make-symbol-device-package-bsdl.ulp

make-symbol-device-package-bsdl.ulp can be used for creating a complete device, or only a package or a symbol. The ULP can be started in the library editor only.
It is possible to use BSDL files or text files, like PDF and HTML, or any other document where you can use CTRL+C and CTRL+V for marking and copying text (rows, columns) into the ULP's text field.

Example 1: BSDL File

Goto <http://www.ti.com/> and search for "TMS320VC5509A". The following page opens:
<http://focus-webapps.ti.com/general/docs/sitesearch/searchsite.tsp?selectedTopic=1653260327&searchTerm=TMS320VC5509A>

Follow the link
<TMS320VC5509A DSP Starter Kit (DSK) - TMDSDSK5509 - TI Tool Folder >

which brings you to this page
<http://focus.ti.com/docs/toolsw/folders/print/tmdsdsk5509.html>.

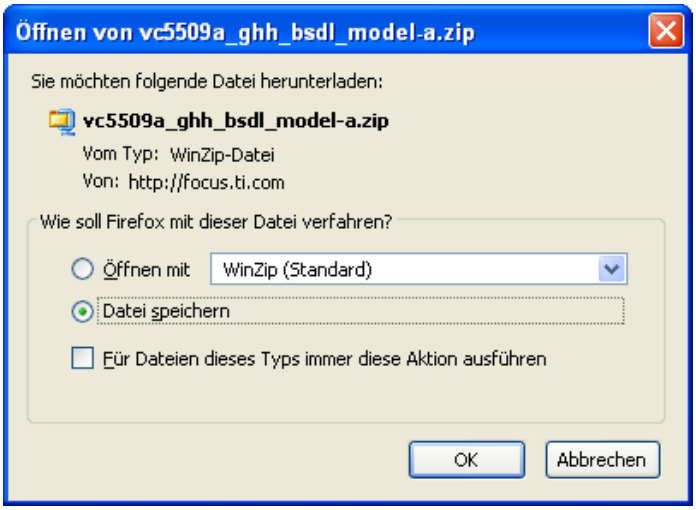
In the **Datasheet** section click onto
TMS320VC5509A Fixed-Point Digital Signal Processor (Rev. K) (PDF 2030 KB)

Your PDF reader opens now and displays the file:
<http://focus.ti.com/lit/ds/symlink/tms320vc5509a.pdf>

Scroll down to **Related Products** and choose TMS320VC5509A

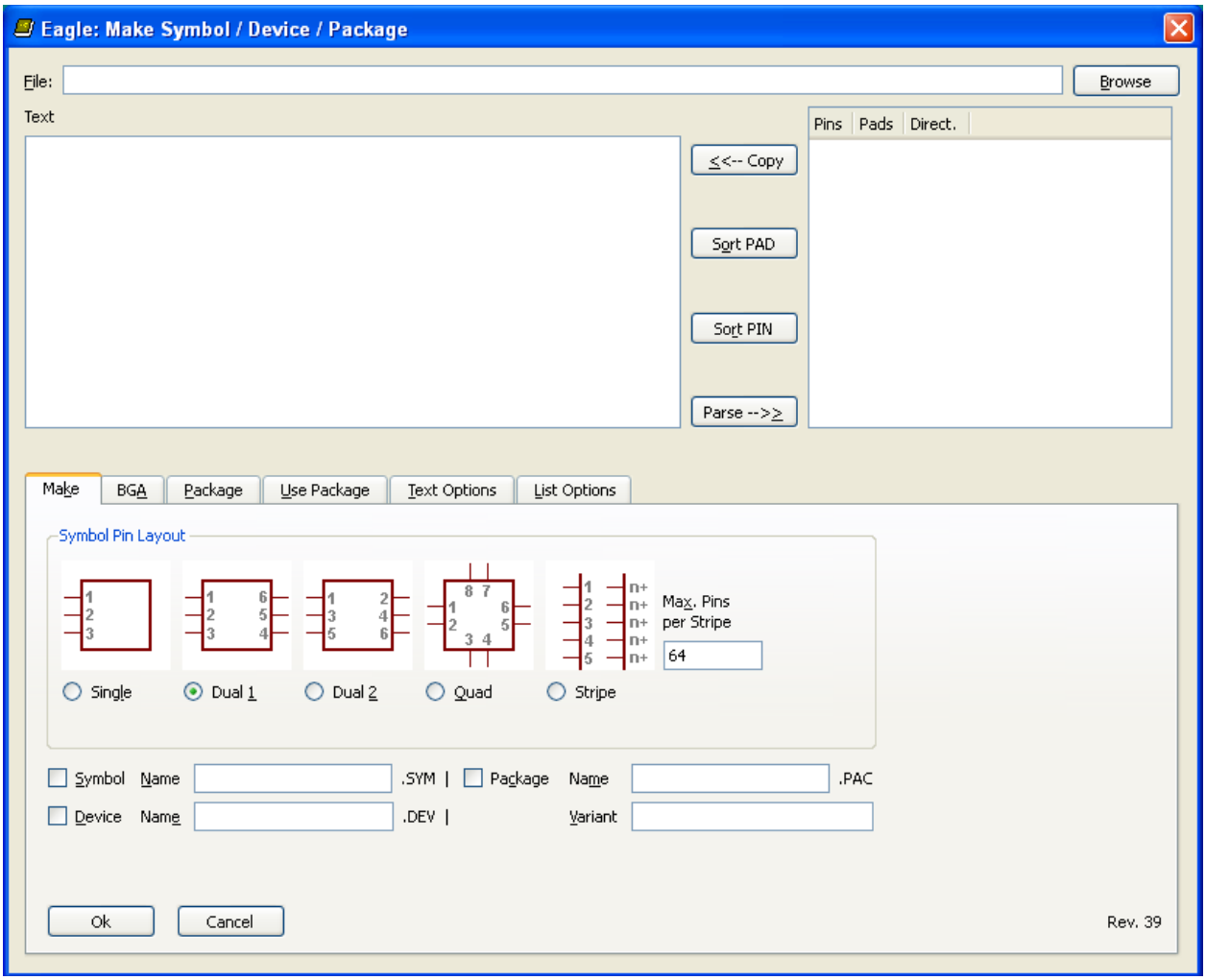
Now you are at <http://focus.ti.com/docs/prod/folders/print/tms320vc5509a.html>.
Scroll down again to **Simulation Models**, and select the BSDL Model
VC5509A GHH BSDL Model (Rev. A) (ZIP 6 KB).

