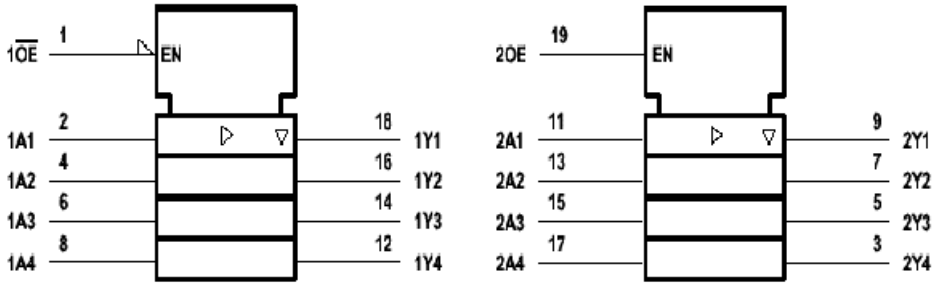
In this section, you will learn to:

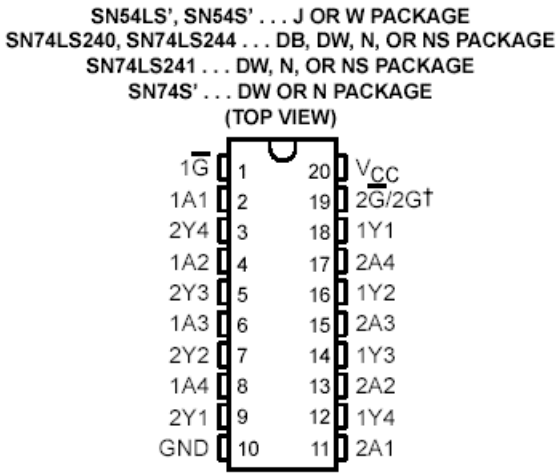
- Use the Package Editor to enter pin information.
- Specify pin information for multiple slots.
- Create symbols for each slot group.

Overview

An asymmetrical part is a part in which multiple functions are present in a package. For example, LS241, an 8-slot part, with two different functions, is an asymmetrical part. This section teaches you how to create LS241. By following the steps detailed here, you can create asymmetrical parts.

Understanding the LS241 Part





As displayed, LS241 is an 8-slot part with a low-asserted enable signal (1OE*) and a high-asserted enable signal (2OE). The high-asserted enable signal 2OE is present in four slots and the low-asserted enable signal 1OE* is present in the remaining four. This divides the part into two groups. The first group has 2OE as the enable pin and the second group has 1OE* as the enable pin. Because the functionality of each slot in a group is the same and because of the different assertion signals across the slots, the logical pin lists for the sections or slots are different.

Task Overview

Do the following:

- Create the `LS241` part in the `my_lib` library.
- Create a package.
- Enter the pin information through the Package Editor.
- Create symbols for the different slot groups.

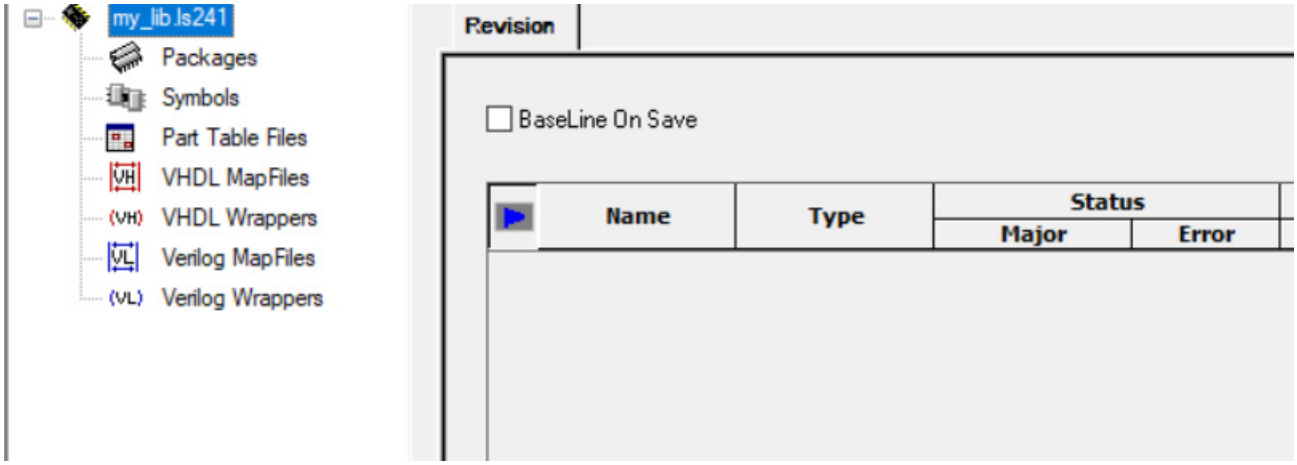
Steps

1. Select *File – New – Cell*.

   The *New Cell* dialog box appears.

2. Select *my_lib* from the *Library* drop-down list.
3. Enter `ls241` in the *Cell* field and click *OK*.

The Cell Editor appears with the empty LS241 part.



4. Right-click the *Packages* entry in the cell tree and select *New.*

   A new package, *LS241*, is created and loaded in the Package Editor.

5. Right-click in the *Logical Pins* grid on the *Package Pin* tab and select *Insert Row After*.

   A blank row is created.

   Because LS241 has eight slots, you will need to create eight slots.

6. To create eight slots, click *Functions/Slots*.

   The *Edit Functions* dialog appears.

   Since slot S1 already exists, you will need to add seven more slots.

7. Click *Add,* specify 7 in the *Slot Count* field of the *Specify the number of slots* dialog box, and click *OK*.

8. Click *OK to close the Edit Functions* dialog box.

   Next, you will enter the pins.

9. Enter `1OE*` in the *Name* column.

10. Because the pin is of type input, select INPUT from the *Type* drop-down list.

    Now, the pin 1OE* is common across the four slots.

11. Since 1OE* is mapped to physical pin 1, enter `1` in the *S1, S2, S3, and S4* columns.

12. Since 1OE* is not present in the remaining four slots, select slots S5 to S8 and click *Map To -*.

This maps the selected slots to `-`.

13. To add another row, press Ctrl + I.

A new row gets added to the Logical Pins grid.

14. Enter `1A` in the *Name* column.

15. Select *INPUT* from the *Type* drop-down list.

16. Since `1A` is present in the first 4 slots and mapped to the physical pins `2`,`4`, `6` and `8`, enter `2`, `4`, `6`, and `8` under S1, S2, S3, and S4, respectively.

17. Select the slots S5 to S8 for pin 1A, and click *Map To -*.

18. To add another row, press Ctrl + I.

A new row gets added to the Logical Pins grid.

19. Enter `1Y` in the *Name* column.

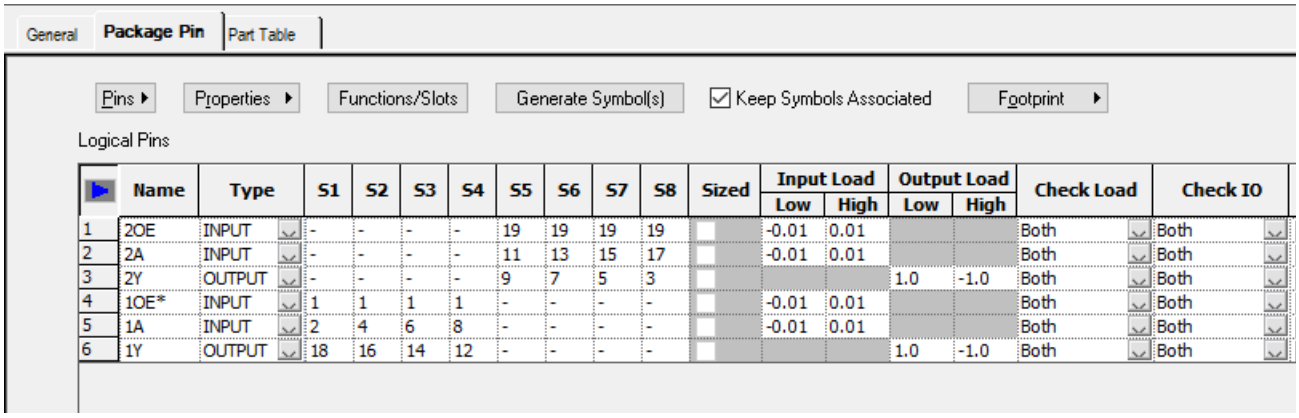
20. Select *OUTPUT* from the *Type* drop-down list.

21. Since `1Y` is present in the first 4 slots and mapped to physical pins `18`,`16`, `14`, and `12`, enter `18`,`16`, `14`, and `12` under S1, S2, S3, and S4, respectively.

22. Select the slots S5 to S8 for pin 1Y and click *Map To -*.

Similarly, enter the remaining pins.

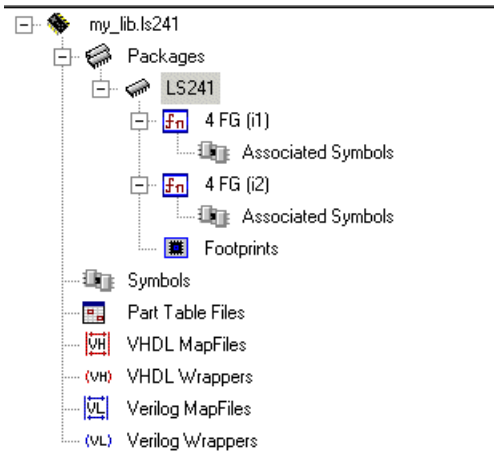
After pins are entered, the *Package Pin* tab should appear as follows:



	Name	Type	S1	S2	S3	S4	S5	S6	S7	S8	Sized	Input Load		Output Load		Check Load	Check IO
												Low	High	Low	High		
1	2OE	INPUT	-	-	-	-	19	19	19	19		-0.01	0.01			Both	Both
2	2A	INPUT	-	-	-	-	11	13	15	17		-0.01	0.01			Both	Both
3	2Y	OUTPUT	-	-	-	-	9	7	5	3				1.0	-1.0	Both	Both
4	1OE*	INPUT	1	1	1	1	-	-	-	-		-0.01	0.01			Both	Both
5	1A	INPUT	2	4	6	8	-	-	-	-		-0.01	0.01			Both	Both
6	1Y	OUTPUT	18	16	14	12	-	-	-	-				1.0	-1.0	Both	Both

23. Choose *File – Save* to save the part.

The *Packages* entry in the cell tree is updated to show the function groups in the package and the number of slots in the function group. In this case, there are two function groups with four slots in each function group.

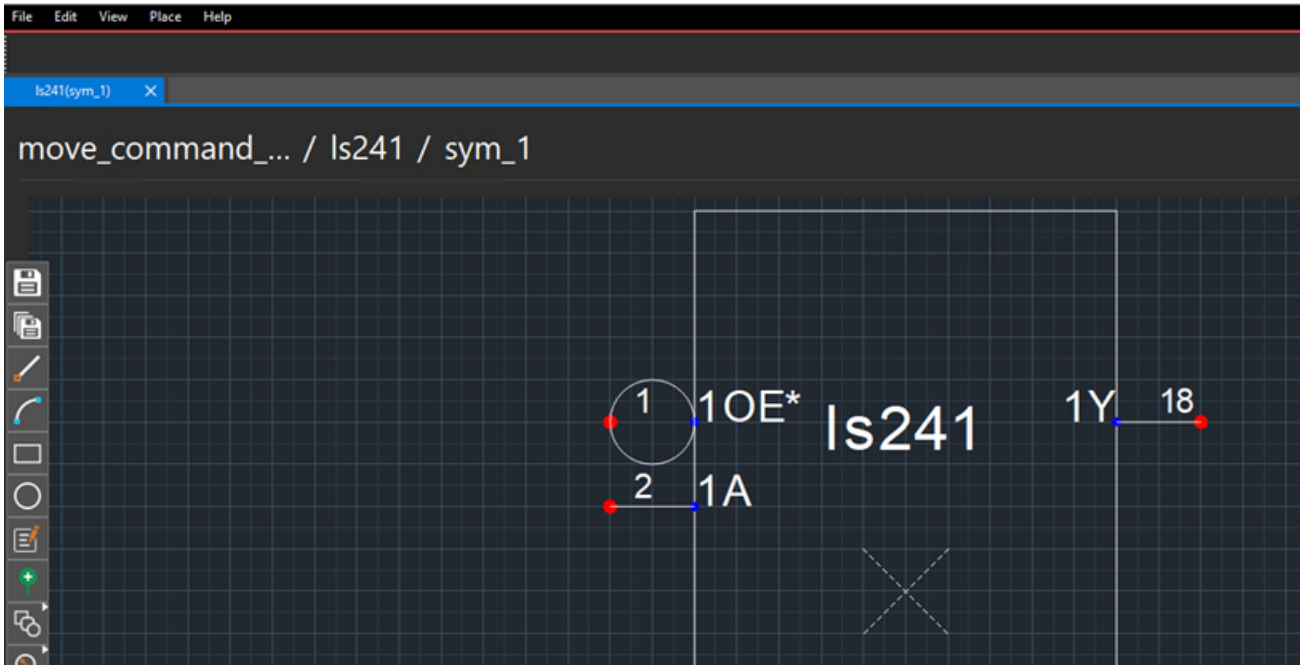


Next, you will create a symbol for each function group.

24. To generate a symbol for the first function group, right-click 4 FG[i1] and choose *Generate Symbol(s)* from the pop-up menu.

The symbol is generated for the function group. Similarly, generate a symbol for the other function group.

25. To view the symbol, right-click *sym_1* and choose *Edit(In Symbol Editor)* from the pop-up menu.



26. Choose *File – Save* to save the part.

Summary

In this section, you learned how to create asymmetrical parts.

8

Working with Differential Pairs

Objective

To become familiar with the steps in adding and removing differential pair information in Part Developer.

In this section, you will learn to:

- Autocreate differential pairs in all cells of a library
- Autocreate differential pairs through the Package Editor
- Create a differential pair from selected pins
- Remove differential pair properties from a differential pair

Overview

When creating parts in Part Developer, you can capture differential pair information from datasheets. If you have legacy libraries without differential pair information, you can run a batch utility and create differential pairs based on specified differential pair recognition rules. This section covers various ways of creating differential pairs and the procedure for removing differential pair information.

To try the various procedures described in this section, you will use the project `dp_proj` and the library `dp_proj_lib` in the `library_project` folder at *<your_inst_dir>*`/doc/pdv_tut/tutorial_data`. Ensure that you have copied the `library_project` folder to *<your_work_area>*.

Points to Remember about Differential Pair Support in Part Developer

- The differential pair property is associated with logical pins.
- The positive and negative pins comprising a differential pair must have the same pin type.

- The differential pair property cannot be associated with `GROUND`, `POWER`, and `NC` pin types.
- The differential pair property is saved in chips only.

Autocreating Differential Pairs in All Cells of a Library

Add differential pair information to all parts in the `dp_lib` library based on the following differential pair recognition rule:

```
DiffPair_Recognition_Rules 'n:SUFFIX,p:SUFFIX;-
     :SUFFIX,+:SUFFIX;_L:SUFFIX,_H:SUFFIX;_LOW:SUFFIX,_HIGH:SUFFIX;_N:SUFFIX,_P:S
     UFFIX'
```

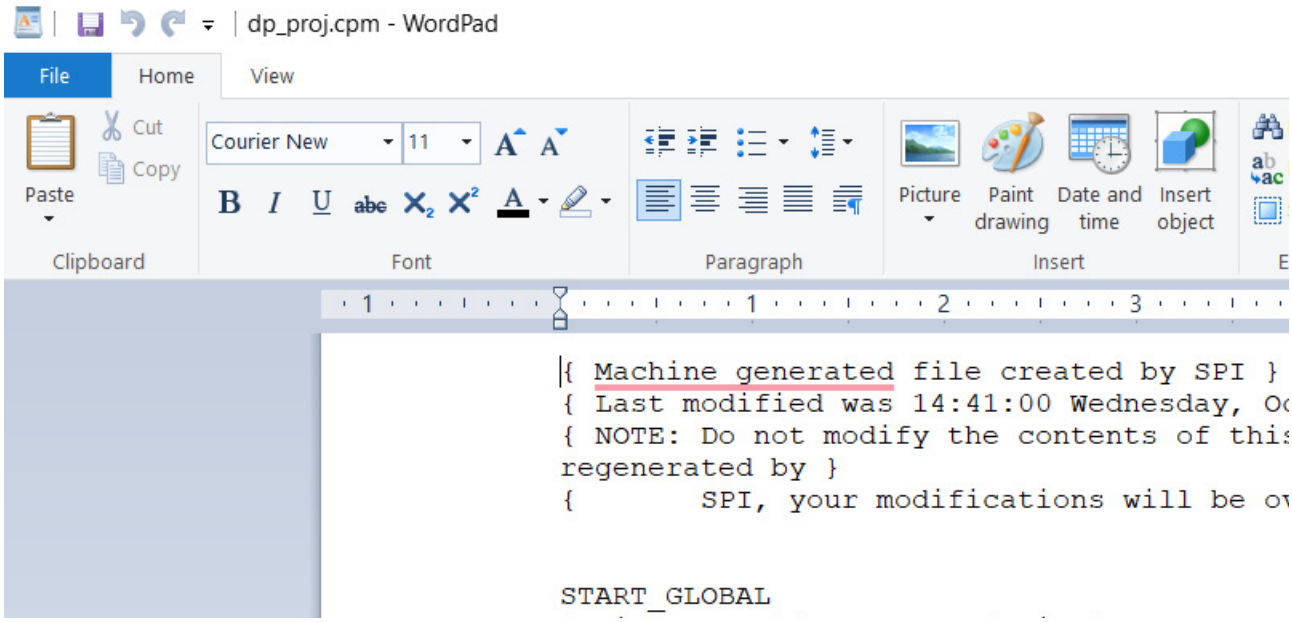
The task involves the following subtasks:

1. Configuring the default differential pair recognition rule in your local project file to add the naming scheme `_N:SUFFIX,_P:SUFFIX`
2. Configuring the low assertion setup in Part Developer to disallow the use of the `_N` suffix
3. Running the `con2con` utility on the `dp_lib` library with the `autocreatediffpair` option

Configuring the Default Differential Pair Recognition Rule for a Project

To configure the default differential pair recognition rule for a project, you need to copy the `DiffPair_Recognition_Rules` definition from the installation CPM file (`cds.cpm`) or the site CPM file (`setup.cpm`) to the project file. For the task at hand, the default differential pair recognition rule has been added from `cds.cpm` to the project file `dp_proj.cpm`.

1. Open the `dp_proj.cpm` project in a text editor.



   Note that the default `DiffPair_Recognition_Rules` definition does not include the naming scheme `_N:SUFFIX,_P:SUFFIX`.

2. To add the naming scheme, click before the closing ' character, type the following:

   ```
   ;_N:SUFFIX,_P:SUFFIX
   ```

   The differential pair recognition rule is modified to:

```
DiffPair_Recognition_Rules 'n:SUFFIX,p:SUFFIX;-
     :SUFFIX,+:SUFFIX;_L:SUFFIX,_H:SUFFIX;_LOW:SUFFIX,_HIGH:SUFFIX;_N:SUFFIX,_P:S
     UFFIX'
```

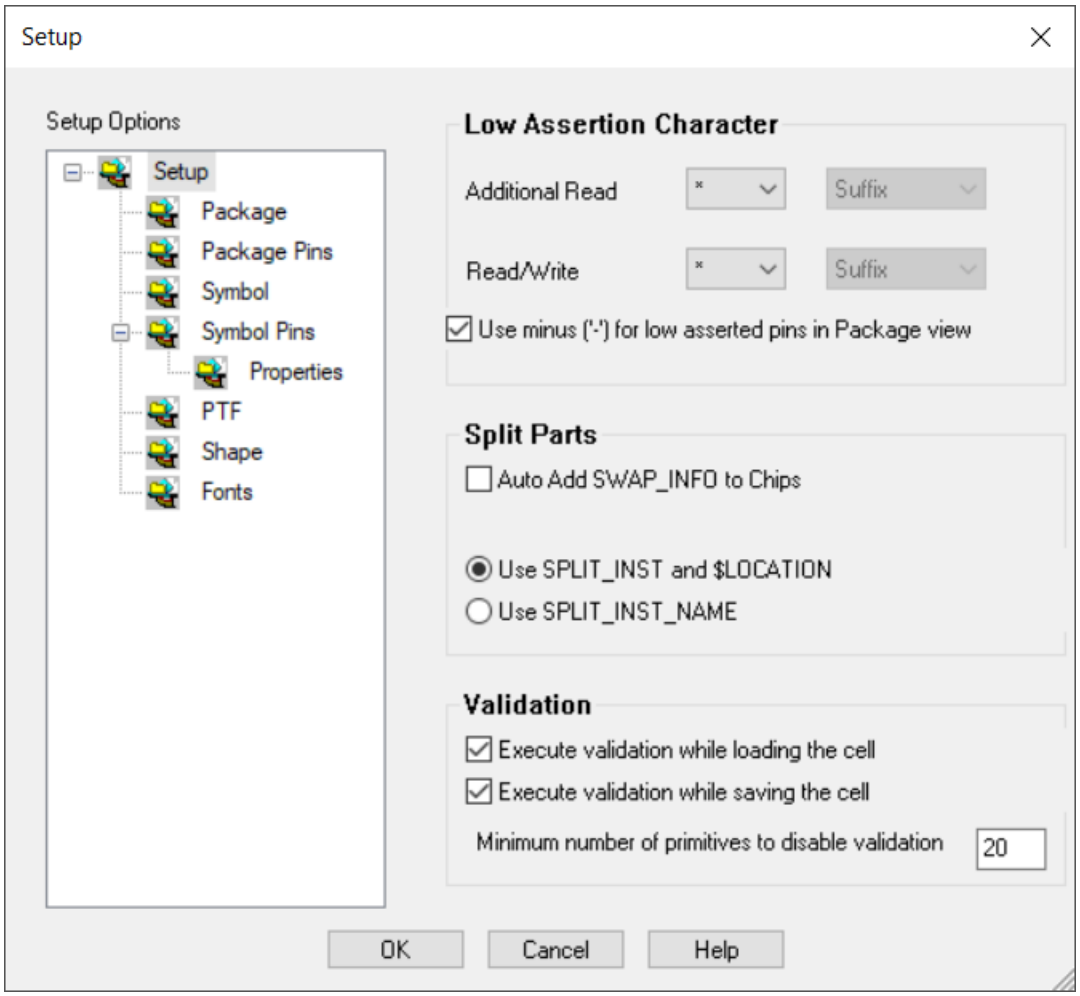
3. Save and close the project file.

Configuring the Low Assertion Setup to Disallow the Use of the _N Suffix

By default, Part Developer considers pin names with the `_N` suffix as low-asserted pins. Therefore, you need to modify the default low assertion setup if you want Part Developer to use the `_N` suffix to identify negative pins of differential pairs.

1. In Part Developer, choose *File – Open Project*.
2. Click the *Browse* button to select the `dp_proj.cpm` project file from the `library_project` folder and click *Open*.
3. Click *OK*.

4. Choose *Tools – Setup*.
5. Select * from the *Additional Read* drop-down list.



6. Click *OK*.

Running the con2con Utility on a Library with the autocreatediffpair Option

After you have configured the differential pair recognition rule according to your requirements, you can run the `con2con` utility with the `autocreatediffpair` option to add differential pair information to libraries in batch mode. For the task at hand, you will add differential pair information to all parts in the `dp_lib` library.

To run the `con2con` utility on the `dp_lib` library with the `autocreatediffpair` option:

➤ Type the following command at the command prompt:

```
con2con -product pcb_librarian_expert -proj <your_work_area>/library_project/
     dp_proj.cpm -cdslib <your_work_area>/library_project/cds.lib -lib
     dp_proj_lib -autocreatediffpair
```

Important

In the specified `con2con` command, <your_work_area> is the location where you have copied the `library_project` folder from `<your_inst_dir>/doc/pdv_tut/tutorial_data` to try the procedures detailed in this tutorial.

Autocreating Differential Pairs through the Package Editor

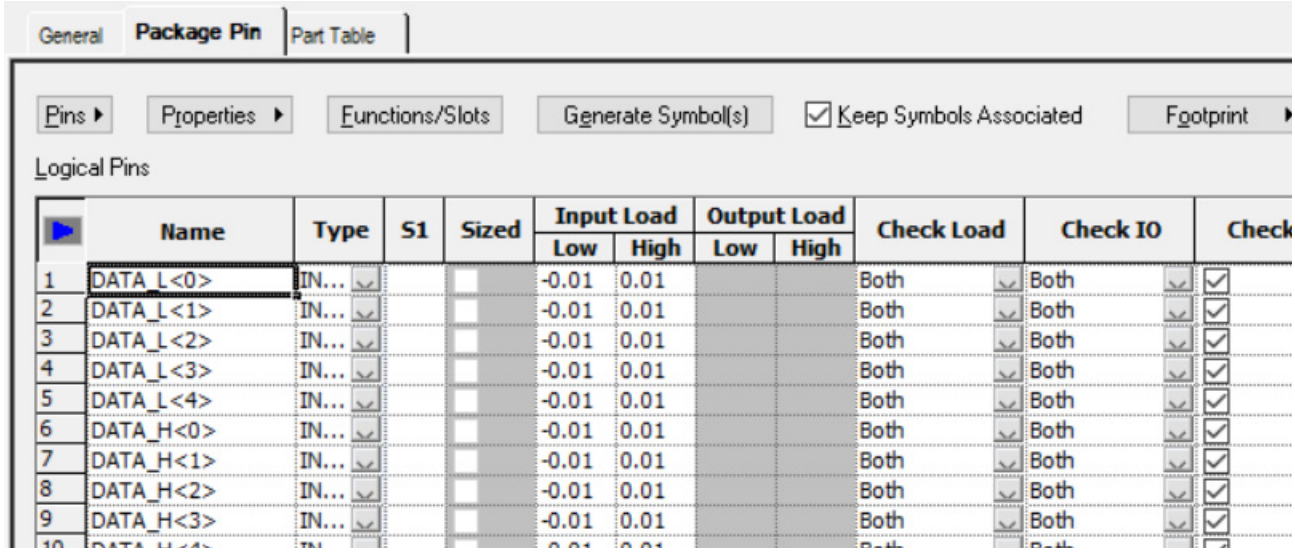
The `dp_proj_lib` library contains parts with differential pair properties. If you add new parts to this library, you can add differential pair properties only to a selected part through the Package Editor.

Create a part, `dp_part_3`, in the `dp_proj_lib` library with the following pin information in packages `DP_PART_3` and `DP_PART_3_1`:

Pin Name	Pin Number	Pin Type
DATA_L<4..0>	1,2,3,4,5	INPUT
DATA_H<4..0>	6,7,8,9,10	INPUT
AS1-	11	ANALOG
AS1+	12	ANALOG
-RD	13	OUTPUT
+RD	14	OUTPUT
VCC	15	POWER
GND	16	GROUND

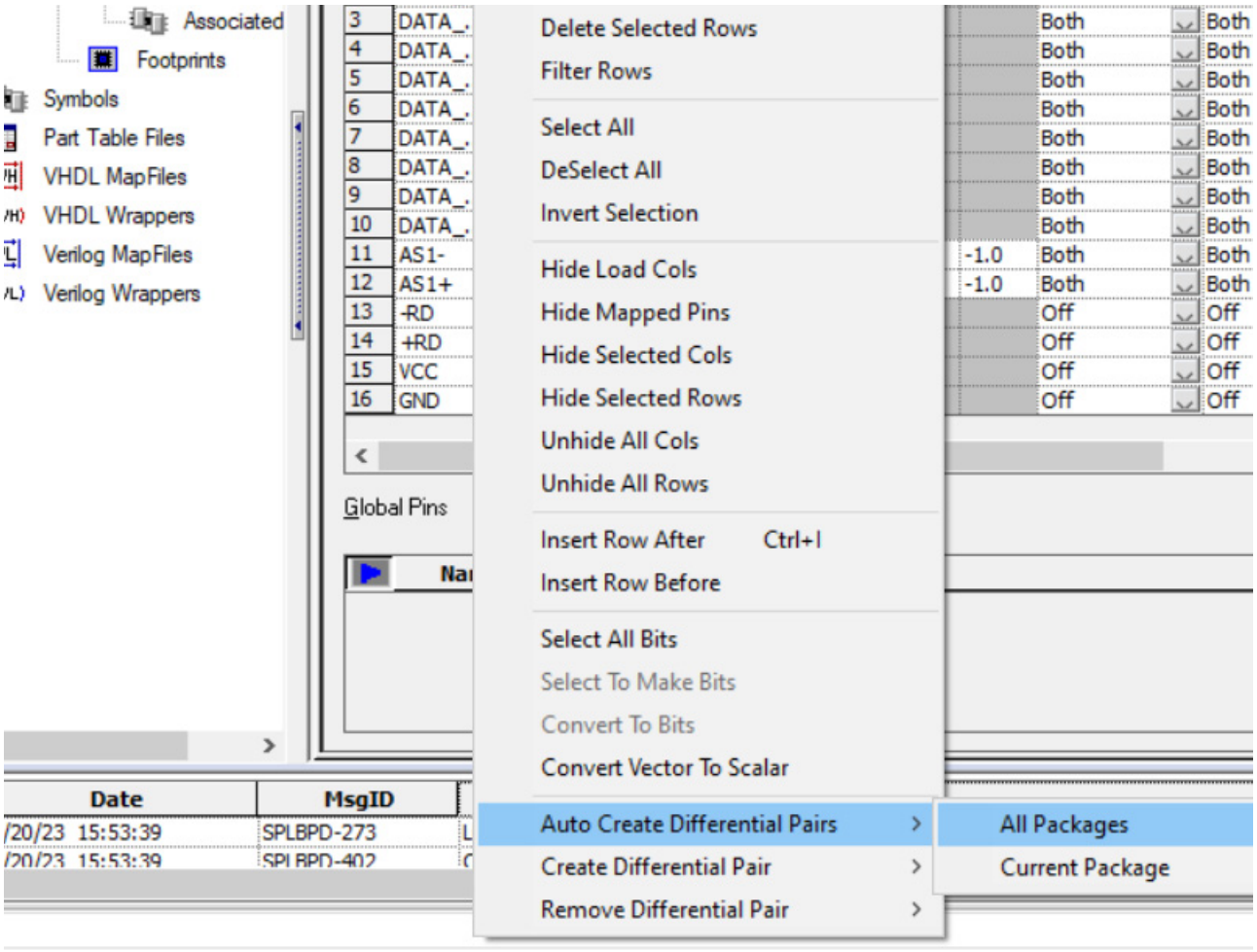
For information on how to create a part, see the *Creating a Flat Part* section.
After the part is created, perform the following steps to automatically create differential pairs in both the packages:

1. Select either of the two packages.



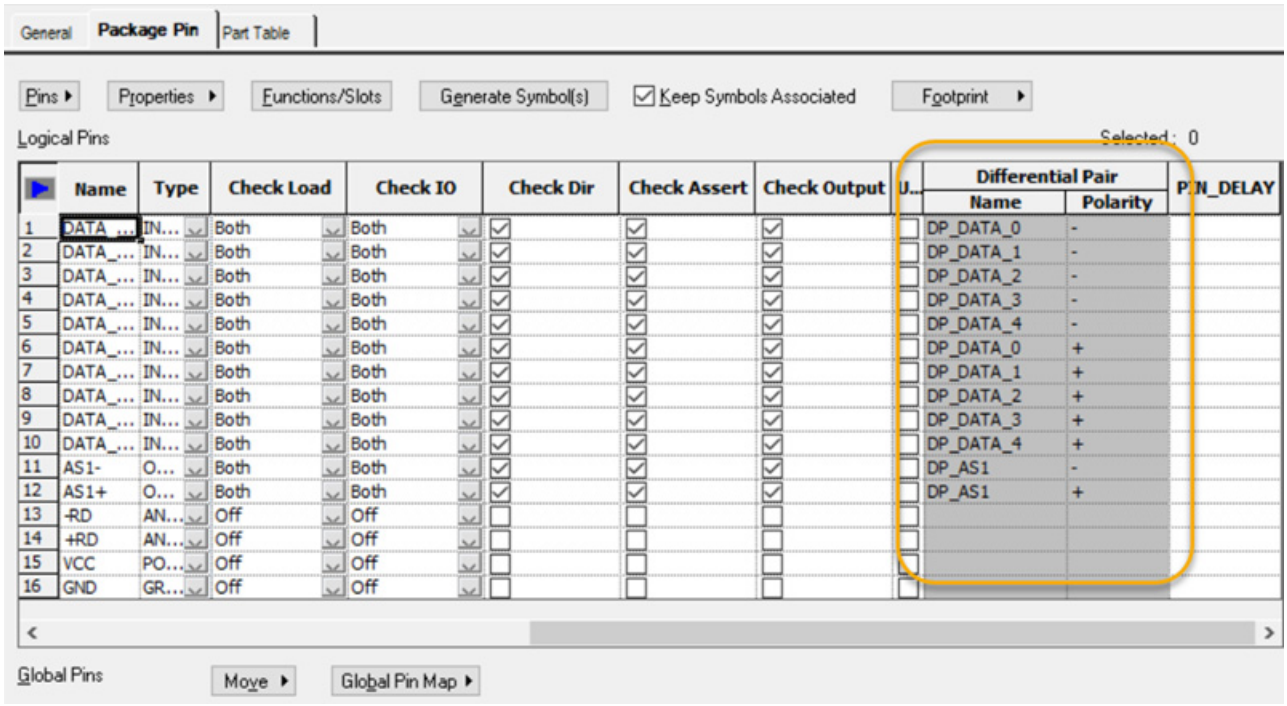
2. Right-click in the *Logical Pins* grid.

3. Choose *Auto Create Differential Pairs - All Packages*.



Choosing *All Packages* ensures that the differential pair properties are added in both packages to all pins that match any of the naming schemes specified in the `DiffPair_Recognition_Rules` definition in the project CPM file. You choose *Current Package* when you want the differential pair properties to be added only in the selected package.

The following graphic shows differential pair information added to the `DP_PART_3_1` package:



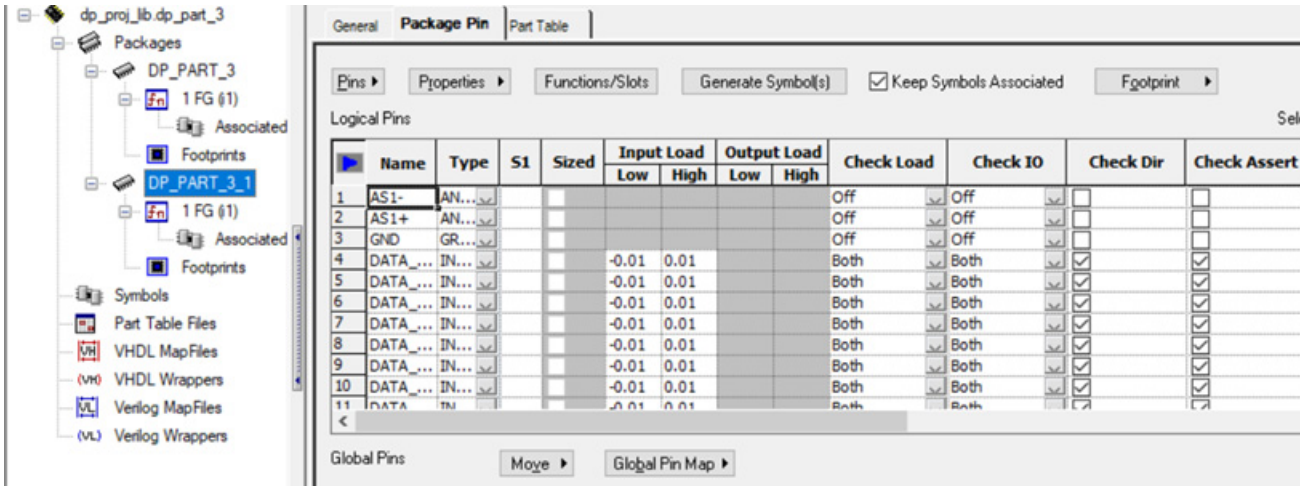
Creating a Differential Pair from Selected Pins

Typically, you select two pins that should constitute a differential pair and choose *Create Differential Pair* from the shortcut (RMB) menu in the following situations:

- You have added new pins to a part that already has differential pair information for existing pins.
- You want to create a differential pair even if the names of the constituent pins do not follow any of the naming schemes specified in the `DiffPair_Recognition_Rules` definition.

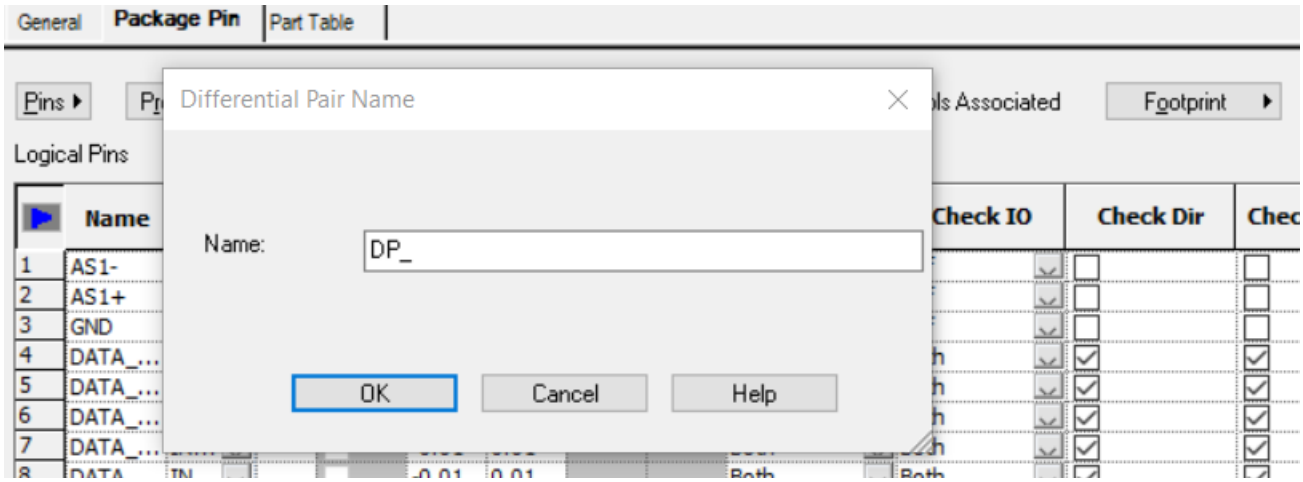
For the task at hand, you will create a differential pair of the `+RD` and `-RD pins` only in the `DP_PART_3_1` package.

1. Select the `DP_PART_3_1` package.



2. Select the pins `+RD` and `-RD`.
3. Right-click the selection and choose *Create Differential Pair – Current Package*.

   The *Differential Pair Name* dialog box appears.



   The *Name* field displays a name for the differential pair that Part Developer derives by adding the prefix or suffix specified in the `Default_Diffpair_Value` directive in `cds.cpm` to the basenames of the pin. In the current scenario, the *Name* field displays only the `Default_Diffpair_Value` directive value because the selected pins do not follow any of the rules specified through the `DiffPair_Recognition_Rules` directive.

   For more information, see the Naming Differential Pairs section of the Creating Parts section of *Part Developer User Guide*.

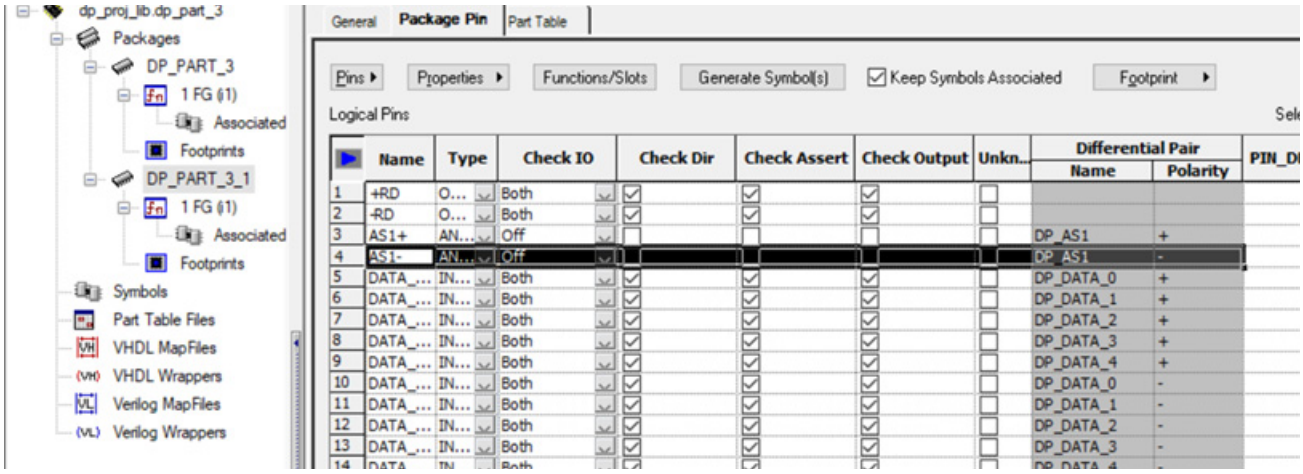
4. Specify the differential pair name as `DP_RD`.
5. Click *OK* to save the modified differential pair name.

   The differential pair information is added to pins `+RD` and `-RD`.

Removing Differential Pair Properties from a Differential Pair

Remove differential pair information from the differential pair `AS1` in the `DP_PART_3` package.

1. Select any of the two pins `AS1+` and `AS1-`.



2. Right-click the selection and choose *Remove Differential Pair – Current Package*.

The differential pair information is removed from both pins.

Summary

In this section, you learned how to create differential pairs according to your requirements and remove differential pair properties from packages.

9

Creating Sizeable and HAS_FIXED_SIZE Symbols

Objective

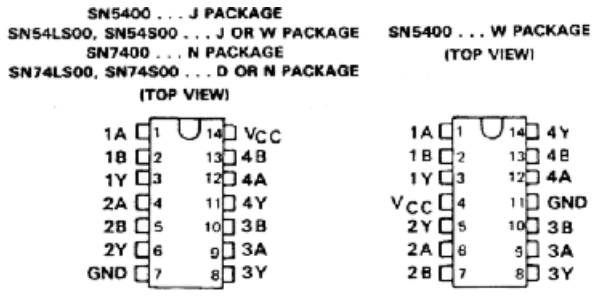
To become familiar with steps involved in creating sizeable and `HAS_FIXED_SIZE` symbols.

