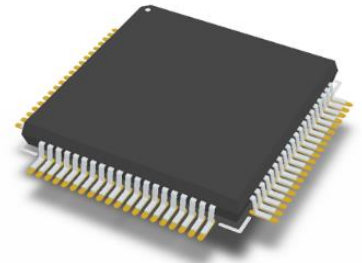
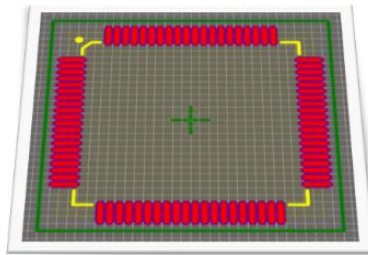


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# Altium Library

Procedure to create and manage components

Version 1.0



## Revision History

Name	Date	Changes	Version
Kleber Gouveia	03/26/2018	Initial release	1.0

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# 1. Introduction

This document can be used as a directive to create/edit the Altium library's components. In the following sections are explained standards and models used in this library.

## 1.1 References

Altium Training: Module 15 - Schematic Library Editor.pdf;

Altium Training: Module 16 - PCB Library Editor.pdf;

## 2. Altium Library

The components are sorted by classes. Each class is treated in a .SchLib and a .PcbLib file as shown below:

**Table 1 – Altium Library Classes and Files**

<b>Component Class</b>	<b>Default Designator</b>	<b>.SchLib File</b>	<b>.PcbLib File</b>
Antenna	ANT?	Antenna.SchLib	Antenna.PcbLib
Battery	BAT?	Battery.SchLib	Battery.PcbLib
Capacitor	C?	Capacitor.SchLib	Capacitor.PcbLib
Connector	CN?	Connector.SchLib	Connector.PcbLib
Crystal	XTAL?	Crystal.SchLib	Crystal.PcbLib
Diode	D?	Diode.SchLib	Diode.PcbLib
Display	-	Display.SchLib	Display.PcbLib
Fuse	F?	Fuse.SchLib	Fuse.PcbLib
Heat Sink	HS?	Heat_SinkSchLib	Heat_Sink.PcbLib
Holder	-	Holder.SchLib	Holder.PcbLib
Inductor	L?	Inductor.SchLib	Inductor.PcbLib
Integrated Circuit	U?	Integrated_Circuit. SchLib	Integrated_Circuit.PcbLib
Miscellaneous	-	Miscellaneous.SchLib	Miscellaneous.PcbLib
Relay	RL?	Relay.SchLib	Relay.PcbLib
Resistor	R?	Resistor.SchLib	Resistor.PcbLib
SOM	-	SOM.SchLib	SOM.PcbLib
Switch	SW?	Switch.SchLib	Switch.PcbLib
SCR, Diac, Triac	TY?	Thyristor.SchLib	Thyristor.PcbLib
Transducer	-	Transducer.SchLib	Transducer.PcbLib
Transformer	TR?	Transformer.SchLib	Transformer.PcbLib
Transistor	T?	Transistor.SchLib	Transistor.PcbLib
Varistor	VR?	Varistor.SchLib	Varistor.PcbLib

## 2.1 Schematic Library (.SchLib)

Each .SchLib file contains all components related to that component class. Inside the .SchLib file (SCH Library panel) there is, in most cases, a component template with name starts with \*MODEL\_ and it has the parameters for this class listed in "Library Component Properties". Some parameters are common to all .SchLib files, for example: Manufacturer, Mount Type or Value. Each component class could be also different parameters only related to that class, for example: tolerance for resistors or dielectric type for capacitors. The main purpose of the parameters is to be used as a filter to help the search of a desired component when the designer is capturing the schematic. A secondary purpose of the parameters is to generate BOMs and reports listing characteristics of the components in a design.

The template components could be used to create a new component using copy, paste and filling the template with the exact data from the desired part number. Figure 1 shows the "Library Component Properties" of the component \*MODEL\_RES listed in Resistor.SchLib. This is a template to creation of general purpose resistors.