Now Download starts.
Save the zip file and extract
sprm155a.bsm from the archive.

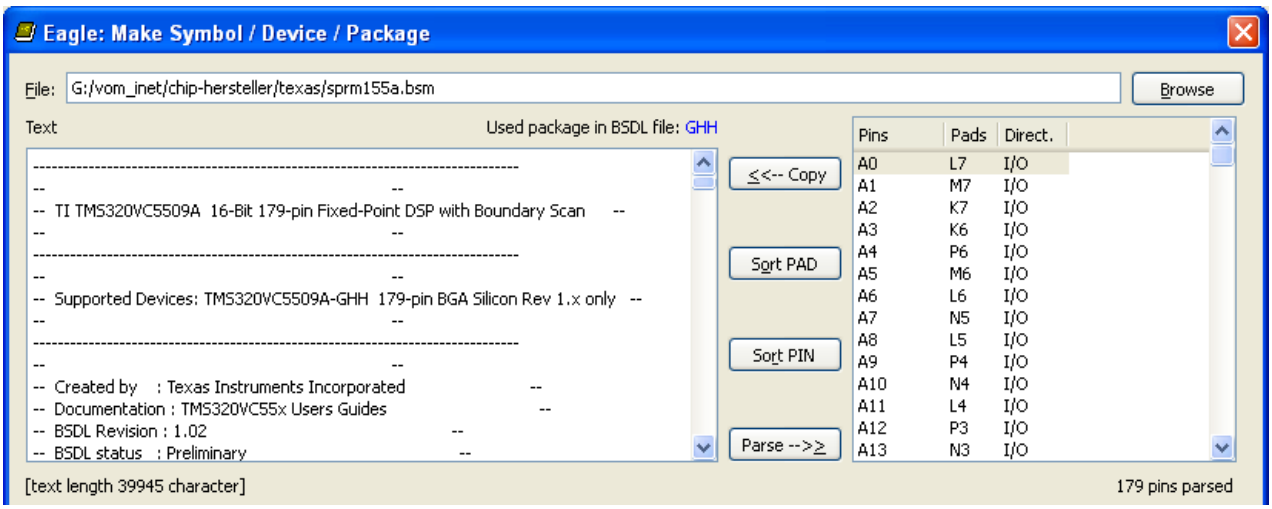


Start the ULP: RUN make-symbol-device-package-bsdl

The **Make** tab appears first, the text field is empty.