In this section, you will learn:

- About the methodology in creating sizeable and `HAS_FIXED_SIZE` symbols
- How to create a sizeable symbol
- How to create a `HAS_FIXED_SIZE` symbol

Overview

You will create the `LS00` part to understand the steps involved in creating sizeable parts. The pin information is displayed below:



Methodology

The following needs to be done to create sizeable and `HAS_FIXED_SIZE` symbols:

1. Create a symbol through the Symbol Editor and add the sizeable pins.
2. Create packages.
3. Create the necessary slots.
4. Create a second symbol, *sym_2*, by making a copy of the existing symbol, sym_1.
5. Specify the value of the `SIZE` property on the basis of the number of slots in *sym_2*. This will add the `HAS_FIXED_SIZE` property to *sym_2*.

Do not specify the value of the SIZE property in the first symbol because it might result in an incorrect generation of the entity view.

Task Overview

Create the LS00 part in the `my_lib` library and create sizeable and `HAS_FIXED_SIZE` symbols.

Steps

1. Choose *File – New – Cell*.

   The New Cell dialog box appears.

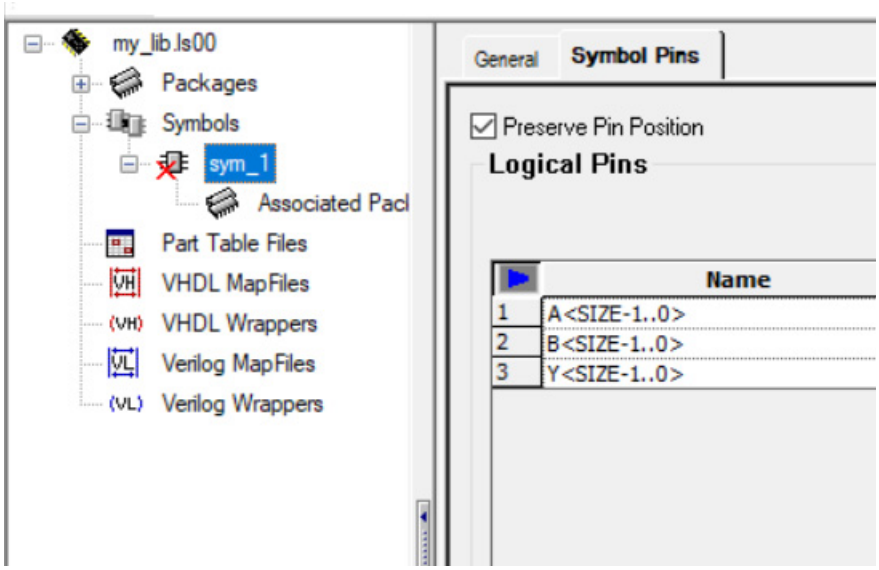
2. Select *my_lib* from the *Library* drop-down list.
3. Enter `ls00` in the *Cell* field and click *OK*.

   The *Cell Editor* appears with the empty ls00 part.

   To enter sizeable pins, you need to use the *Add Pin* dialog accessed through the *Symbol Editor*.

4. To access the Symbol Editor, right-click the *Symbols* entry in the cell tree and choose *New*.

A new symbol, *sym_1,* is created for the part.



5. To access the *Add Pin* dialog, choose *Pins – Add* from the Symbol Pins page.

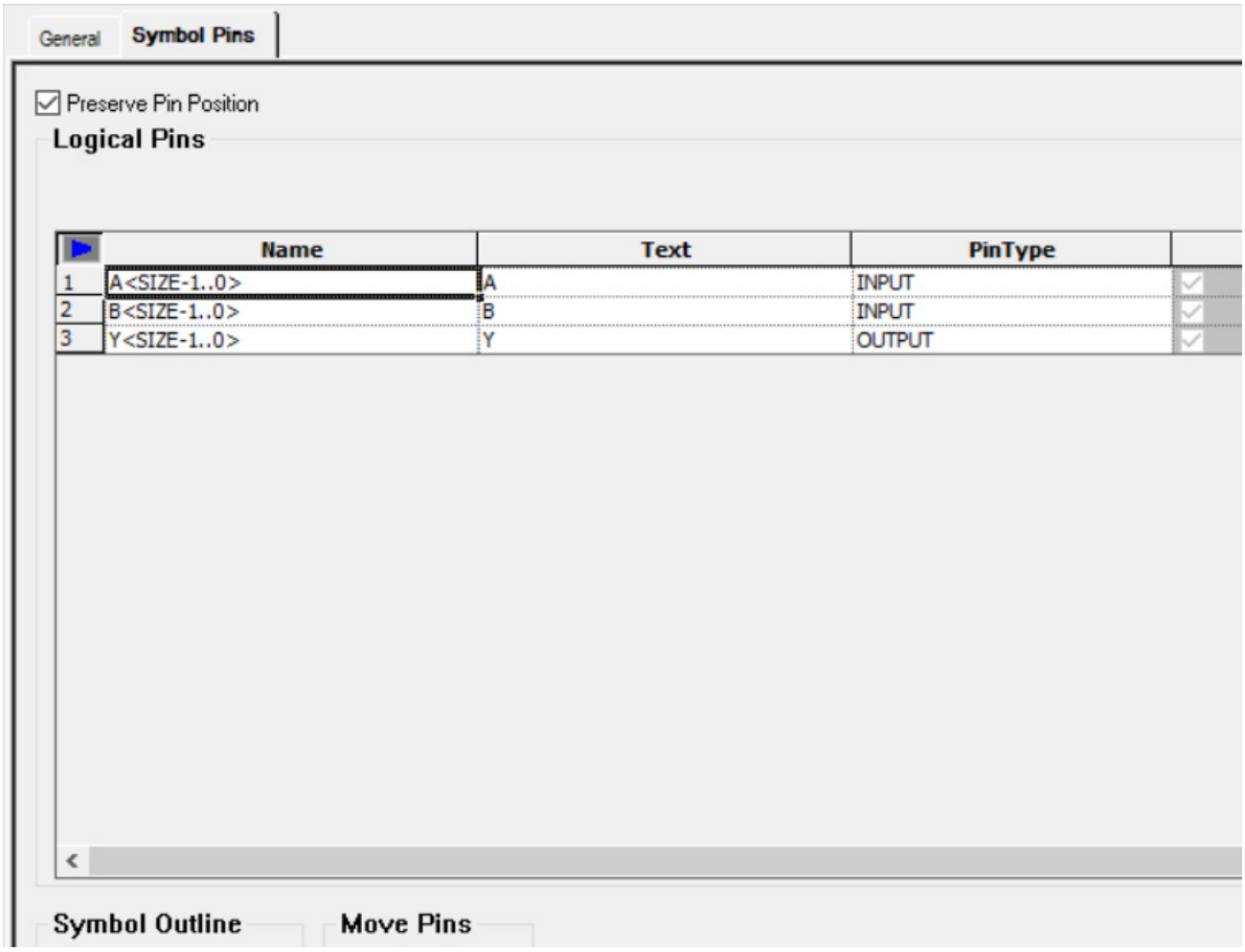
   The *Add Pin* dialog appears.

6. Choose the *Sizeable* option.

   As shown in the datasheet, LS00 has two input pins, `A` and `B`, and one output pin, `Y`. These pins are present in four slots.

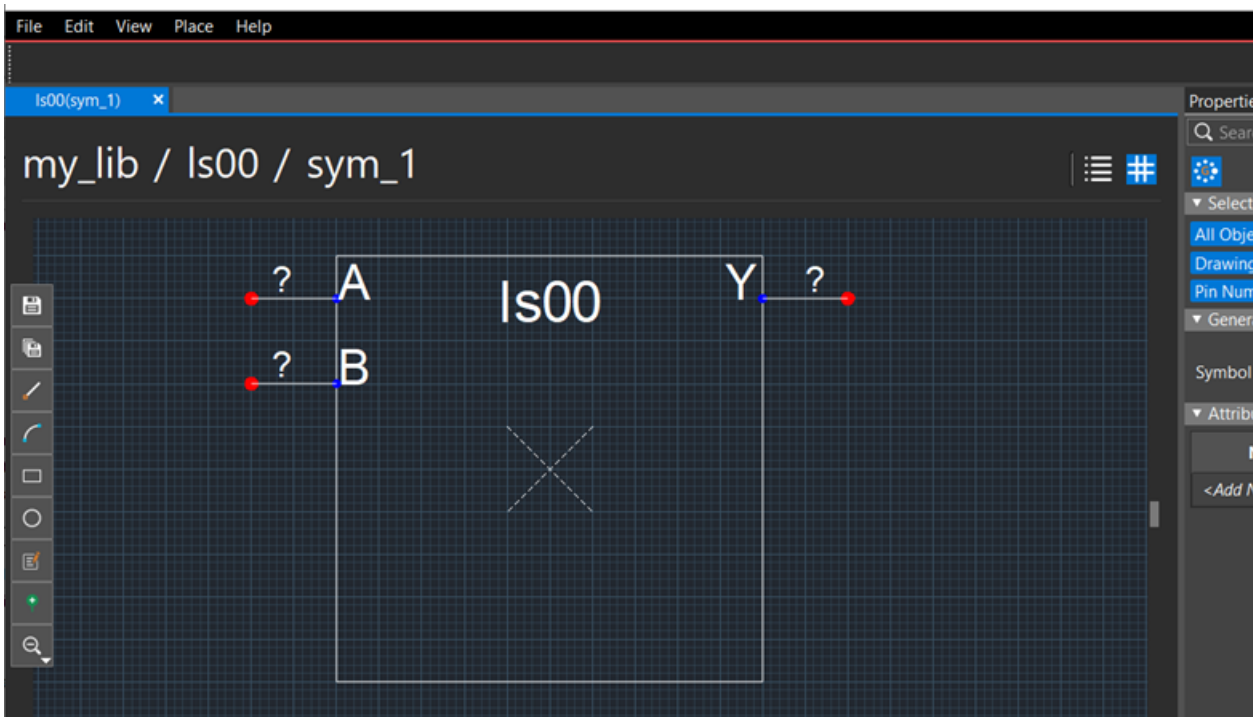
7. Enter `A` in the *Base Name* field.
8. Select *INPUT* from the *Type* drop-down list and click *Add*.
9. Enter `B` in the *Base Name* field.
10. Select *INPUT* from the *Type* drop-down list and click *Add*.
11. Enter `Y` in the *Base Name* field.
12. Select *OUTPUT* from the *Type* drop-down list and click *Add*.
13. To add the pins to the symbol, click *OK*.

The pins are added to the symbol with the `SIZE` property.



14. To view the symbol in Symbol Editor, right-click sym_1 and choose *Edit(In Symbol Editor)*.

The symbol is loaded in Symbol Editor.



Next, you will create a sizeable symbol.

Creating a Sizeable Symbol

1. Right-click *sym_1* and choose *Generate Package*.

   The package is created for the LS00 part.

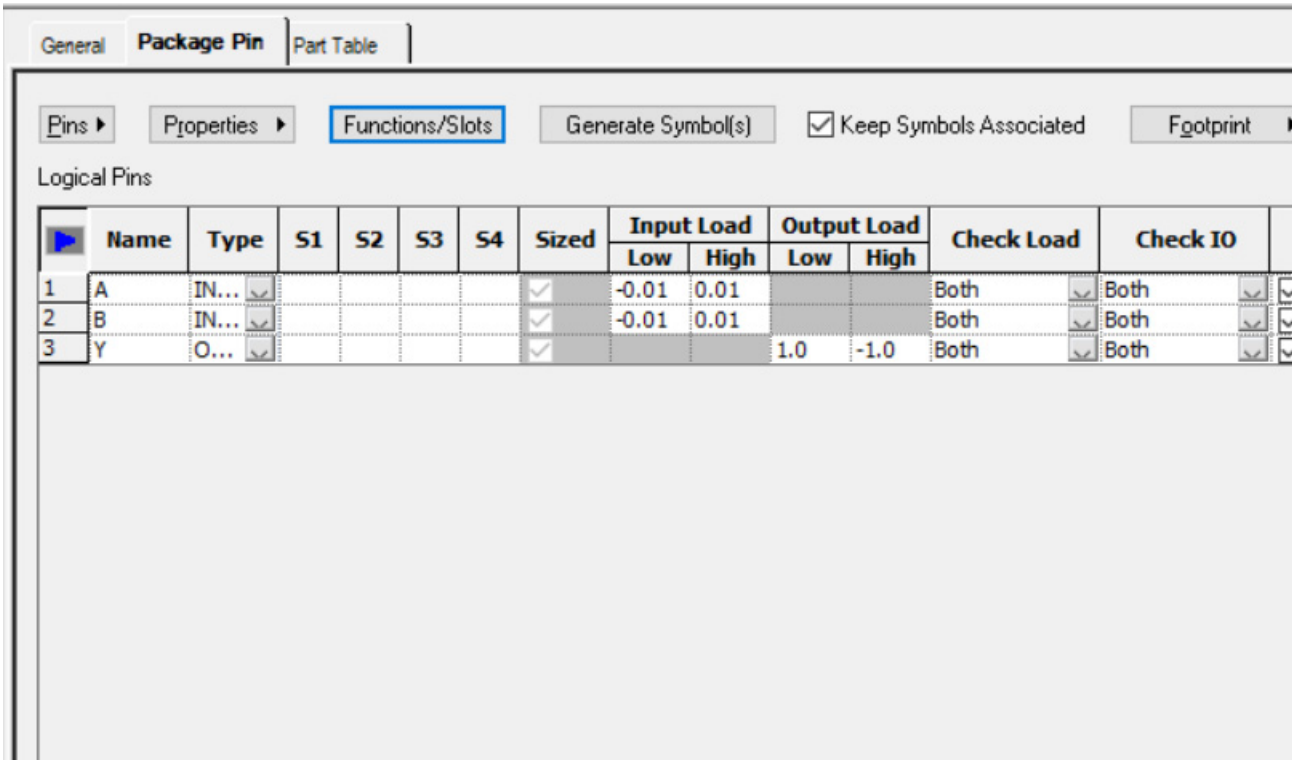
   Since the pins are spread in four slots, you will need to create four slots.

2. To create the four slots, in the *Package Pin* tab, click *Functions/Slots*.

   The Edit Functions dialog appears.

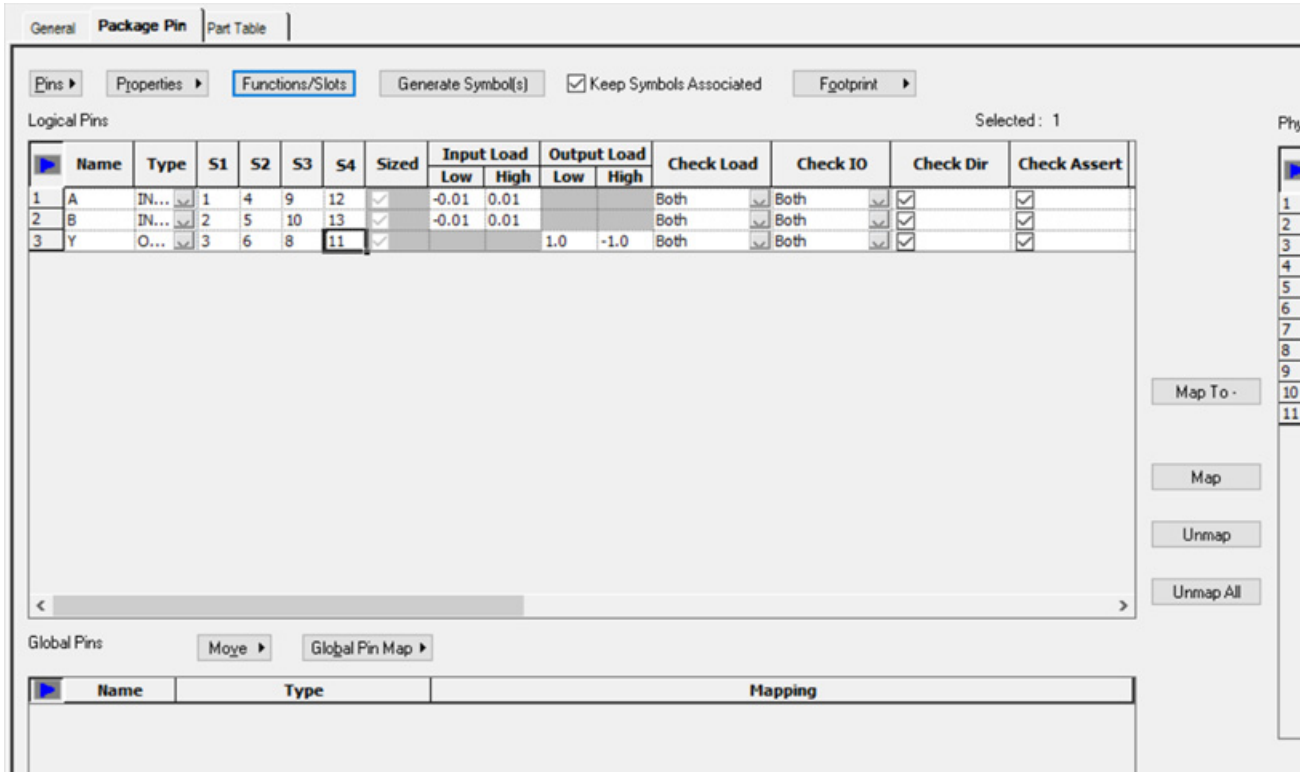
3. To create 4 slots, click *Add* and specify 3 in the Specify the number of slots dialog box.
4. Click *OK*.
5. Click *OK* to close the Edit Functions dialog.

The four slots appear in the Package Editor.



6. Since pin A is mapped to the physical pins1, 4, 9, and 12, enter 1, 4, 9, and 12 under S1, S2, S3, and S4, respectively.
7. Map pin B to the physical pins 2, 5, 10, and 13 by entering 2, 5, 10, and 13 under S1, S2, S3, and S4, respectively.
8. Similarly map pin Y to the physical pins 3, 6, 8, and 11 by entering 3, 6, 8, and 11 under S1, S2, S3, and S4, respectively.

After entering the pins, the *Package Pin* tab should appear as:

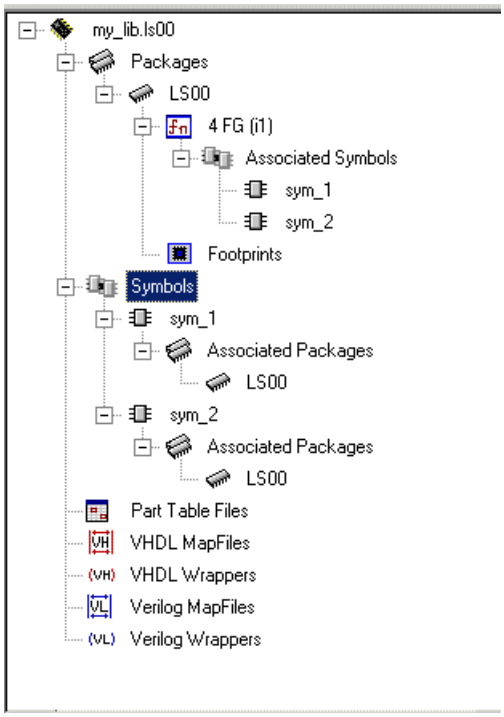


Next, you will create a `HAS_FIXED_SIZE` symbol.

Creating a HAS_FIXED_SIZE Symbol

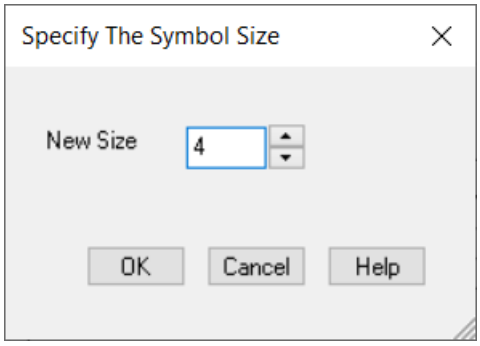
1. Right-click the *sym_1* entry under *Symbols* in the cell tree and choose *Copy*.
2. Right-click the *Symbols* entry in the cell tree and choose *Paste*.

This creates a new symbol, *sym_2,* which is a copy of *sym_1*.



3. Click on *sym_2*.
4. Click *Set Size*.

   The *Specify The Symbol Size* dialog box appears.



5. Enter 4 as the value of the `SIZE` property in the *New Size* field and click *OK*.

   Note: The `SIZE` property value depends on the number of slots in which the pin is present. In this case, the value is 4 because the pin is present in 4 slots.

6. Save the part.

The `HAS_FIXED_SIZE` property will be automatically added to the `symbol.css` file of *sym_2*.

Note: The `HAS_FIXED_SIZE` property is not visible from within Symbol Editor.

Do not change the pin_name <0> pin for HAS_FIXED_SIZE symbols. This might lead to the deletion of all the bits of the pin. For example, renaming A<0> might lead to the deletion of all the bits of pin A.

Summary

In this section, you learned how to create sizeable and `HAS_FIXED_SIZE` symbols.

10

Modifying Packages

Objective

To become familiar with the steps involved in modifying packages.

In this section, you will learn to:

- Add pins to a package
- Add properties to a package
- Delete pins from a package
- Delete pins from all packages and symbols
- Modify pin types
- Move global pins to logical pins
- Move logical pins to global pins
- Modify the footprint information
- Add Package Pin properties
- Specify pin swappability

Overview

Often, you need to modify a package to meet changed requirements. Using Part Developer, part modifications can be done quickly and effectively. This section covers some of the common part-modification tasks. You will use the library part `mypart` in the `my_lib` library to perform the part-modification tasks.

The part has two packages, MYPART and MYPART_1, and two symbols, sym_1 and sym_2. The symbol sym_1 is associated with the package MYPART and sym_2 with the package MYPART_1.

Adding Pins to a Package

Add an input pin, `my_pin`, to the MYPART package.

1. Choose *File – Open – Cell.*

   The Open Cell dialog box appears.

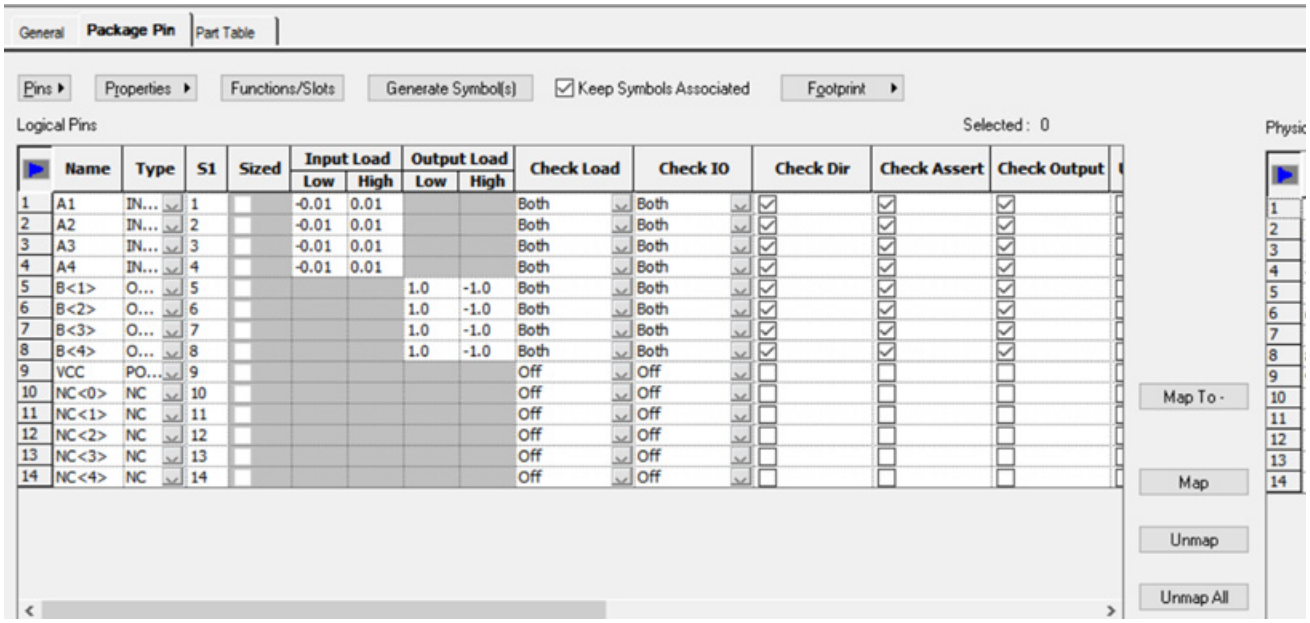
2. Select *my_lib* from the *Library* drop-down list.

3. Select *mypart* from the *Cell* drop-down list and click *OK*.

   The part `mypart` loads in the Cell Editor.

4. Next click *MYPART* under the *Packages* entry in the cell tree.

   MYPART gets loaded in the Package Editor.



5. In the *Package Pin* tab, in the *Logical Pins* grid, select the last row.

6. Press Ctrl + I.

   A blank row is added in the *Logical Pins* grid.

7. Enter `my_pin` in the *Name* column and select *INPUT* from the *Type* drop-down list.

8. Enter the physical pin number `15` under the column S1 for `my_pin` and click on the Physical Pins grid.

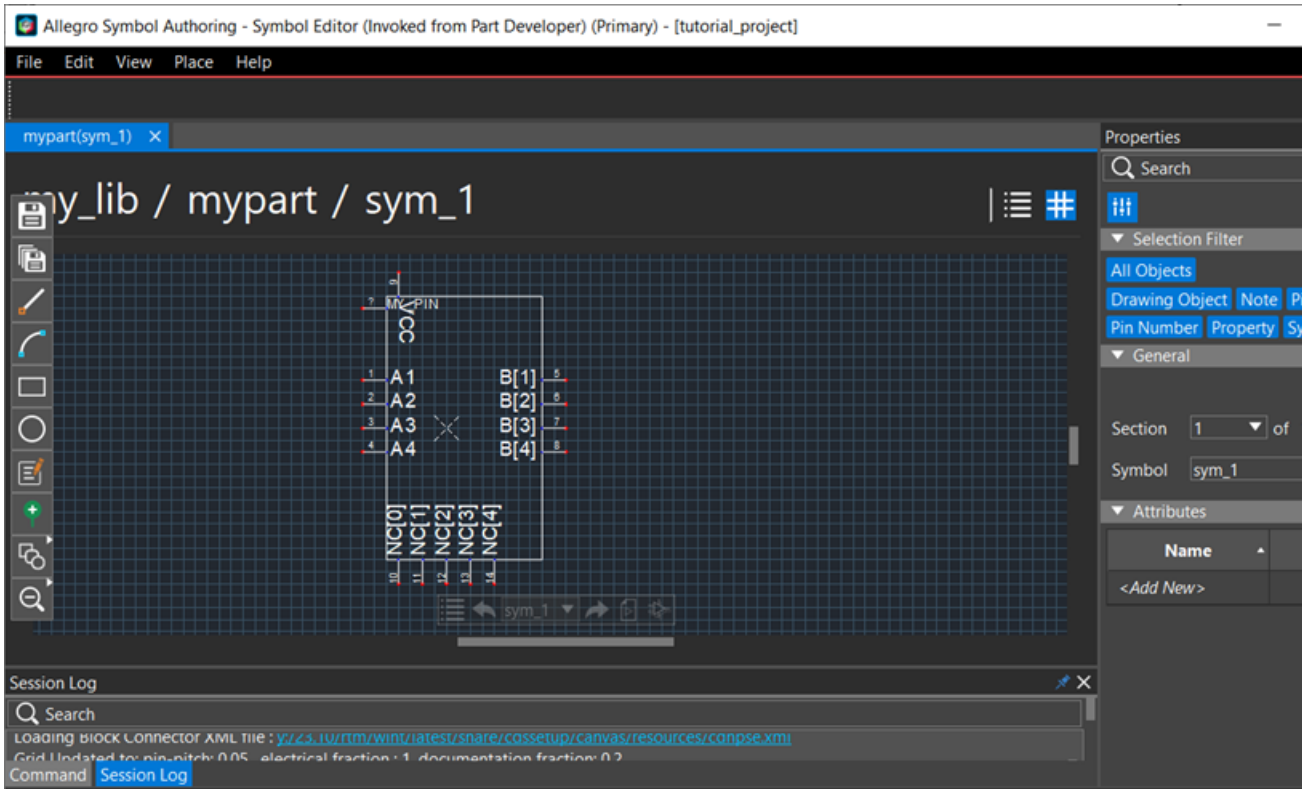
9. Save the part.

Important

The symbol `sym_1` is associated with the package `MYPART`. Therefore, when a pin is added to the package, the symbol pin list will also have to be updated to ensure that the symbol is in sync with the package. If the *Keep Symbols Associated* check box is selected, Part Developer automatically updates the symbol pin list whenever the package pin list is modified.

10. The *Keep Symbols Associated* check box is selected by default. To check that `my_pin` has been added to the symbol as well, right-click the symbol *sym_1* and select *Edit(In Symbol Editor)*.

The symbol is loaded in the Symbol Editor. Note that the pin appears in the top-left corner of the symbol outline.

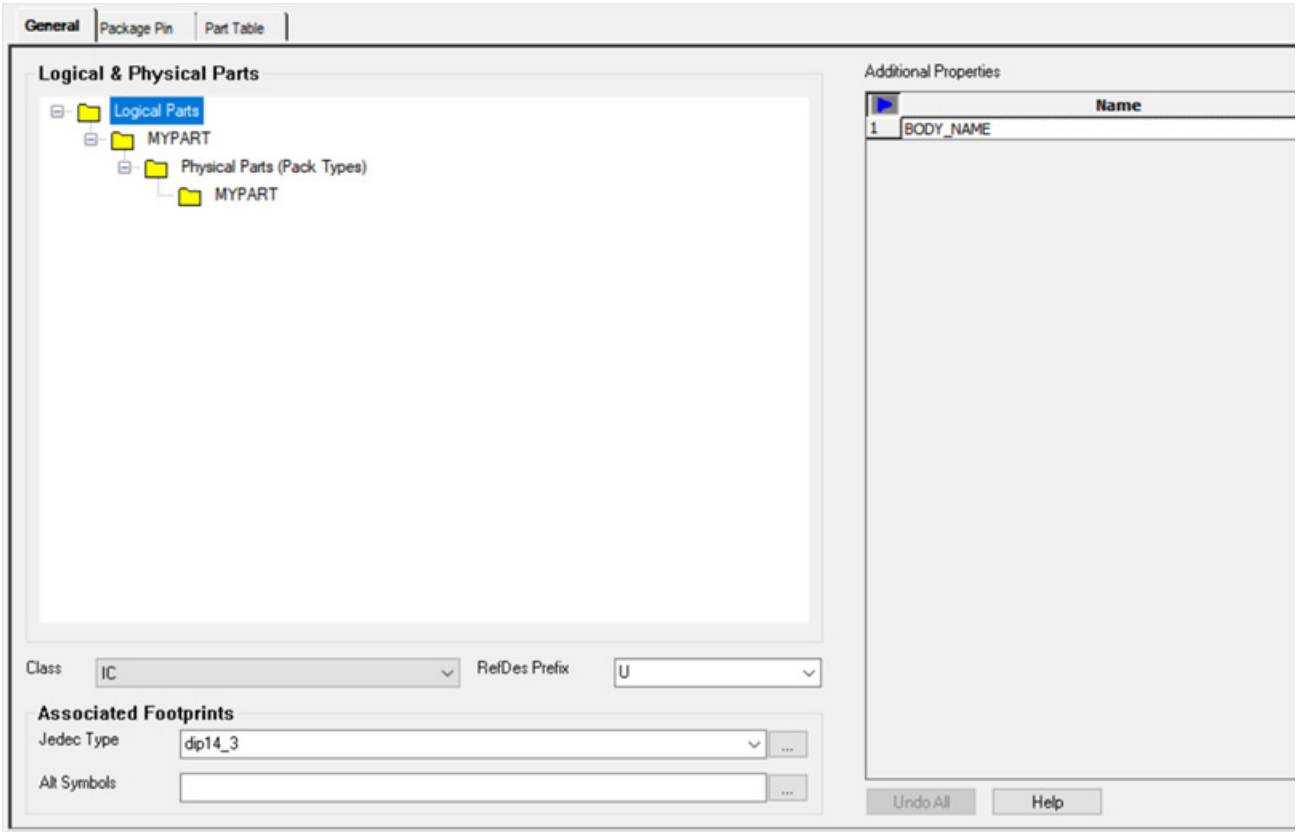


Adding Properties to a Package

Add the property `LIBRARY_MODIFIED_DATE` with the value `?` to the MYPART package.

1. Select the MYPART package.
2. Click on the *General* tab.

   The *General* tab appears.



3. In the *Additional Properties* grid, select the `BODY_NAME` property and press `Ctrl` + `I`.

   A blank row is added in the *Additional Properties* grid.
4. Enter `LIBRARY_MODIFIED_DATE` in the *Name* column and `?` in the *Value* column.
5. Save the part.

Deleting Pins from a Package

Delete the pin `my_pin` from the `MYPART` package.

1. Select the *MYPART* package.
2. In the *Logical Pins* grid under *Package Pin* tab, right-click the row that contains the pin `MY_PIN` and select *Delete Selected Rows*.

   The pin is deleted from the package.

Important

Because the *Keep Symbols Associated* option is selected, the pin will be automatically deleted from sym_1 as well and updated in the Symbol Editor window.

3. Save the part.

   On save, a warning is generated stating that pin MY_PIN is not present in any package or symbol. This is because when a pin is deleted from a package or symbol without using the *Global Delete* option or from the Add Pin dialog, the pin is not deleted from the Part Developer database. It is stored so that it can be added to a package or symbol if required. To delete the pin completely:

   a. Choose *Pins – Add*.

      The *Add Pin* dialog is displayed.

   b. Right-click MY_PIN and select *Delete Selected Rows.*

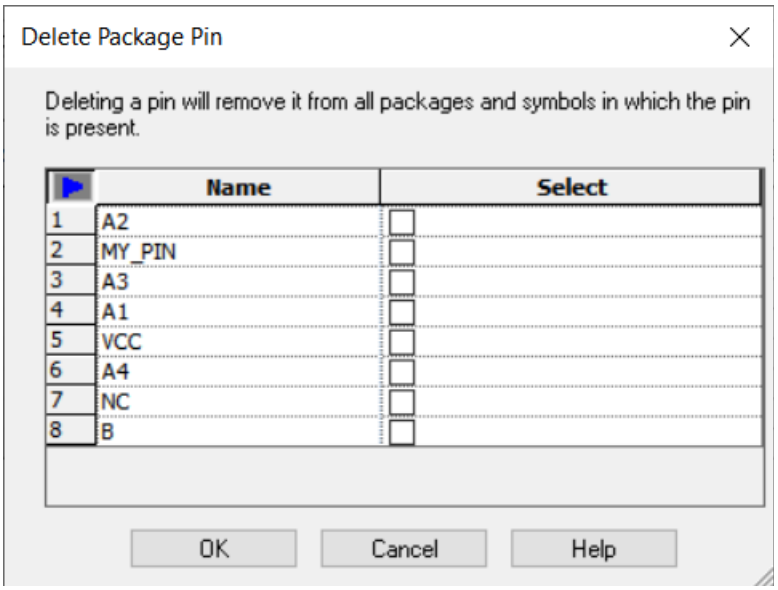
   c. Click *OK*.

Deleting Pins from All Packages and Symbols

Delete the input pin A1 from all the packages and symbols.

1. Select any package.
2. Choose *Pins – Global Delete*.

The *Delete Package Pin* dialog box appears.



3. Select the check box corresponding to pin A1 and click *OK*.

   Pin A1 is deleted from all the packages and symbols.

4. Save the part.

Important

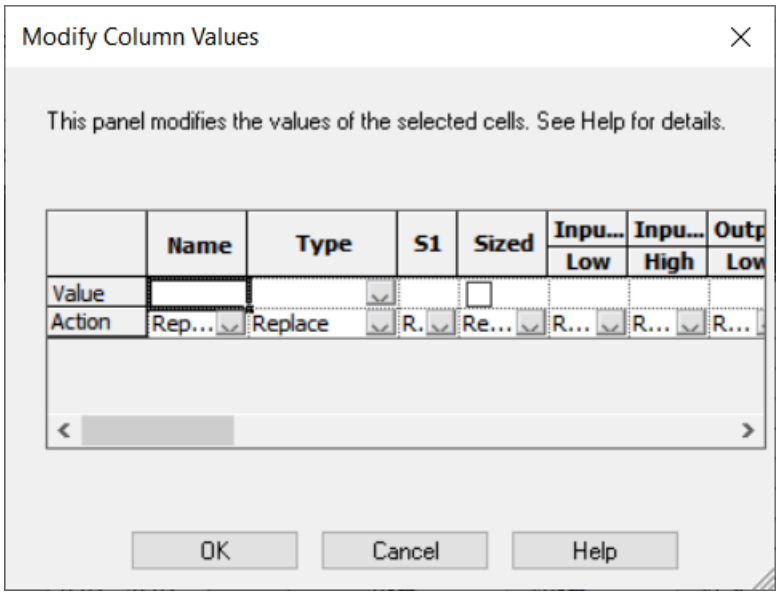
There is no undo action available for pin deletion operations done using the *Delete Package Pin* option. Pins deleted using the *Delete Package Pin* option are deleted from all packages and symbols.

Modifying Pin Types

Modify the input pins in the MYPART package to BIDIR pins.

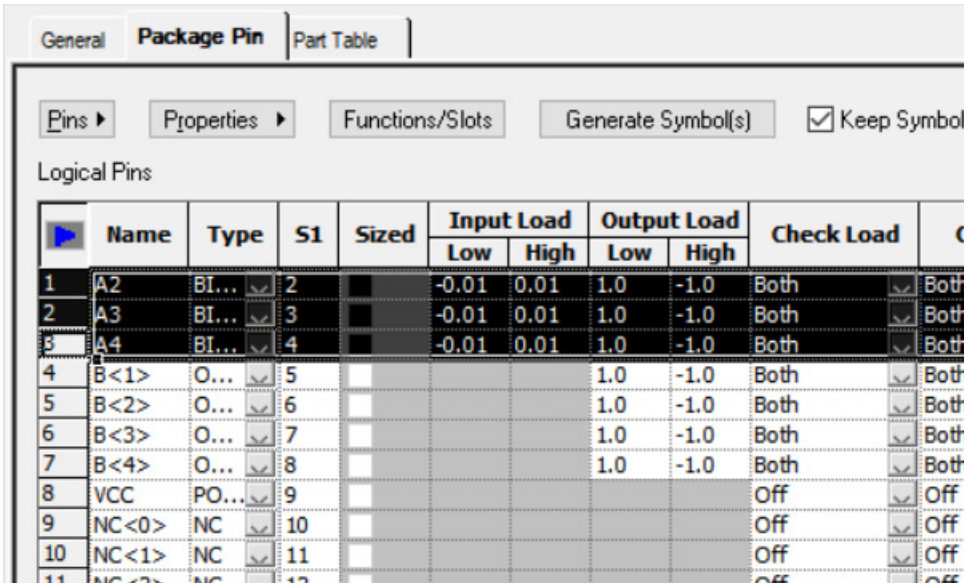
1. Select the package *MYPART*.
2. In the *Package Pin* tab, select the rows for input pins A2, A3, and A4 in the *Logical Pins* grid.Right-click the selection and choose *Modify Values* from the pop-up menu.

The *Modify Column Values* dialog box appears.



3. Select *BIDIR* from the *Type* drop-down list.
4. Click *OK*.

   The pin types are modified to BIDIR.



5. Save the part.

A warning message is generated stating that a list of specified pins have different pin types in different packages.

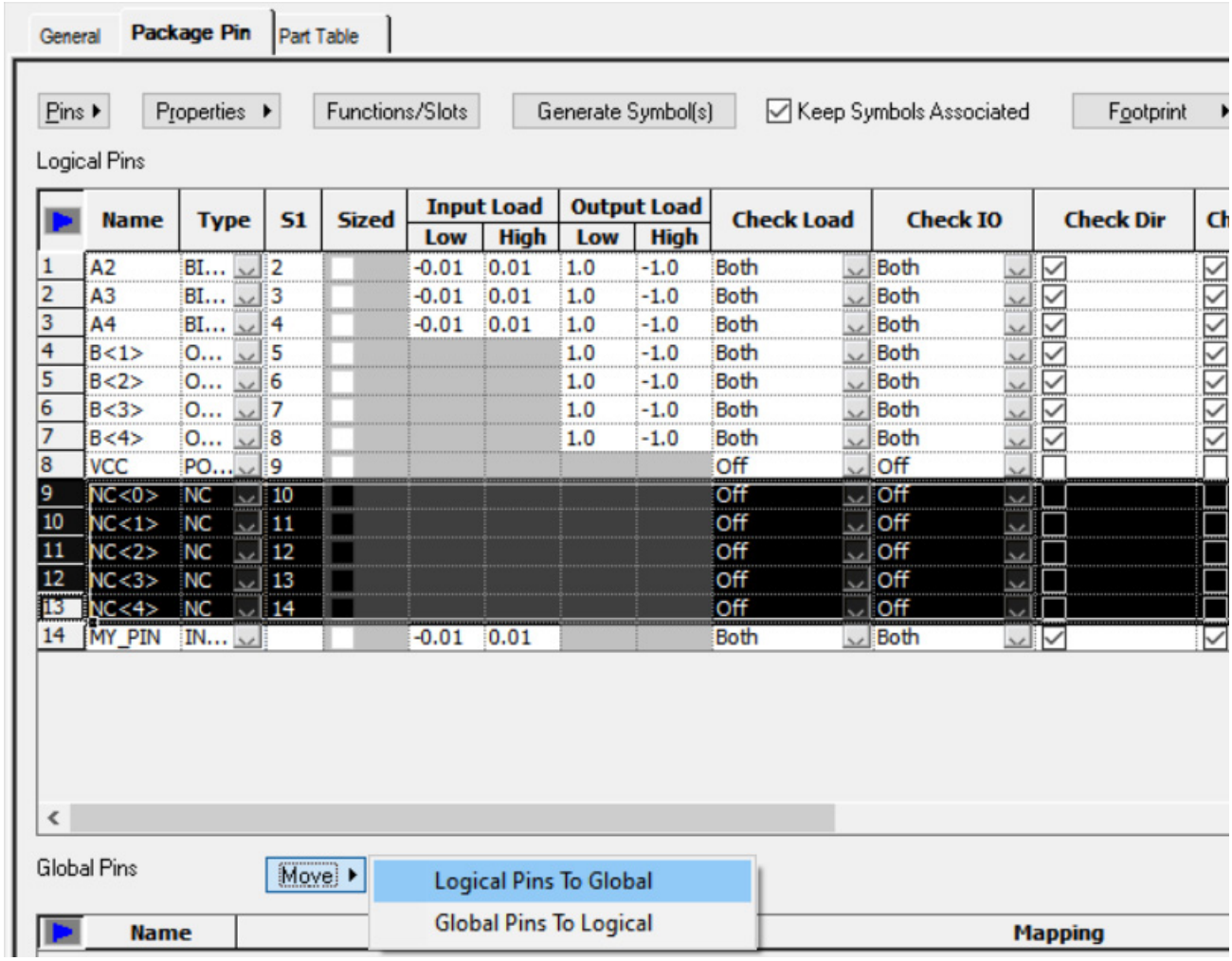
6. Click *OK*.