Library Component Properties

**Properties**

Default Designator: R? ☒ Visible ☐ Locked

Default Comment: \* ☐ Visible

Description: Description

Type: Standard

**Library Link**

Symbol Reference: \*MODEL\_RES

**Graphical**

Mode: Normal ☒ Lock Pins

☐ Show All Pins On Sheet (Even if Hidden)

☐ Local Colors

**Parameters**

Visible	Name	Value	Type
<input type="checkbox"/>	Manufacturer	*	STRING
<input type="checkbox"/>	Mount Type	*	STRING
<input checked="" type="checkbox"/>	Power	xxW	STRING
<input type="checkbox"/>	Tolerance	xx%	STRING
<input checked="" type="checkbox"/>	Value	xyyR	STRING

**Models**

Name	Type	Description	Vault	Item Rev...	Revision...
------	------	-------------	-------	-------------	-------------

Buttons: Edit Pins..., OK, Cancel

Figure 1 - "Library Component Properties" window.

### 2.1.1 Filling the Library Component Properties

Below is the standard manner to fill the fields of the Library Component Properties window:

**Default Designator** (Visible) – Put the designator listed on Table 1 corresponding the correct component class. Don't forget the "?".

**Comment** – (not Visible) Put the component manufacturer's part number.

**Description** – Put the component description. It's useful to put in this field the short description by Digikey's web page (or the description by another Supplier).

**Symbol Reference** – Put the component manufacturer's part number.

**Parameters** – (not Visible) Put the parameters related to the component.

- Add suppliers (Digikey, Farnell, Newark, Mouser, Arrow, etc.) using the Altium's Supplier Search;
- Add the parameter "Manufacturer" filling the manufacturer name.
- Add the parameter "Mount Type" filling the mount type of the component: SMD, PTH, PANEL...
- Add the parameters related to each component class as described in the following sections (Visible in some cases).

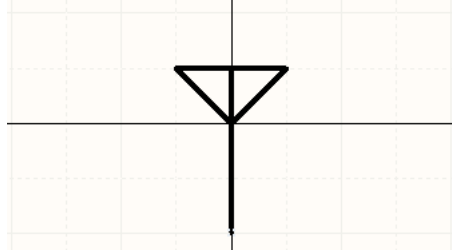
**Models** – Add the footprint of the component.

### 2.1.2 Templates and specific parameters for each component class

Inside each .SchLib file there are some components with name in the form: \*MODEL\_XXXXXXX, where XXXXXXX is something related to that class. These components are templates that could be copied to help the component creation. In the next sections these templates and its parameters are described.

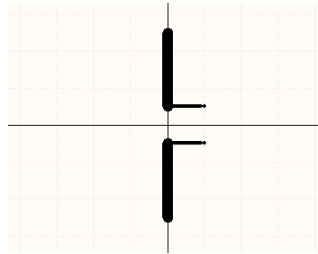
#### 2.1.2.1 Antenna

- \*MODEL\_ANT



- Parameters:
  - Value (Visible) – Put the component manufacturer's part number.

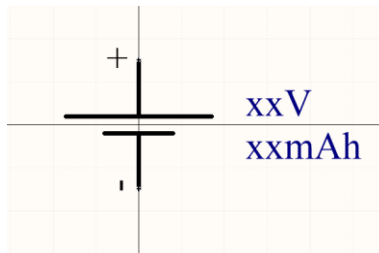
- \*MODEL\_DIPOLE



- Parameters:
  - Value (Visible) – Put the component manufacturer's part number.

#### 2.1.2.2 Battery

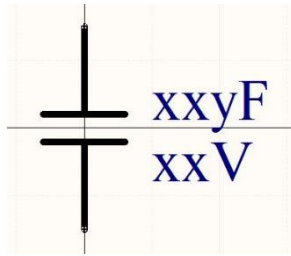
- \*MODEL\_BATTERY



- Parameters:
  - Value (Visible) – Put the battery nominal voltage in Volts (V).
  - Capacity (Visible) – Put the battery capacity in mA-hours (mAh).
  - Type (not Visible) – Put the battery type (Li-ion, Ni-Cad, Ni-MH, lead-acid...).

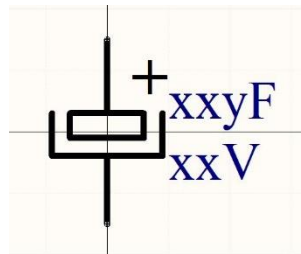
#### 2.1.2.3 Capacitor

- \*MODEL\_CAP\_NO\_POL



- Parameters:
  - Value (Visible) – Put the capacitor capacitance.
  - Voltage (Visible) – Put the capacitor nominal voltage.
  - Category – Put the capacitor category (Ex: Ceramic, Electrolytic, Tantalum...).
  - Dielectric – Put the capacitor dielectric type.