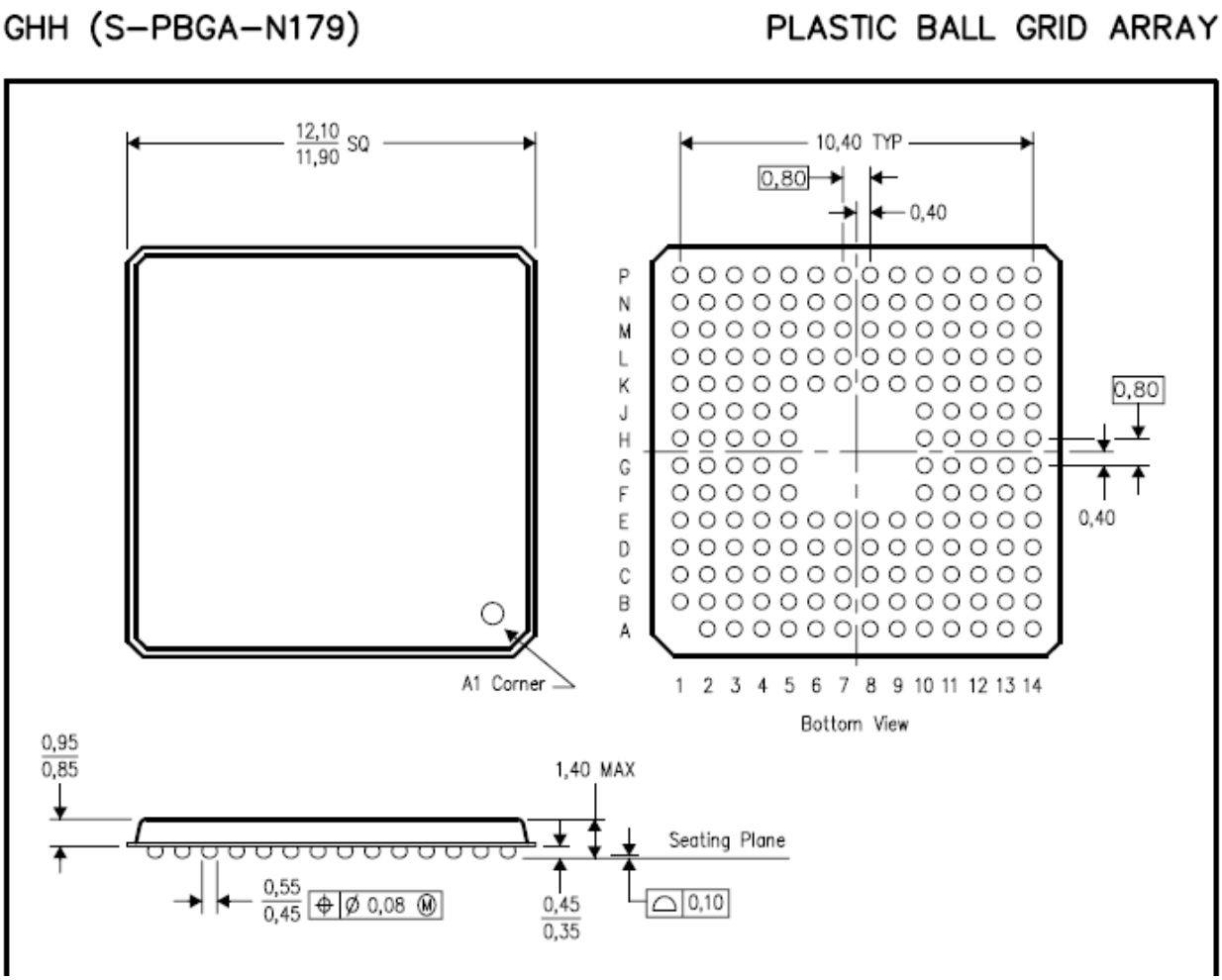


Specify the name of the BSDL file (or any other file name) in the line File: or alternatively use the [`Browse`] button for selecting the file.
The content of the file will be analyzed. If BSDL format is detected it wil be parsed automatically.

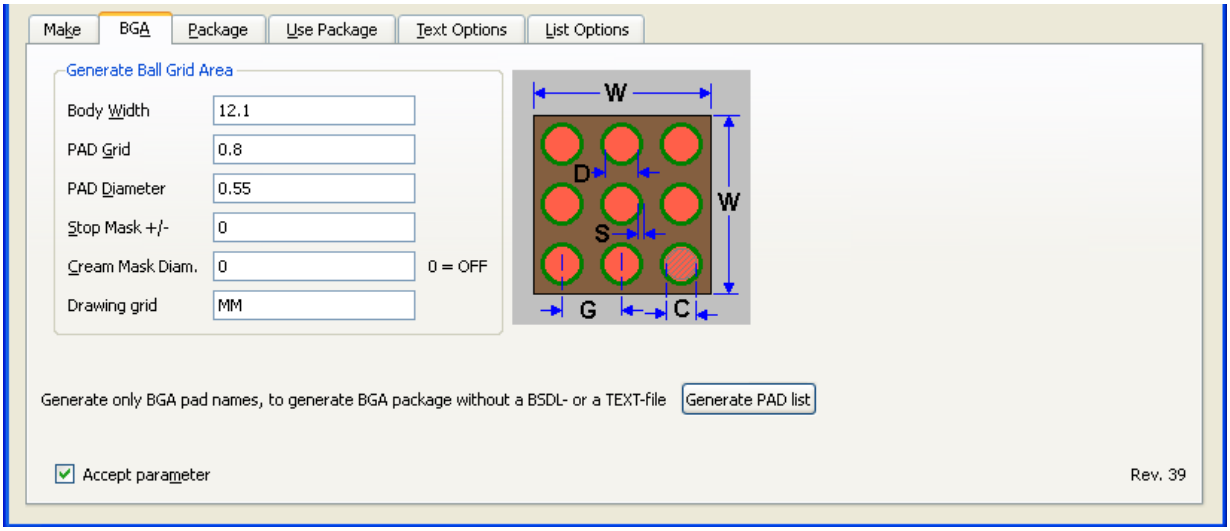


The text length and the number of pins parsed is shown. Pad and pin names and the pin direction will be recognized and automatically listed.

Next we need package information. Therefore switch to your browser where the PDF file is shown. Scroll down to the package description.



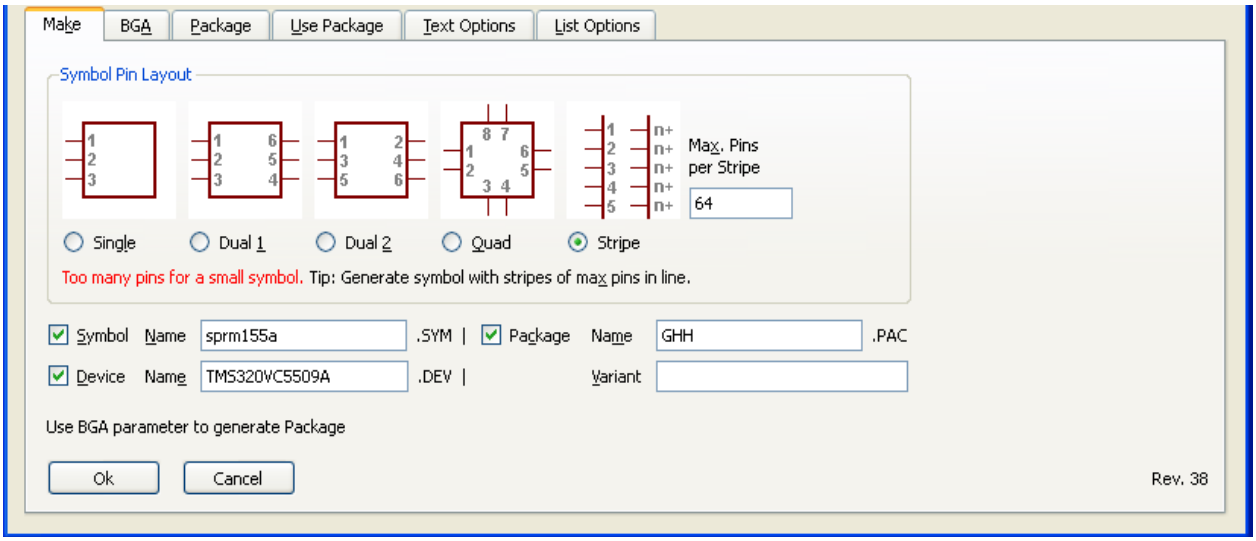
Click onto the ULP's BGA tab and fill in the values.