Moving Logical Pins to Global Pins

Move the NC pins in the MYPART package to the *Global Pins* grid.

1. Select the MYPART package.
2. Select all the NC pins in the *Logical Pins* grid.
3. Choose *Move – Logical Pins to Global*.

   The NC pins are moved to the *Global Pins* grid.



Important

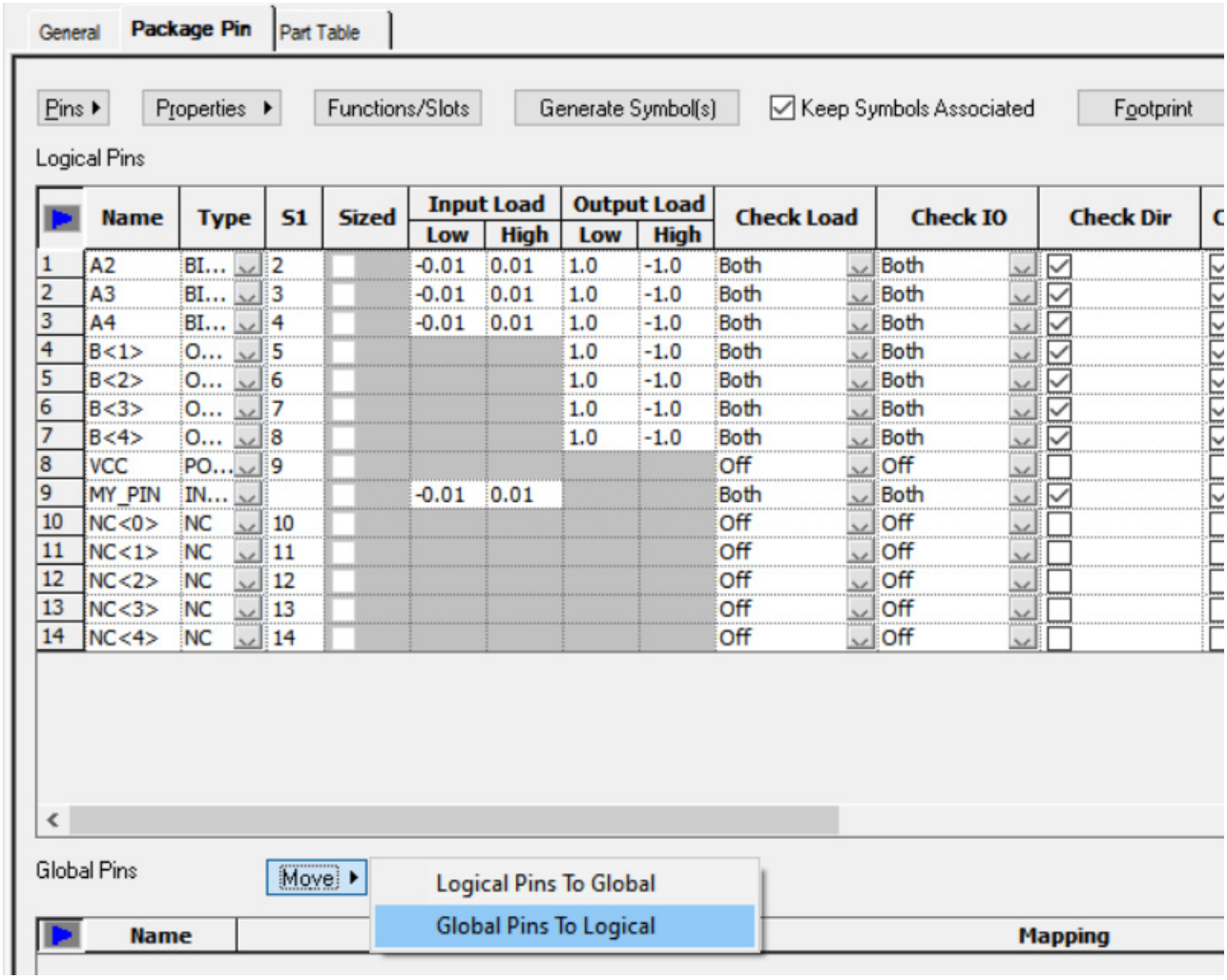
The NC pins, which appeared as bits of vector pins, are collapsed and placed as a single pin in the *Global Pins* grid. The *Mapping* column displays the physical pins that are mapped to the NC pins.

Moving Global Pins to Logical Pins

Move the NC pins in the MYPART package to the *Logical Pins* grid.

1. Select the MYPART package.
2. Select the NC pins in the *Global Pins* grid.
3. Choose *Move – Global Pins to Logical*.

The NC pins are moved to the *Logical Pins* grid.



Important

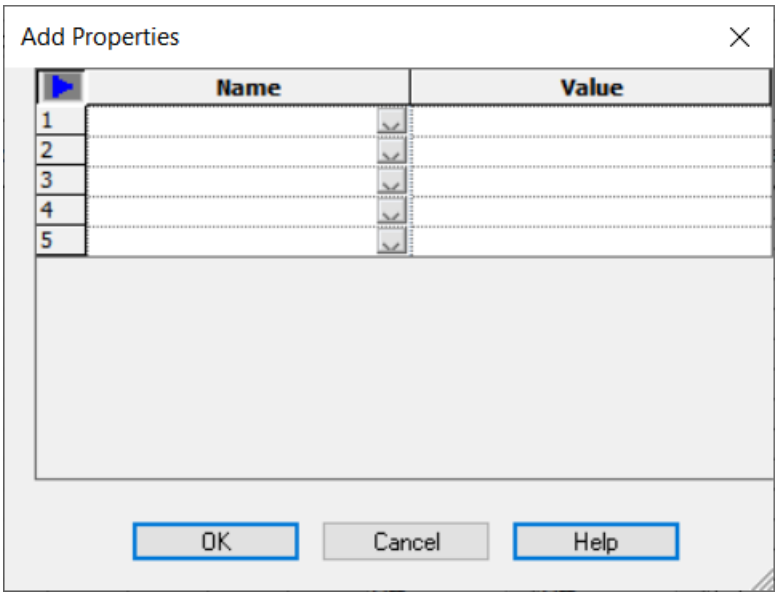
The NC pins, which appeared as a single pin in the *Global Pins* grid, appear as bits of a vector pin in the *Logical Pins* grid.

Adding Package Pin Properties

Add the package pin property `my_pin_property` with value `val 1` to the pins A2 and A3 of the MYPART package.

1. Select the package MYPART.
2. In the *Package Pin* tab, choose *Properties – Add*.

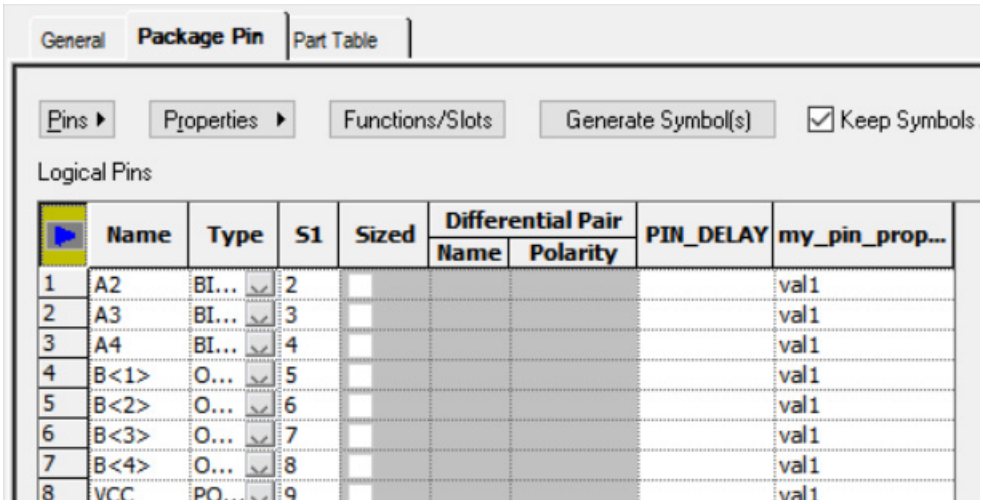
The *Add Properties* dialog box appears.



3. To specify the properties, enter `my_pin_property` in the *Name* column and `val1` in the *Value* column.
4. Click *OK*.

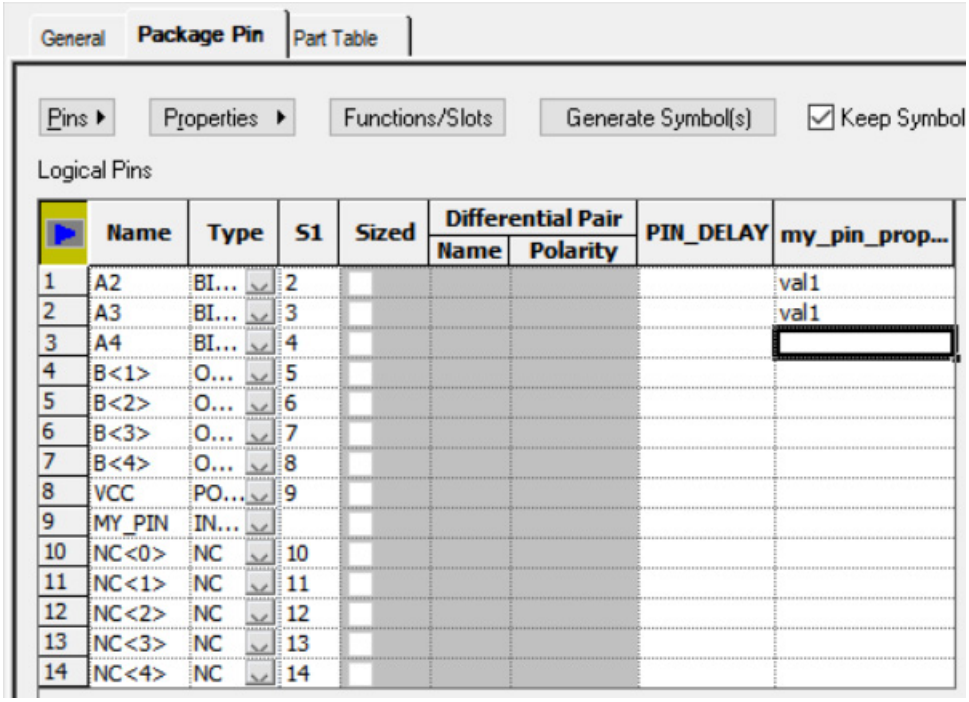
   By default, the property gets added to all the pins. To remove the property from a specific pin, you need to delete the value of the property for that pin.
5. To hide the unnecessary columns, right-click anywhere in the *Logical Pins* grid and select *Hide Load Cols*.

   The columns are hidden.



6. To delete the pin property from pins A4 to NC<4>, delete the property values for the pins from the *my_pin_property* column.

   After the property values are deleted, the *Logical Pins* grid should appear as follows:



	Name	Type	S1	Sized	Differential Pair		PIN_DELAY	my_pin_prop...
					Name	Polarity		
1	A2	BI...	2					val1
2	A3	BI...	3					val1
3	A4	BI...	4					
4	B<1>	O...	5					
5	B<2>	O...	6					
6	B<3>	O...	7					
7	B<4>	O...	8					
8	VCC	PO...	9					
9	MY_PIN	IN...						
10	NC<0>	NC	10					
11	NC<1>	NC	11					
12	NC<2>	NC	12					
13	NC<3>	NC	13					
14	NC<4>	NC	14					

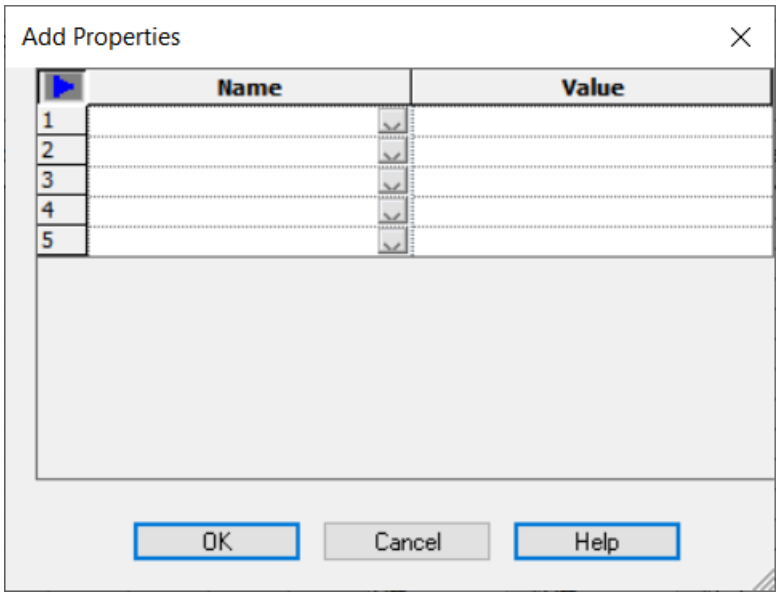
Specifying Pin Swappability

Pin swappability is determined by the `PIN_GROUP` pin property. The pins that have the same values for this property are considered swappable.

Make the pins A2 and A4 of the MYPART package swappable.

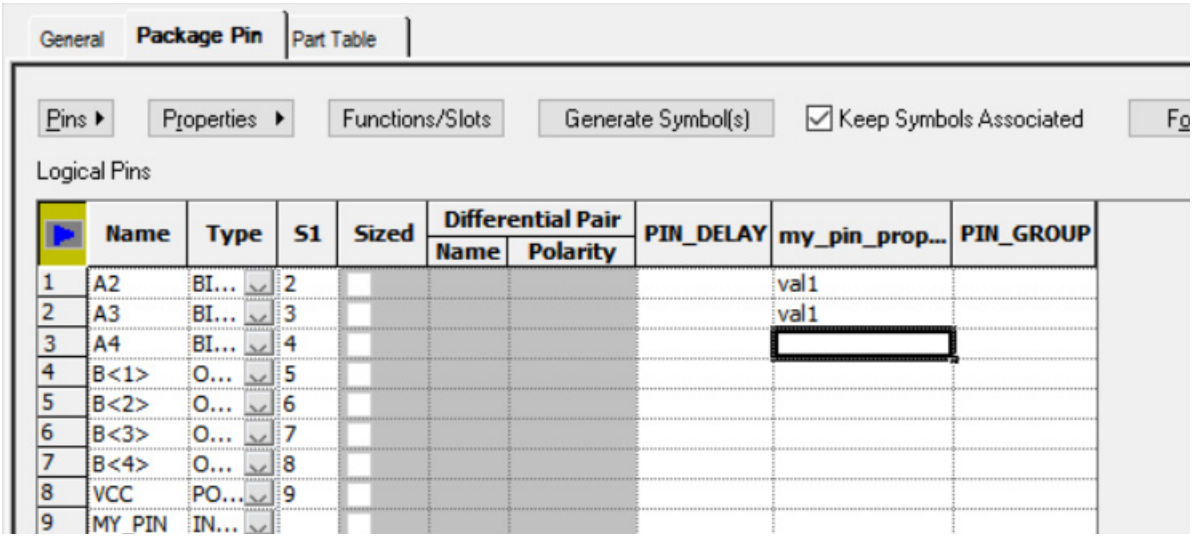
1. Select the MYPART package.
2. Choose *Properties – Add.*

The *Add Properties* dialog box appears.



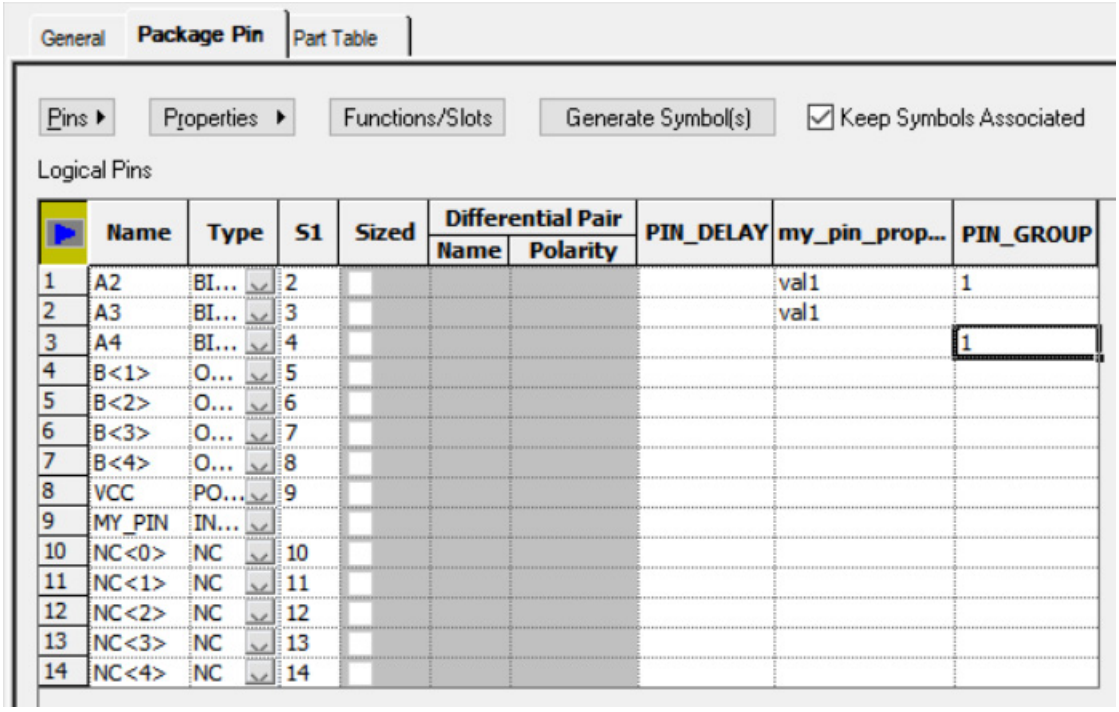
3. Select *PIN_GROUP* from the *Name* drop-down list.
4. Click *OK*.

   By default, the property gets added to all the pins.



5. To make pins A2 and A4 swappable, assign the value `1` for the `PIN_GROUP` property for pins A2 and A4.

The *Logical Pins* grid should appear as follows:



	Name	Type	S1	Sized	Differential Pair		PIN_DELAY	my_pin_prop...	PIN_GROUP
					Name	Polarity			
1	A2	BI...	2					val1	1
2	A3	BI...	3					val1	
3	A4	BI...	4						1
4	B<1>	O...	5						
5	B<2>	O...	6						
6	B<3>	O...	7						
7	B<4>	O...	8						
8	VCC	PO...	9						
9	MY_PIN	IN...							
10	NC<0>	NC	10						
11	NC<1>	NC	11						
12	NC<2>	NC	12						
13	NC<3>	NC	13						
14	NC<4>	NC	14						

6. Save the part.

   A warning message is generated stating that a list of specified pins have different pin types in different packages.

7. Click *OK*.

Summary

In this section, you learned how to modify packages.

11

Modifying Symbols

Objective

To become familiar with the steps involved in modifying symbols.

Note: To perform these tasks using legacy Symbol Editor, refer to Appendix A: Modifying Symbols Using Legacy Symbol Editor.

In this section, you will learn to:

- Add a pin to a symbol.
- Add a property to a symbol.
- Add a symbol pin property.
- Modify a symbol pin property.
- Delete a pin from a symbol.
- Add symbol text.
- Move a symbol pin.
- Modify a symbol outline.
- Expand and collapse vector pins.
- Modify the PIN_TEXT property.

Overview

Often, you may need to modify a symbol to meet changed requirements. Using Part Developer, symbol modifications can be done quickly and effectively. This section will cover some of the common part modification tasks. You will use the library part `mypart` in the `my_lib` library to perform part modification tasks.

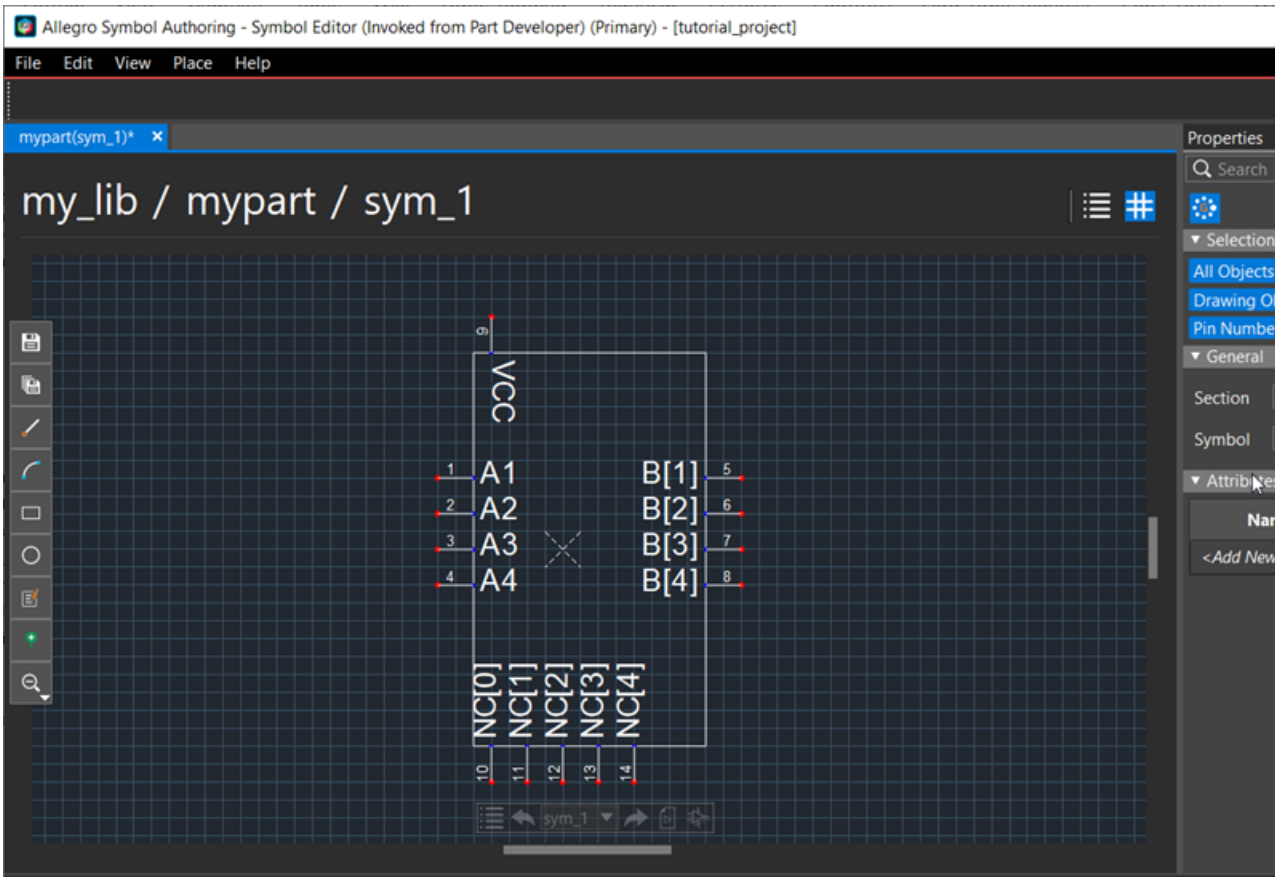
The part has two packages, `MYPART` and `MYPART_1`, and two symbols, `sym_1` and `sym_2`. The symbols `sym_1` and `sym_2` are associated with the packages `MYPART` and `MYPART_1`, respectively.

Adding Pins to a Symbol

Add an input pin, `A5`, to `sym_1`.

1. Right-click the symbol *sym_1* in the cell tree and select *Edit(In Symbol Editor)*.

   The symbol is loaded in Symbol Editor.



2. Choose *Place – Pin*.

   The *Add Pin* dialog appears.

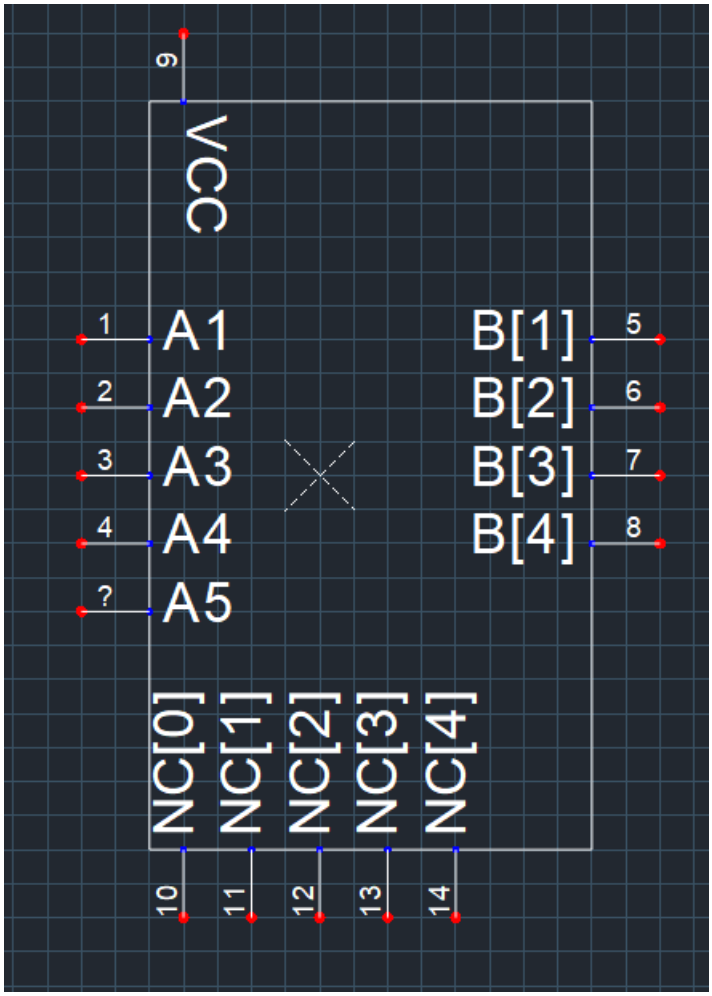
3. Enter `A5` in the *Name* field.

4. Retain the default values in other fields and click *OK*.

The pin A5 is attached to the cursor.

5. Click the symbol outline below the pin A4 to attach the pin to the symbol.

   The input pin A5 is attached to the symbol.

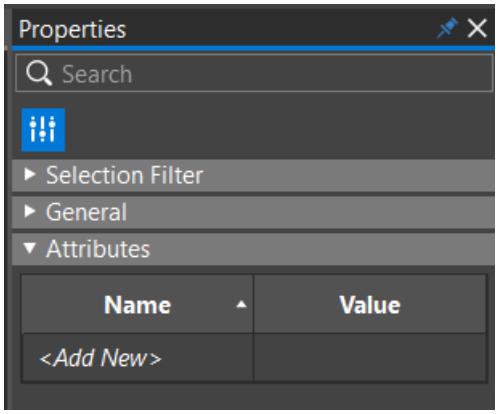


Adding Properties to a Symbol

Add the property `my_symbol_prop` with value `sym_val` to `sym_1`.

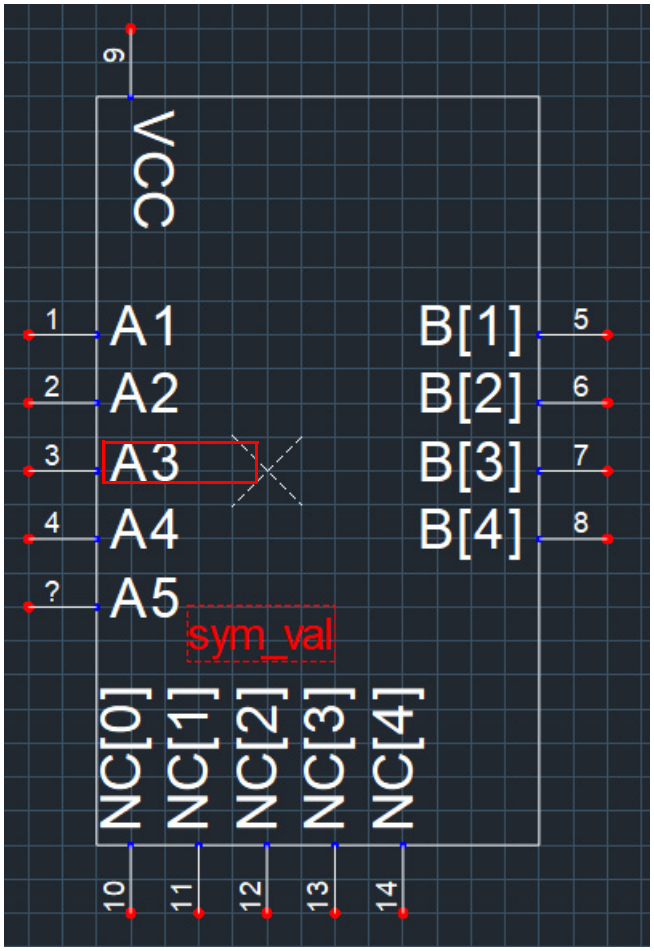
1. In the *Properties* panel, click `<Add New>` under the *Name* column under the *Attributes* section.

   The filed becomes editable.



2. Enter `my_symbol_prop` in the *Name* column and `sym_val` in the *Value* column.

The property value is added to the symbol and displayed on the canvas.

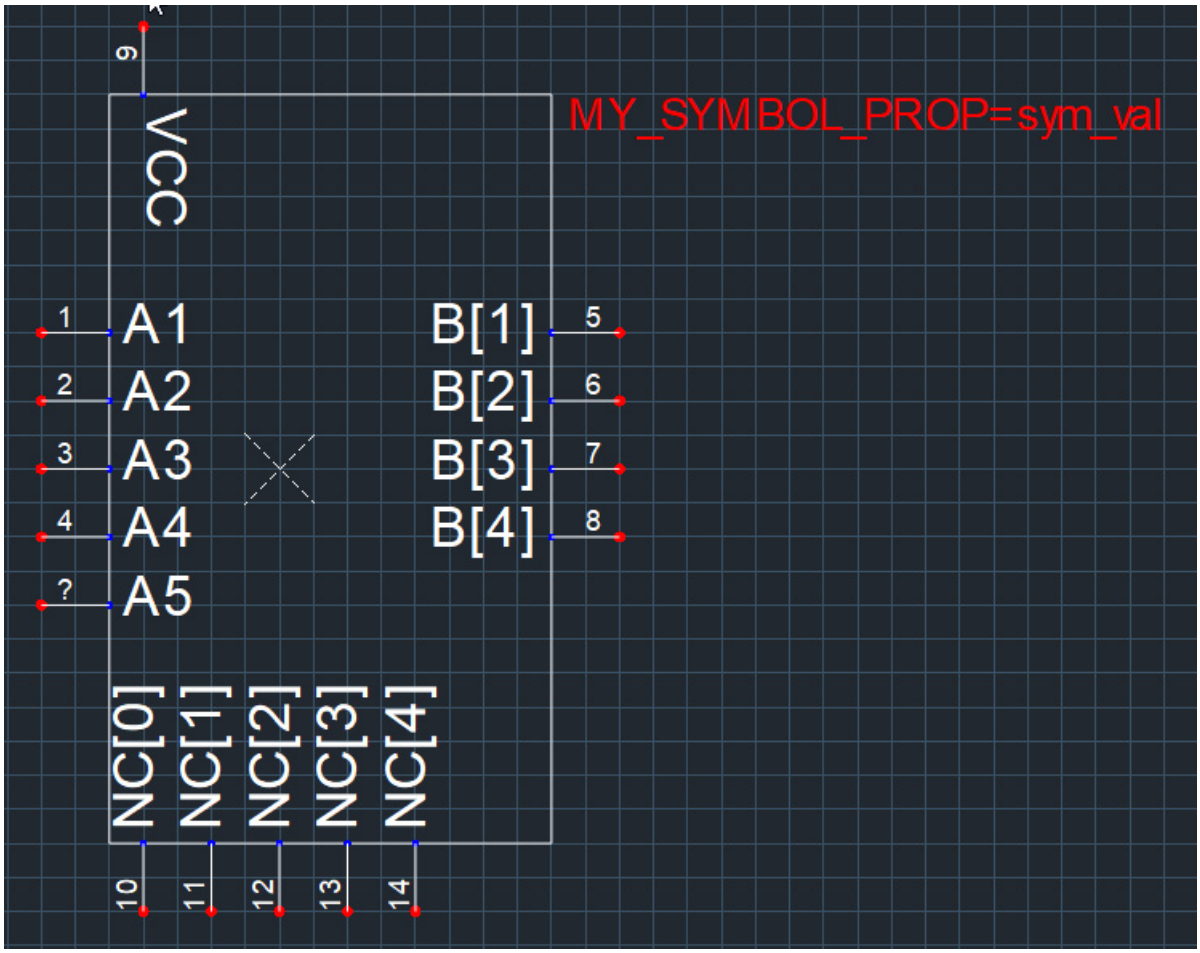


Next, you need to determine the appearance of the property and its value on the symbol.

3. Click the visibility icon for `my_symbol_prop` in the *Name* column.

   The property name is also displayed on the canvas.

4. Move the property from the left to the top-right of the symbol.

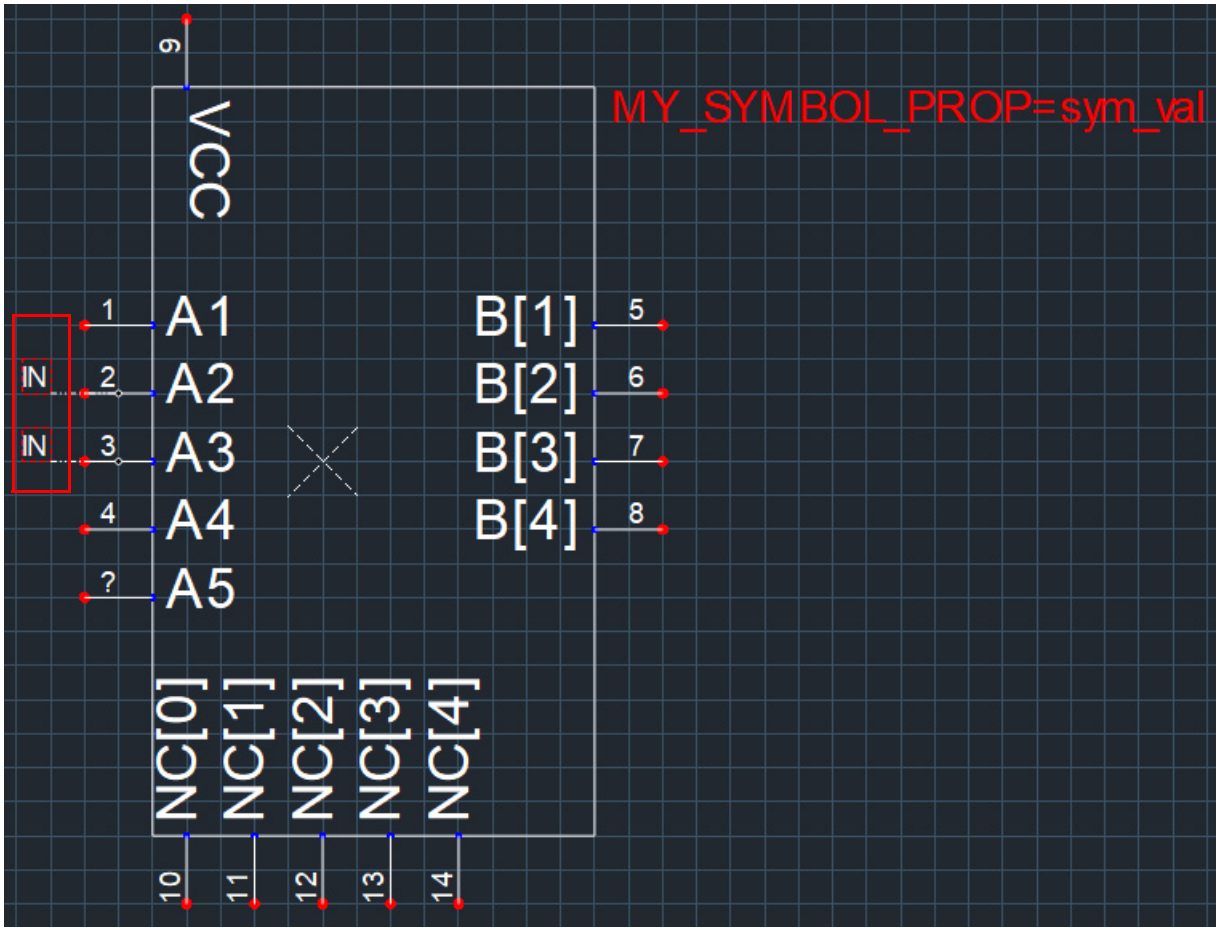


Adding Symbol Pin Properties

Add the symbol pin property `VHDL_TYPE` with the value `IN` to pins `A2` and `A3`.

1. In the *Symbol Editor* window, select the pins A2 and A3.
2. Enter `VHDL_TYPE` in the *Name* column and `IN` in the *Value* column, in the *Attributes* section of the *Properties* panel.

The property value is added to the pins and displayed on the canvas.

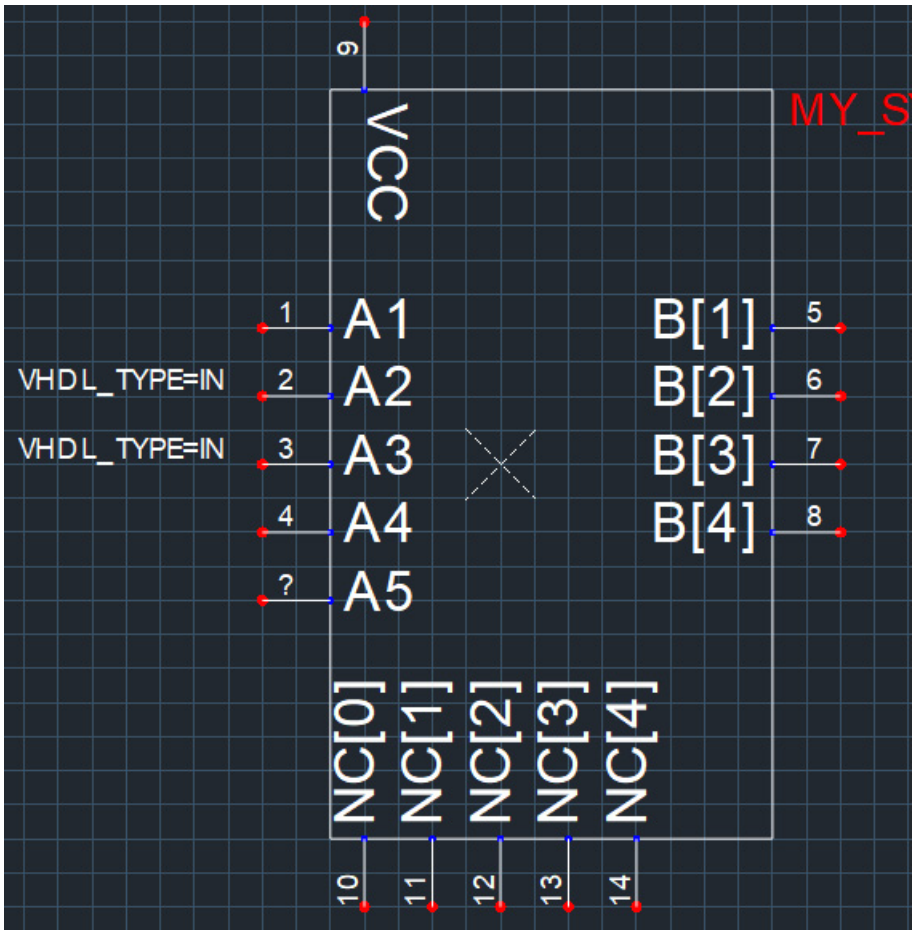


Modifying Symbol Pin Properties

Modify the `VHDL_TYPE` symbol pin property name to make it visible on the symbol pins.

1. Select the pins A2 and A3.
2. Under the *Attributes* section of the *Properties* panel, click the visibility icon for `VHDL_TYPE` in the *Name* column to display it on the canvas.

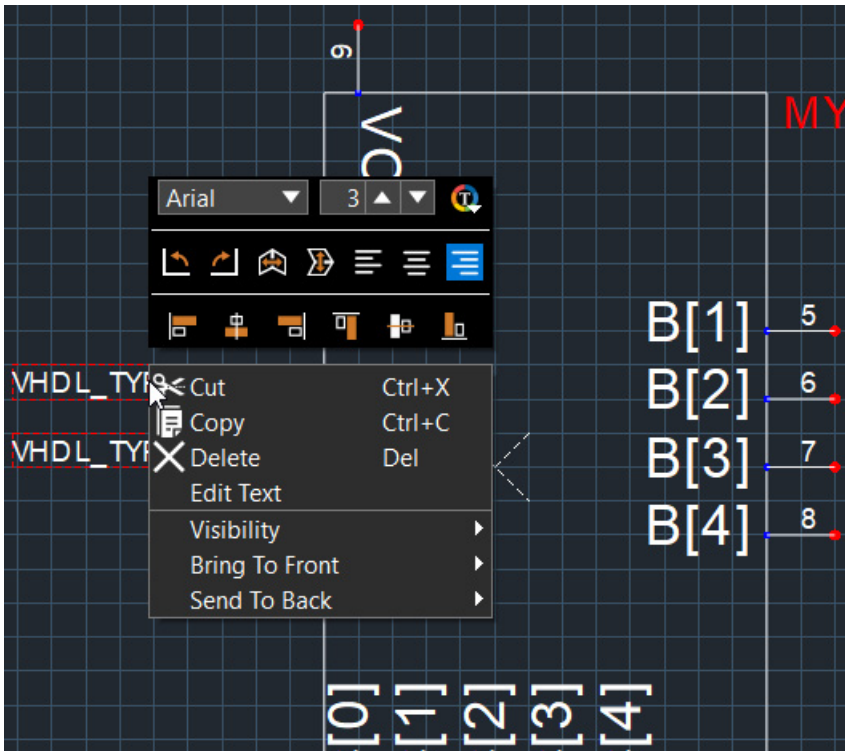
The symbol pin property name along with its value appears next to the pins A2 and A3.