- \*MODEL\_CAP\_POL

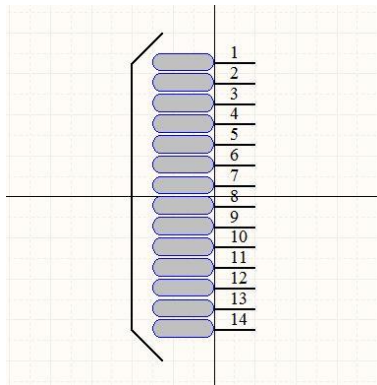


**Figura 2 - Esquemático do \*MODEL\_CAP\_POL**

- Parameters:
  - Value (Visible) – Put the capacitor capacitance.
  - Voltage (Visible) – Put the capacitor nominal voltage.
  - Category – Put the capacitor category (Ex: Ceramic, Electrolytic, Tantalum...).

#### 2.1.2.4 Connector

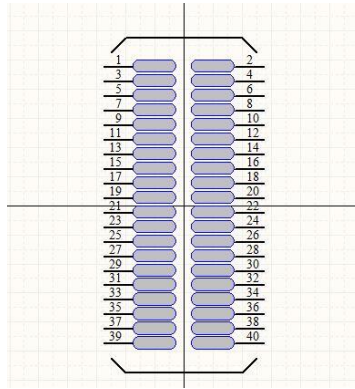
- \*MODEL\_CONNECTOR\_1LIN



- Parameters:
  - N of Positions – Put the number of positions of the connector.
  - Pitch – Put the connector pitch.
  - Value (Visible) – Put the connector part number.

- \*MODEL\_CONNECTOR\_2LIN

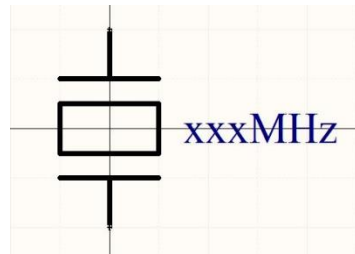




- Parameters:
  - N of Positions – Put the number of positions of the connector.
  - Pitch – Put the connector pitch.
  - Value (Visible) – Put the connector part number.

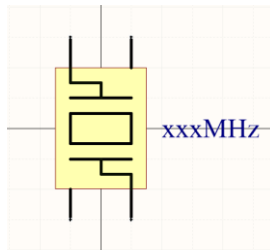
### 2.1.2.5 Crystal

- \*MODEL\_XTAL



- Parameters:
  - Load Capacitance – Put the crystal load capacitance in pico Farads (pF).
  - Value (Visible) – Put the crystal frequency.

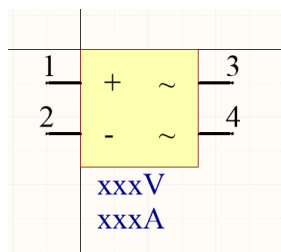
- \*MODEL\_\_XTAL\_4PIN



- Parameters:
  - Load Capacitance – Put the crystal load capacitance in pico Farads (pF).
  - Value (Visible) – Put the crystal frequency in Hertz (Hz).

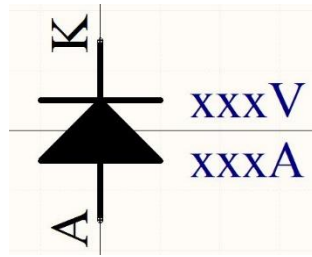
### 2.1.2.6 Diode

- \*MODEL\_BRIDGE



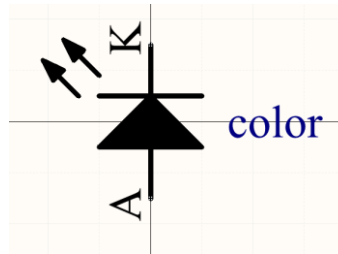
- Parameters:
  - Category – Put the diode category (Bridge, LED, Rectifier, Schottky, TVS, Zener...).
  - Value (Visible) – Put the forward current in Ampères (A).
  - Voltage (Visible) – Put the reverse voltage in Volts (V).