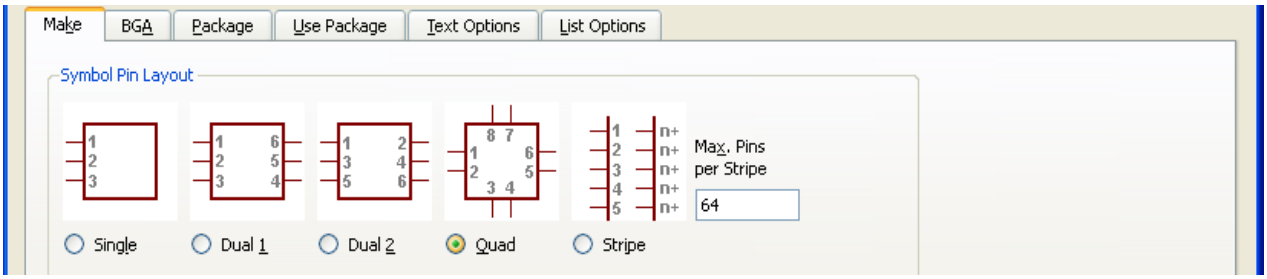
Some manufacturers specify smaller values for the solder stop mask than the SMD size is. This is done in order to compensate production tolerances and have the mask always inside the SMD'S copper area. In this case the value for `Stop Mask +/-` has to be negative, e.g. -0.05.
If the solder stop mask is bigger than the pad/smd it can happen that there is no solder stop laquer between the contacts of finepitch components (e.g. FBGA). This can easily result in short curcuits between the pads.
If the manufacturer does not need/specify a value for the solder paste mask, set 0 for the value of `Cream-Mask Diam.` No solder paste mask will be created. In all other cases you have to specify the diameter of the cream frame.

Finally you have to tick the checkbox [√] `Accept parameter` because the ULP can't verify the values specified in the **Make** tab.

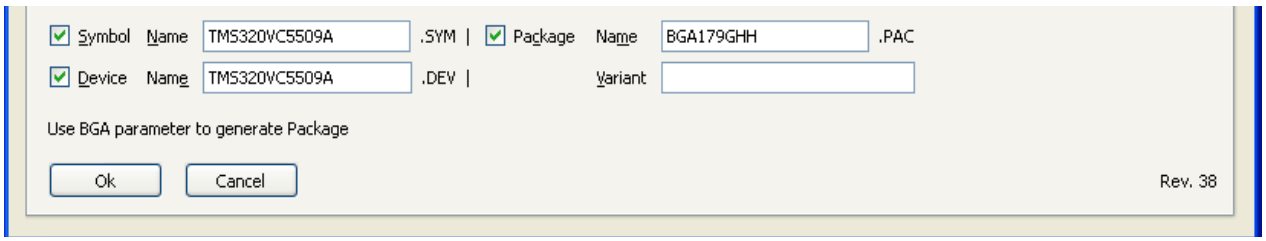
Now go back to the **Make** tab and choose the symbol's layout.



Choose Quad for this example, pins will be at all four sides.

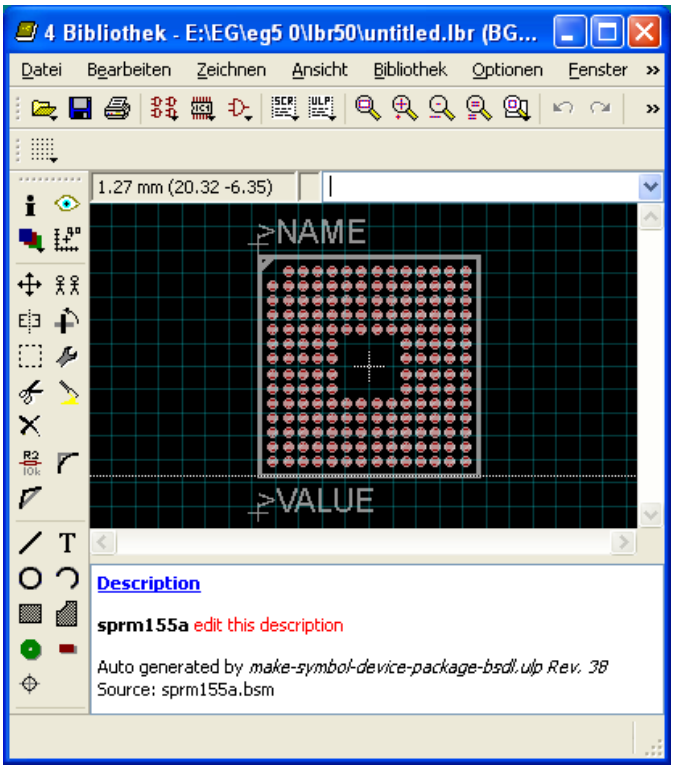


Enter name of Device, Symbol and Package, and confirm with a tick [√] that you want to create it.

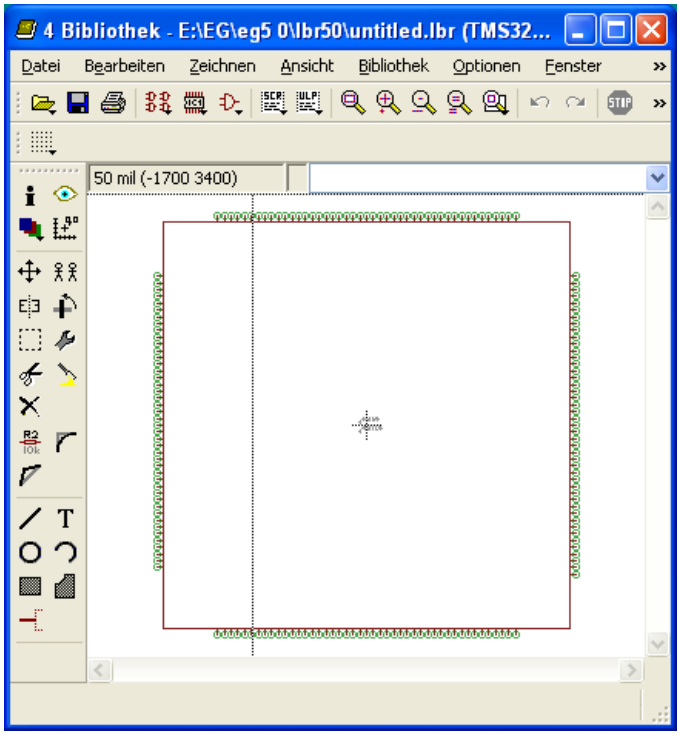


Click onto [OK] in order to generate and execute the script.