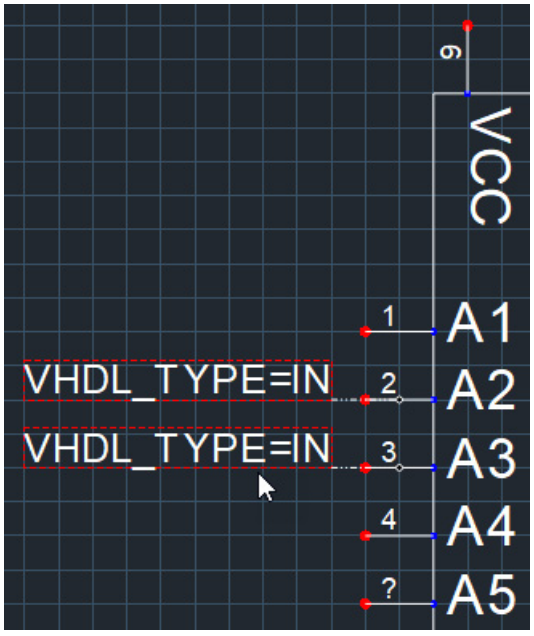
You can also reduce or increase the font size of the property text from the right-click pop-up menu.

3. Select both the pin properties.

4. Right-click the selected properties and set the font size to `2` in the Font size box from the pop-up menu.



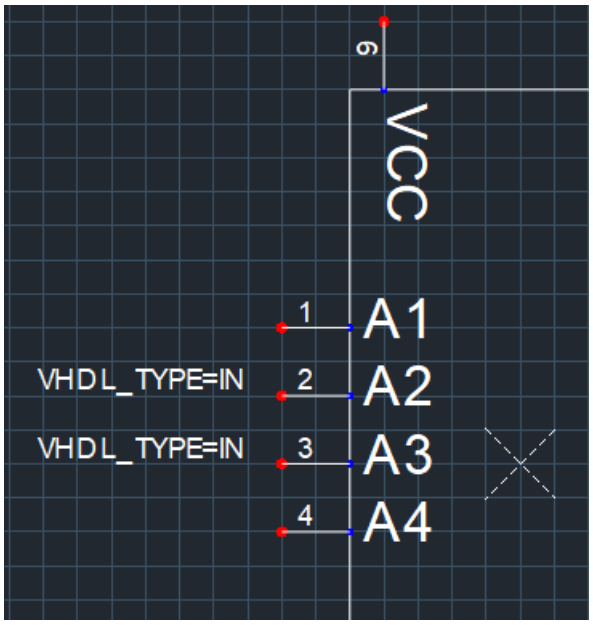
After changing the font size and position, the properties are displayed as shown in the following figure:



Deleting Pins from a Symbol

Delete the pin A5 from sym_1.

1. In the Symbol Editor window, right-click the pin A5 and choose *Delete* from the pop-up menu.



2. Save the symbol.

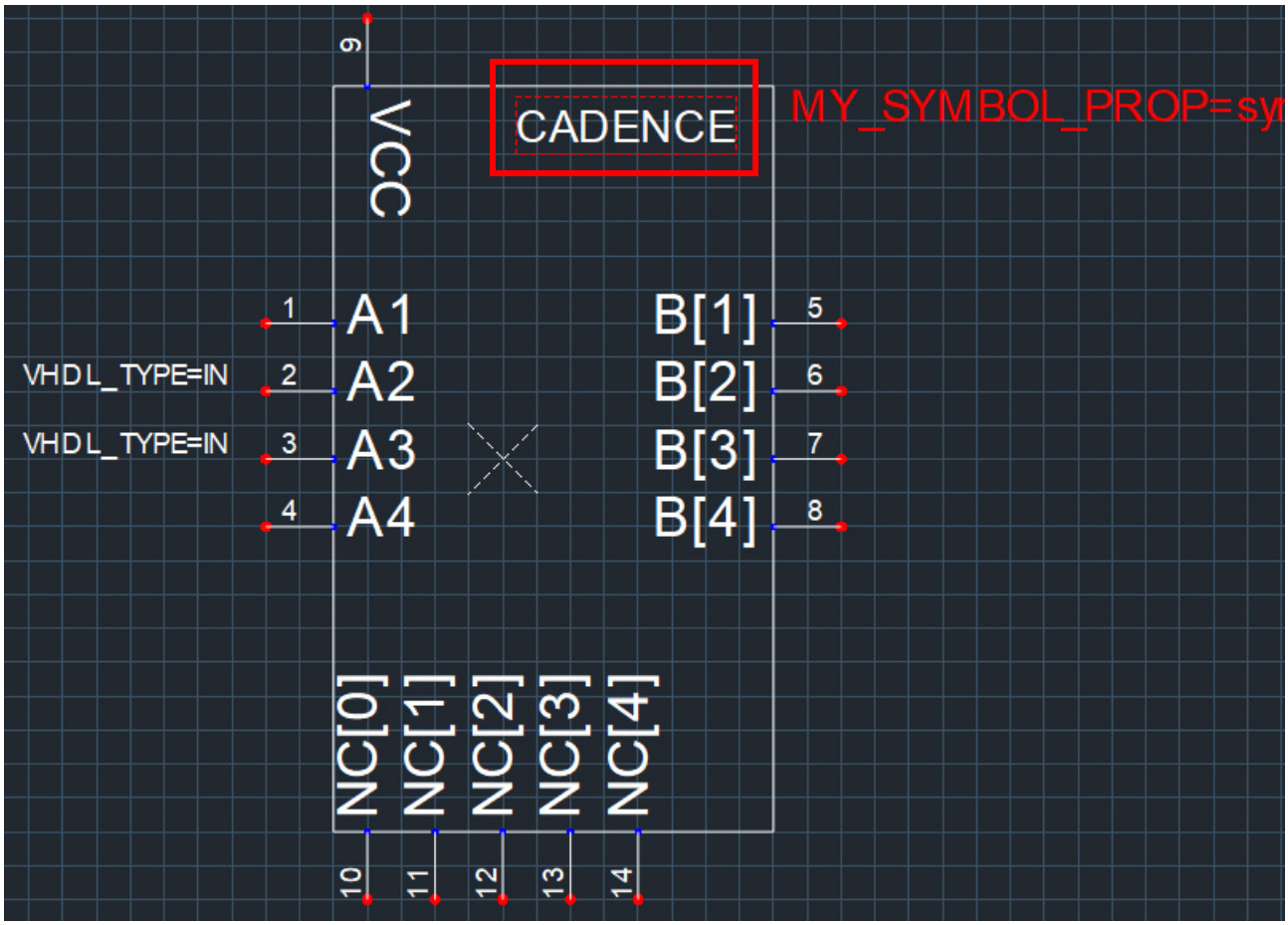
Adding Note

Add the note *CADENCE* to sym_1.

1. In the *Symbol Editor* window, choose *Place – Note*.
2. Click anywhere on the canvas to place the note.

   A blank note is placed on the canvas.
3. Type `CADENCE` and click outside the note.

4. Move the note to the center of the symbol.



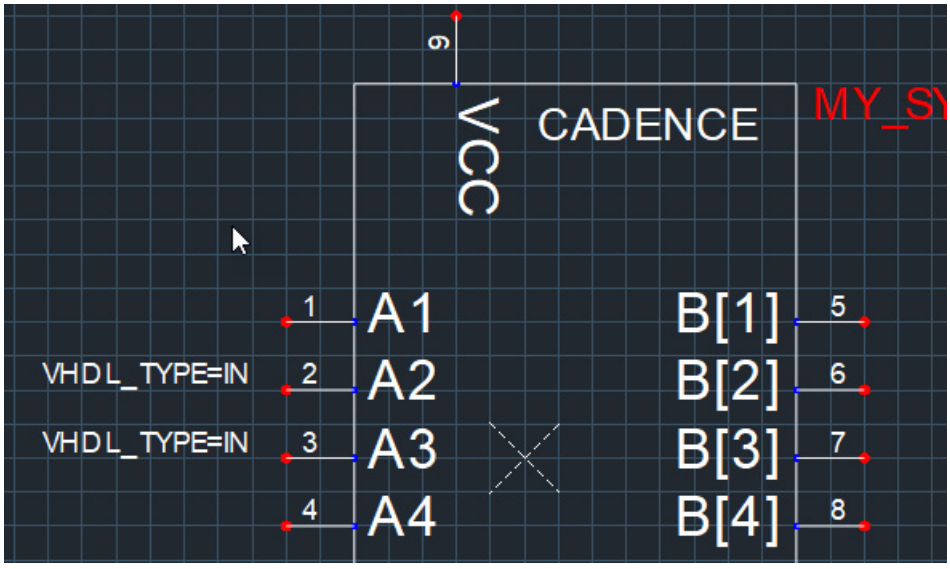
Modifying Objects

In this section, you will learn to:

- *Move a single pin*
- *Move multiple pins*
- *Resize a pin*
- *Align pins*

To move the pin VCC:

1. In the Symbol Editor window, select the pin VCC and drag it to the right by two grids.

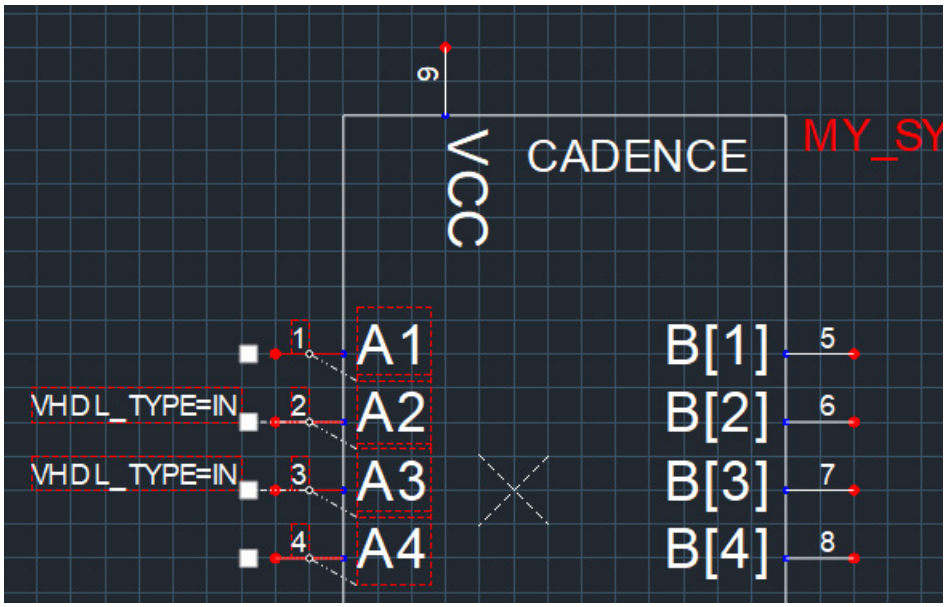


You can also move and resize multiple pins, or objects. When moving or resizing multiple pins or objects, all the selected pins or objects move the same distance and direction from their original position.

To move all the pins on the left side of the symbol:

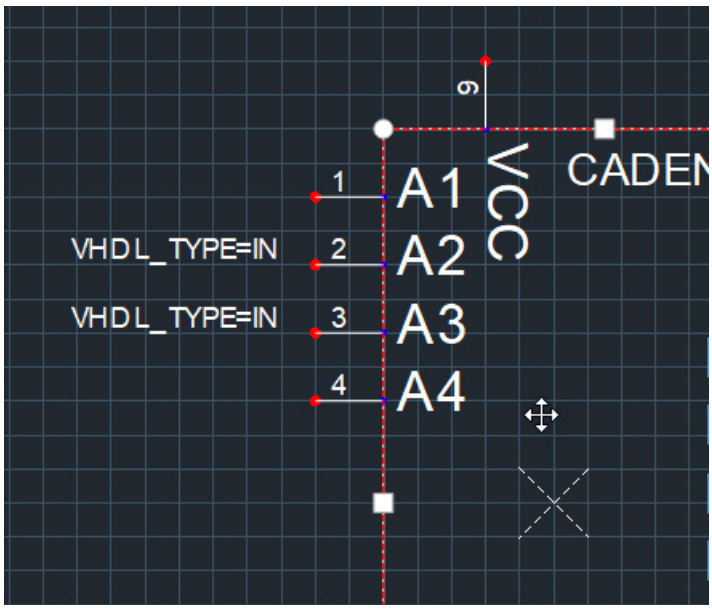
1. Select all pins on the left side of the symbol by creating a selection box around the pins. The selection box selects all the objects enclosed within its boundaries.

All the pins on the left side of the symbol are selected.



2. Drag the selection towards the top of the symbol.

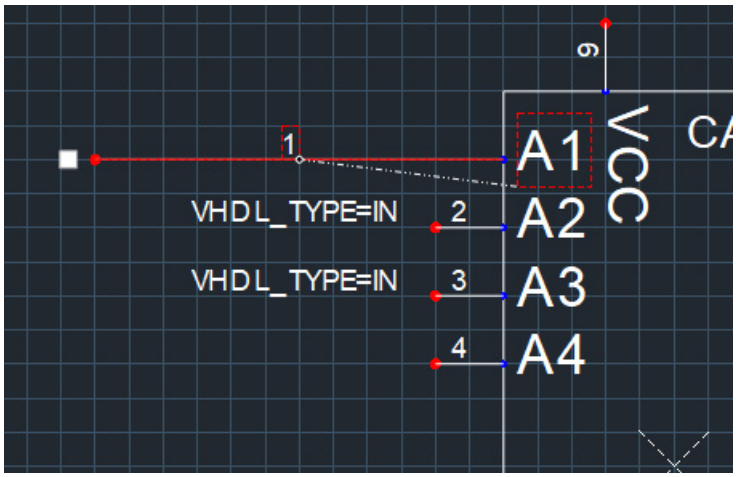
   All the pins on the left side of symbol are moved, as shown in the following figure:



To resize pin *A1*:

1. Select the pin *A1*.

2. Drag the sizing handle ( ) (near to the connection point) until the pin is of required size.

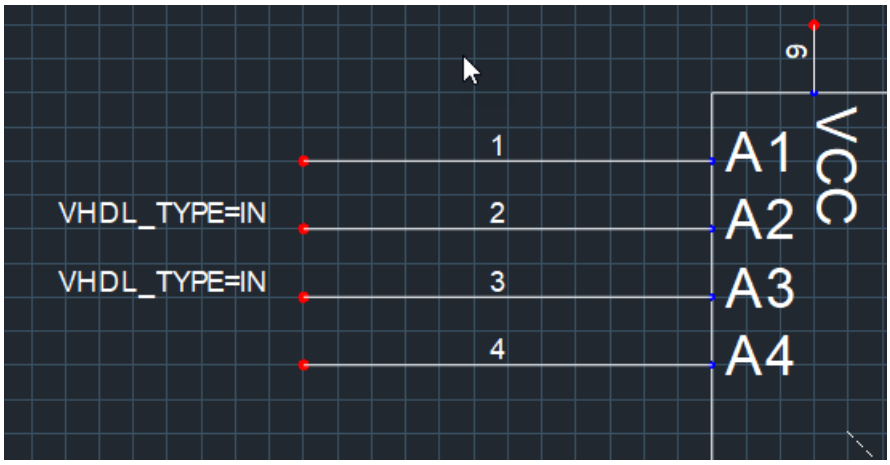


The connection points should be aligned on all sides of the symbol. Notice that connection points on the left side of the symbol are not aligned.

In Symbol Editor, you can select pins of different sizes and quickly align them to make them equally sized. You can align pins to left, right, center, top, middle, and bottom.

To align pins on the left side of the symbol:

1. Select all the pins on the left side of symbol.
2. Right-click any selected pin and click the *Align Left* ( ) button in the pop-up menu.

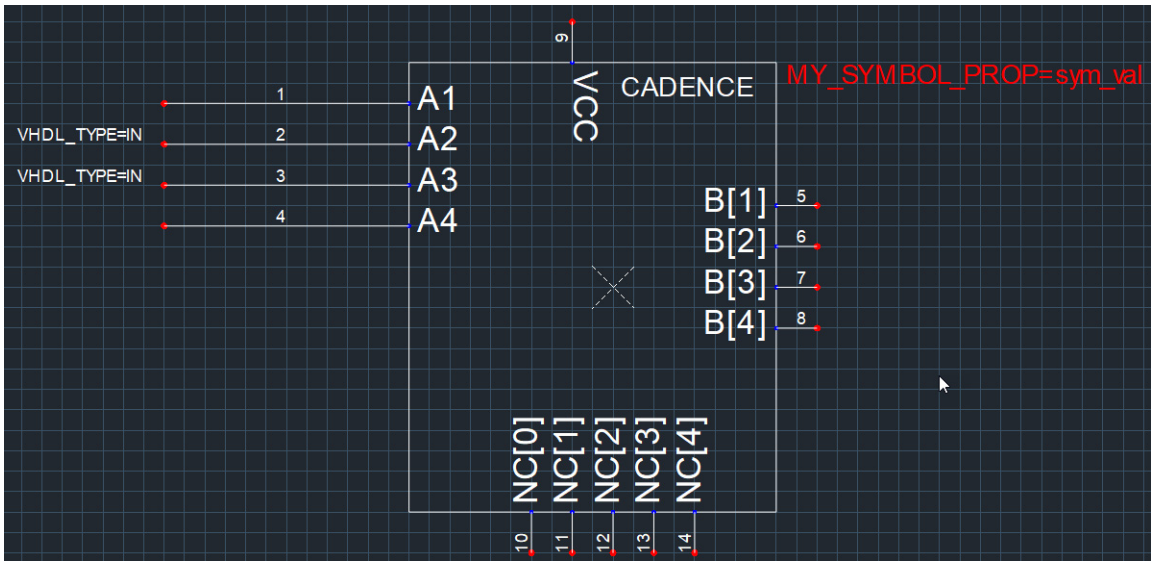


Modifying Symbol Outline

Increase the left outline of sym_1 by five grids.

1. In the Symbol Editor window, select the symbol.
2. Drag the sizing handle ( ) to the left by five grids.

   The symbol outline changes as shown in the following figure. Note that the symbol pin positions also change automatically with the change in the symbol outline.

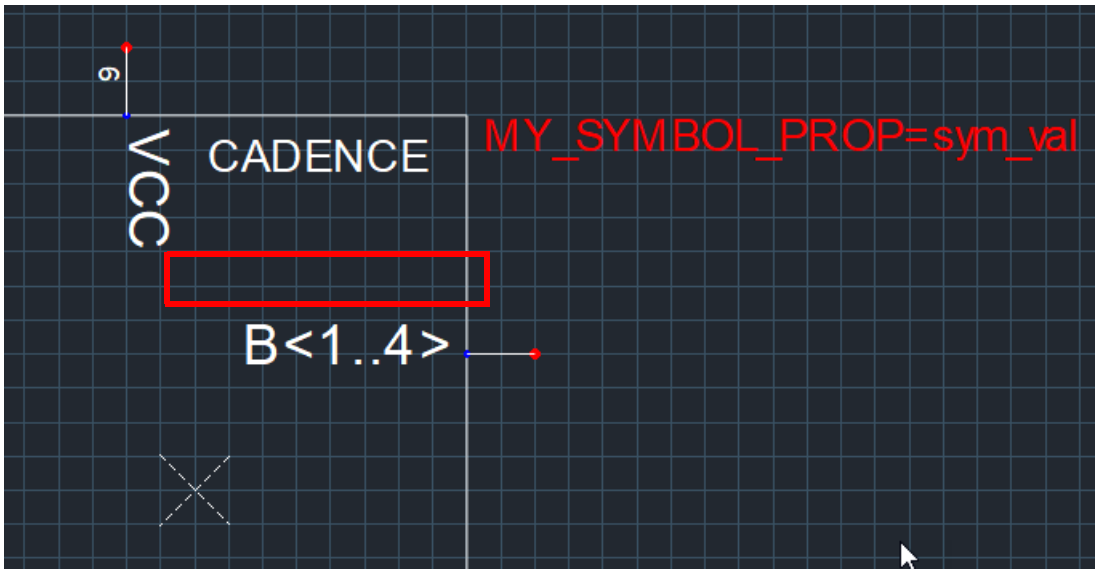


Expanding and Collapsing Vector Pins

Collapse the bits of the vector pin B:

1. In the Symbol Editor window, select all the bits of the vector pin B.
2. Right-click the selection and choose *Collapse – Collapse Ascending*.

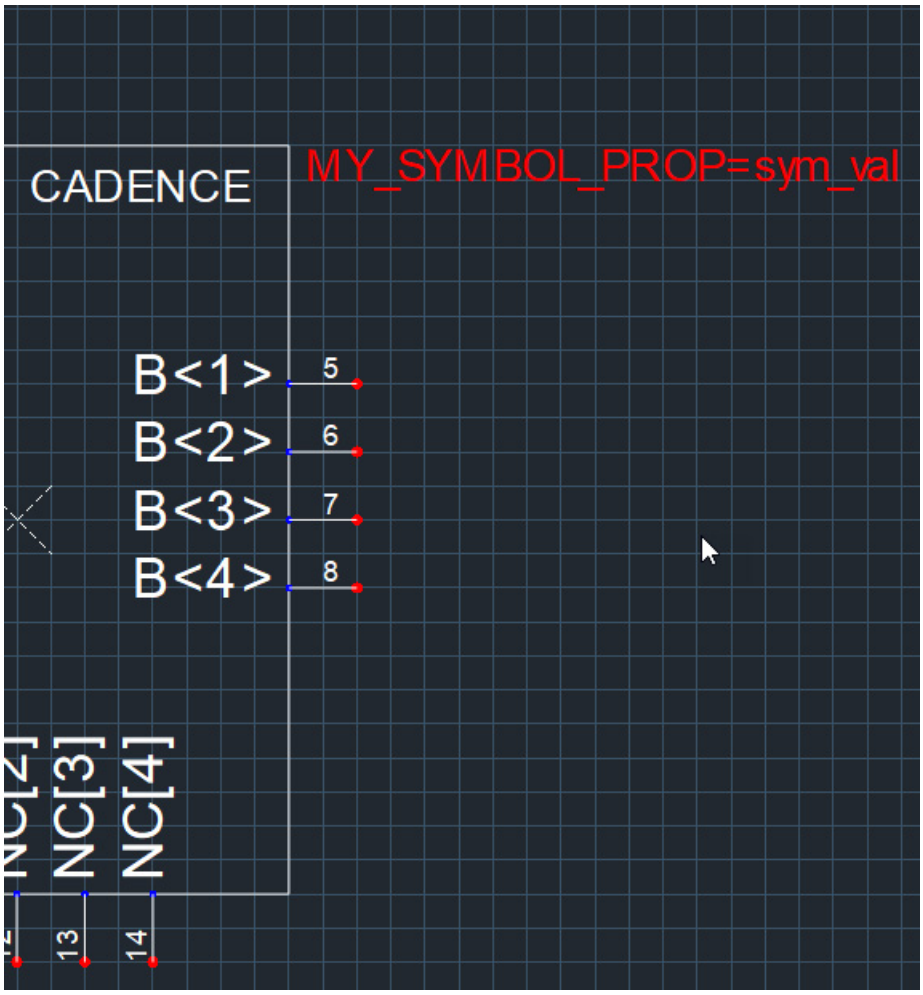
The bits collapse to form a vector pin.



Expand the vector pin B:

1. Select the collapsed vector pin B.
2. Right-click the selection and choose *Expand – Expand Ascending*.

The pin is expanded.



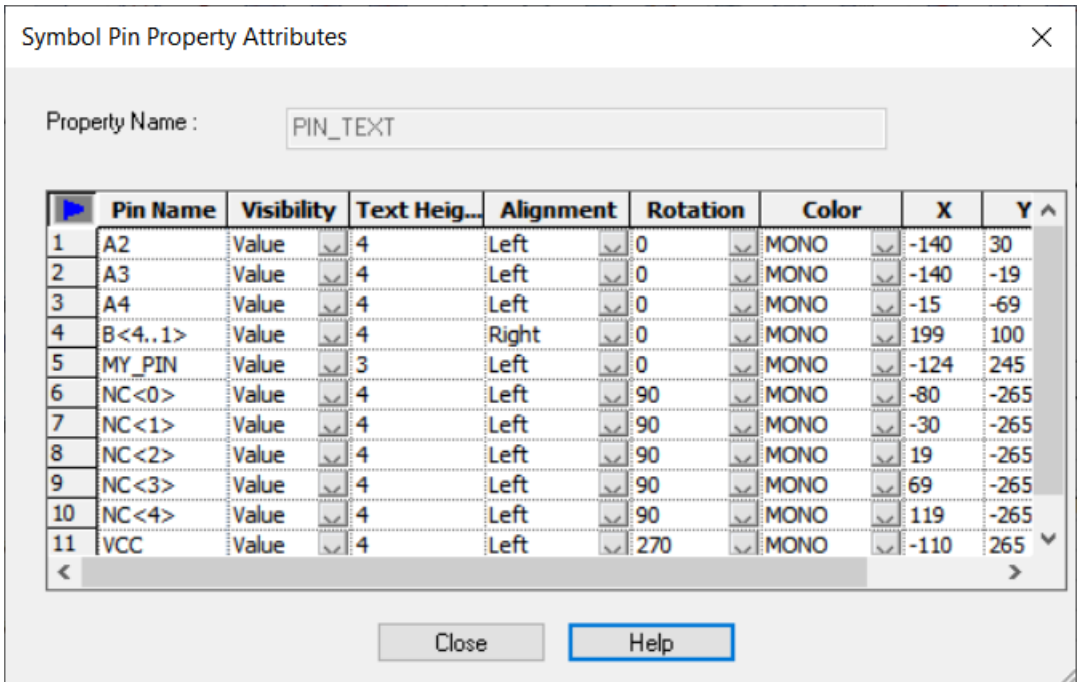
Modifying the PIN_TEXT Property

The value in the *Text* column shows the value of the PIN_TEXT property for the symbol pins. To change the values, simply edit the value for a particular pin.

To change the display attributes of the PIN_TEXT property:

1. In the Part Developer window, select *Pins – Pin Text Attributes*.

   The *Symbol Pin Property Attributes* dialog box appears.



	Pin Name	Visibility	Text Heig...	Alignment	Rotation	Color	X	Y
1	A2	Value	4	Left	0	MONO	-140	30
2	A3	Value	4	Left	0	MONO	-140	-19
3	A4	Value	4	Left	0	MONO	-15	-69
4	B<4..1>	Value	4	Right	0	MONO	199	100
5	MY_PIN	Value	3	Left	0	MONO	-124	245
6	NC<0>	Value	4	Left	90	MONO	-80	-265
7	NC<1>	Value	4	Left	90	MONO	-30	-265
8	NC<2>	Value	4	Left	90	MONO	19	-265
9	NC<3>	Value	4	Left	90	MONO	69	-265
10	NC<4>	Value	4	Left	90	MONO	119	-265
11	VCC	Value	4	Left	270	MONO	-110	265

2. Change the display attributes as required and click *Close*.

Summary

In this section, you learned how to modify symbols.

12

Editing Symbol Graphics

Objective

To become familiar with the steps in editing symbol graphics by using the Symbol Editor.

Note: To perform these tasks using legacy Symbol Editor, refer to Appendix B: Editing Symbol Graphics Using Legacy Symbol Editor.

In this section, you will learn to:

- Working with Custom Shapes
- Working with Properties
- Adding Notes and Images
- Creating Copies of Objects
- Performing Zoom and Pan Operations on a Symbol
- Rotating an Object
- Aligning Objects
- Moving and Stretching Objects

Overview

In Part Developer, you can modify a symbol in two ways, by changing the values of various fields in the *Symbol Pins* panel or by modifying the symbol text and graphics on the Symbol Editor canvas. While some symbol modification tasks, such as changing the location of a pin from left to right, can be done using either the Symbol Pins panel or the Symbol Editor, some other tasks, such as adding graphics to indicate the functionality of the symbol, can be done only using the Symbol Editor. This section covers various Symbol Editor features, which you can use to edit symbol graphics. You will use the library part `sample_part` in the `my_lib` library.

The part `sample_part` has six symbols.

Working with Custom Shapes

In Symbol Editor, you can attach a custom shape to a pin, which can make it easy for you to understand what that pin represents. You can also rotate and resize custom shapes using the right-click pop-up menu.

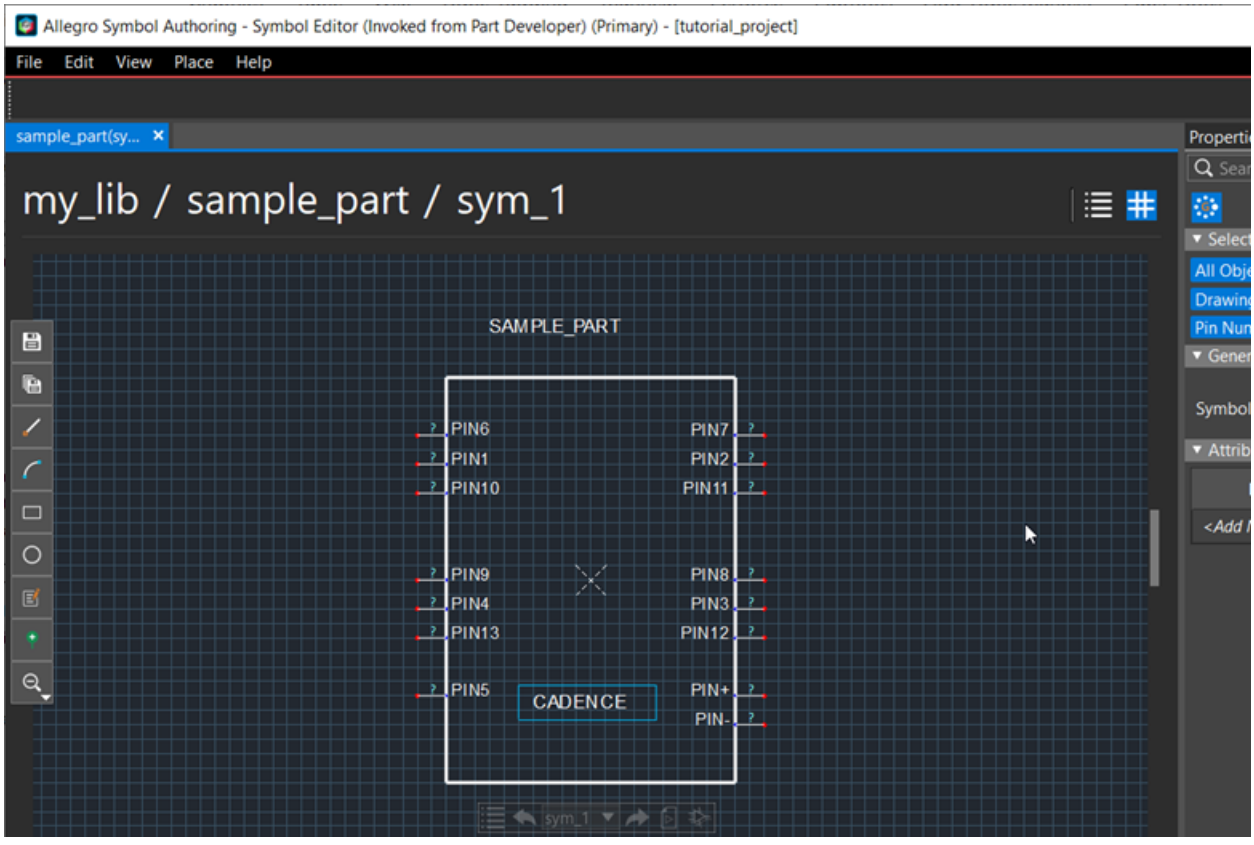
Similarly, you can flip a shape using the Mirror Vertical or Mirror Horizontal commands. These quick commands reduce the need for manual accuracy required while placing shapes.

In this section, you will add the *1PSwitch* shape in the `sym_1` symbol of `sample_part` to indicate that pins `PIN6` are associated with a buffer and a switch.

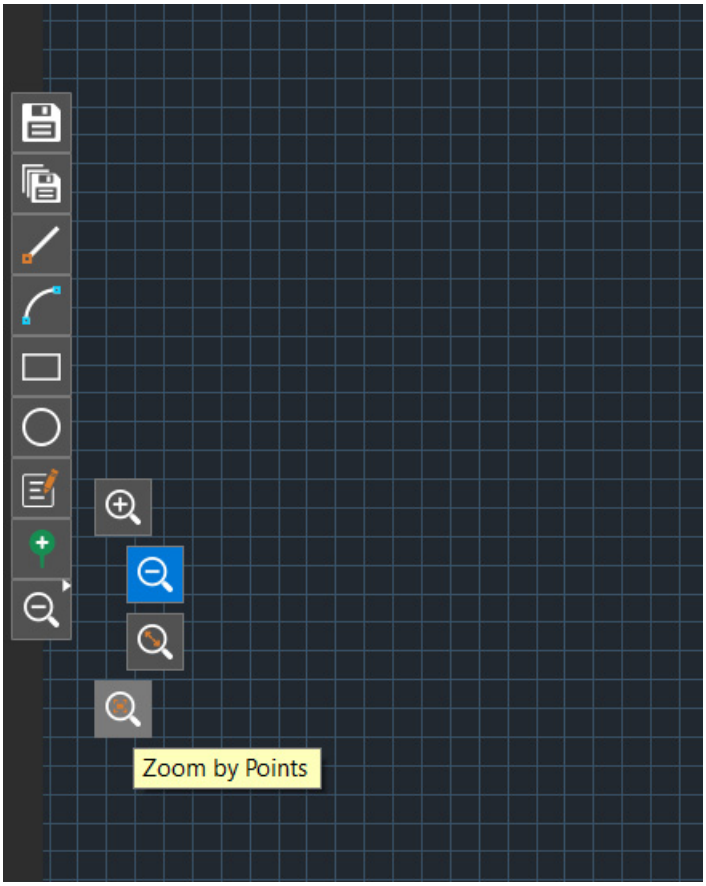
To add the shape *1PSwitch*:

1. Right-click *sym_1* in the cell tree and select *Edit(In Symbol Editor)*.

   The symbol is loaded in Symbol Editor.



2. Right-click the zoom group button and choose *Zoom By Points* .

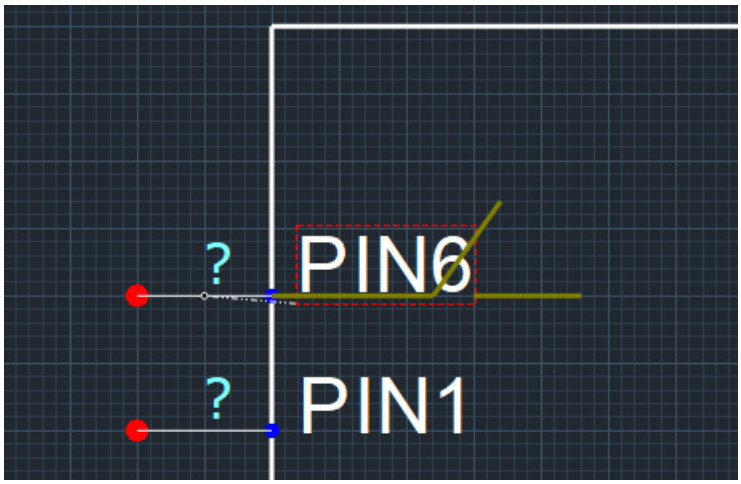


3. Using the mouse, drag and select the area that encloses `PIN6`.

   `PIN6` is magnified.

4. Choose Place - Line.
5. Create a switch shape ( ) and attach it to pin PIN6.
6. Select and drag the shape to attach it to pin PIN6.

The shape is attached to pin PIN6 as shown in the following figure:



Working with Properties

Symbol Editor allows you to access or add a property to any object from the *Properties* panel. This panel displays the property name, property value, and visibility of the property. You can add a new property by specifying a name and a value to the property.

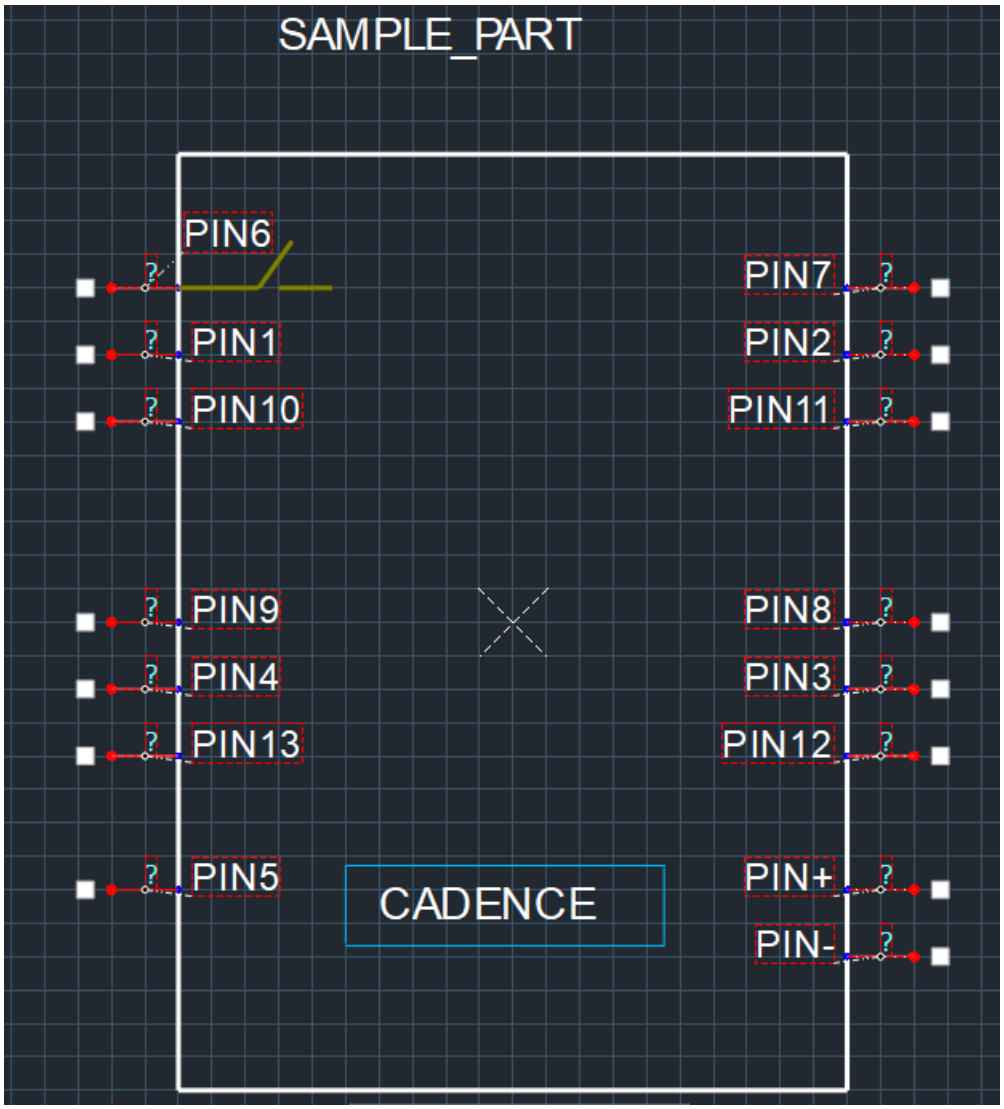
When you select multiple objects, the properties that are common to all the selected objects are displayed on this panel. You can also add the same property to multiple objects in one go. The properties on an object can be displayed on the schematic canvas.

To edit properties on the canvas:

1. Reset all the filters by clicking *All Objects* in the *Selection Filter*.
2. Select the *Pin* filter.

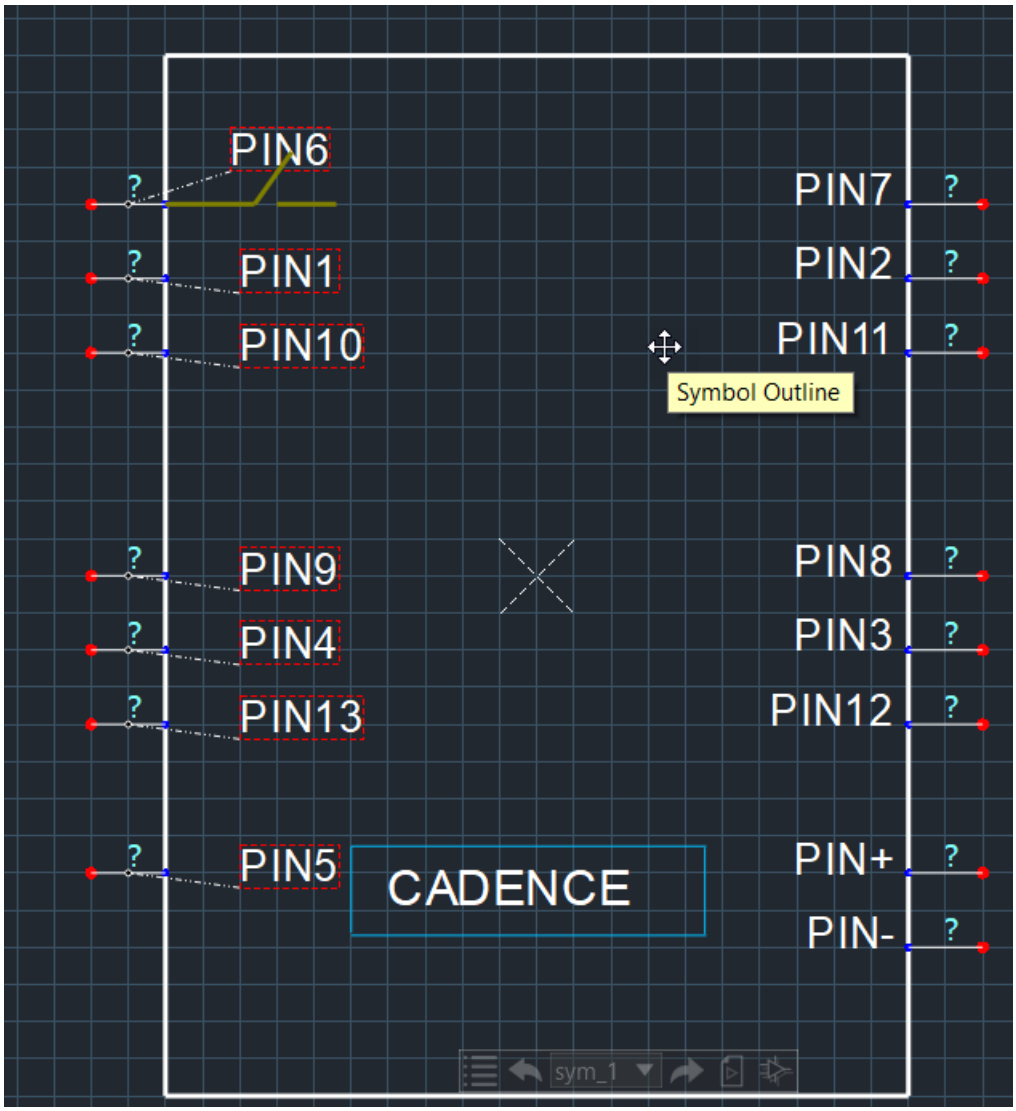
   As you select or deselect filters in the Selection Filter, the corresponding types of objects are either selected or deselected on the canvas.
3. Select all the objects on the canvas using *Ctrl + A* and view the items selected in the *Selection Filter*.