- \*MODEL\_DIODE



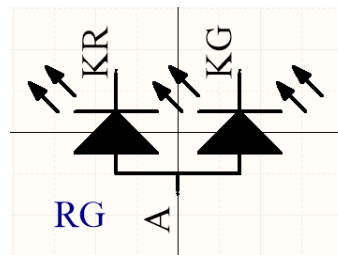
- Parameters:
  - Category – Put the diode category (Bridge, LED, Rectifier, Schottky, TVS, Zener...).
  - Value (Visible) – Put the forward current in Ampères (A).
  - Voltage (Visible) – Put the reverse voltage in Volts (V).

- \*MODEL\_LED



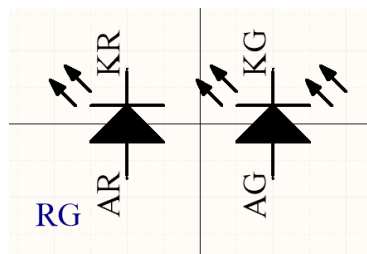
- Parameters:
  - Category – Put the diode category (Bridge, LED, Rectifier, Schottky, TVS, Zener...).
  - Value (Visible) – Put the color.
  - Voltage – Put the forward voltage in Volts (V).

- \*MODEL\_LED\_BI\_COLOR



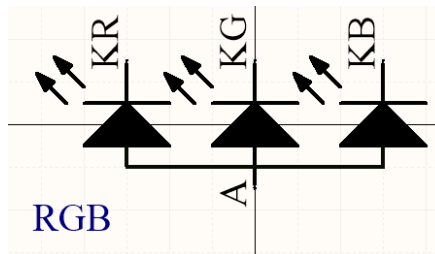
- Parameters:
  - Category – Put the diode category (Bridge, LED, Rectifier, Schottky, TVS, Zener...).
  - Value (Visible) – Put the color.
  - Voltage – Put the forward voltage in Volts (V).

- \*MODEL\_LED\_BI\_COLOR\_2



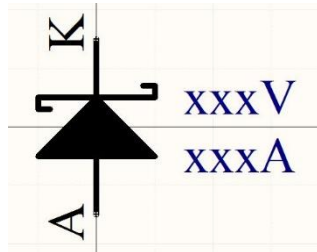
- Parameters:
  - Category – Put the diode category (Bridge, LED, Rectifier, Schottky, TVS, Zener...).
  - Value (Visible) – Put the color.
  - Voltage – Put the forward voltage in Volts (V).

- \*MODEL\_LED\_TRI\_COLOR



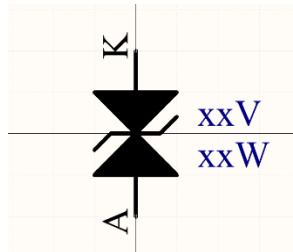
- Parameters:
  - Category – Put the diode category (Bridge, LED, Rectifier, Schottky, TVS, Zener...).
  - Value (Visible) – Put the color.
  - Voltage – Put the forward voltage in Volts (V).

- \*MODEL\_SCHOTTKY



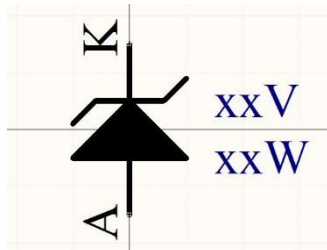
- Parameters:
  - Category – Put the diode category (Bridge, LED, Rectifier, Schottky, TVS, Zener...).
  - Value (Visible) – Put the forward current in Ampères (A).
  - Voltage (Visible) – Put the reverse voltage in Volts (V).

- \*MODEL\_TVS



- Parameters:
  - Category – Put the diode category (Bridge, LED, Rectifier, Schottky, TVS, Zener...).
  - Value (Visible) – Put the nominal voltage in Volts (V).
  - Power (Visible) – Put the nominal power in Watts (W).

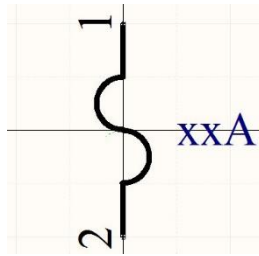
- \*MODEL\_ZENER



- Parameters:
  - Category – Put the diode category (Bridge, LED, Rectifier, Schottky, TVS, Zener...).
  - Value (Visible) – Put the nominal voltage in Volts (V).
  - Power (Visible) – Put the nominal power in Watts (W).