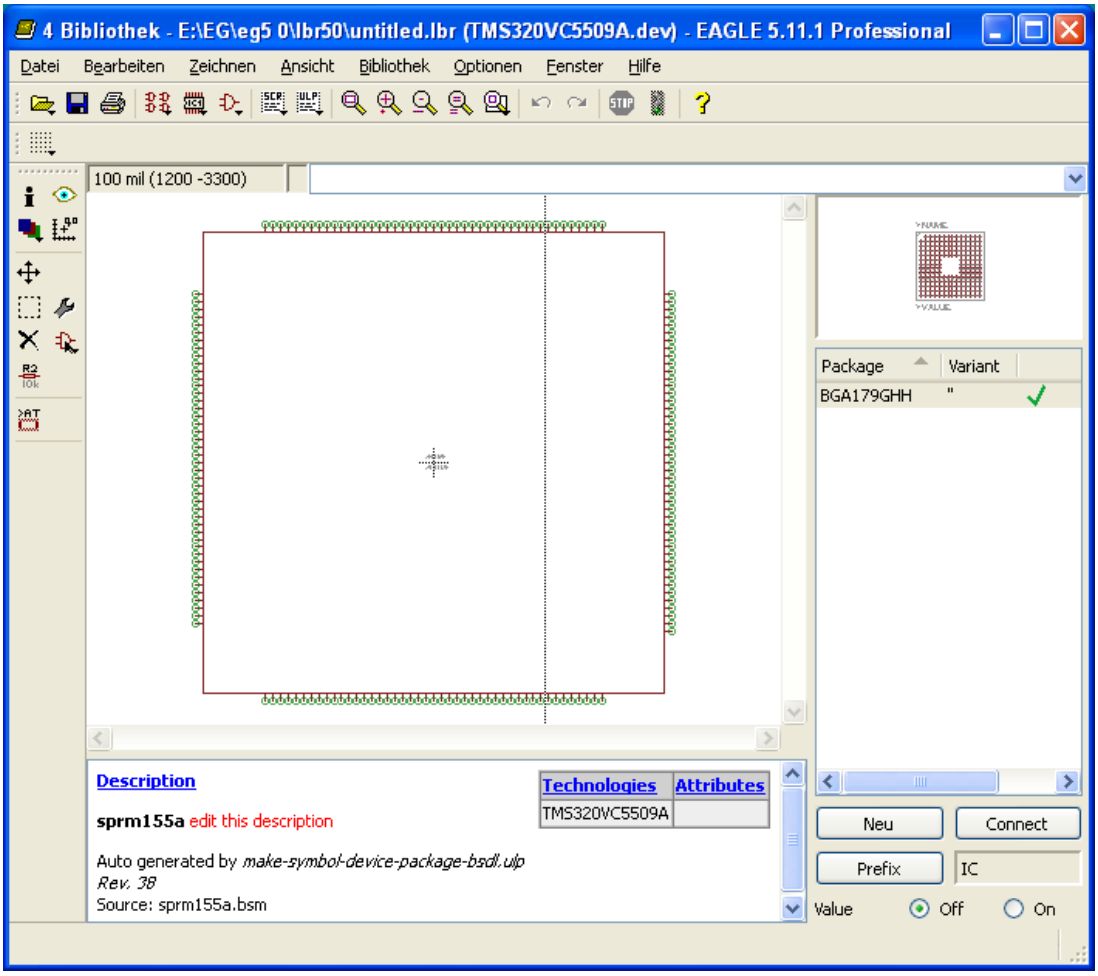
The package created:



The symbol created:



The device created:



End of example 1.

Example 2 with BSDL file

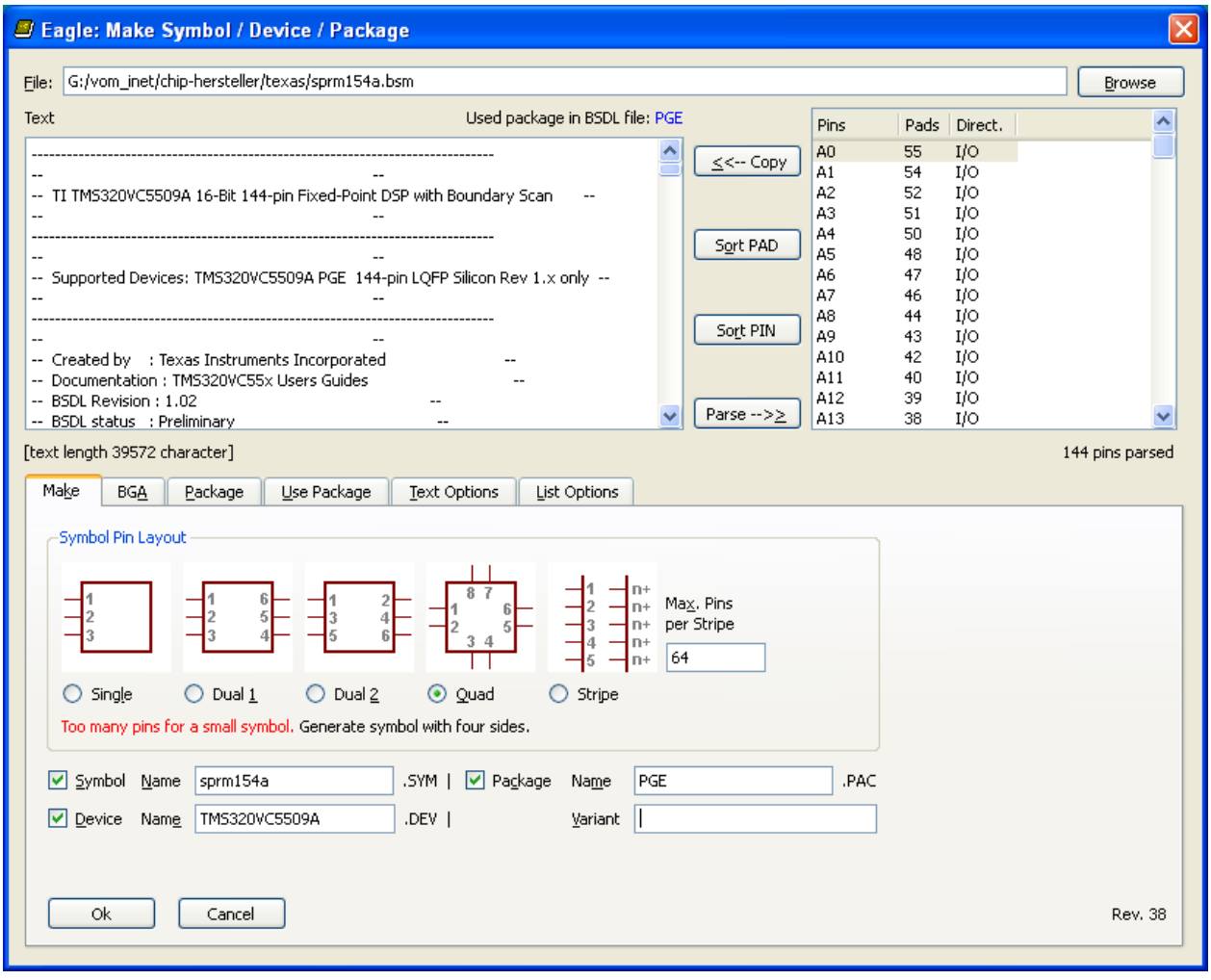
Package variant PGE:
Download the according BSDL file:
<http://focus.ti.com/docs/prod/folders/print/tms320vc5509a.html>