Because you have selected the *Pins* filter in the *Selection Filter*, only pins and its associated objects are selected on canvas.

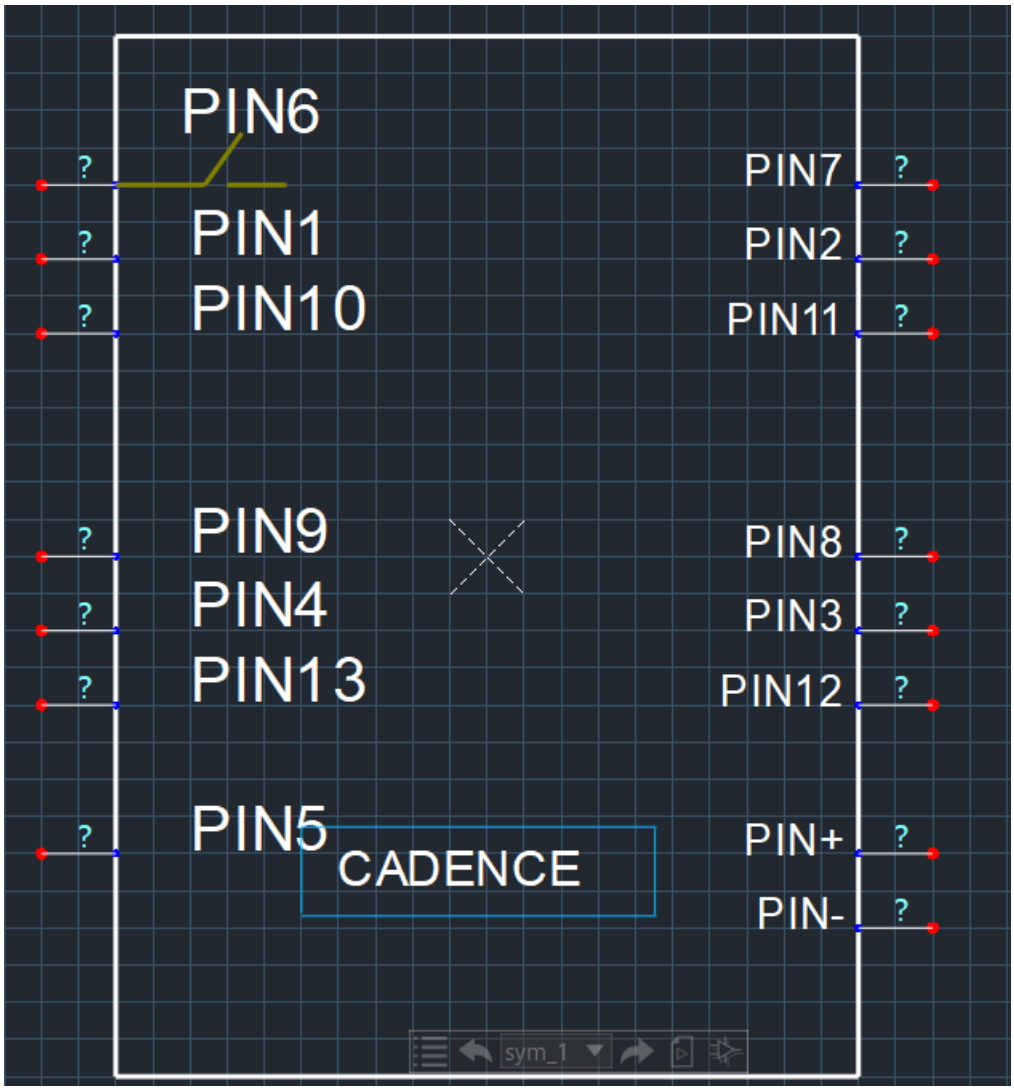


4. Select the *Pin Number* check box in the *Selection Filter*.
5. Select all the properties on the left side of the symbol by creating a selection box around the properties in the symbol boundary.

6. Drag the properties away from the symbol boundary as shown in the following figure.

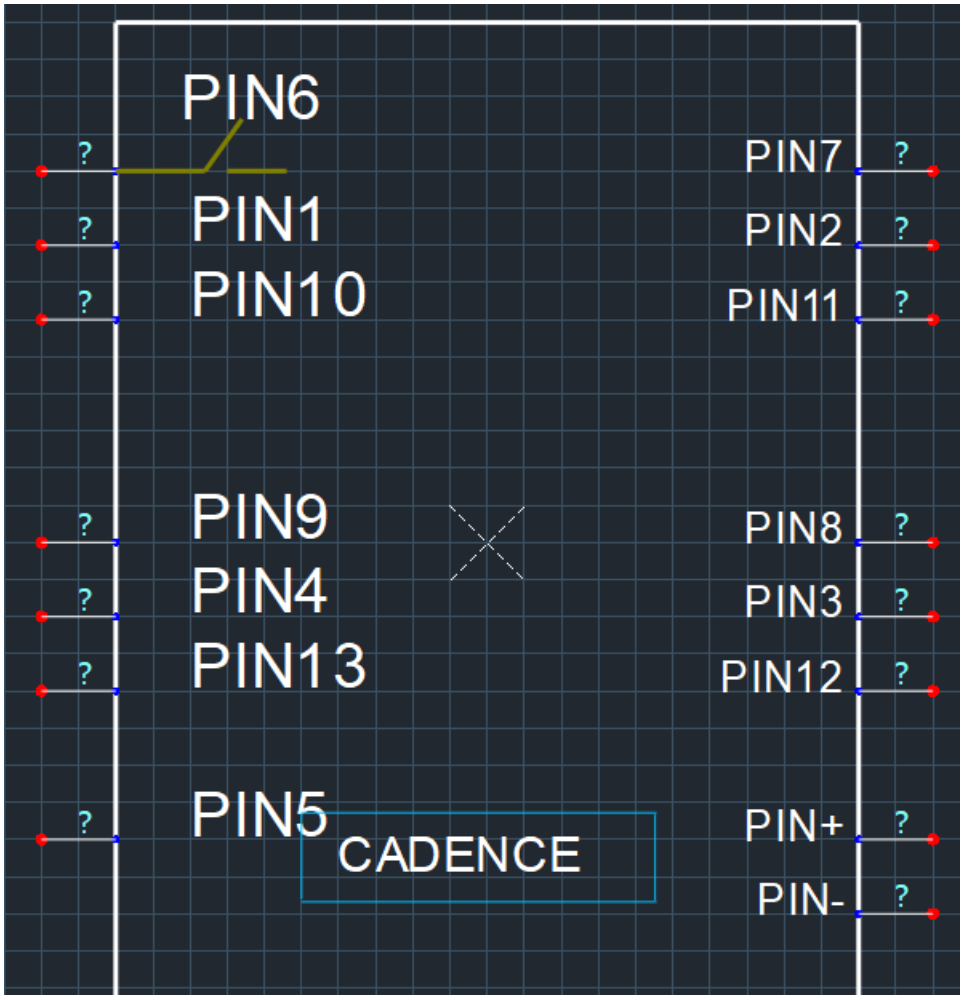


You can also change the font size and color of the selected properties from the *Font Size* and *Font Color* drop-down list.



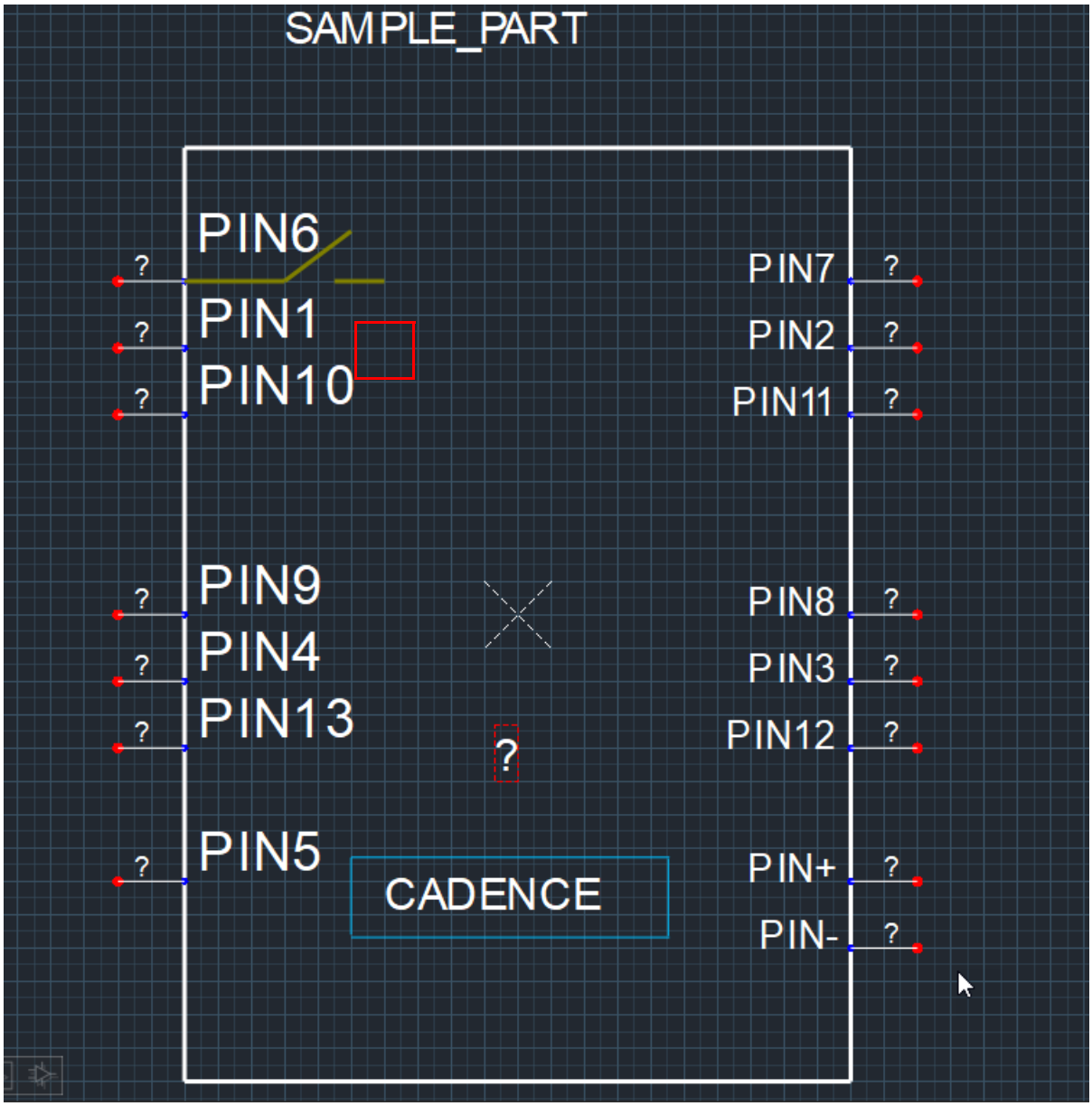
To add the LOCATION property to symbol:

1. Select *All Object* in the *Selection Filter*.
2. Click anywhere on the canvas to ensure that nothing is selected.

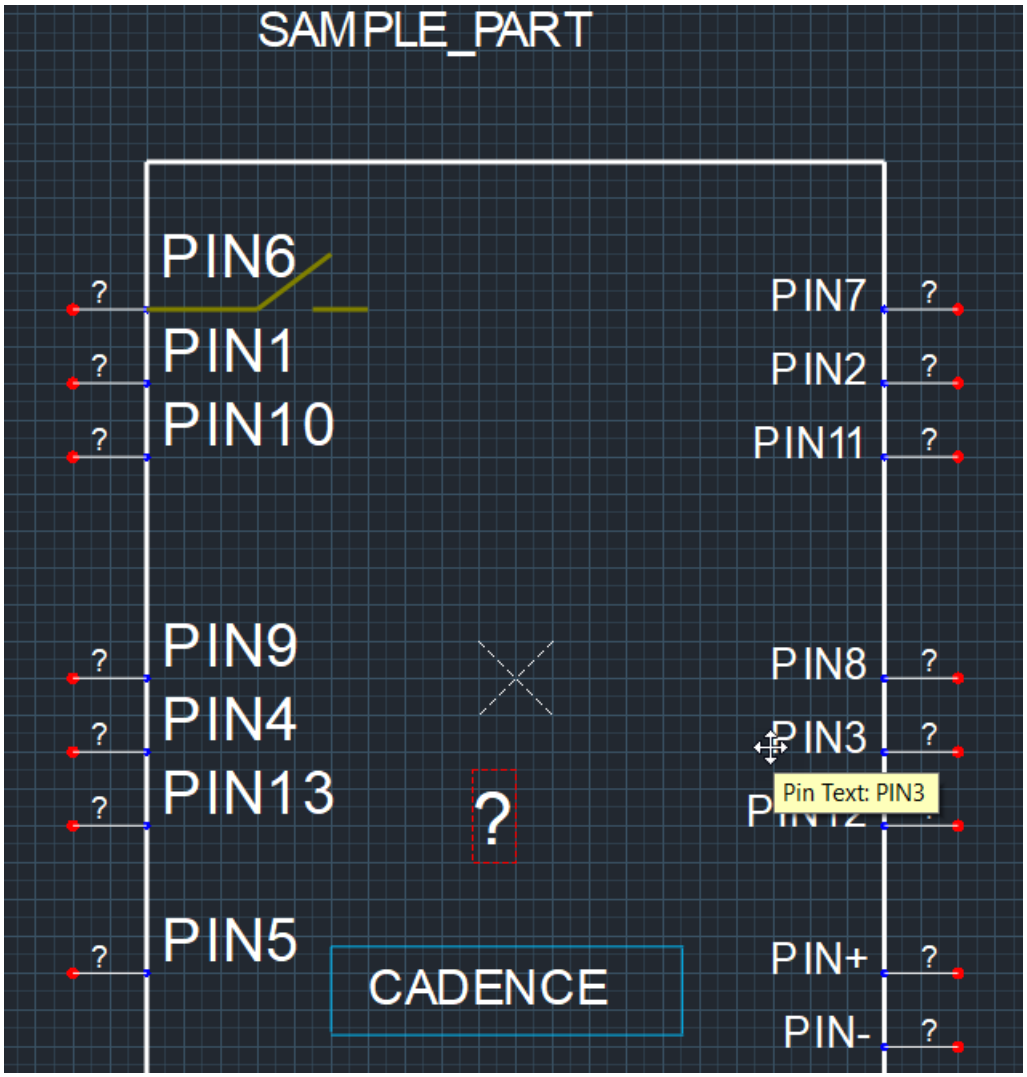


3. Type `$LOCATION` in the *Name* column in the *Attributes* section.
4. Type `?` in the *Value* column and press *Enter*.

The property value ? is added to the symbol.



5. Right-click the ? property and set the font size to 7 in the *Font size* box from the pop-up menu.



Adding Notes and Images

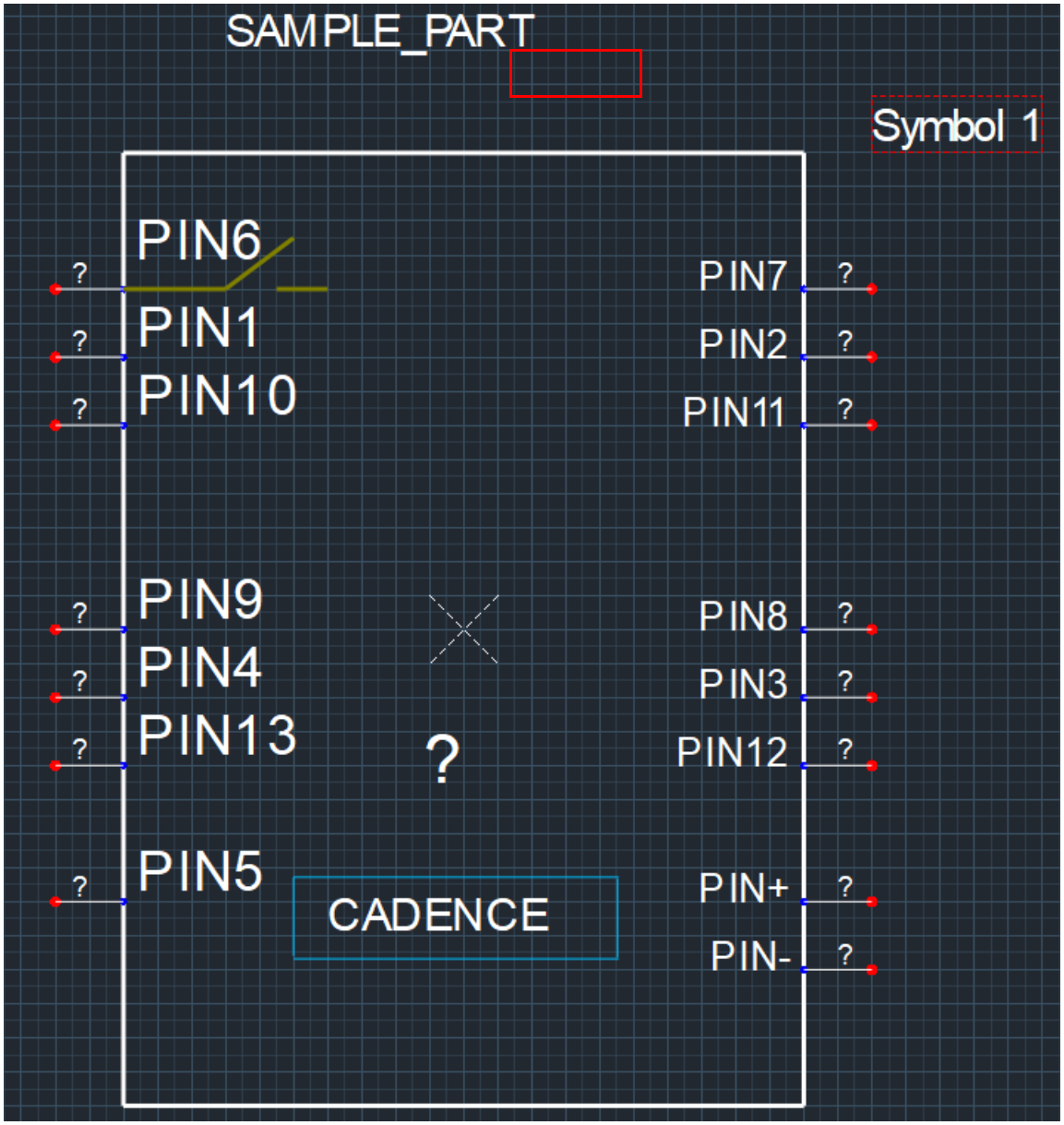
In addition to the properties and shapes, you can also add notes and images to the symbol.

To add a note:

1. Choose *Place – Note*.
2. Click anywhere on the canvas to place the note.

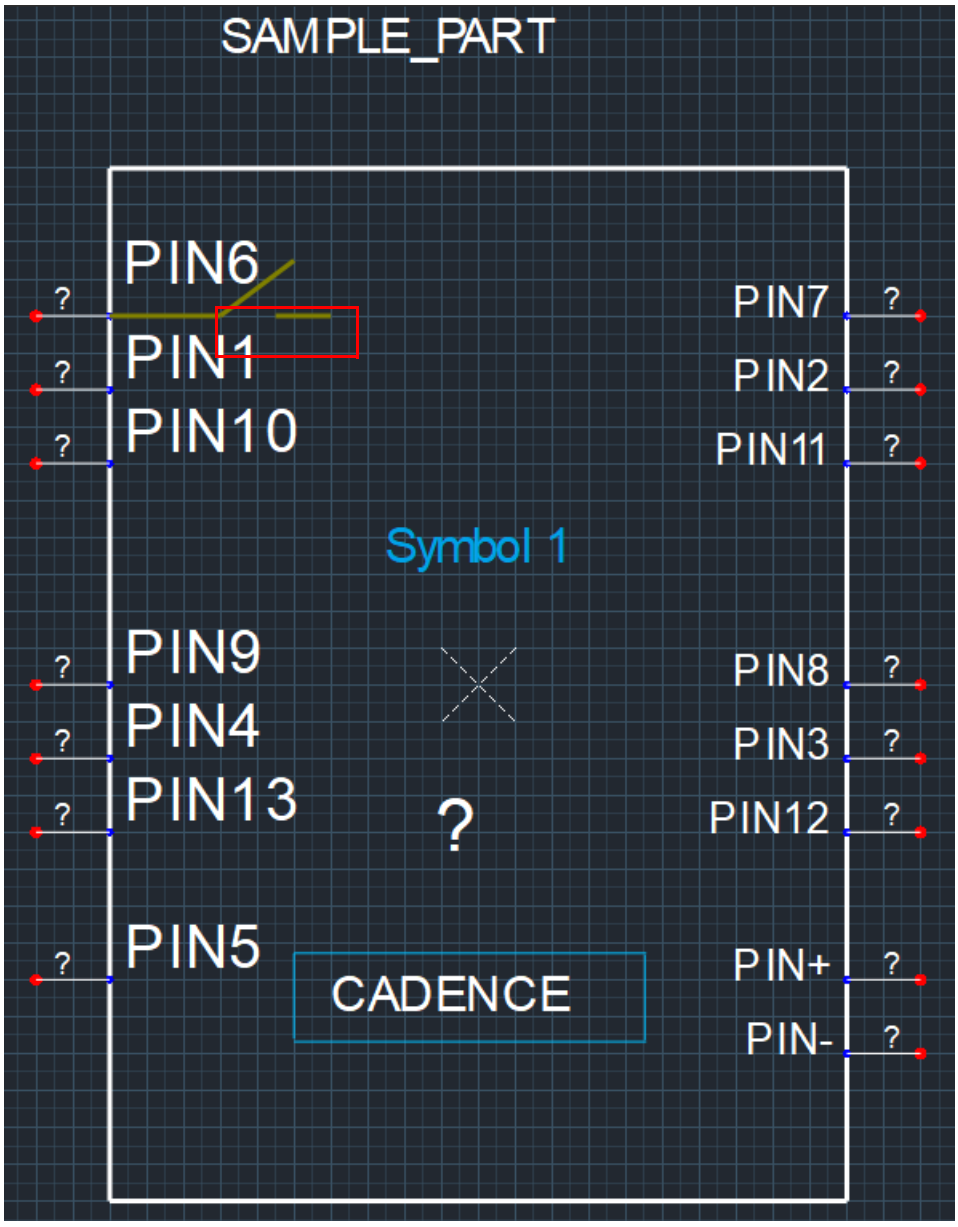
   A blank note is placed on the canvas.

3. Type `Symbol 1` and click outside the note.



4. Right-click the note and change the color from the pop-up menu.

5. Move the note to the center of the symbol.



To add an image:

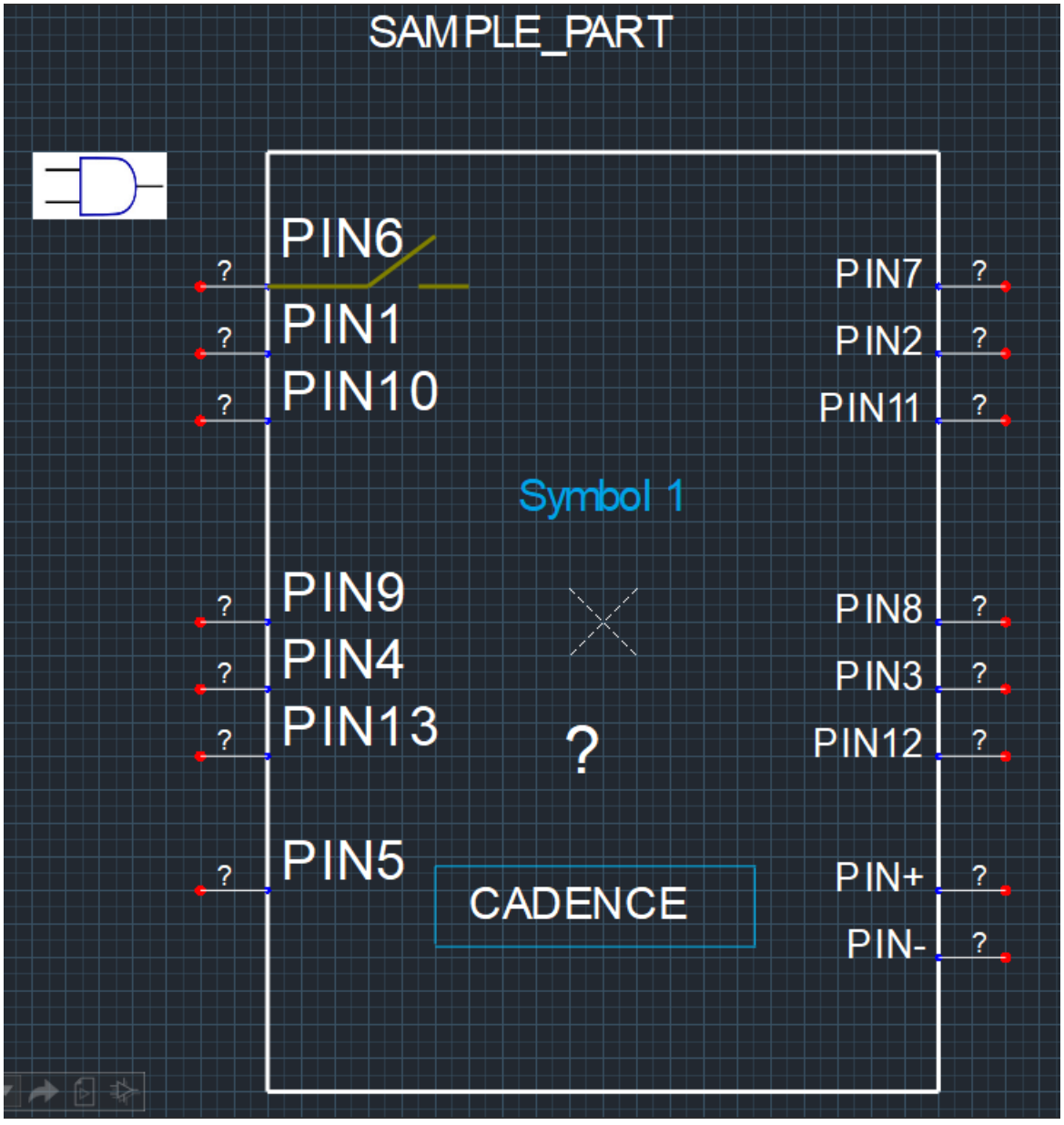
1. Choose *Place – Picture*.

   The *Image* window is displayed.

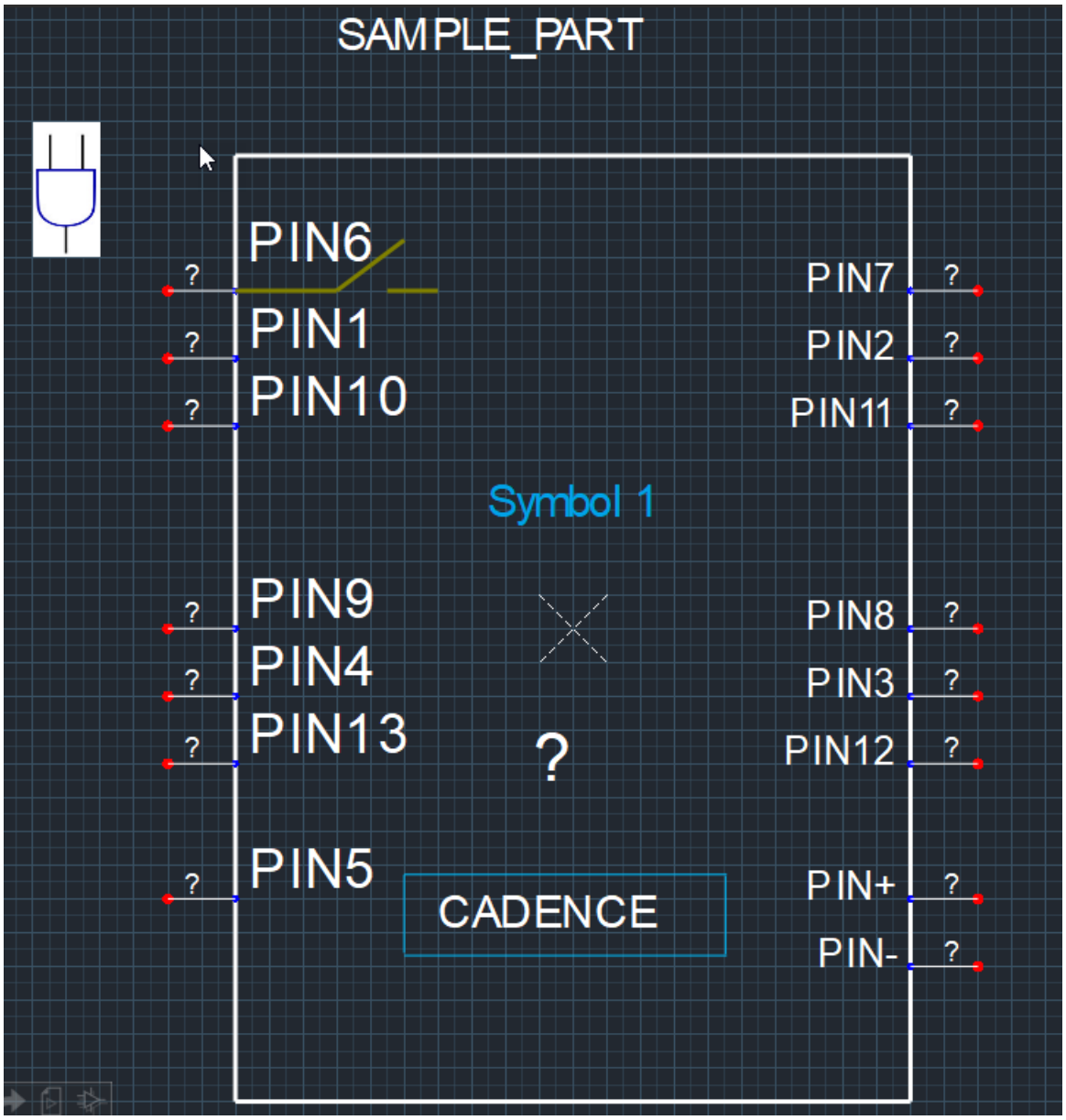
2. Locate and open the `image.jpg` file from `<your_work_area>/doc/pdv_tut/tutorial_data/images`.

3. Click anywhere on the canvas to place the image.

The image is added to the canvas.



4. Right-click the image, and click *Rotate Right* from the pop-up menu.



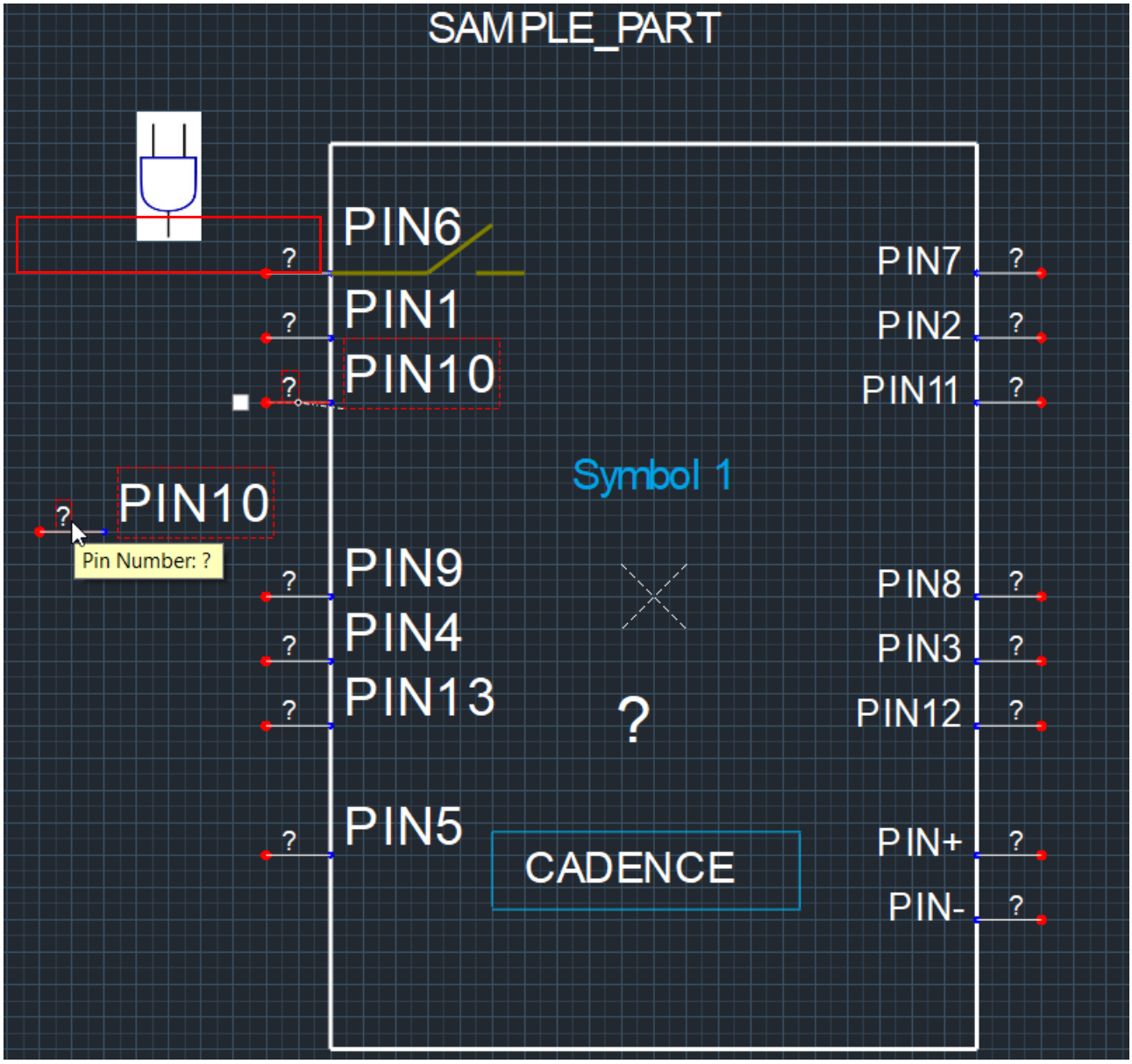
Creating Copies of Objects

In this section, you will add a new pin by copying and pasting a pin.

To copy and paste PIN 10:

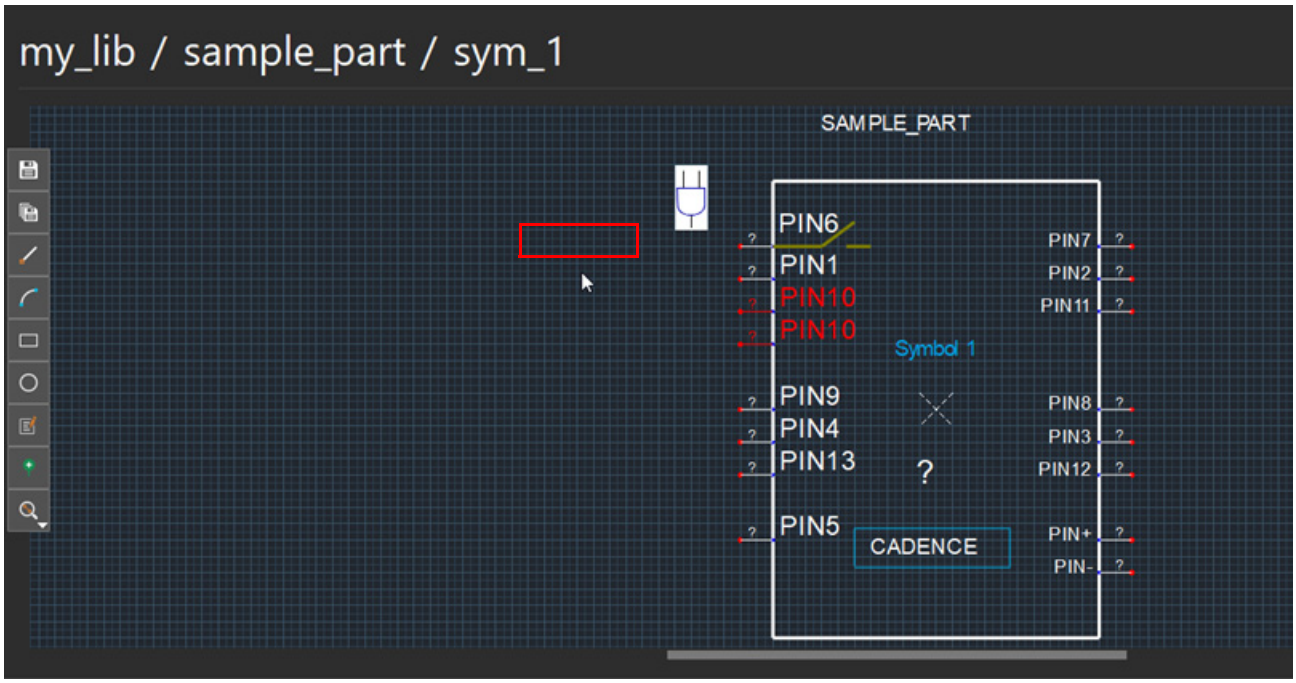
1. Select PIN 10 and press *Ctrl* + *C* to copy it.
2. Press *Ctrl* + *V* to paste the copied pin.

   The copied pin is attached to the cursor with the same name.

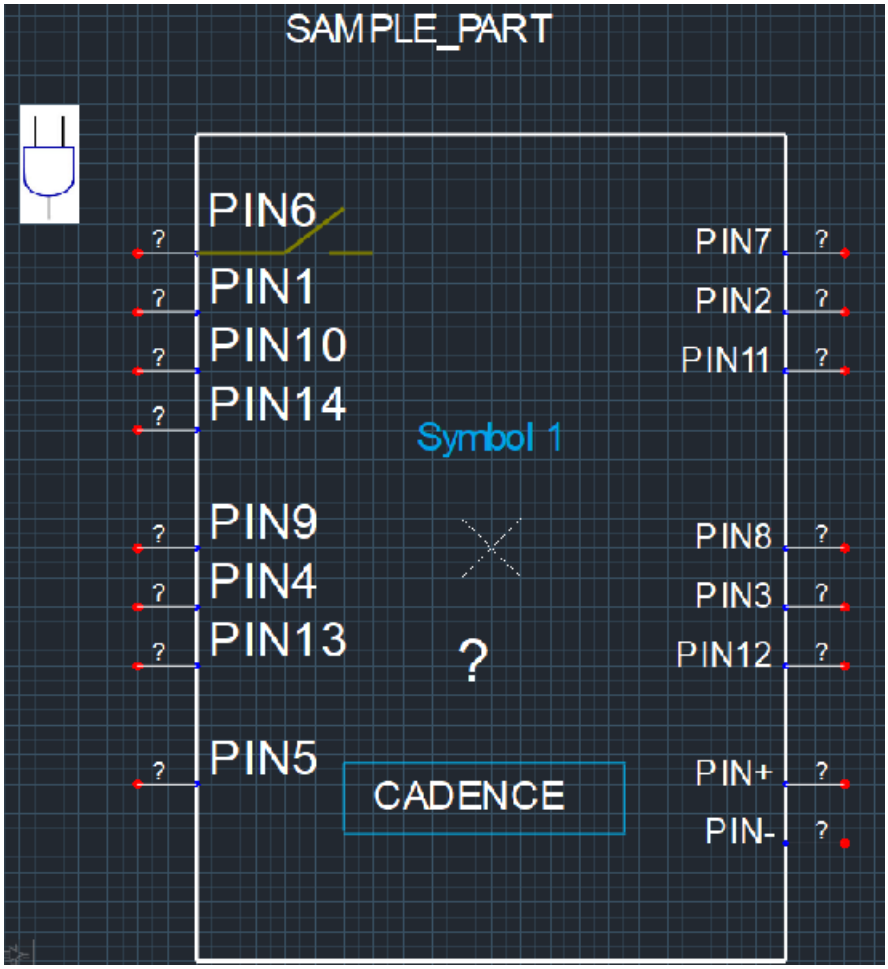


3. Click the symbol outline to paste the pin.

PIN10 is attached to the symbol. An error message is also displayed in the Violation window saying that duplicate pin names are specified.



4. Rename the copied pin to resolve the error.

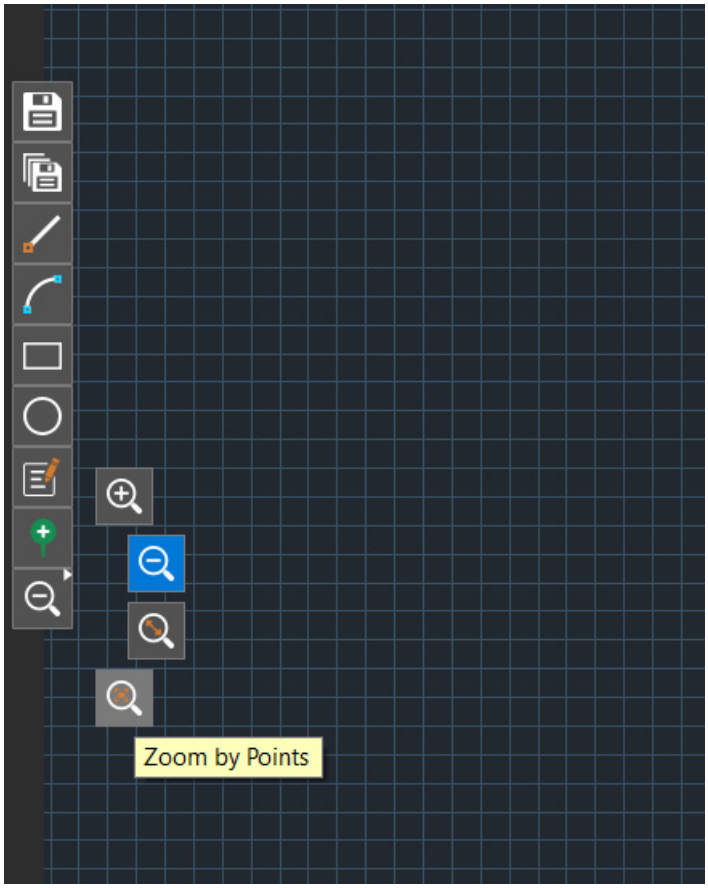


Performing Zoom and Pan Operations on a Symbol

Zoom in on the switch graphics associated with the `PIN1` pin in `sym_6`. After the object has been magnified according to your specification, pan the Symbol Editor canvas to display only the `PIN+` and `PIN-` pins.