### 2.1.2.7 Fuse

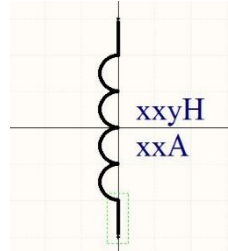
- \*MODEL\_FUSE



- Parameters:
  - Value (Visible) – Put the nominal current in Ampères (A).

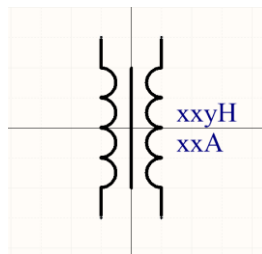
### 2.1.2.8 Inductor

- \*MODEL\_IND



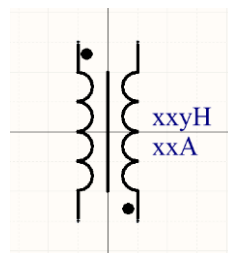
- Parameters:
  - Current (Visible) – Put the nominal current in Ampères (A).
  - Value (Visible) – Put the inductor inductance in Henrys(H).

- \*MODEL\_IND\_COM



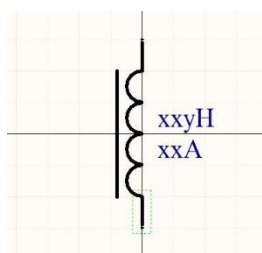
- Parameters:
  - Current (Visible) – Put the nominal current in Ampères (A).
  - Value (Visible) – Put the inductor inductance in Henrys(H).

- \*MODEL\_IND\_COM\_REV



- Parameters:
  - Current (Visible) – Put the nominal current in Ampères (A).
  - Value (Visible) – Put the inductor inductance in Henrys(H).

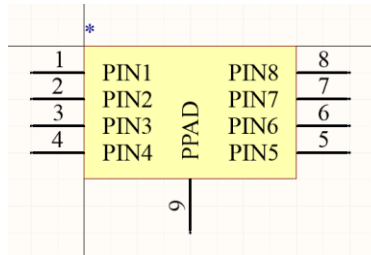
- \*MODEL\_IND\_CORE



- Parameters:
  - Current (Visible) – Put the nominal current in Ampères (A).
  - Value (Visible) – Put the inductor inductance in Henrys(H).

### 2.1.2.9 Integrated Circuit

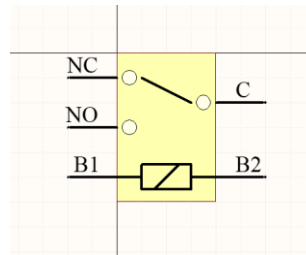
- \*MODEL\_CI



- Parameters:
  - Category – Put the category of the CI (Amplifier, Driver, Reference, Regulator, Memory, Microcontroller, FPGA, DC DC converter, Logical...)
  - Value (Visible) – Put the component part number.

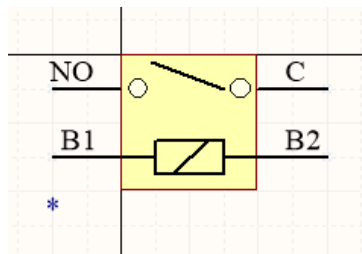
### 2.1.2.10 Relay

- \*MODEL\_SPDT



- Parameters:
  - Action – Put the kind of action (Latched or Momentary)
  - Circuit – Put the kind of circuit (SPST, SPDT, DPST, DPDT...)
  - Value (Visible) – Put the component part number.

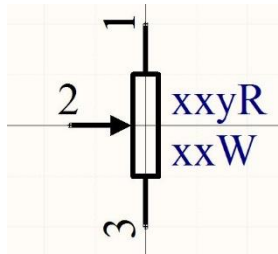
- \*MODEL\_SPST



- Parameters:
  - Action – Put the kind of action (Latched or Momentary)
  - Circuit – Put the kind of circuit (SPST, SPDT, DPST, DPDT...)
  - Value (Visible) – Put the component part number.

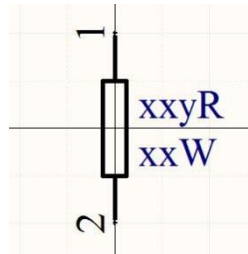
### 2.1.2.11 Resistor

- \*MODEL\_POT



- Parameters:
  - Power (Visible) – Put the power in Watts (W).
  - Tolerance – Put the tolerance in %.
  - Value (Visible) – Put the component resistance.