Scroll to

Simulation Models
BSDL Model

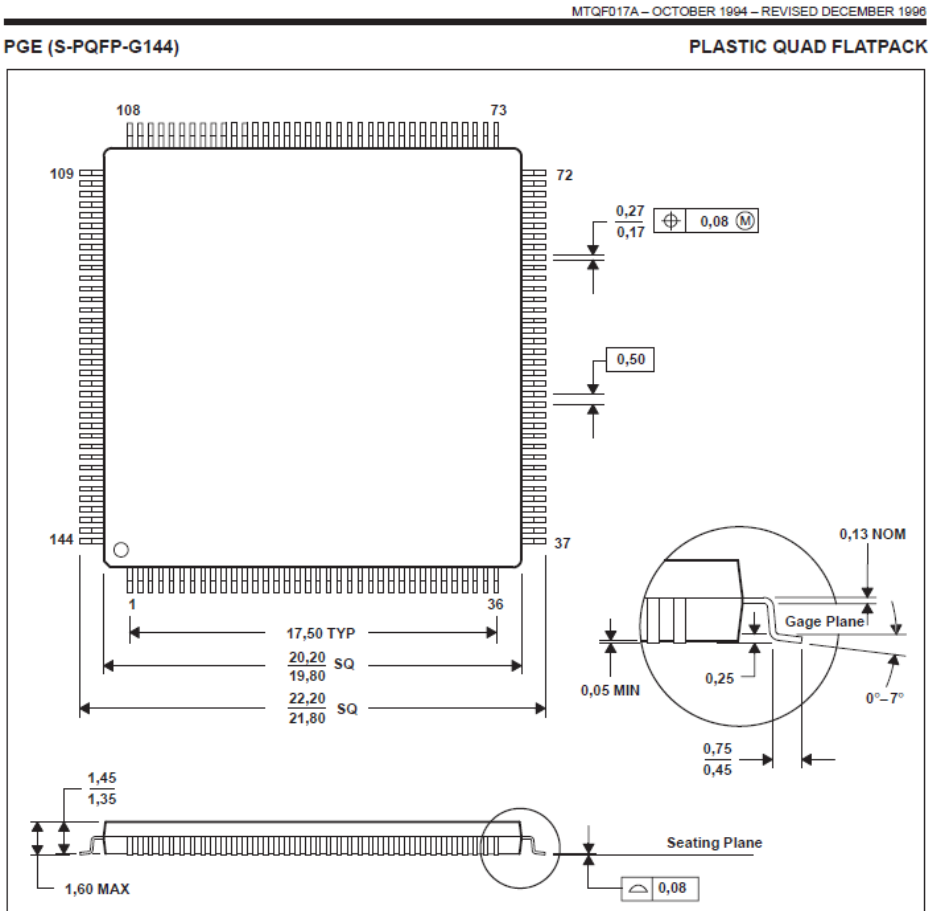
Downoad the ZIP file and extract it
VC5509A PGE BSDL Model (Rev. A) (ZIP 6 KB)

RUN make-symbol-device-package-bsdl and select the file sprm154a.bsm.