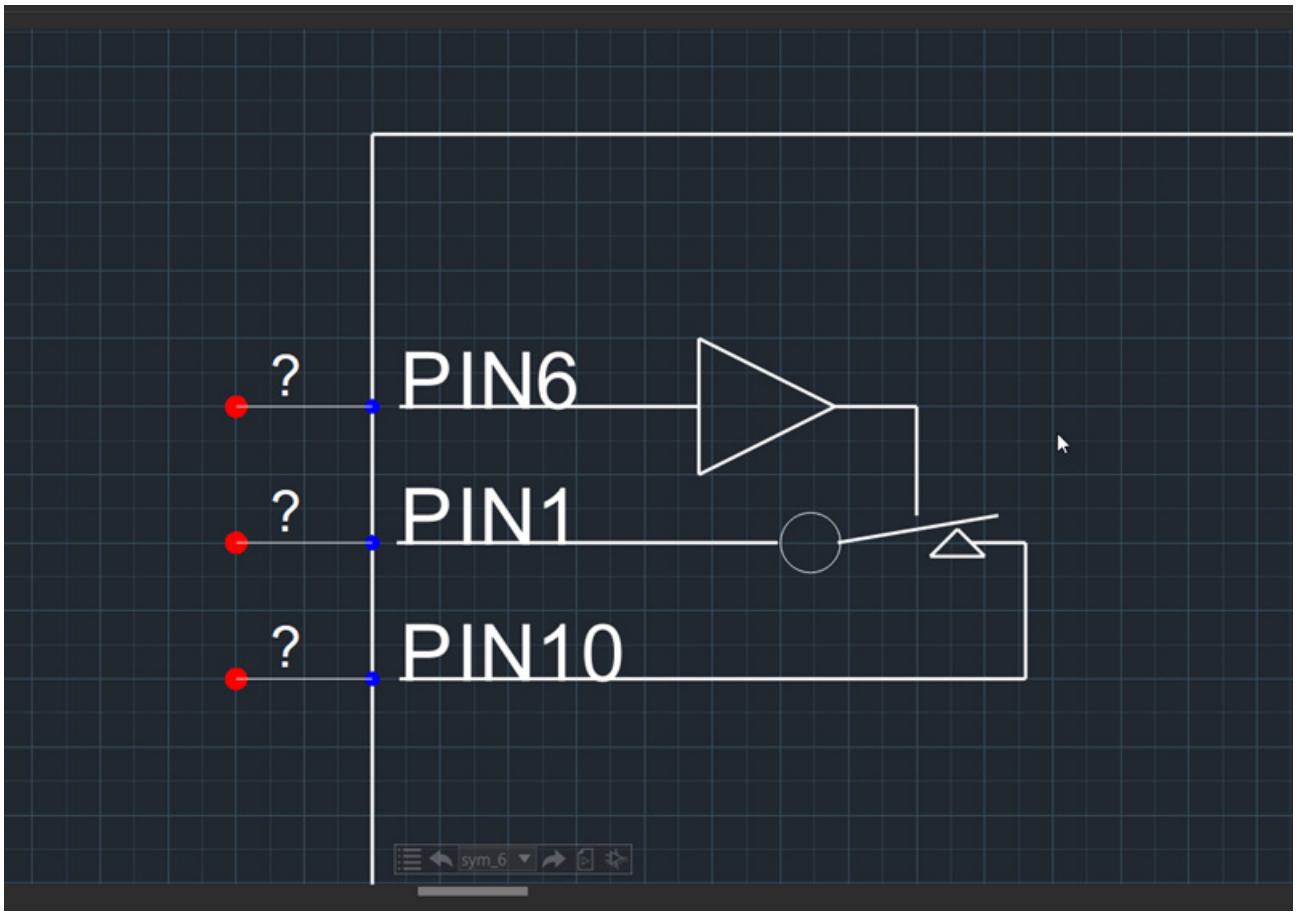
1. Open `sym_6` in Symbol Editor.
2. Right-click the Zoom button on the floating toolbar and click *Zoom By Points* button.

   Note that the mouse pointer changes to a crosshair.



3. Using the mouse, drag and select an area that encloses the switch associated with the `PIN1` pin.

The switch is magnified.

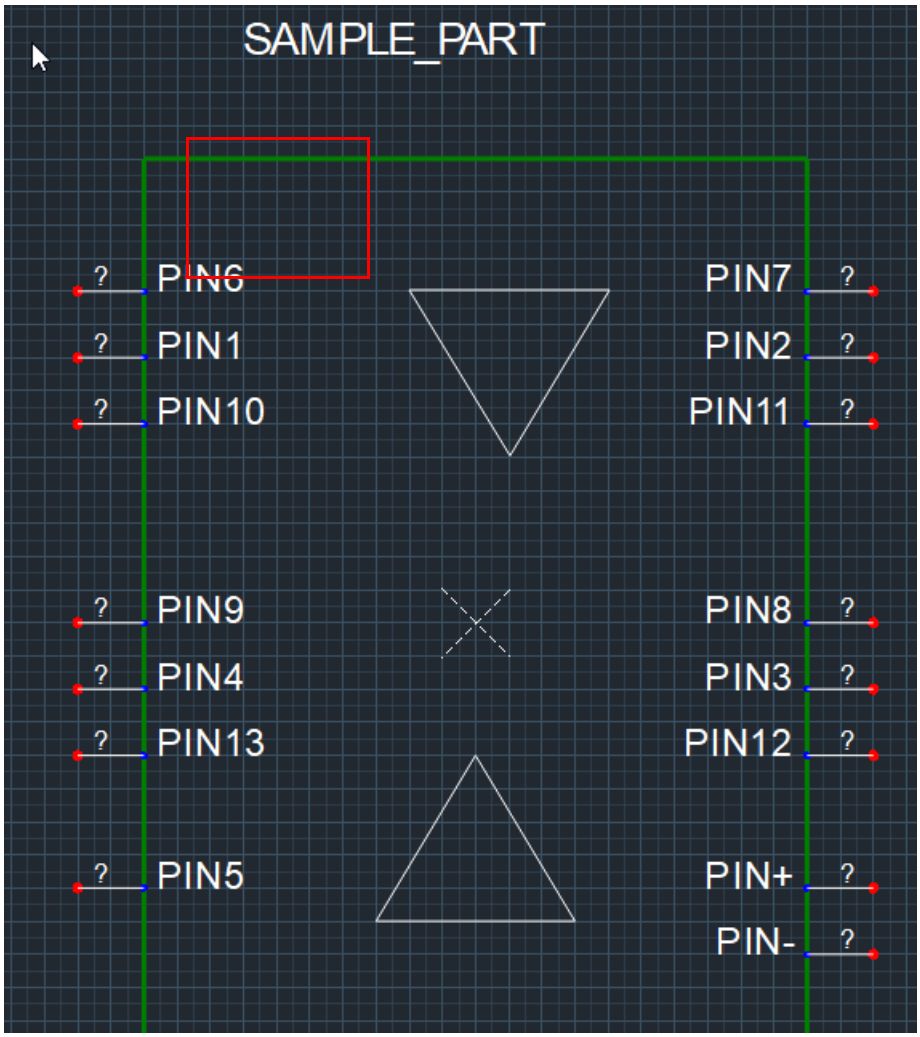


Rotating an Object

In the `sym_2` symbol, rotate the first triangle to make it inverted.

1. Open `sym_2` in Symbol Editor.
2. Select the first triangle by creating a selection box around the triangle.
3. Right-click the selection and click the *Rotate Right* button two times.

The triangle is inverted.

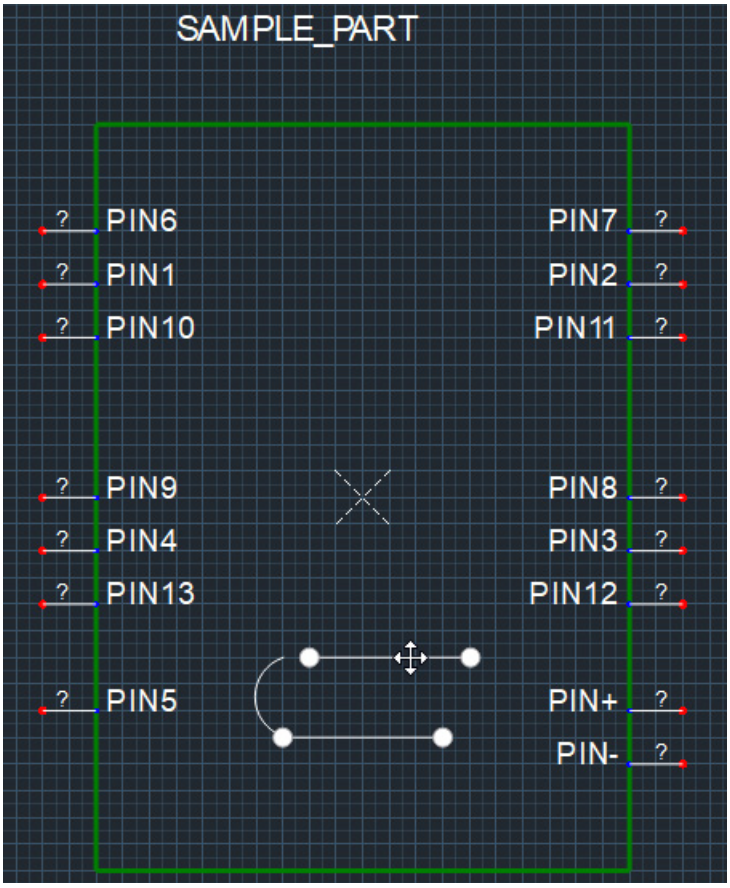


Aligning Objects

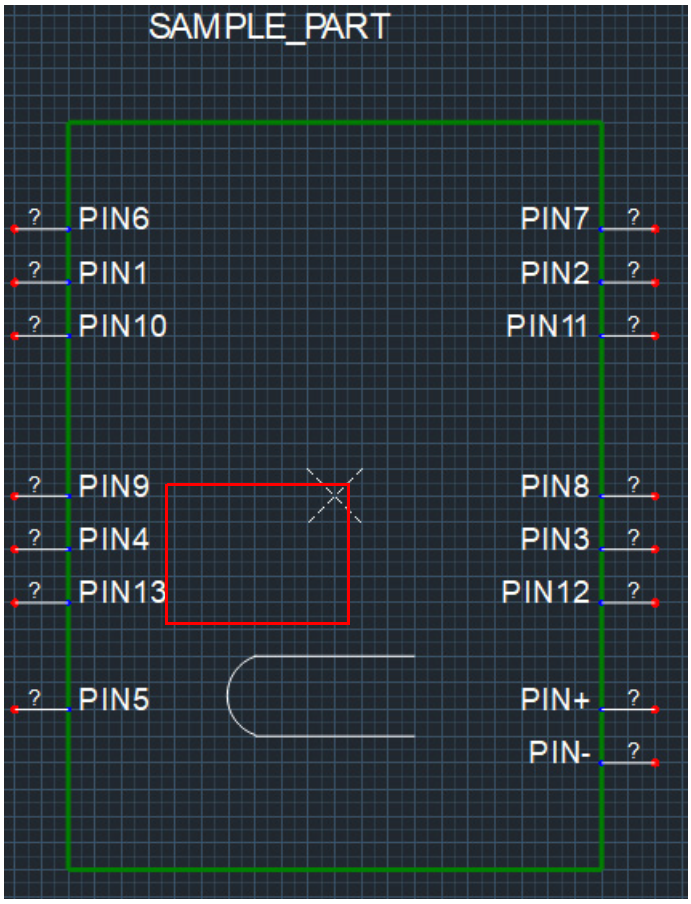
In the `sym_3` symbol, left-align the first horizontal line with the second horizontal line.

1. Open `sym_3` in Symbol Editor.
2. Select the first horizontal line inside the symbol.

3. Keeping the Ctrl key pressed, select the second horizontal line.



4. Click the *Align Left* tool button .



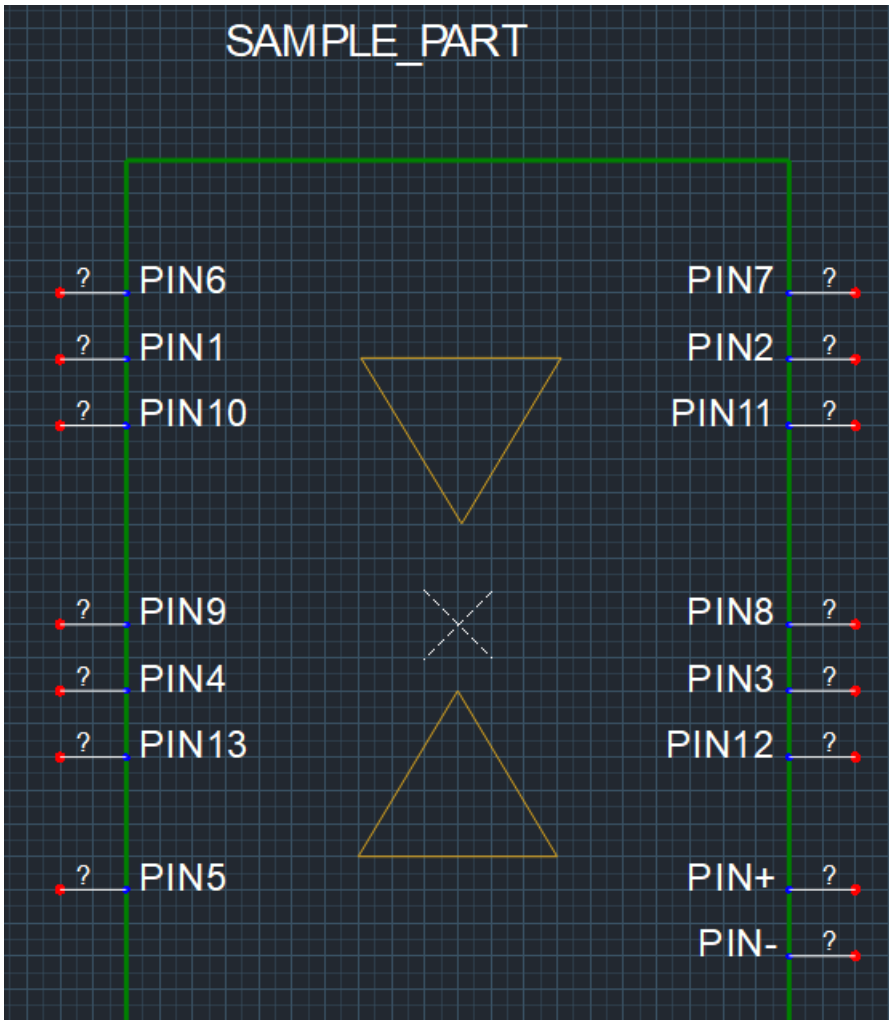
Tip

To make a set of circles concentric, select all the circles and then click the *Align Middle* tool button and the *Align Center* tool button.

Moving and Stretching Objects

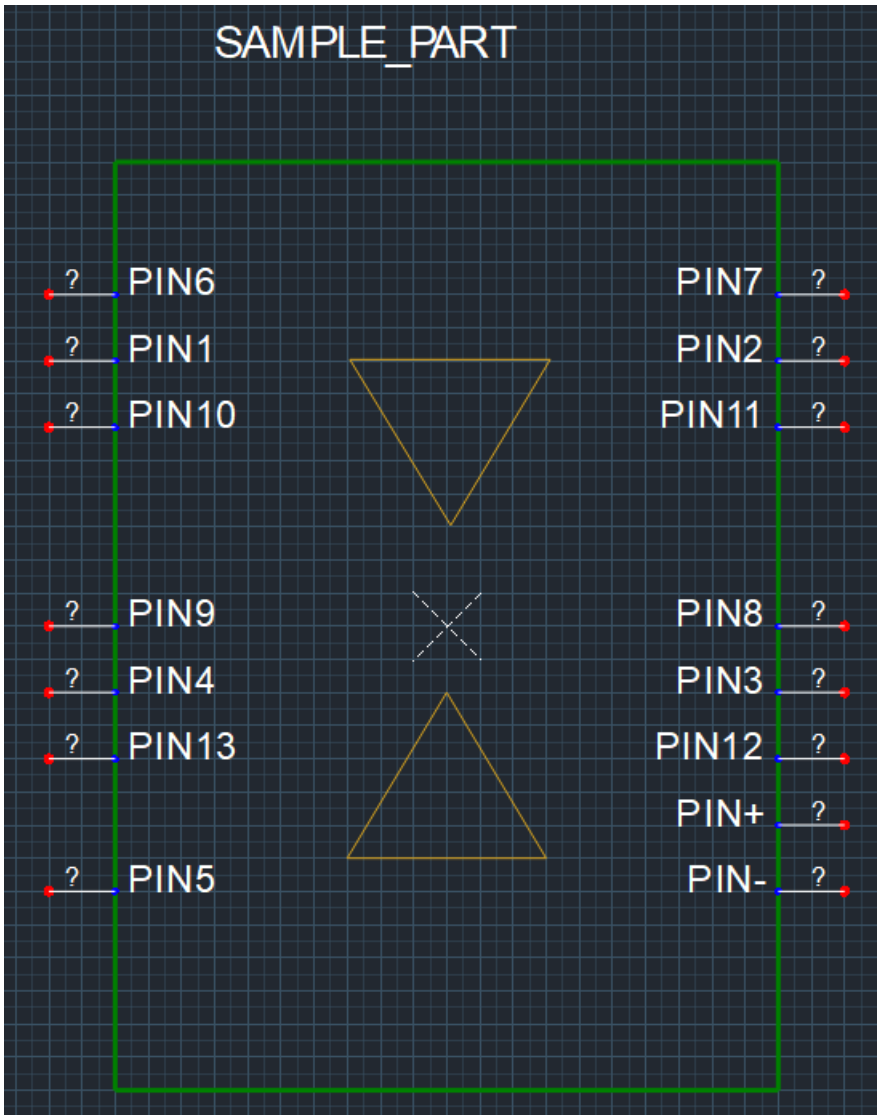
Move the group of `PIN+` and `PIN-` pins a few grid points down in the `sym_5` symbol. Increase the symbol size by dragging the symbol outline.

1. Open `sym_5` in Symbol Editor.



2. Select the `PIN+` and `PIN-` pins.
3. Place the mouse pointer on the selection and drag upwards.

The group is moved to the new location.



Tip

To move pins from one side of the symbol to another, use the *Table View*. Symbol Editor automatically adjusts the direction of a pin when the *Location* column value for the pin is changed.

Summary

In this section, you learned how to edit symbol graphics in Symbol Editor.

13

Importing and Exporting

Objective

To become familiar with commonly used import and export procedures.

In this section, you will learn to:

- Import pin information from a CSV file to create a part.
- Import changed pin information (Import ECO) from a CSV file to update an existing part.
- Export part information to save in CSV format.
- Import pin information from an FPGA component to create a part.
- Import pin information from a die file to create a part.
- Export part information to create a Capture part.
- Export part information to save in ViewLogic format.

Overview

Support for a wide variety of file import and export in Part Developer makes Part Developer a powerful library-development tool. The Import and Export wizard of Part Developer not only speeds up logical-part creation but also eliminates the errors that are often introduced inadvertently when information is copied from one tool to another.

This section covers some of the import and export procedures that are commonly used by librarians.

The data files that you can use to try the import procedures covered in this section are stored in a directory called `import_files` at `<your_inst_dir>/doc/pdv_tut/tutorial_data`.

CSV Import and Export

CSV format enables you to maintain data in tool-independent format. If you need to support design teams that use multiple schematic editors with a layout tool, such as Allegro PCB Editor, you can single-source part data with CSV import and export support.

In this tutorial, you will:

- Import the pentium4_3Ghz.csv file to create a part named p4_3ghz.
- Update the `p4_3ghz` part by importing changed pin information from the CSV file that was used to create the part.
- Export the part details of the `p4_3ghz` part to a CSV file, `p4_3Ghz`.csv.

Importing a CSV File

Import the pentium4_3Ghz.csv file to create a part named p4_3ghz.

Import File Description

The pentium4_3Ghz.csv file contains information about logical and physical pins and symbols. When creating a part from this information, Part Developer maps the logical and physical pins and generates symbols for the part.

Task Overview

When creating the `p4_3ghz` part from the `pentium4_3Ghz.csv` file, do the following:

- Convert the duplicate `BIDIR` pins to the bits of a vector pin.
- Move the duplicate `POWER` pins to the global pin list.
- Change the type of the `UNSPEC` pins to `INPUT`.

Steps

The steps are as follows:

1. Open the `tutorial_project.cpm` project from the `library_project` folder in `tutorial_data`.

2. Choose *File – Import and Export*.

   The *Import and Export* dialog box appears.

3. Choose the *Import Comma Separated Value (.csv) file* option and click *Next*.

   The *Select Source* dialogbox appears.

4. Browse to select the input CSV file `pentium4_3Ghz.csv` from the `import_files` folder and click *Open*.

5. Click *Next*.

   The *Select Destination* dialogbox appears.

   The name of the part to be created is seeded automatically from the CSV filename.

6. Change the part name to `p4_3ghz` by deleting the necessary characters in the displayed part name.

7. Select the library `my_lib` from the *Select the destination Library* drop-down list and click *Next*.

   The *Preview of Import Data* dialogbox appears.

8. Change the type of pin `P100` from `UNSPEC` to `INPUT` by choosing the *INPUT* option from the *Type* drop-down list.

9. Click *Finish* to complete the part creation process.

   Duplicate Pin Resolver dialog box is appears displaying the duplicate pins in the CSV file and provides options to resolve the duplicate pins. You can convert the duplicate pins into the bits of a vector pin, define them as individual scalar pins, or move them to the global pin list.

10. To convert the six `BPM` pins into a vector pin of six bits, retain the *Vector* option in the *Convert* column.

11. To move the duplicate POWER pins VCC_1 and VSS_1 to the global pin list, select the *Global* option from the *Convert* list for each pin.

12. Click *OK*.

    The Cell Editor appears with the part information.

13. Save the imported part and close the Cell Editor.

Importing a CSV File to Update a Part

Import pin information from a CSV file, `pentium4_3Ghz_eco.csv,` in the ECO process to update the `p4_3ghz` part.

Task Overview

When updating the `p4_3ghz` part, do the following:

- Ensure that all symbol graphic modifications that have been done during ECO are retained.

Steps

1. Choose *File – Import and Export*.

   The *Import and Export* dialogbox appears.

2. Choose the *Import ECO - Comma Separated Value (.csv) file* option and click *Next*.

   The *Select Source for ECO* dialogbox appears.

3. Browse to select the CSV file `pentium4_3Ghz_eco.csv` and click *Open*.

4. Click *Next*.

   The *Select Destination for ECO* dialogbox appears.

5. Select `my_lib` from the *Select the destination Library* drop-down list and `pentium4_3ghz` from the *Select the destination cell* drop-down list and click *Next*.

   The *Preview of Import Data* dialogbox appears.

6. Click *Next*.

   Duplicate Pin Resolver dialog box appears displaying the duplicate pins in the CSV file.

7. Resolve the duplicate pins and click *OK*.

8. Click *Next*.

   The *ECO Messages* dialogbox appears. You can review the list of differences and select only those that you want to import.

9. To retain all symbol graphic modifications that have been done during ECO, ensure that the *Graphic modifications* check box in the *Ignore* section is not selected.

10. Click *Finish*.

The Cell Editor appears with the part information.

11. Save the updated part and close the Cell Editor.

Exporting to a CSV File

Export the details of a part named `p4_3ghz` to a CSV file, `p4_3Ghz`.csv.

Steps

The steps are as follows:

1. Choose *File – Import and Export*.

The *Import and Export* dialog appears.

2. Choose the *Export Comma Separated Value (.csv) file* option and click *Next*.

The *Select Source* dialogbox appears.

3. Select `my_lib` from the *Select the source Library* drop-down list and `p4_3ghz` from the *Select the cell to be exported* drop-down list, and click *Next*.

The *Select Package* dialogbox appears.

4. Select `P4_3GHZ` as the package and click *Next*.

5. Specify `import_files` as the directory to which the CSV file will be saved and click *Finish*.

The `p4_3ghz` part is exported.

Note: The CSV filename is derived from the package name of the part.

Importing an FPGA Component

Import the Xilinx place-and-route file `xilinx_7x.pad` to create a library part named `xilinx_7x`.

Task Overview

- Ensure that you create a new schematic symbol for the imported FPGA.

- Specify the default values for the following properties:
  - DESCRIPTION
  - JEDEC_TYPE

Steps

The steps are as follows:

1. Choose *File – Import and Export*.

   The *Import and Export* dialog box appears.

2. Choose the *Import FPGA* option and click *Next*.

   The *Select Source* dialogbox appears. On this page, you choose the vendor for the place-and-route tool you used to create the place-and-route file for an FPGA.

3. Choose *Xilinx* from the *Vendor* drop-down list.

4. Select the `xilinx_7x.pad` file in the *Pad File* field by clicking the browse button and navigating to the `import_files` folder.

5. Click *Next*.

   The *Select Destination* dialogbox appears.

6. To create a new schematic symbol for the FPGA, choose the *Generate Custom Component* option.

7. Click *Default Properties* button.

   The *Default Properties* dialog box appears where you can specify the default values for the following properties:

Name	Value
DESCRIPTION	Xilinx pad file
JEDEC_TYPE	ff668

8. To specify the value for a property, select a property from the *Name* drop-down list and then enter its value in the *Value* field.

Tip

After adding the information for one property, press `Ctrl +I` to add a new row.

9. To close the *Default Properties* dialog box, click *OK*.
10. Select `my_lib` as the library in which you want the FPGA component to be created, from the *Destination Library* drop-down list and click *Next*.

    The *Preview of Import Data* dialogbox appears.
11. Click *Finish*.

    The Cell Editor appears with the part information.
12. Save the imported part and close the Cell Editor.

    You can now use the Component Browser to add the FPGA component or the block instantiating the FPGA component in your design.

Importing a Die File

Import the die file `transceiver.txt` from the `import_files` folder to create a library part named `transceiver`.

Task Overview

When creating the `transceiver` part from the `transceiver.txt` die file, do the following:

- Change the type of the `UNSPEC` logical pins to `INPUT`.

Steps

The steps are as follows:

1. Choose *File – Import and Export*.

   The *Import and Export* dialogbox appears.
2. Choose the *Import Die Text* option and click *Next*.

   The *Select Source* dialogbox appears.
3. Click the browse button to select the die file `transceiver.txt` and click *Open*.

4. Click *Next*.

   The *Select Source*dialogbox appears.

   The name of the part to be created is seeded automatically from the name of the die file.

5. Select `my_lib` from the *Select the destination Library* drop-down list and click *Next*.

   The *Preview of Derived Data* dialogbox appears.

   All the pins in the *Logical Pins* grid are of the UNSPEC type.

6. To change the type of all the pins to INPUT, select all the values in the *Type* column.

7. Type `i`.

   The types of all the pins are changed to `INPUT`.

8. Click *Finish* to complete the part creation process.

   Duplicate Pin Resolver dialog box appears displaying the duplicate pins in the die file.

9. To convert the duplicate pins to vector pins, retain the *Vector* option in the Convert column and click *OK*.

   The Cell Editor appears with the part information.

10. Save the imported part and close the Cell Editor.

Exporting to a Capture Part

Export the details of a part named `p4_3ghz_sym` to create a Capture part.

Task Overview

Ensure that the symbol port names are used to represent the pins in Capture.

Steps

The steps are as follows:

1. Choose *File – Import and Export*.

   The *Import and Export* dialog box appears.

2. Choose the *Export Capture Part (Windows Only)* option and click *Next*.

The *Select Source* dialogbox appears.

3. Select `my_lib` from the *Select the destination Library* drop-down list and `p4_3ghz_sym` from the *Select the cell to be exported* drop-down list, and click *Next*.

   The *Select Package and Symbol(s)* dialogbox appears.

4. Select the `P4_3GHZ_SYM` package from the *Part* drop-down list.

5. To use the symbol port names as pin names in Capture, select the *Use Pin Name to write Capture Port name* check box.

6. Click *Next*.

7. Click *Browse*.

8. Navigate to the `import_files` folder and specify `export_p4_3ghz` in the *File name* field as the name of the Capture library in which the part is to be created, and click *Open*.

9. Click *Finish*.

   The part details have been exported to a file called `EXPORT_P4_3GHZ.OLB` in the `import_files` folder. You can launch Capture and view the part.

Exporting to a ViewLogic Part

Export the details of a part named `p4_3ghz_sym` to save in ViewLogic format.

Steps

The steps are as follows:

1. Choose *File – Import and Export*.

   The *Import and Export* dialog box appears.

2. Choose the *Export ViewLogic(VL) Part* option and click *Next*.

   The *Select Source* dialogbox appears.

3. Select `my_lib` from the *Select the destination Library* drop-down list and `p4_3ghz_sym` from the *Select the cell to be exported* drop-down list, and click *Next*.

   The *Select Associated Package(s) or Unassociated Symbol(s)* dialogbox appears.

4. Select the check box corresponding to `P4_3GHZ_SYM` in the *Select* column.

5. Select the *Specify ViewLogic Part Type* check box and select *Non-Hetero* from the drop-down list.
6. Click *Next*.

   The *Select Destination* dialogbox appears.
7. Click *Browse*.
8. Navigate to the `import_files` folder and click *Open*.
9. Click *Finish*.

   The part is exported to the specified directory. If you have ViewLogic installed, you can open the newly created part.

Summary

In this section, you learned how to use Part Developer to import pin information in various formats to create Design HDL parts and export pin information from Design HDL parts to various formats.

14

Part Logging and Versioning

Part logging and versioning enables you to store and view the following information about a part:

- A log of all actions done on a part, such as symbol creation and pin modifications
- Major and minor revision numbers of all the views

By default, whenever you start part logging, Part Developer assigns the major revision number for all views and the cell as 1. The minor revision number is 0. Then, depending upon the types of changes you make to the part or views, the major or minor number of the part or the views are updated automatically by Part Developer.

Whenever a major or minor revision number of a view is incremented, the major or minor revision number of the cell is also incremented. For example, a part and its package and symbol views have a major revision number 1 and a minor revision number 0. Now, the package undergoes a modification, resulting in a major revision number change for the package. This will cause the major revision number of the part to be incremented as well. So, the part and the package will have the major revision number as 2. Now, the symbol is modified, resulting in the major revision number of the symbol to be incremented. This will also result in the major revision number of the part to be incremented. So, the part will now have the major revision number as 3 while the major revision numbers of the package and the symbol continue to be 2. See Modifications that Result in Major and Minor Number Changes on page 174 for details.

The part log and version information is stored in the metadata view of the part. The metadata view contains the following files:

- master.tag

  The `master.tag` file is the control file that ensures that Part Developer treats this directory as a valid view.

- revision.dat

  The `revision.dat` file stores the version information for a part. The information stored includes the name of the view, the type of the view, major and minor revision

numbers, the date and time of creation, the name of the creator, the library to which the part belongs, and the modification history.

- revision.log

  The `revision.log` file logs all the activities that are done on the part. The information stored includes the time of the modification, the name of the modifier, the type of modification, and a detailed description of the type of change.

  Both `revision.dat` and `revision.log` files are written when the part is saved.

- pinlist.txt

  The `pinlist.txt` file stores the list of pins that have been added to the part.

Part Developer will start logging all the changes that you make on the part and also automatically increment the major or minor version of the views and parts as required.

Do not manually edit the revision.dat and revision.log files outside of Part Developer. If these files are manually edited, Part Developer might fail to give you the correct version information or logging information for the part.

Starting Part Logging and Versioning

Task Overview

Load the `for_baselining` part from the `my_lib` library and baseline it. Modify the package by deleting the input pin A1. View the version numbers after the changes are made to the part.

Steps

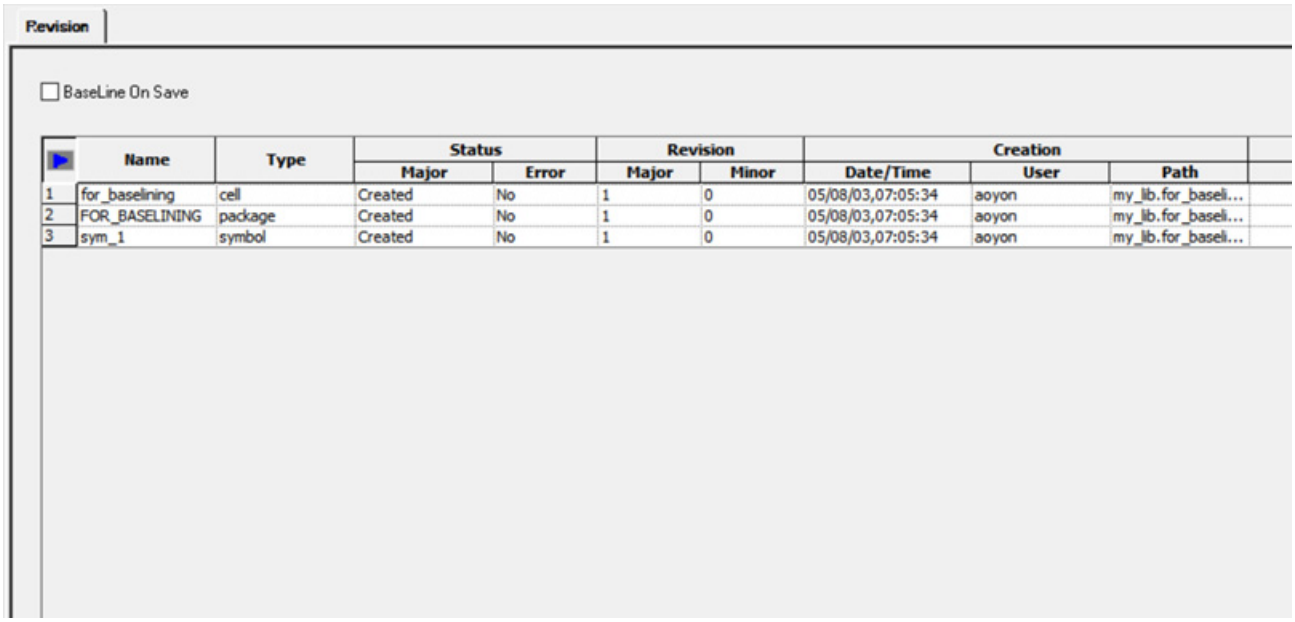
1. Select *File – Open – Cell.*

   The Open Cell dialog box appears.

2. Select *my_lib* from the *Library* drop-down list.

3. Select *for_baselining* from the *Cell* drop-down list and click *OK*.

The part is loaded in the Cell Editor. Note that by default, the *Major* revision number is assigned as 1 for the existing views. Also, the *Major* status appears as *Created*.



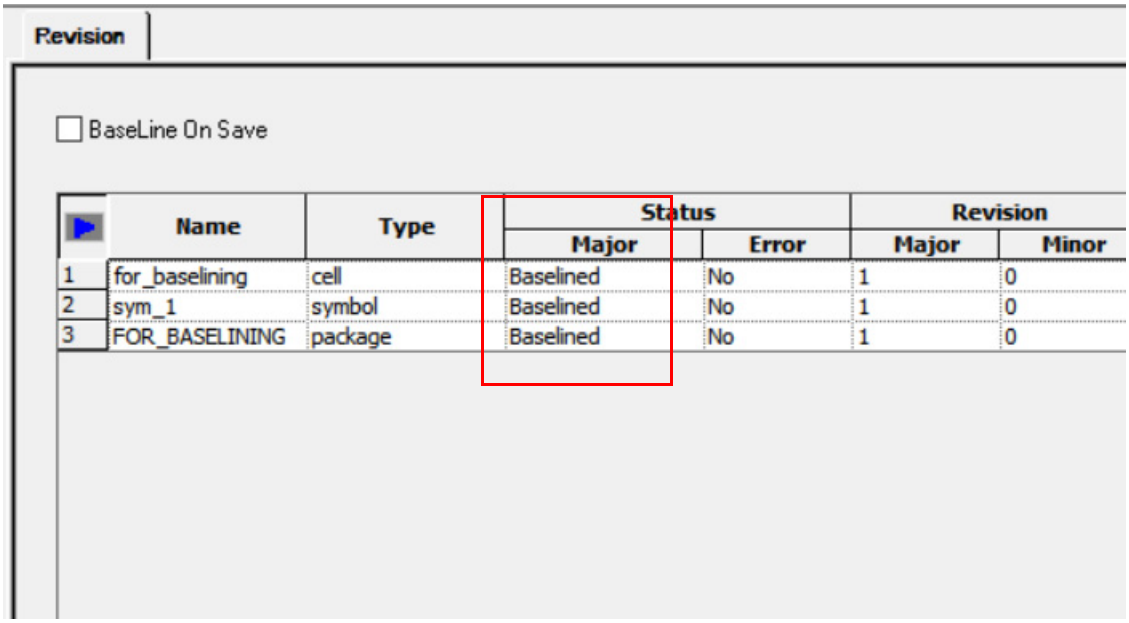
	Name	Type	Status		Revision		Creation		
			Major	Error	Major	Minor	Date/Time	User	Path
1	for_baselining	cell	Created	No	1	0	05/08/03,07:05:34	aoyon	my_lib.for_baseli...
2	FOR_BASELINING	package	Created	No	1	0	05/08/03,07:05:34	aoyon	my_lib.for_baseli...
3	sym_1	symbol	Created	No	1	0	05/08/03,07:05:34	aoyon	my_lib.for_baseli...

4. Select the *BaseLine On Save* check box.
5. Save the part.
6. To view the change log and revision numbers in Part Developer, close the part and reload it.

   The Revision Editor appears with the major version appearing as `Baselined` for the cell and all its views. Now, whenever any change is made to the cell, the revision number will be updated.

   Note: The changes are not dynamically reflected in the Revision Editor. You will need to

reload the part to see the revision history.



Important

The *BaseLine On Save* check box is deselected by default when a part is reloaded. You will need to select the *BaseLine On Save* check box before saving the part to ensure that the revision numbers are updated.

In case a baselined part is saved with the *BaseLine On Save* check box selected, a `.baselined` file is created in all the views. For example, `chips.prt.baselined` is created in the chips view. Now, if the part is saved with the *BaseLine On Save* check box selected, the views are compared against the `.baselined` files and revision numbers are updated accordingly.

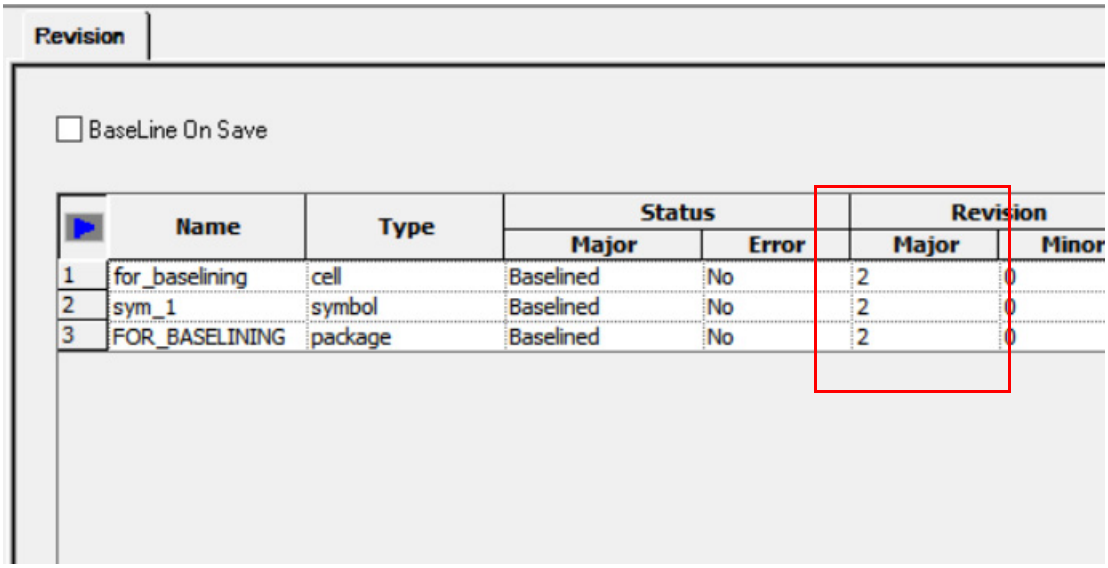
Important

Part logging is possible only for error-free parts.

7. Select the *FOR_BASELINING* package in the cell tree.
8. Delete the input pin *A1*.
9. Click the root of the cell tree.
10. Select *BaseLine On Save* check box.
11. Save the part.