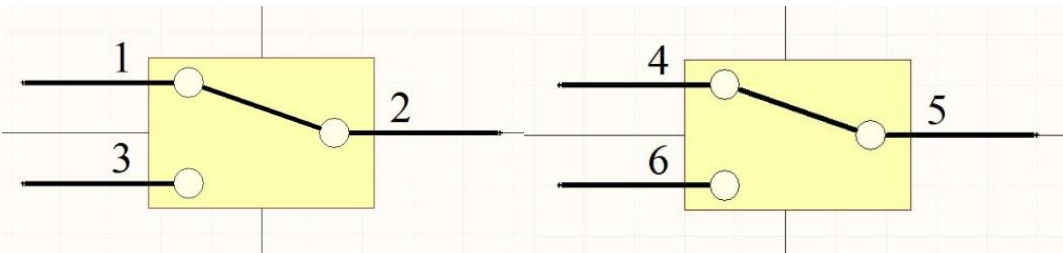
- \*MODEL\_RES



- Parameters:
  - Power (Visible) – Put the power in Watts (W).
  - Tolerance – Put the tolerance in %.
  - Value (Visible) – Put the component resistance.

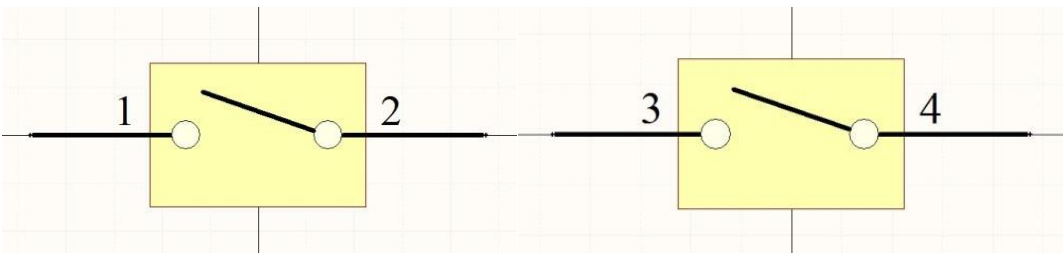
### 2.1.2.12 Switch

- \*MODEL\_DPDT



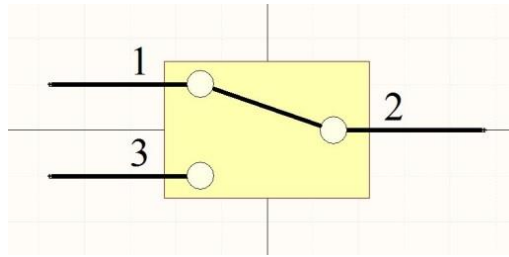
- Parameters:
  - Action – Put the kind of action (Latched or Momentary)
  - Circuit – Put the kind of circuit (SPST, SPDT, DPST, DPDT...)
  - Value (Visible) – Put the component part number.

- \*MODEL\_DPST



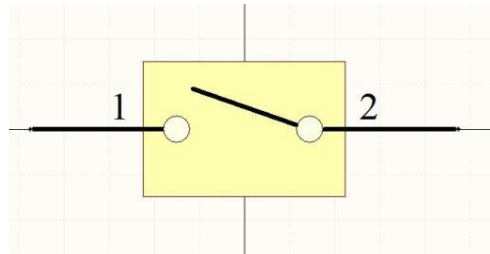
- Parameters:
  - Action – Put the kind of action (Latched or Momentary)
  - Circuit – Put the kind of circuit (SPST, SPDT, DPST, DPDT...)
  - Value (Visible) – Put the component part number.

- \*MODEL\_SPDT



- Parameters:
  - Action – Put the kind of action (Latched or Momentary)
  - Circuit – Put the kind of circuit (SPST, SPDT, DPST, DPDT...)
  - Value (Visible) – Put the component part number.

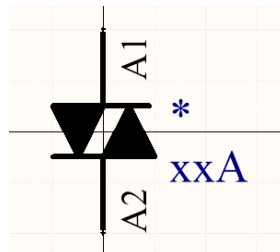
- \*MODEL\_SPST



- Parameters:
  - Action – Put the kind of action (Latched or Momentary)
  - Circuit – Put the kind of circuit (SPST, SPDT, DPST, DPDT...)
  - Value (Visible) – Put the component part number.