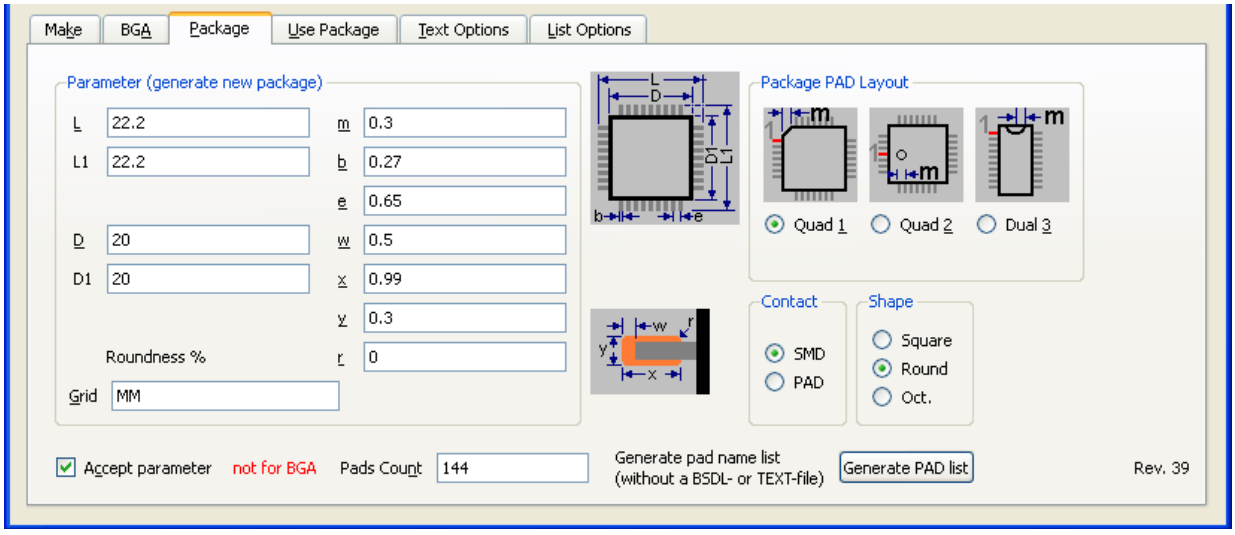


Here we have 144 pins in a QFP package.

Switch to the Package tab and fill in the values specified in the PDF file.

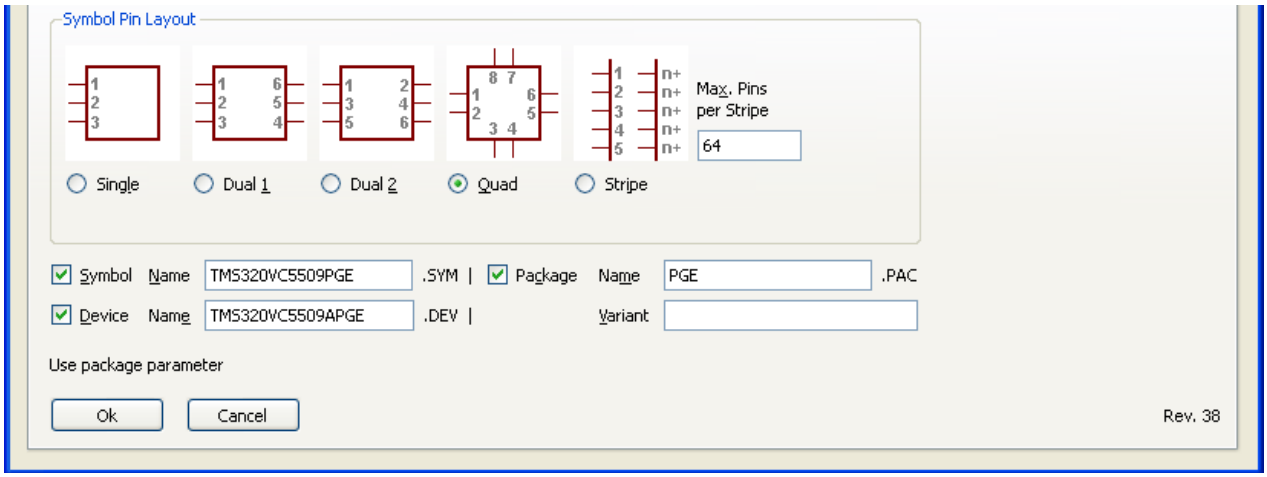


These are the values to be set:



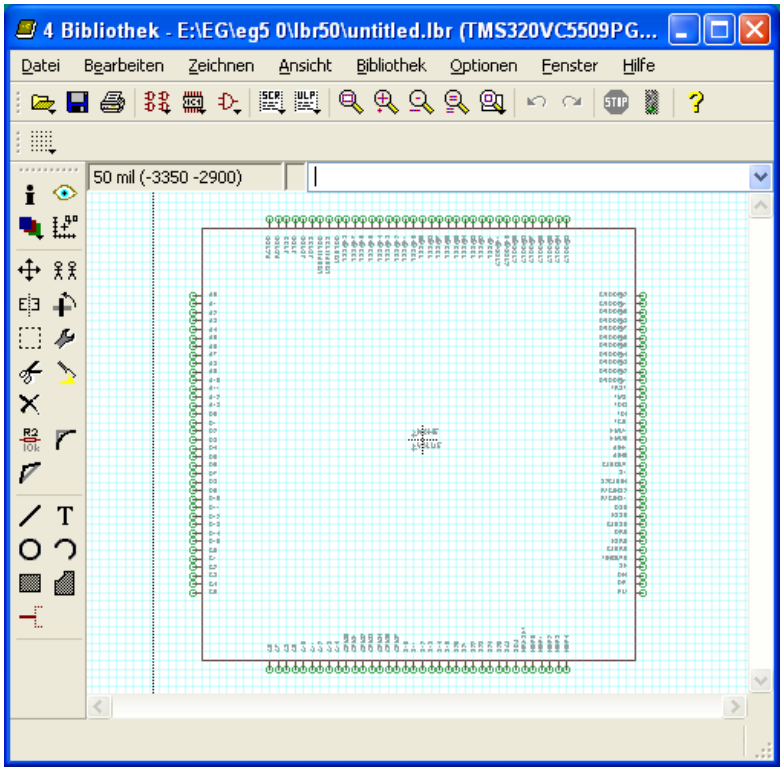
Don't forget to confirm the checkbox [√] `Accept parameter` because the ULP can't verify these values in the **Make** tab.

Go to the **Make** tab now.