12. Close and reload the part.

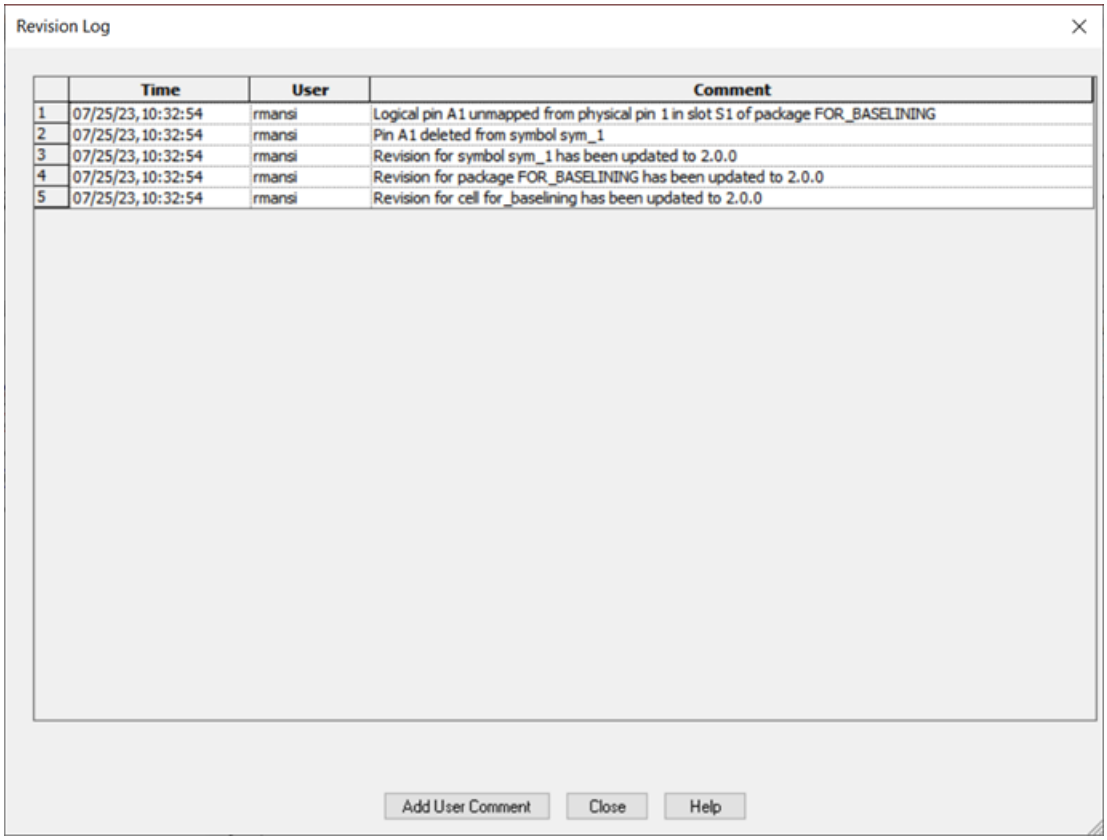
The Major version is updated for the part.



Viewing the Revision Log

1. To view the revision log file, click *Change log*.

The *Revision Log* dialog box appears displaying the log of changes made to the part and its views.

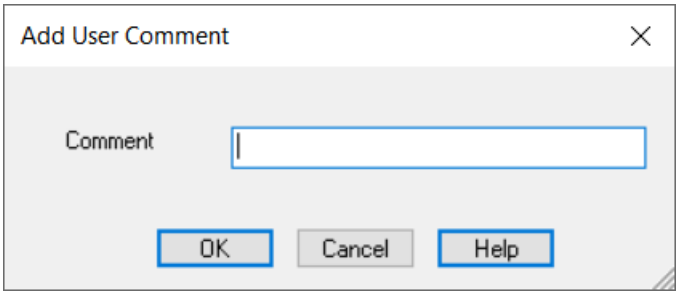


Adding Your Comments to the Revision Log

Part Developer allows you to write to the revision log of a part. To do so:

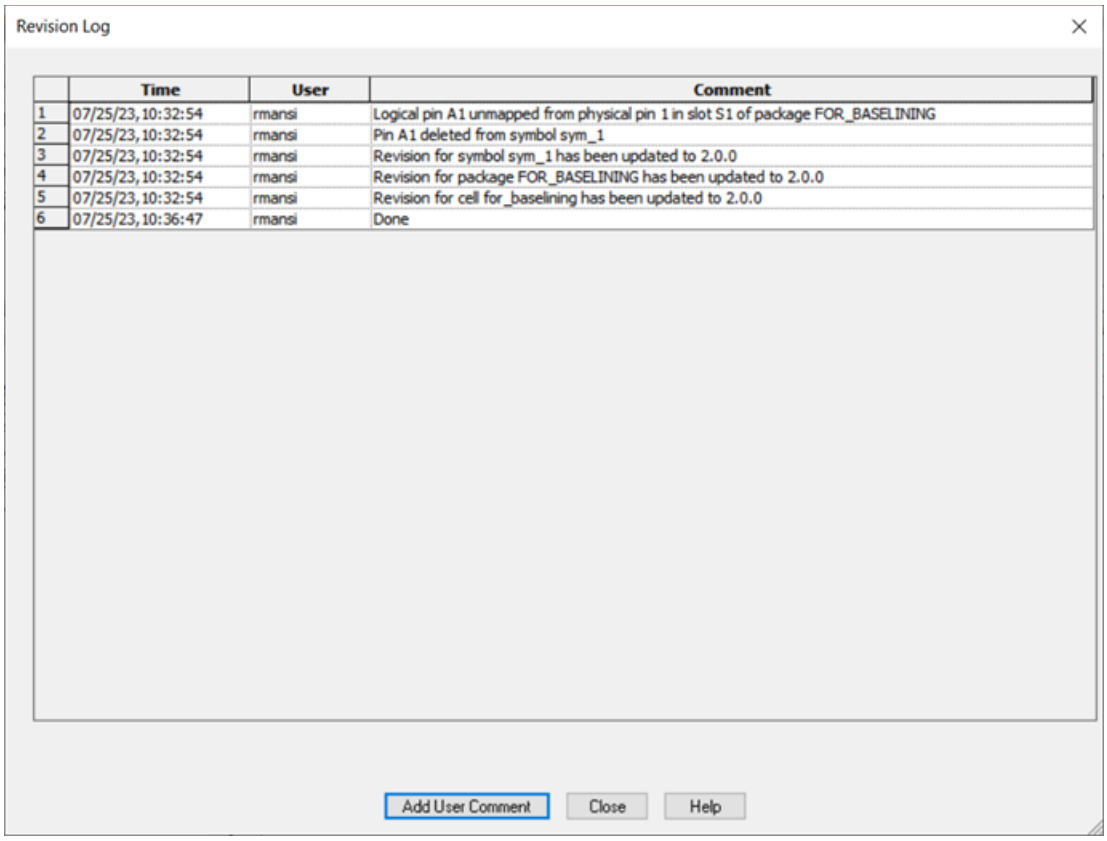
1. Click *Add User Comment* in the *Revision Log* dialog box.

   The Add User Comment dialog box appears.



2. Enter the comment that you want to add to the log file and click *OK*.

   The comment is written to the `revision.log` file and appears in the *Revision Log* dialog box.



Stopping Part Logging and Versioning

➤ To stop part logging and versioning, deselect the *BaseLine On Save* check box.

Restarting Part Logging and Versioning

➤ To start part logging and versioning, select the *BaseLine On Save* check box.

Modifications that Result in Major and Minor Number Changes

The changes that impact the design flow are considered major changes, leading to an increment in the major revision number. All other changes are treated as minor changes and result in incrementing the minor revision number.

Modifications that Result in a Major Number Change for a Part or a View

The following modifications cause a change in the major revision number:

- Addition, deletion, or renaming of any view
- Modification of the JEDEC_TYPE property
- Addition or deletion of pins from packages and symbols
- Modification of the pin type for an existing pin
- Renaming of pins in the package and symbols
- Addition, deletion, or renaming of symbol text
- Modification of a symbol pin position
- Addition or deletion of slots from a package
- Change in the low-assertion character setup for a part, resulting in the change of how the low-assertion character is stored in the chips and the symbol view
- Change in the distribution of pins among slots
- Change in the mapping information of existing pins
- Global renaming of pins
- Global deletion of pins
- Addition or deletion of a model for a wrapper
- Modification of a model for an existing wrapper
- Mapping or unmapping of pin to m-port mapping in a mapfile or a wrapper
- Addition, deletion, or modification of the binding statement for a VHDL wrapper or mapfile
- Addition or deletion of pin-to-model port mapping for primitives from Verilog/VHDL mapfiles

- Modification of the `default_model` property for a primitive in the map view
- Addition, deletion, or modification of a model for a primitive entry in the mapfile
- Annotation of parameters or generics onto symbols
- Deletion of annotated parameters or generics from the symbols
- Updating pin mode or port type of pins during Verilog/VHDL mapfile/wrapper creation
- Modification of the `UPPERCASE` property of primitives

Modifications that Result in a Minor Number Change for a Part or a View

- Addition, deletion, or renaming of an additional package property
- Addition, deletion, or renaming of a package pin property
- Addition, deletion, or renaming of a package alias
- Modification of the electrical class of a package
- Modification of the reference designator prefix of a package
- Addition, deletion, or renaming of a symbol property
- Addition, deletion, or renaming of a symbol pin property
- Modification of the symbol outline (thickness/width/height)
- Modification of the color of the symbol outline
- Change of pin shapes
- Modification of symbol and symbol pin attributes
- Addition or deletion of the model alias from the primitive in the mapfile

Summary

In this section, you learned how to create and maintain part versions and change logs.

15

Interface Comparator

The Interface Comparator is a mechanism by which you can compare the pin lists of two interfaces, such as a package and a symbol, identify the differences between them and then update the pin list of one of the objects to match the other, or both with respect to each other.

The following scenario explains the need and usefulness of this feature. Suppose you create a part where you develop the packages and symbols separately. After creating them, you realize that there are some symbols that are unassociated with any of the packages. Such a part is not usable in the design flow because the symbols must be packageable into one of the packages. To make a symbol packageable, you need to update the pin list of the symbol to match the pin list of the package or vice-versa. For large pin-count parts, this task, when done manually, can be tiresome and error-prone. The Interface Comparator feature enables you to automatically identify the differences between the selected symbol and the package and update the pin list of either the symbol or the package to match the other.

Using Interface Comparator, you can do comparisons between:

- A function group and a symbol
- Two function groups of a package
- Two symbols

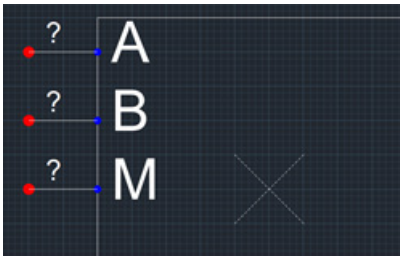
After the comparison, you can choose to update the pin list of one of the compared objects with the pin list of the other or both with respect to each other.

A sample part, `part_for_interface_comparison`, is used to explain this. The `part_for_interface_comparison` part has one package with four pins, `A`, `B`, `C`, and `D`. These four pins are split into two function groups, with pins `A` and `B` forming the first function group, and pins C and D forming the other. The pin list of the package is displayed below:

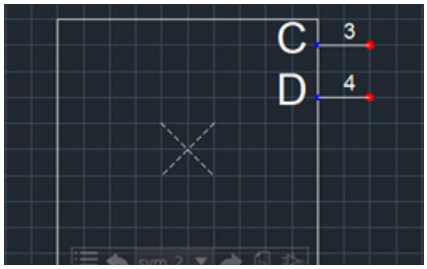
	Name	Type	S1	S2
2	A	INPUT	1	-
3	B	INPUT	2	-
4	C	OUTPUT	-	3
5	D	OUTPUT	-	4

The `part_for_interface_comparison` part also has two symbols, sym_1 and sym_2. The symbols are displayed below:

Sym_1



Sym_2



The symbol `sym_2` is associated with the second function group. The symbol `sym_1` has pins `A` and `B` and an extra pin `M`. This results in `sym_1` being not associated with any function group.

The Interface Comparator will be used to synchronize the function group with the symbol. As a result of this synchronization, the logical pin `M` will be added to the first function group. Part Developer will ensure that the synchronization does not destroy the existing function group and symbol associations, for example, the association of `sym_2` with function group 2.

Running the Interface Comparator

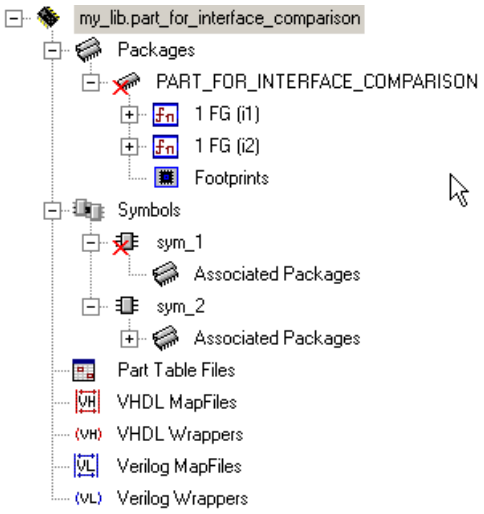
Task Overview

Synchronize the `sym_1` symbol of the `part_for_interface_comparison` part of the `my_lib` library with the `PART_FOR_INTERFACE_COMPARISON` package.

Steps

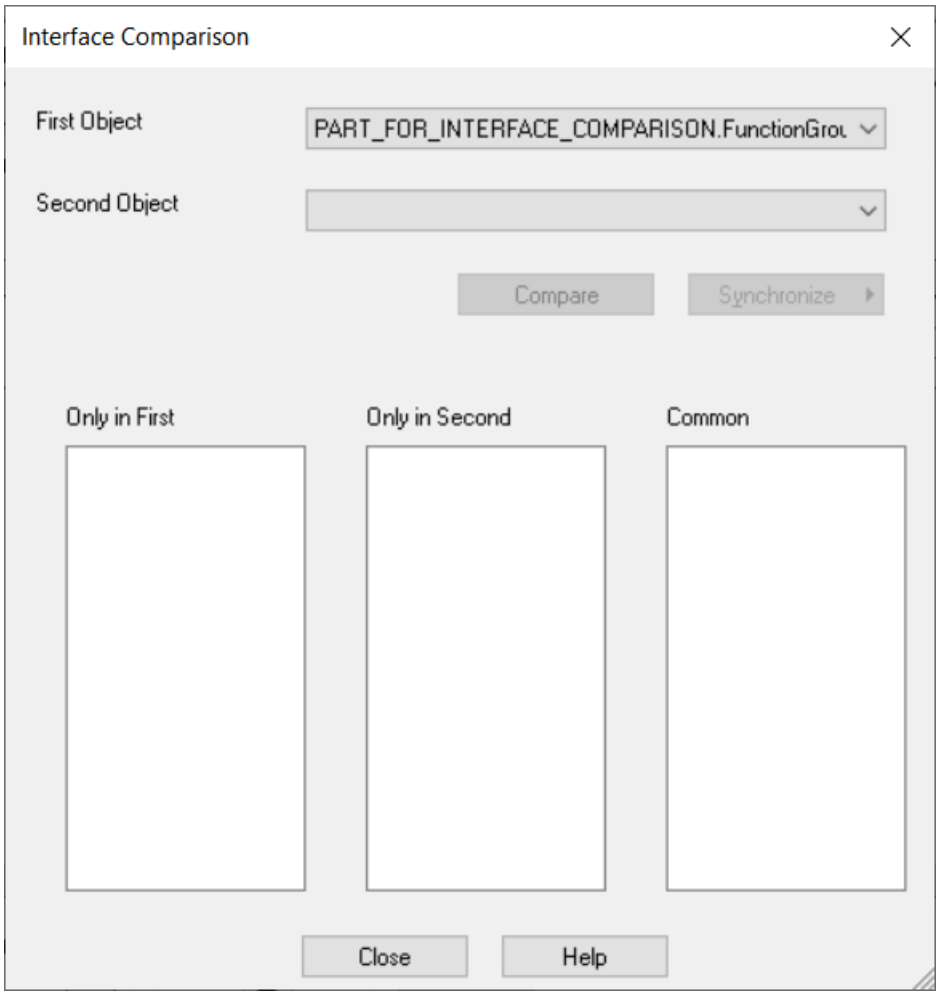
1. Load the `part_for_interface_comparison` part from the `my_lib` library.

Error and Warning window appears displaying two error messages. This is because `sym_1` is not associated with any package.



2. Right-click the `sym_1` entry and choose *Interface Comparison* from the pop-up menu.

Interface Comparison dialog box appears.



3. Select *PART_FOR_INTERFACE_COMPARISONB.FunctionGroup1* from the *First Object* drop-down list.
4. Select *sym_1* from the *Second Object* drop-down list.
5. Click *Compare*.

   Part Developer runs a comparison check on the logical pin lists of the two objects and displays the results in the following way:

   - The pins that are present only in the first object are displayed in the *Only in First* list box.
   - The pins that are present only in the second object are displayed in the *Only in Second* list box.

- The pins that are common to both the objects are displayed in the *Common* list box.

Next, you need to determine how to synchronize the pin lists of the two objects. Synchronization is the process by which the pin list of one of the objects is updated to match the pin list of the other object. This is done by either adding or removing pins. Synchronization can be done in one of the following ways:

- First with Second

  In this method, the second object is treated as the master object and the pin list of the first object is updated to match the pin list of the second object. Extra pins in the first object are deleted from the first object. If the second object has additional pins, they are added to the first object.

- Second with First

  In this method, the first object is treated as the master object and the pin list of the second object is updated to match the pin list of the first object. The pins that are present in the first object but not in the second object are added to the second object. Pins that are present in the second object but not in the first will be deleted from the second object.

- Both

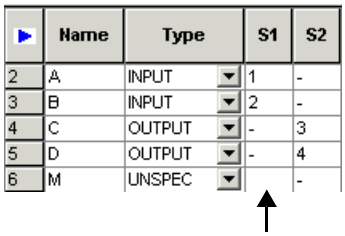
  In this method, both the objects are treated at par. Only the common pins are retained in both the objects and the extra pins, if any, are deleted.

6. Click *Synchronize*.
7. Select the *First With Second* option.

   An information message appears.

   Now, when you synchronize with the *First with Second* option, pin `M` is added to the first function group. Pin `M` appears with a hyphen in the second function group, thus showing

that it is not present in the second function group. As shown below, you will need to specify the physical pin numbers for the new logical pin `M` and do the mapping.



	Name	Type	S1	S2
2	A	INPUT	1	-
3	B	INPUT	2	-
4	C	OUTPUT	-	3
5	D	OUTPUT	-	4
6	M	UNSPEC		-

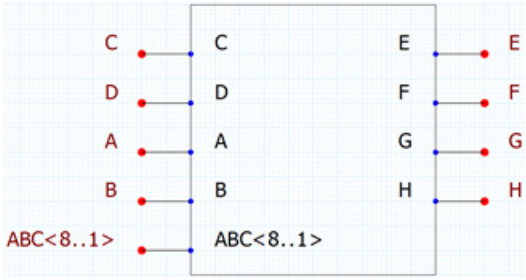
Pin M added after synchronization

Points to Remember when Running Interface Comparator

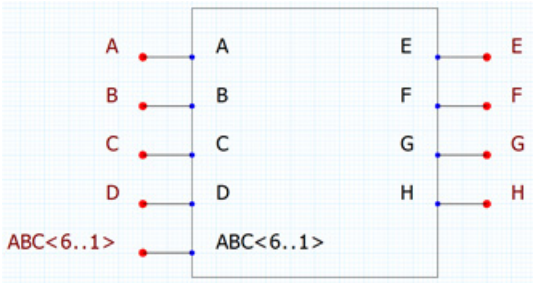
- In case logical pins are added to a package after synchronization, you will need to open the package in the Package Editor and manually specify the logical-to-physical pin mappings for the new pins.
- When a pin is added to the symbol, the location for the pin is read from the setup options.
- When a pin is added to a package, the attributes like pin type, pin location, loading values, and checks are taken from the global data. Therefore, if the package, function group, or symbol from which the pin is added has the attribute values that are different from the global data, those values are ignored and the attribute values in the global data is used.
- If pins are added to a symbol, Part Developer attempts to fit in as many pins as possible in the existing symbol outline. If the pins do not fit into the existing symbol outline, Part Developer automatically extends the symbol outline. In case the symbol outline is extended and the *Preserve Pin Position* option is checked on the Pins page of the Symbol Editor, Interface Comparator will keep the positions of the existing pins intact when adding the new pins.
- For vector pins in a symbol, if some bits are deleted after synchronization, Part Developer displays the vector pin in an expanded format with the remaining bits.

For example, consider the following two symbols. The symbol `sym_1` has a vector pin, `ABC`, with 6 bits, and `sym_2` has a vector pin, `ABC`, with 8 bits.

Sym_2



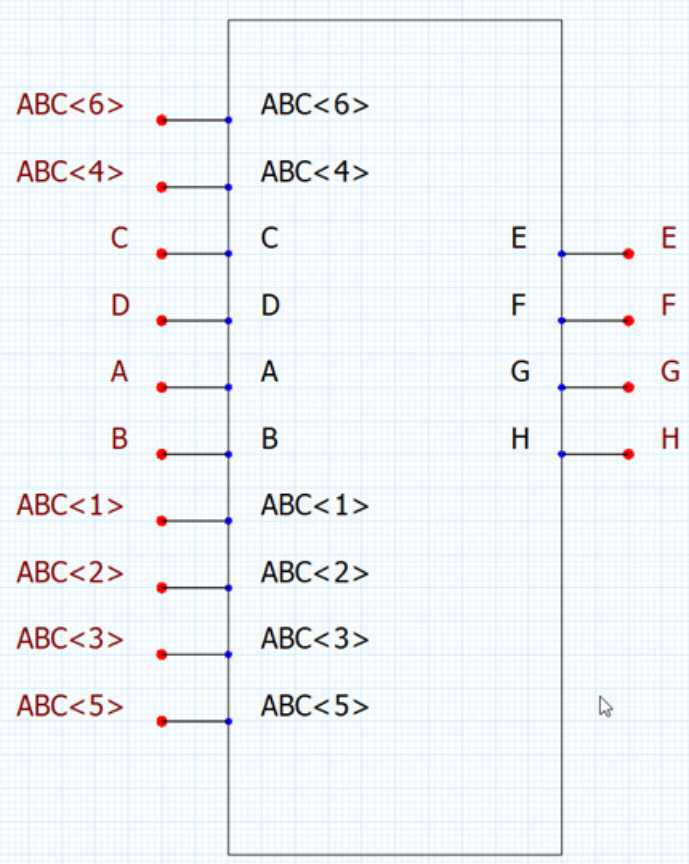
Sym_1



On running the interface comparison on the two symbols, the Interface Comparator dialog box appears.

Now, when you synchronize with the *First with Second* option, the bits 7 and 8 will get deleted from `sym_2`. As shown in the following graphic, the vector pin `ABC` appears in `sym_2` with all the 6 bits expanded.

Sym_2 After Synchronization



- After comparing a function group with another, it may be possible that a pin has hyphens in all the slots. In such a case, the pin is deleted from the package.

Summary

In this section, you learned to run Interface Comparison to eliminate errors in your part.

A

Appendix A: Modifying Symbols Using Legacy Symbol Editor

This appendix describes how to modify symbols using legacy Symbol Editor.

Note: To use the legacy Symbol Editor, set the `CDS_LEGACY_SYMBOL_EDITOR` environment variable to `1`.

Adding Pins to a Symbol

Add an input pin, `A1`, to `sym_1`.

1. Select the symbol *sym_1* in the cell tree.

   The symbol is loaded in the Symbol Editor.

2. Choose *Pins – Add*.

   The *Add Pin* dialog box appears.

3. Ensure that the *Scalar* option is selected and enter `A1` in the *Prefix* field.

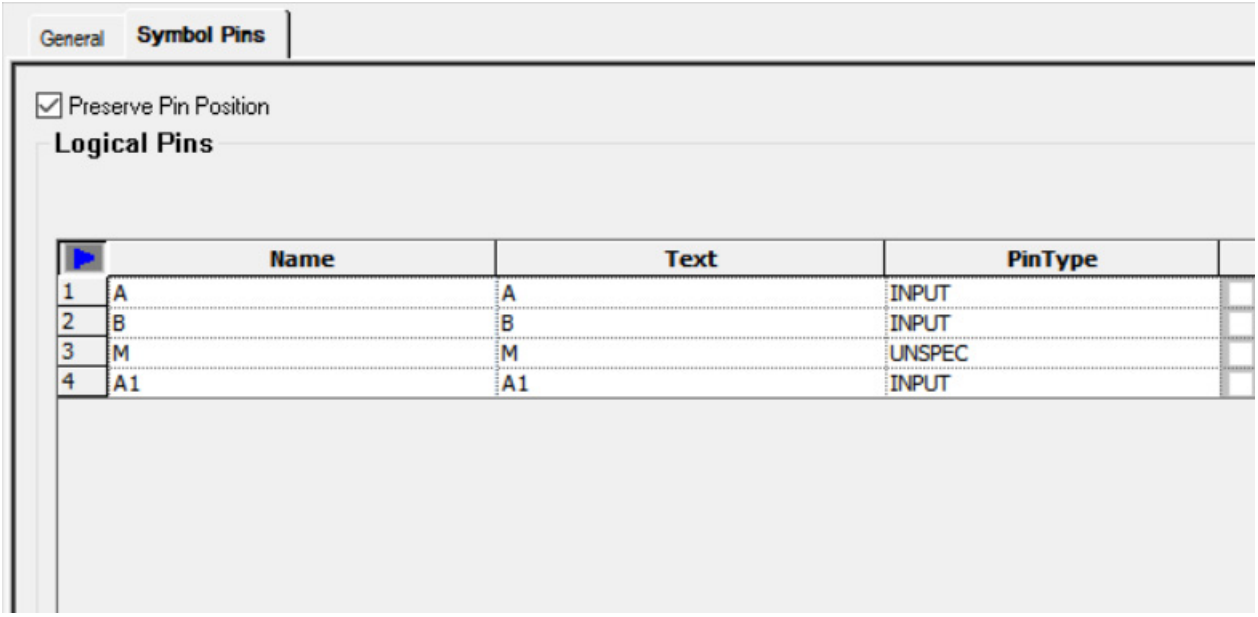
4. Select *INPUT* from the *Type* drop-down list.

5. Click *Add*.

   The input pin A1 is added to the pin grid.

6. Click *OK.*

The input pin A1 gets added to the symbol.



Caution

Changes to the symbol pin list results in breaking symbol-package associations. You will need to update the package pin list to ensure that the symbol is usable in the flow. You can use Interface Comparator to synchronize the pin lists of packages and symbols. See Interface Comparator***for more details on interface comparison.***

Important

The *Preserve Pin Position* option determines whether the pin positions and their associated properties and pin text will be preserved when the symbol outline is modified. If the option is not selected, the pin positions, their properties, and the pin text are adjusted dynamically when the symbol outline changes. Otherwise, the pin positions, their properties and pin text do not change with the change in the symbol outline.

When a new symbol is created, this option is deselected by default. This allows Part Developer to dynamically shift the pins on the symbol outline as and when new pins are added.

Note: Part Developer extends the symbol outline when new pins are added. However, no symbol outline contraction is done when symbol pins are deleted. You need to manually resize the symbol outline. When an existing symbol is loaded, this option is selected by default. This is done to ensure that graphics associated with a symbol pin

are not destroyed by the automatic movement of pins. This also ensures that in the case of horizontal or vertical extension of the symbol outline due to the addition of pins, the pins at the top or bottom or on the left or right of the symbol remain bounded to the symbol outline.

Adding Properties to a Symbol

Add the property `my_symbol_prop` with value `sym_val` in `sym_1`.

1. Select *sym_1* in the cell tree.

   The symbol is loaded in the Symbol Editor.

2. Click on the *General* tab.

3. Right-click the Properties grid and select *Insert Row After*.

   A blank row is added to the *Properties* grid.

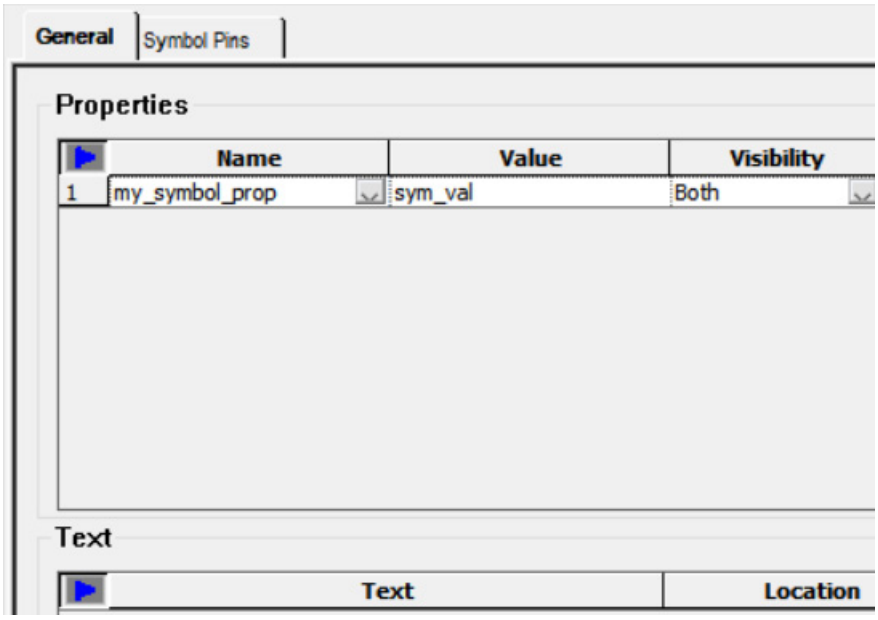
4. Enter `my_symbol_prop` in the *Name* column and `sym_val` in the *Value* column.

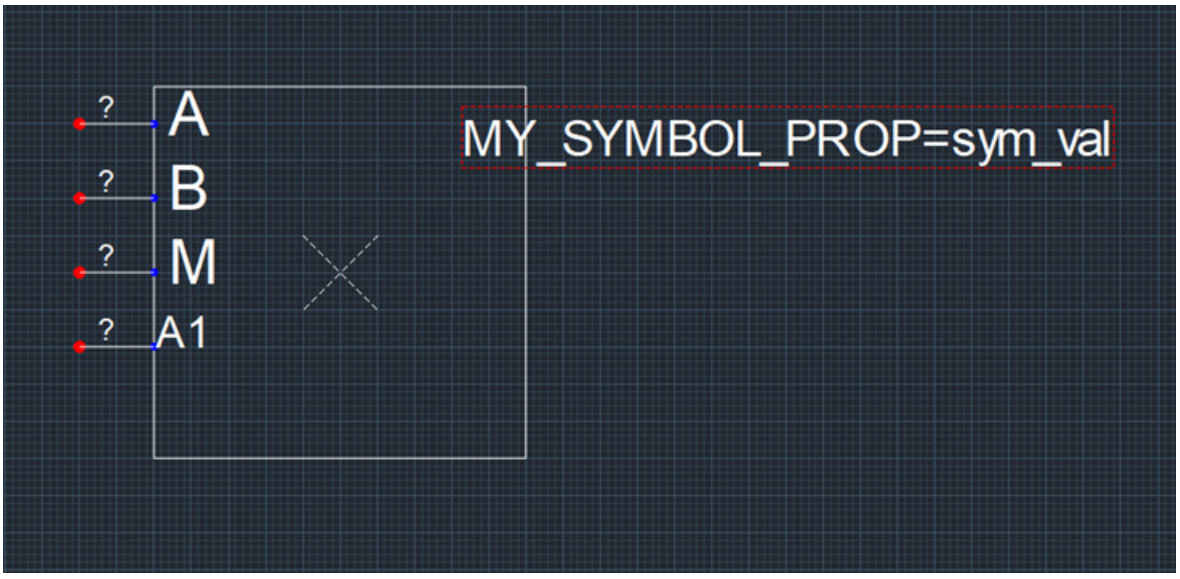
   Next, you need to determine the appearance of the property and its value on the symbol.

5. To make both the property and its value visible, select *Both* from the *Visibility* drop-down list.

6. To make the property appear in the top-right corner of the symbol, select *Top-Right* from the *Location* drop-down field.

Similarly, you can specify other values, such as rotation, alignment, and so on. Note that the changes you make are immediately visible on the Symbol Editor canvas.





Adding Symbol Pin Properties

Add the symbol pin property `VHDL_TYPE` with the value `lN` to pins `A2` and `A3`.

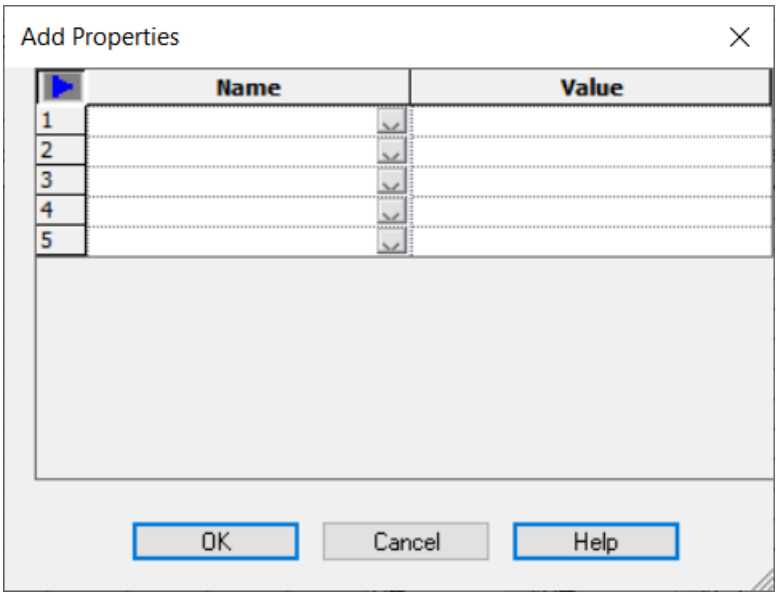
1. Select *sym_1* in the cell tree.

   The symbol is loaded in the Symbol Editor.

2. Click on the *Symbol Pins* tab.

3. Select *Properties – Add*.

   The Add Properties dialog box appears.



4. Enter `VHDL_TYPE` in the *Name* column and click *OK*.

   The `VHDL_TYPE` property is added. By default, the property will get added to only those pins that have a value. A null value results in the property being omitted from the pins.

5. To add the value of IN to the pin A2, enter `IN` in the A2 row in the `VHDL_TYPE` column.

6. Similarly, specify `IN` as the `VHDL_TYPE` property value for the pin A3.

Modifying Symbol Pin Properties

Modify the `VHDL_TYPE` symbol pin property to make it visible on the symbol pins.

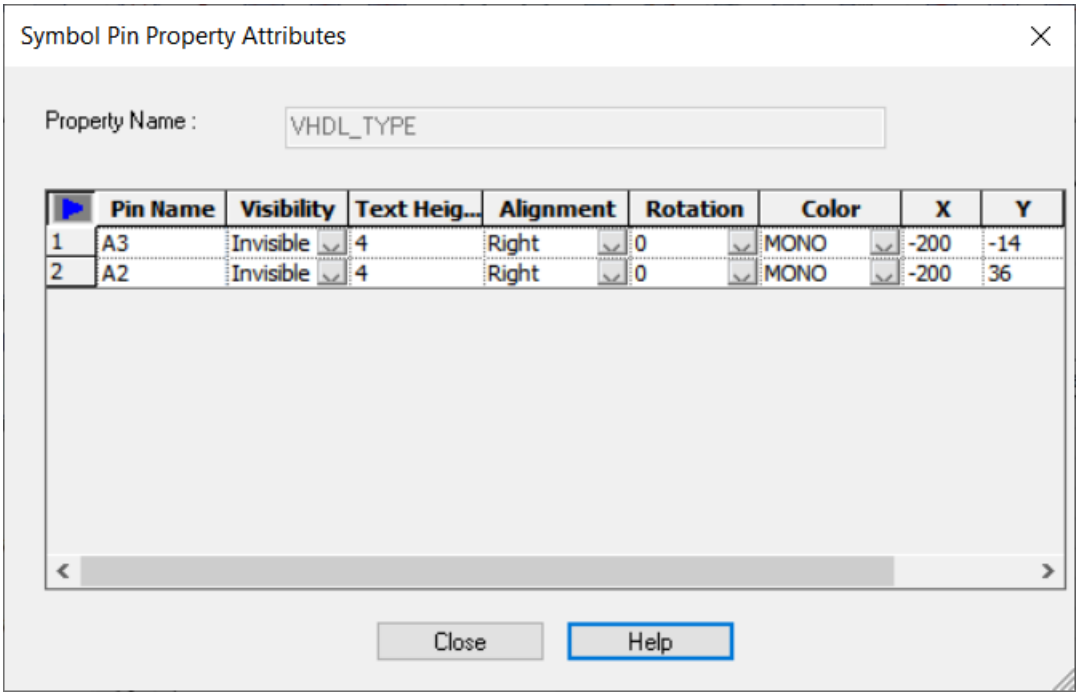
1. Select *sym_1* in the cell tree.

   The symbol gets loaded in the Symbol Editor.

2. Select the `VHDL_TYPE` column in the *Logical Pins* grid.

3. Select *Properties – Attributes.*

   The Symbol Pin Property Attributes dialog box appears.

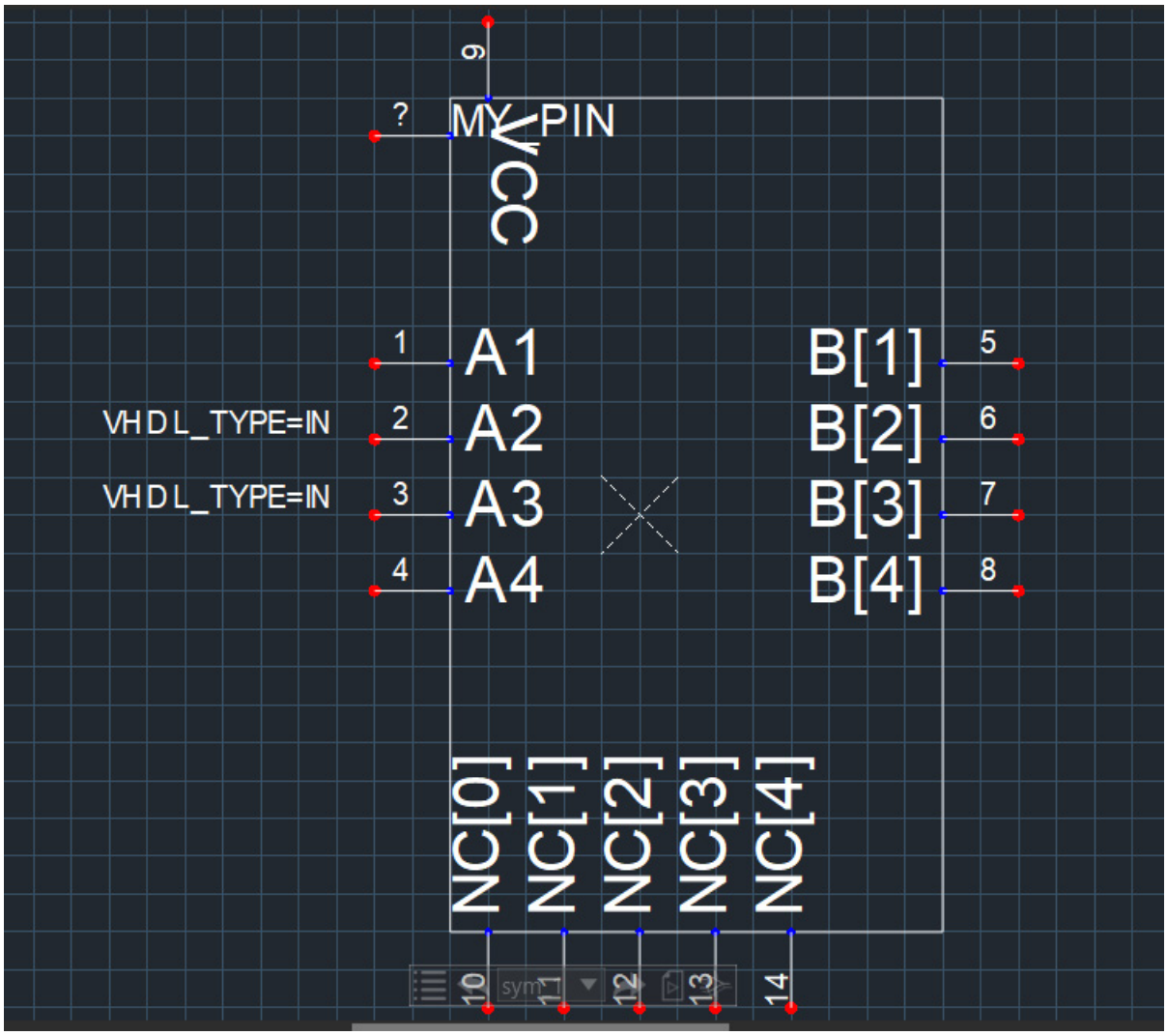


4. For pins A2 and A3, select *Both* from the *Visibility* drop-down list box.

   Similarly, you can modify the other attributes through this dialog box.

5. Click *Close*.

The symbol pin properties appear next to the pins A2 and A3.



Deleting Pins from a Symbol

Delete the pin A2 from sym_2.

1. Select *sym_2* in the cell tree.

   The symbol gets loaded in the Symbol Viewer.

2. Right-click the pin A2 and select *Delete Selected Rows*.

   The pin gets deleted from sym_2.

Adding Symbol Text

Add the text *CADENCE* to sym_1.

1. Select *sym_1* in the cell tree.

   The symbol gets loaded in the Symbol Viewer.