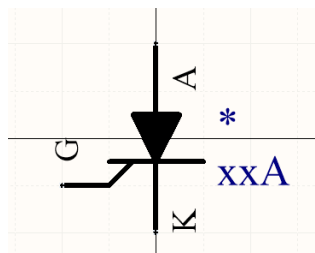
### 2.1.2.13 Thyristor

- \*MODEL\_DIAC



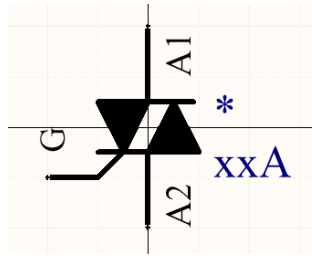
- Parameters:
  - Category – Put the thyristor category (DIAC, SCR, TRIAC...).
  - Current (Visible) – Put the nominal current in Ampères (A).
  - Value (Visible) – Put the component part number.

- \*MODEL\_SCR



- Parameters:
  - Category – Put the thyristor category (DIAC, SCR, TRIAC...).
  - Current (Visible) – Put the nominal current in Ampères (A).
  - Value (Visible) – Put the component part number.

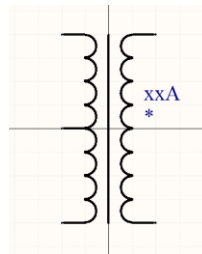
- \*MODEL\_TRIAC



- Parameters:
  - Category – Put the thyristor category (DIAC, SCR, TRIAC...).
  - Current (Visible) – Put the nominal current in Ampères (A).
  - Value (Visible) – Put the component part number.

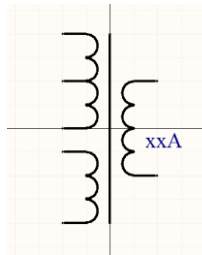
#### 2.1.2.14 Transformer

- \*MODEL\_TRANS\_1+1P\_1S



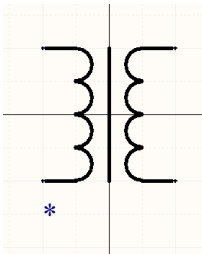
- Parameters:
  - Current (Visible) – Put the nominal current in Ampères (A).
  - Value (Visible) – Put the component part number.

- \*MODEL\_TRANS\_1Px2\_2S



- Parameters:
  - Current (Visible) – Put the nominal current in Ampères (A).
  - Value (Visible) – Put the component part number.

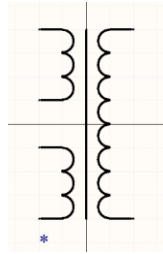
- \*MODEL\_TRANS\_1P\_1S



- Parameters:
  - Current (Visible) – Put the nominal current in Ampères (A).
  - Value (Visible) – Put the component part number.

- \*MODEL\_TRANS\_2P\_1S

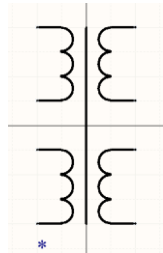




○ Parameters:

- Current (Visible) – Put the nominal current in Ampères (A).
- Value (Visible) – Put the component part number.

• \*MODEL\_TRANS\_2P\_2S

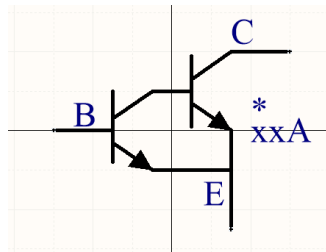


○ Parameters:

- Current (Visible) – Put the nominal current in Ampères (A).
- Value (Visible) – Put the component part number.

### 2.1.2.15 Transistor

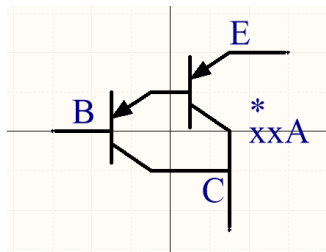
• \*MODEL\_DARL\_NPN



○ Parameters:

- Category – Put the transistor category (BJT NPN, BJT PNP, NMOSFET, PMOSFET...).
- Current (Visible) – Put the nominal current in Ampères (A).
- Value (Visible) – Put the component part number.

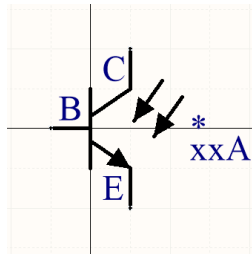
• \*MODEL\_DARL\_PNP



○ Parameters:

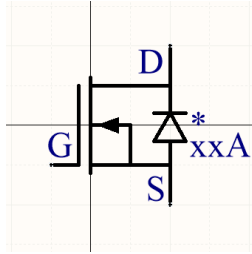
- Category – Put the transistor category (BJT NPN, BJT PNP, NMOSFET, PMOSFET...).
- Current (Visible) – Put the nominal current in Ampères (A).
- Value (Visible) – Put the component part number.

• \*MODEL\_FOTO\_NPN



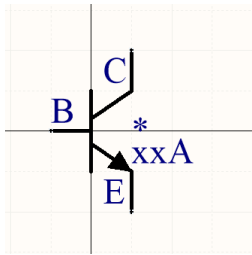
- Parameters:
  - Category – Put the transistor category (BJT NPN, BJT PNP, NMOSFET, PMOSFET...).
  - Current (Visible) – Put the nominal current in Ampères (A).
  - Value (Visible) – Put the component part number.

- \*MODEL\_ NMOS



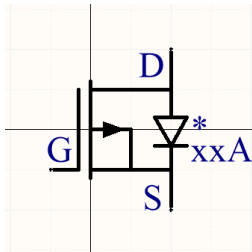
- Parameters:
  - Category – Put the transistor category (BJT NPN, BJT PNP, NMOSFET, PMOSFET...).
  - Current (Visible) – Put the nominal current in Ampères (A).
  - Value (Visible) – Put the component part number.

- \*MODEL\_ NPN



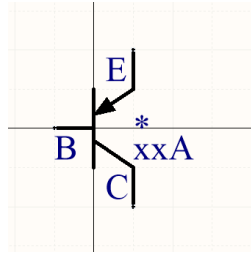
- Parameters:
  - Category – Put the transistor category (BJT NPN, BJT PNP, NMOSFET, PMOSFET...).
  - Current (Visible) – Put the nominal current in Ampères (A).
  - Value (Visible) – Put the component part number.

- \*MODEL\_ PMOS



- Parameters:
  - Category – Put the transistor category (BJT NPN, BJT PNP, NMOSFET, PMOSFET...).
  - Current (Visible) – Put the nominal current in Ampères (A).
  - Value (Visible) – Put the component part number.

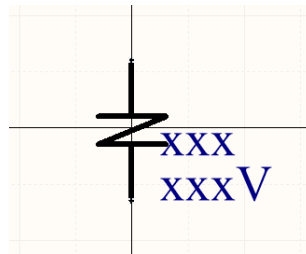
- \*MODEL\_ PNP



- Parameters:
  - Category – Put the transistor category (BJT NPN, BJT PNP, NMOSFET, PMOSFET...).
  - Current (Visible) – Put the nominal current in Amperes (A).
  - Value (Visible) – Put the component part number.

### 2.1.2.16 Varistor

- \*MODEL\_ VARISTOR



- Parameters:
  - Voltage (Visible) – Put the nominal voltage in Volts (V).
  - Value (Visible) – Put the component part number.

## 2.2 PCB Library (.SchLib)

To the creation of the footprints the following table must be considered:

Layer	Role
Mechanical 1	Border outline
Mechanical 2	Dimensions
Mechanical 3	Route tool
Mechanical 4	3D Body
Mechanical 15	Occupied area

Whenever possible is preferred to use these configurations in the silkscreen:

- Line trace: 0.2mm
- Font size: 0,8mm height, 0,2mm width

## 2.3 Observations during adding/editing components

### 2.3.1 .SchLib Files

- Use grid = 5;
- Centralize the component in relation of the origin;
- Check what fields in the “Library Component Properties” must be selected as “visible”;
- Check if pins in .SchLib file are compatible with pins in .PcbLib file;

### 2.3.2 .PcbLib Files

- Put the origin in component center (Edit->Set Reference->Center);
- Put a colorful 3D body. A good place to find 3D models is <http://www.3dcontentcentral.com>.