2. Click on the *General* tab.

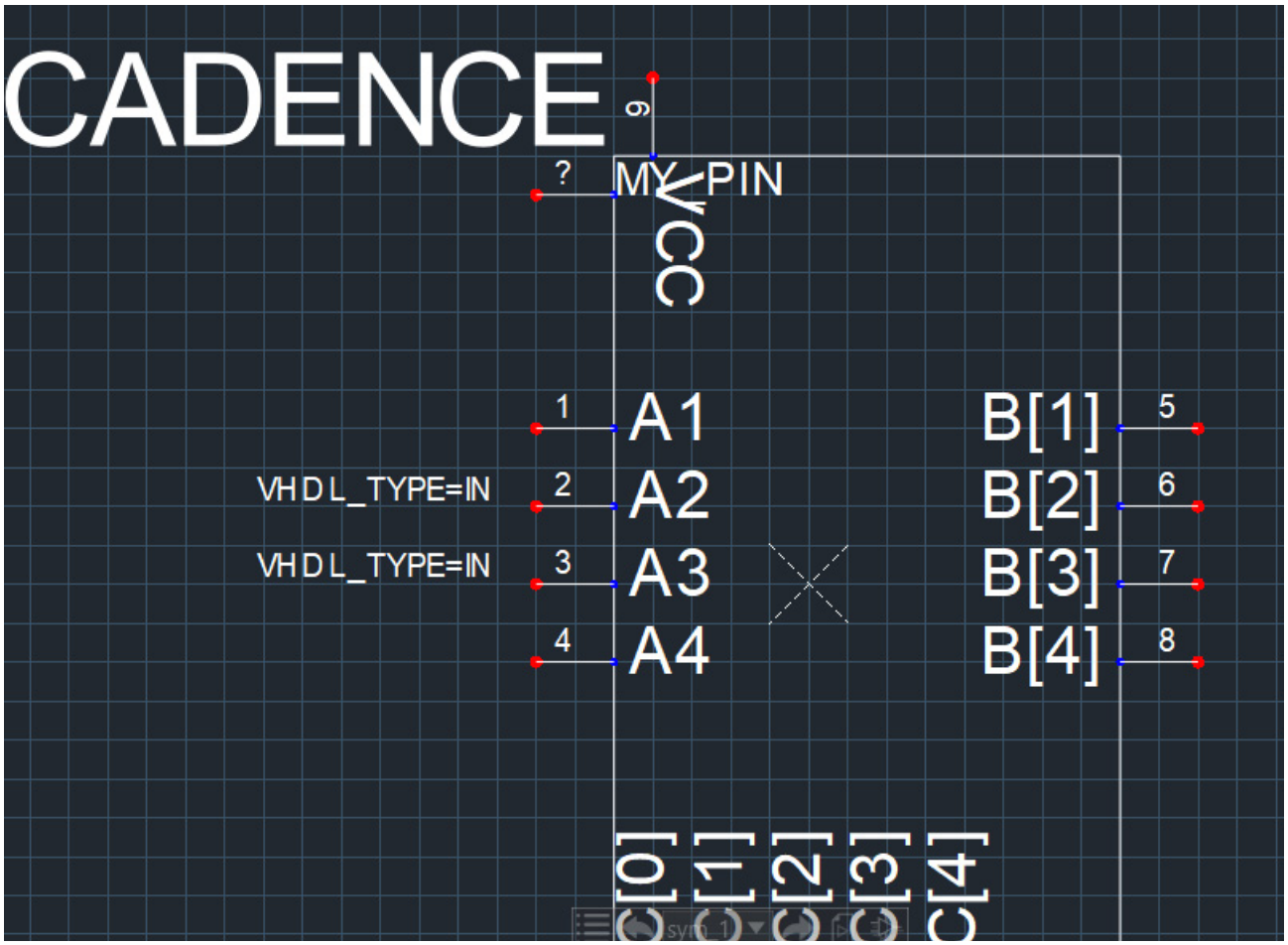
3. Right-click the Text grid and select *Insert Row After*.

   A blank row is inserted in the *Text* grid.

4. Enter *CADENCE* in the text column.

5. To make the text appear in the top-left location of the symbol, select *Top-Left* from the *Location* drop-down box.

   The symbol text appears in the top-left corner of the symbol.



Moving Symbol Pins

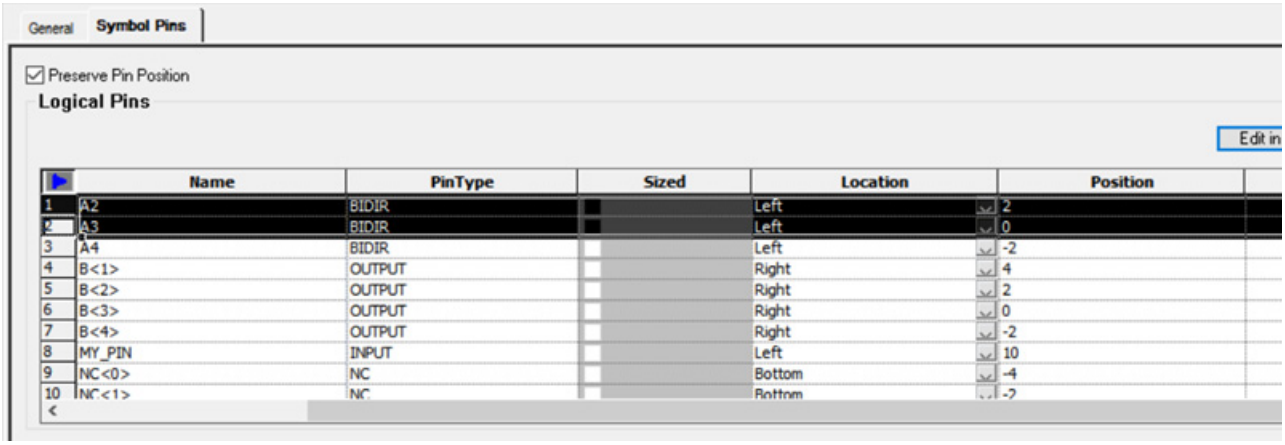
Move the pins A2 and A3 by 1 grid to the left and pin A4 by 4 grids to the right.

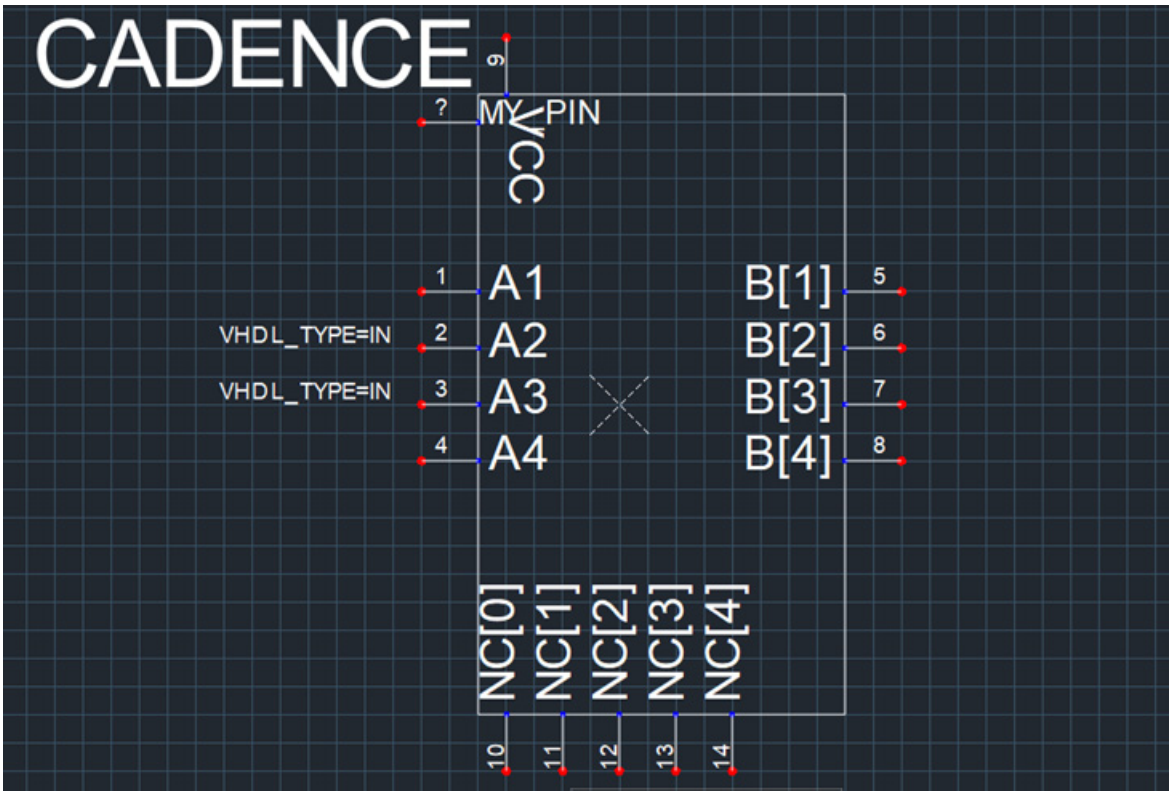
1. Select *sym_1* in the cell tree.

   The symbol gets loaded in the Symbol Editor.

2. Select the pins A2 and A3.

   The Symbol Editor shows the selected pins.





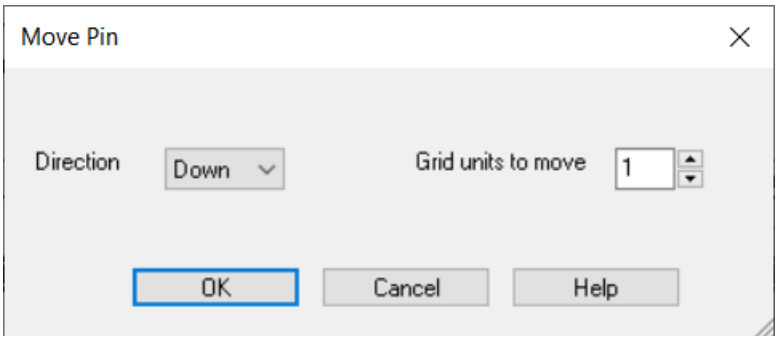
3. To move the pins by one grid to the left, click the left arrow button in the Move Pins grid.

   The selected pins move to the left by one grid.

4. Next, select pin A4.

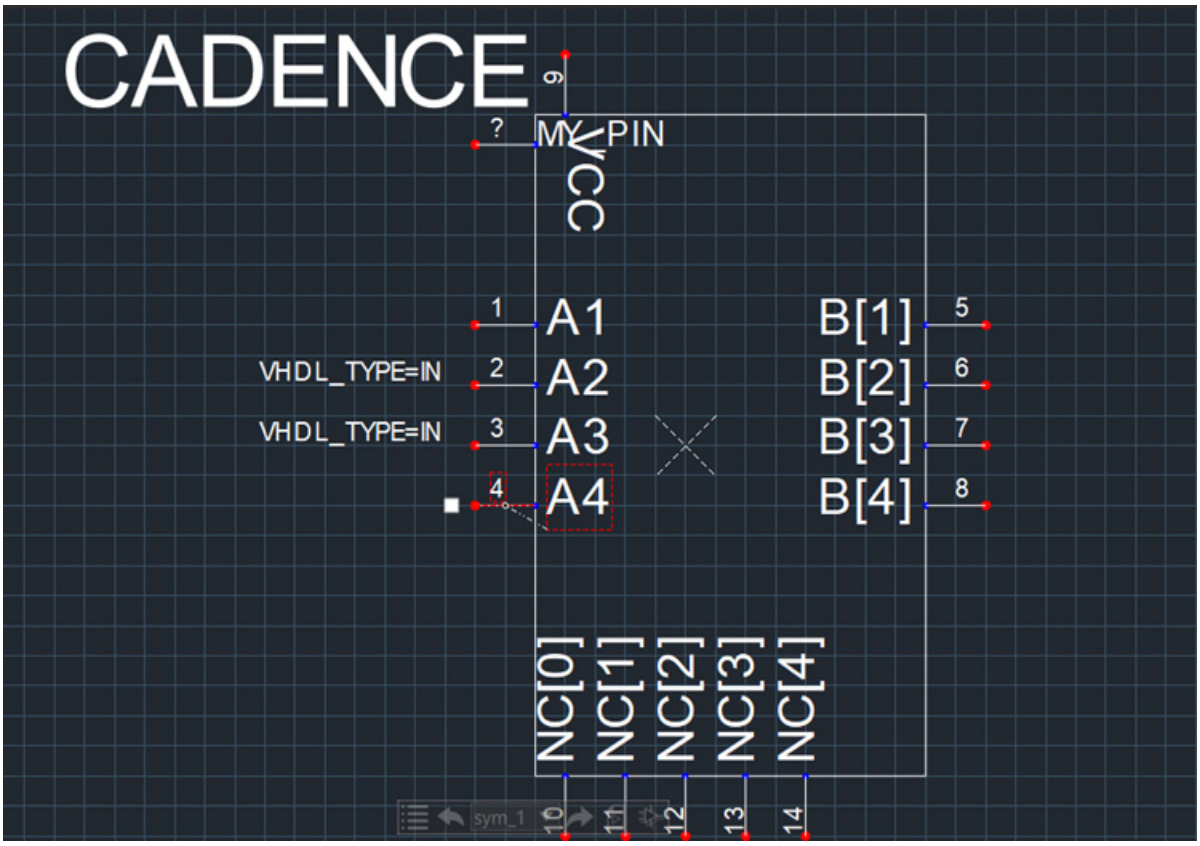
5. To move pins by more than one grid at a time, click *Move* in the Move Pins grid.

The Move Pin dialog box appears.



6. Select *Right* from the *Direction* drop-down list box.
7. Enter `4` in the *Grid units to move* field.
8. Click *OK*.

   The pin A4 moves to the right by 4 grid units.



Modifying Symbol Outline

Increase the left and right outline of sym_2 by 5 grids.

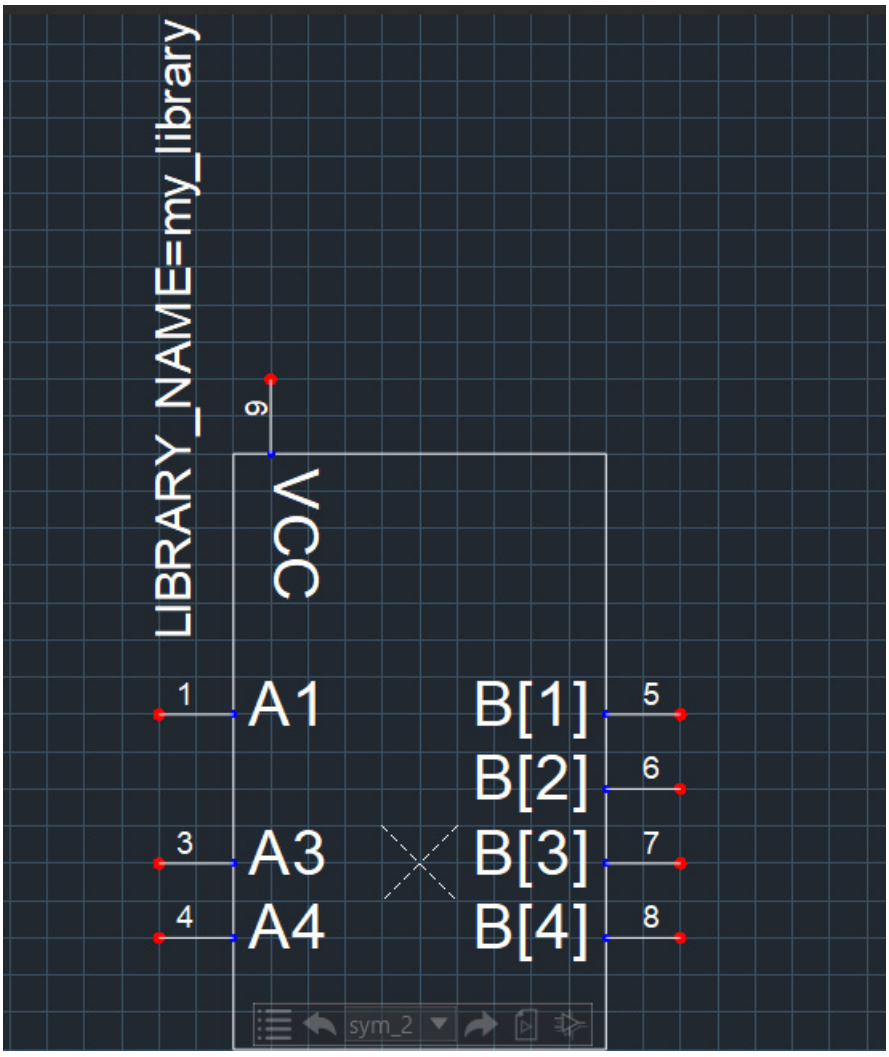
1. Select sym_2 in the cell tree.

   The symbol loads in the Symbol Editor.

2. Enter the value `-10` in the *Left* field in the *Symbol Outline* group box.

3. Enter the value `10` in the *Right* field in the *Symbol Outline* group box.

   The symbol outline changes as specified. Note that the symbol pin positions are not changing automatically with the change in the symbol outline. This is because the *Preserve Pin Position* option is selected. If you want to move the pin automatically with the symbol outline, deselect the *Preserve Pin Position* option.



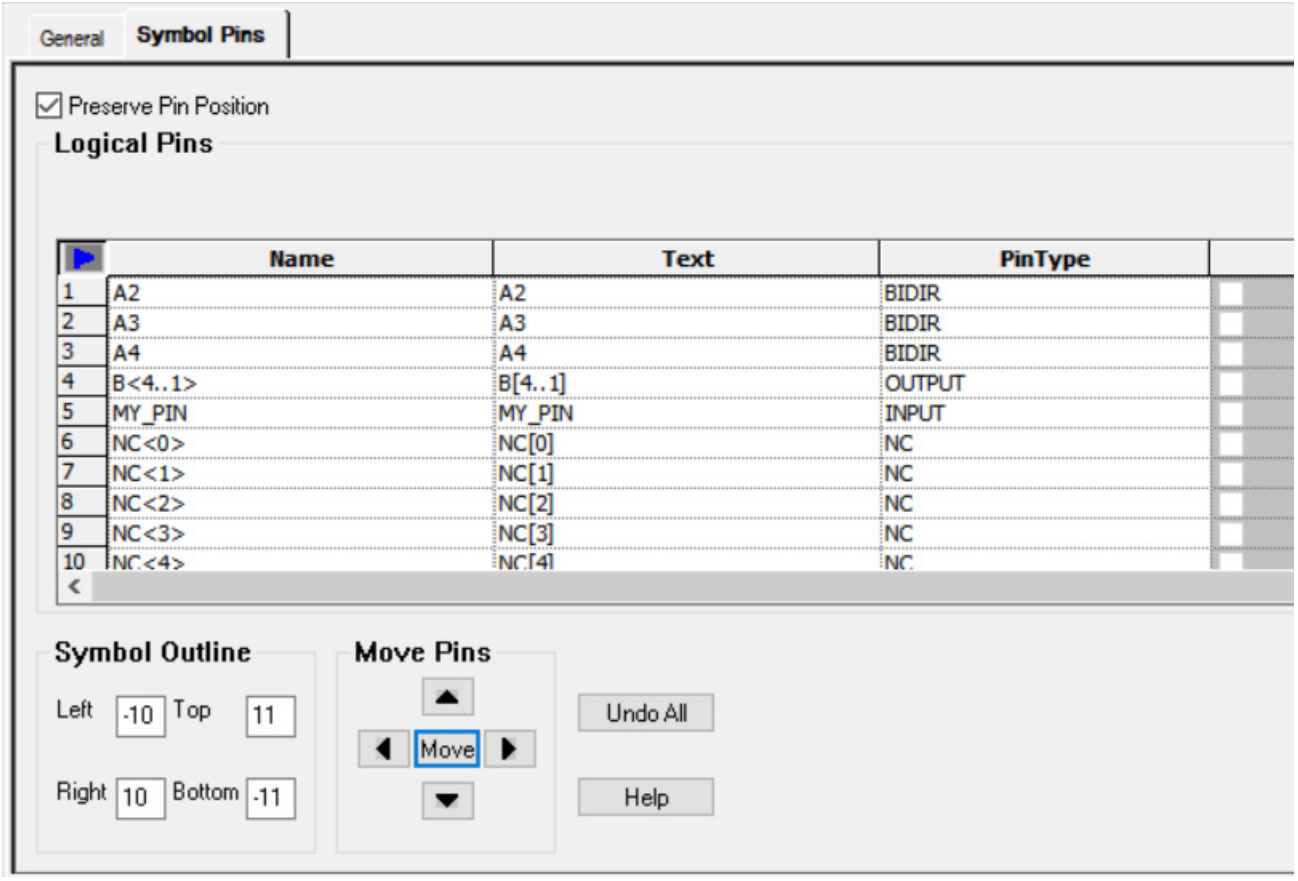
Expanding and Collapsing Vector Pins

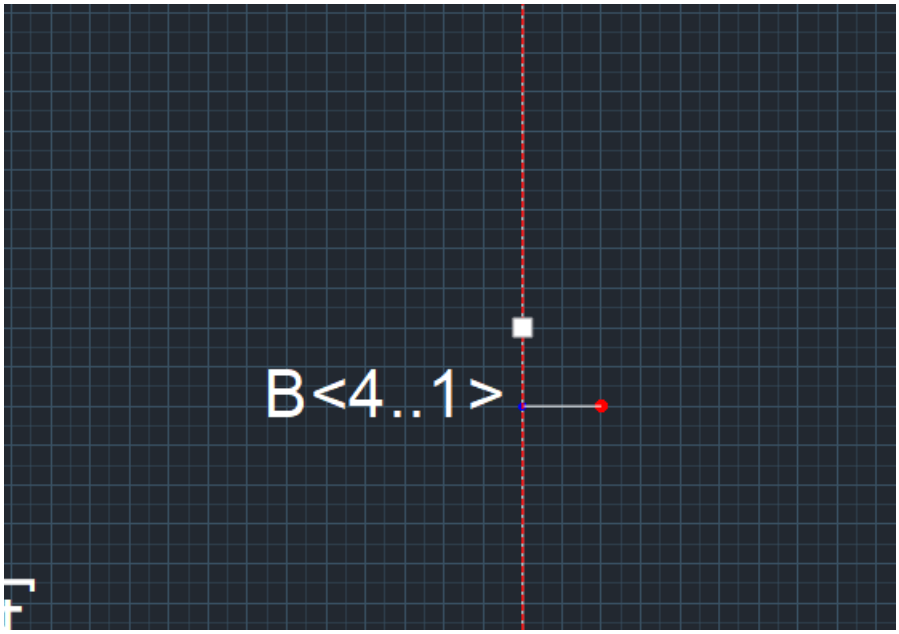
Collapse the bits of the vector pin B.

1. Select all the bits of the vector pin B.
2. Right-click the selection and select *Collapse*.

   Part Developer gives an error message saying that bit-specific properties might get lost on collapsing.
3. Click *Yes*.

   The bits collapse to form a vector pin.





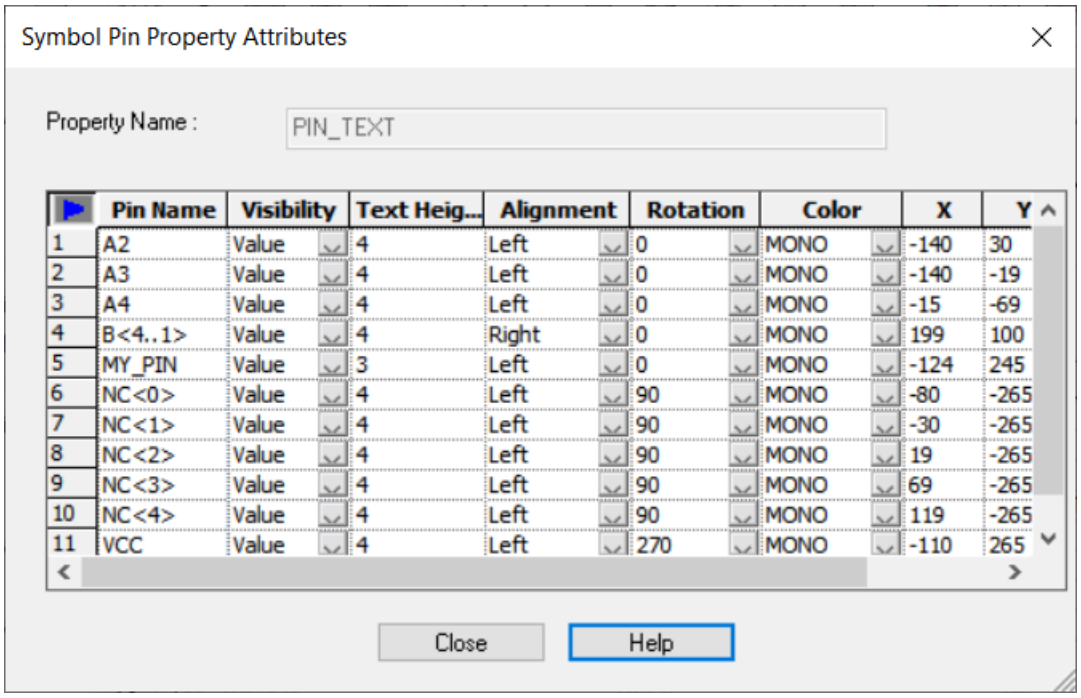
Modifying the PIN_TEXT Property

The value in the *Text* column shows the value of the PIN_TEXT property for the symbol pins. To change the values, simply edit the value for a particular pin.

To change the display attributes of the PIN_TEXT property:

1. Select *Pins – Pin Text Attributes*.

   The *Symbol Pin Property Attributes* dialog box appears.



	Pin Name	Visibility	Text Heig...	Alignment	Rotation	Color	X	Y
1	A2	Value	4	Left	0	MONO	-140	30
2	A3	Value	4	Left	0	MONO	-140	-19
3	A4	Value	4	Left	0	MONO	-15	-69
4	B<4..1>	Value	4	Right	0	MONO	199	100
5	MY_PIN	Value	3	Left	0	MONO	-124	245
6	NC<0>	Value	4	Left	90	MONO	-80	-265
7	NC<1>	Value	4	Left	90	MONO	-30	-265
8	NC<2>	Value	4	Left	90	MONO	19	-265
9	NC<3>	Value	4	Left	90	MONO	69	-265
10	NC<4>	Value	4	Left	90	MONO	119	-265
11	VCC	Value	4	Left	270	MONO	-110	265

2. Change the display attributes as required and click *Close*.

Summary

In this appendix, you learned how to modify symbols.

B

Appendix B: Editing Symbol Graphics Using Legacy Symbol Editor

This appendix describes how to edit symbol graphics using legacy Symbol Editor.

Note: To use the legacy Symbol Editor, set the `CDS_LEGACY_SYMBOL_EDITOR` environment variable to `1`.

Performing Zoom and Pan Operations on a Symbol

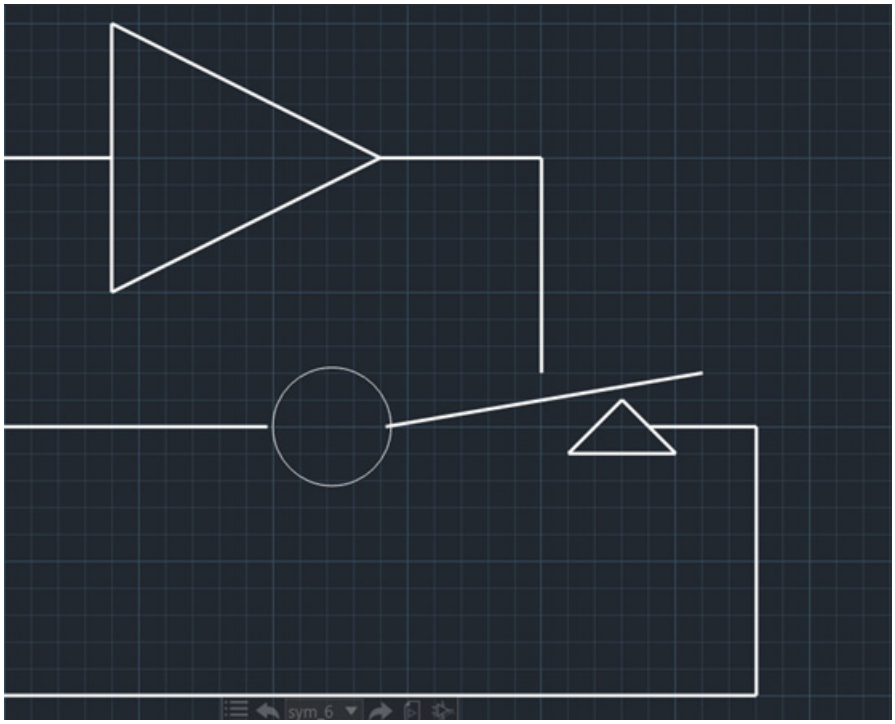
Zoom in on the switch graphics associated with the `PIN1` pin in `sym_6`. After the object has been magnified according to your specification, pan the Symbol Editor canvas to display only the `PIN+` and `PIN-` pins.

1. Click the *Zoom By Points* tool button  .

   Note that the mouse pointer changes to a magnifying glass.

2. Using the mouse, drag and select an area that encloses the switch associated with the `PIN1` pin.

The switch is magnified.



Note: If you want to edit the graphics, first press Esc to exit the zoom mode.

3. To pan the canvas so that the `PIN+` and `PIN-` pins can be viewed, click the *Pan* tool button.

   The mouse pointer changes to a hand.

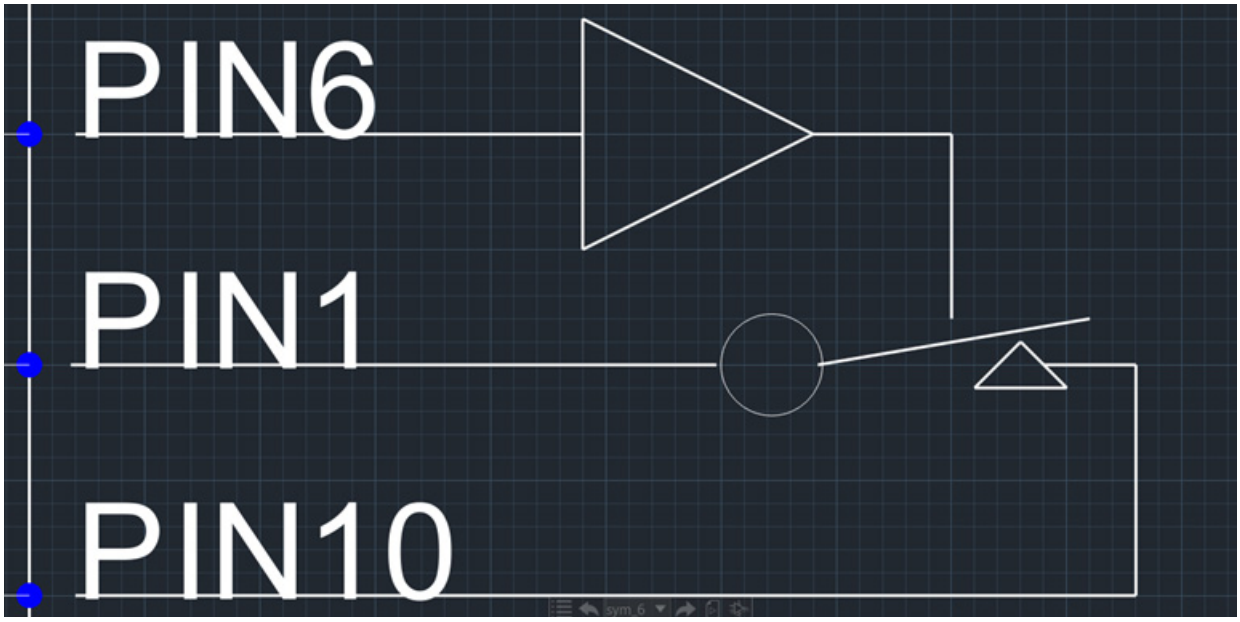
4. Click and release the mouse button only after the `PIN+` and `PIN-` pins are displayed at the desired location on the Symbol Editor canvas.

Tip

If you are using a three-button mouse, you can pan using the middle mouse button.

Drawing Graphical Objects to Add to a Symbol

Draw the following graphic in the `sym_1` symbol of `sample_part` to indicate that pins `PIN6`, `PIN1`, and `PIN10` are associated with a buffer and a switch.



1. To begin drawing the buffer, click the *Place Line* tool button .
2. Click below the `PIN6` text label and drag the mouse pointer to draw a horizontal line of the desired length.
3. To draw the triangle, click the *Add Polygon* tool button .
4. To draw a straight vertical line that is bisected by one end of the `PIN6` horizontal line, click at the desired location in the symbol and drag the mouse pointer vertically until the line is of the desired length.
5. Click and drag the mouse pointer to the apex of the triangle.
6. Double-click to complete the triangle.
7. To complete the buffer, click the *Add Polyline* tool button .
8. Click at the apex of the triangle and drag horizontally up to the desired length.
9. Click and drag vertically down up to the desired length.
10. Double-click to complete the shape.

11. To draw the switch, first draw a horizontal line of the desired length below the `PIN1` text label.
12. To draw a circle at the end of the horizontal line, click the *Add Circle* tool button  .
13. Click on the desired location and drag the mouse pointer to draw the diameter of the circle.
14. Release the mouse pointer.

    The circle is drawn.
15. Using the *Add Line* tool button, draw a slanted line from the circle.
16. Using the *Add Polygon* tool button, draw a small triangle, the apex of which touches the slanted line.
17. Draw a horizontal line below the `PIN10` text label and drag it vertically up and then horizontally left to connect to the small triangle.

    The graphic is complete.

 *Tip*

When drawing objects, you can either copy/paste or use the *Make components the same width* and *Make components the same height* tool buttons to create objects of identical dimensions.

 *Tip*

To draw objects that should not be snapped to fit into the grid, make sure the *Snap to Grid* option is not selected. You can access this option from the *Canvas* menu item on the *Graphic Editor* menu or from the toolbar using the *Snap to Grid* tool button  .

Creating a Group of Symbol Objects

In `sym_1`, create a group of the two pins `PIN+` and `PIN-` so that the pins can be moved together.

1. To select the `PIN+` pin along with its name and text label, click the pin when the mouse pointer changes to the move icon. You will note that the same pin gets selected in the Symbol Pins panel.
2. Keeping the Ctrl key pressed, click the `PIN-` pin.

Both the pins are selected. Note that each selected pin is displayed in a separate box.

3. right-click the selection.
4. Click the Group option.

   Note that all the selected objects are now displayed in a single box. This indicates that the group is created. You can now do any operation on the grouped object.

Tip

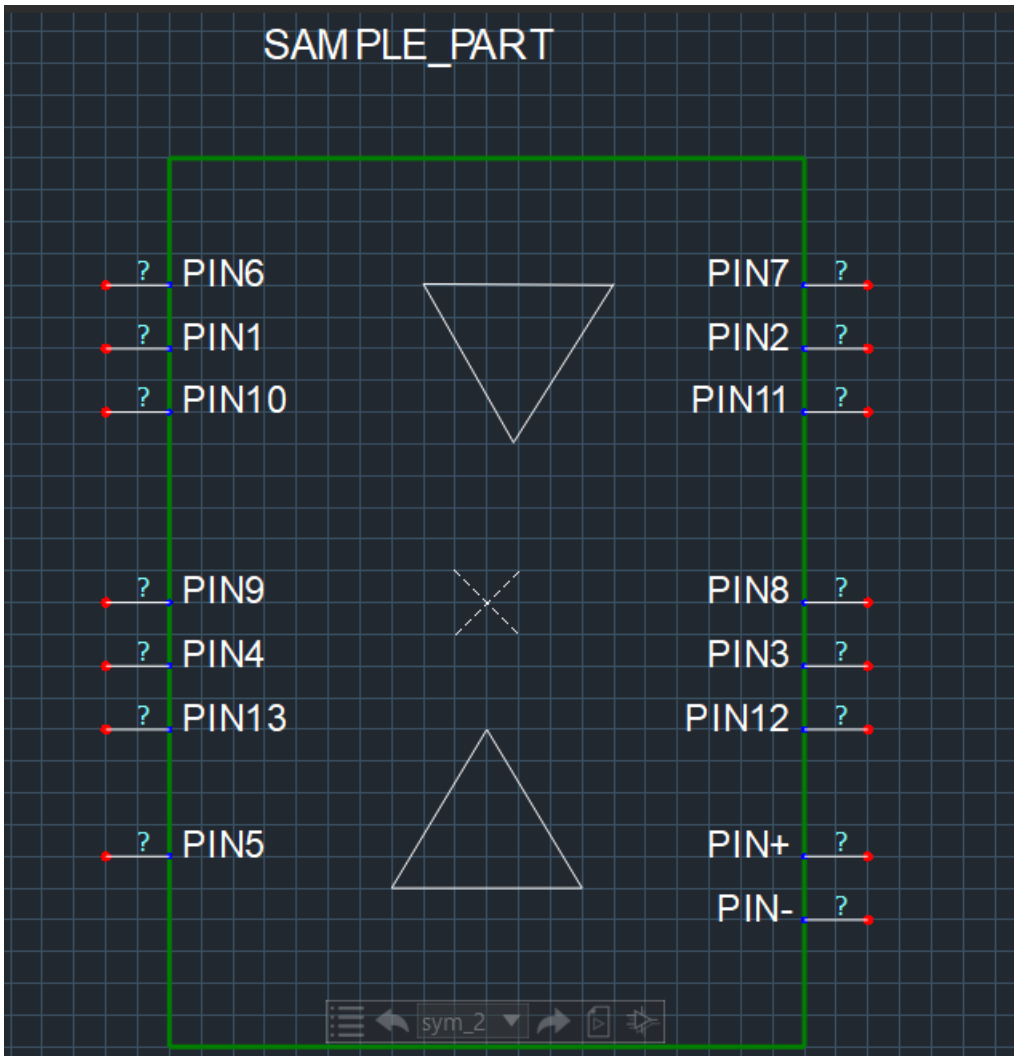
You can also select pins from the Symbol Pins panel by clicking the row number in the first column of the Logical Pins grid. This method of selection cannot be used if you want to select symbol objects other than pins.

Rotating an Object

In the `sym_2` symbol, rotate the first triangle to make it inverted.

1. Create a group of the three lines that constitute the first triangle.
2. Click the *Rotate 90 degrees counter clockwise* tool button  two times.

The triangle is inverted.

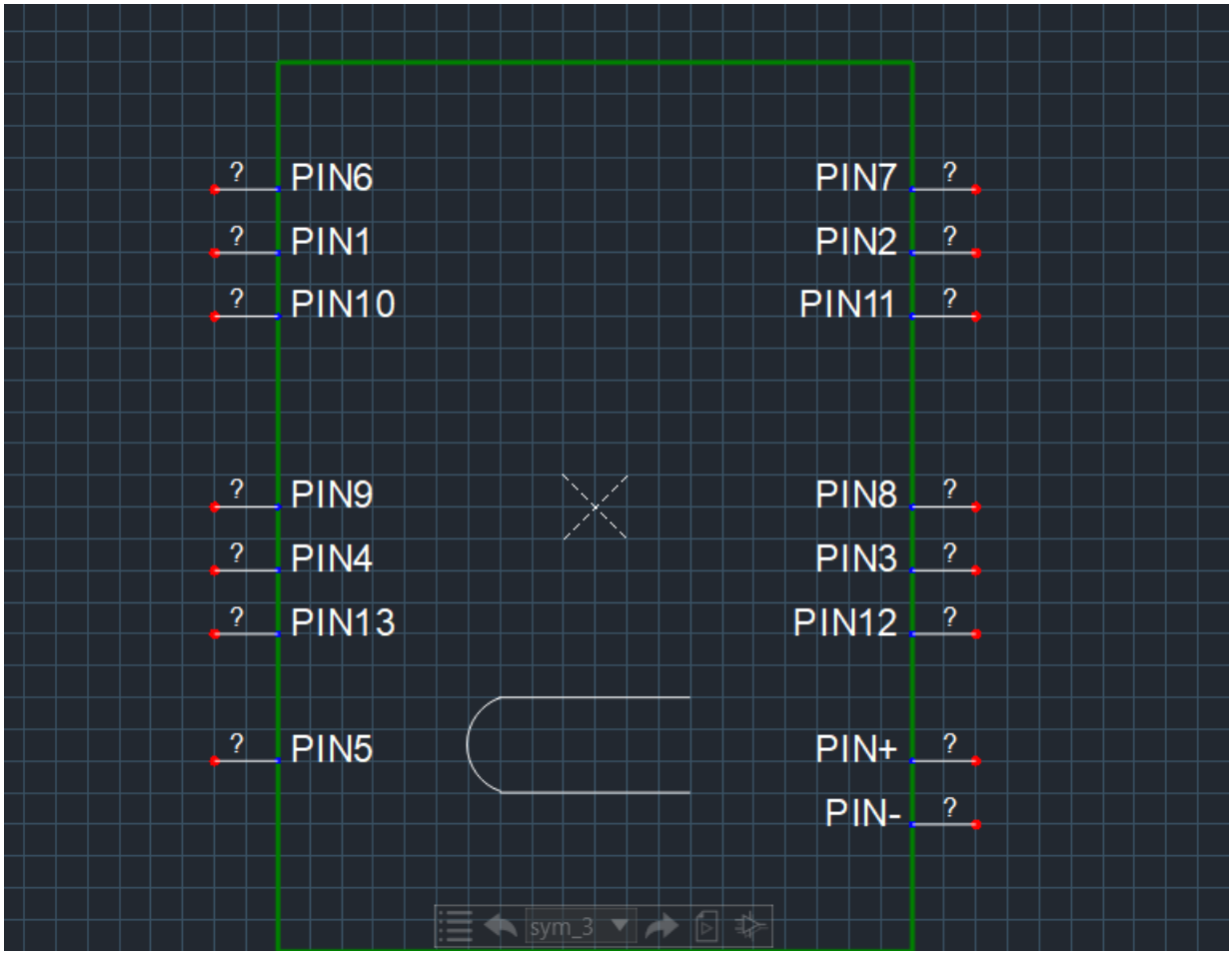


Aligning Objects

In the `sym_3` symbol, left-align the first horizontal line with the second horizontal line.

1. Select the first horizontal line.
2. Keeping the Ctrl key pressed, select the second horizontal line.
3. Click the *Align Left* tool button  .

The line selected first is left-aligned with the line selected next. In the case of more than two objects, all objects are aligned with the last selected object.



Tip

To make a set of circles concentric, select all the circles and then click the *Align Middle* tool button and the *Align Center* tool button.

Adding a Bitmap to a Symbol

Add the bitmap `logo.bmp` to the `sym_4` symbol.

1. Click the *Add Image* tool button .

   The *Open* dialog box displays.

2. The path of the `logo.bmp` file is `<your_work_area>/library_project/my_lib/sample_part/images`. Browse the `my_lib` folder to select the bitmap `logo.bmp` and click the *Open* button.

   Note that the mouse pointer changes to indicate that an image is being added.

3. To add the image, click at the desired location on the canvas.

The image is added to the symbol. You can stretch the image to increase its size.

Important

Make sure that the image to be added is stored in a `.bmp` file or a `.jpg` file.

Performing Move and Stretch Operations on Symbol Objects

Move the group of `PIN+` and `PIN-` pins a few grid points down in the `sym_5` symbol. Increase the symbol size by dragging the symbol outline.

1. Create a group of `PIN+` and `PIN-` pins.
2. Place the mouse pointer on either pin and drag the group to the desired location in the symbol.

   The group is moved to the new location.

3. To increase the length of the symbol, move the horizontal line at the base of the symbol down to the desired location.

   Note that a yellow dotted line indicating the existing symbol outline is displayed at the original location.

4. Click the dotted line to display stretch handles and drag the middle handle until the outline merges with the horizontal line that you had moved to the new location.

   The symbol size is increased according to your specification.

Tip

To move an object by a fraction of a grid in any direction, you can use *Nudge Up*, *Nudge Down*, *Nudge Left*, or *Nudge Right* tool buttons.

Tip

To move pins from one side of the symbol to another, use the Symbol Pins panel instead of the Symbol Editor. Part Developer automatically adjusts the direction of a pin when the *Location* column value for the pin is changed in the Symbol Pins panel.

Summary

In this section, you learned how to edit symbol graphics.