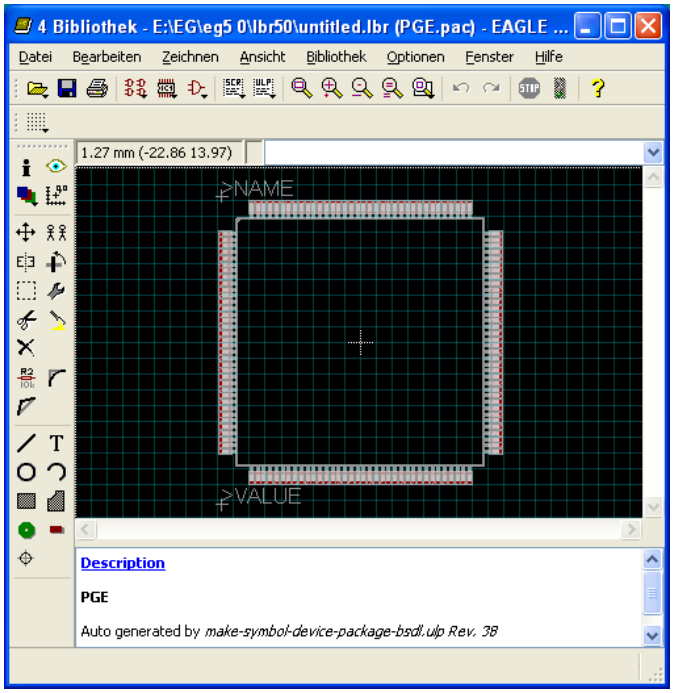


Choose the layout for the symbol and the names for package, symbol and device. The names in the library have to be well-defined so that the symbols can be clearly assigned.
Click the [OK] button for generating and executing the script.

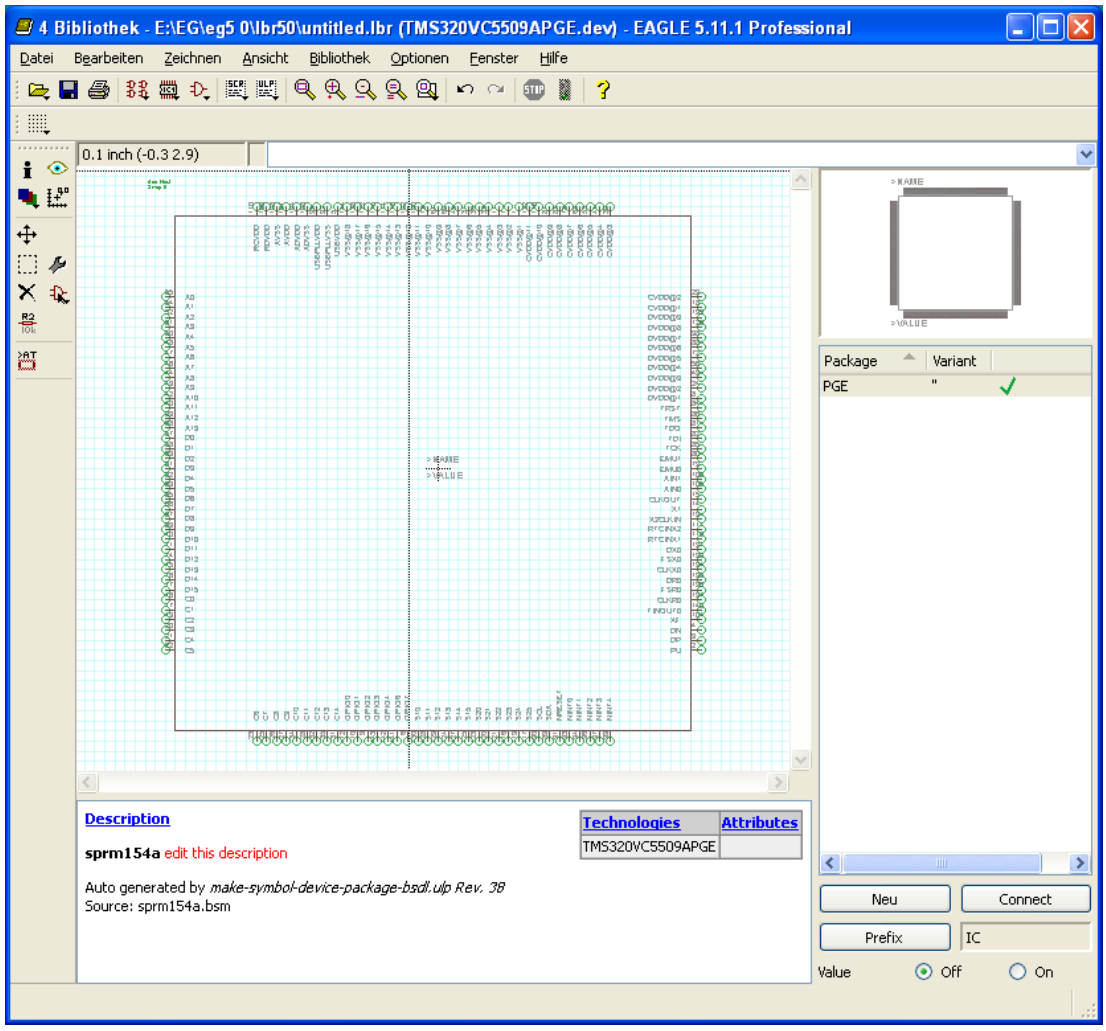
The symbol created:



The package:



The device:



End of example 2.

Example 3 with a table from a PDF file

An example that shows how to use the special text adaption from a PDF file table.
As example file serves the data sheet <http://focus.ti.com/lit/ds/symlink/ads7960.pdf>.
From page 12 on the pin name assignment is listed.

TERMINAL FUNCTIONS - TSSOP PACKAGES

DEVICE NAME				PIN NAME	I/O	FUNCTION
ADS7953 ADS7957 ADS7961	ADS7952 ADS7956 ADS7960	ADS7951 ADS7955 ADS7959	ADS7950 ADS7954 ADS7958			
PIN NO.						
REFERENCE						
4	4	4	4	REFP	I	Reference input
3	3	3	3	REFM	I	Reference ground

TERMINAL FUNCTIONS - TSSOP PACKAGES (continued)

DEVICE NAME				PIN NAME	I/O	FUNCTION
ADS7953 ADS7957 ADS7961	ADS7952 ADS7956 ADS7960	ADS7951 ADS7955 ADS7959	ADS7950 ADS7954 ADS7958			
PIN NO.						
ADC ANALOG INPUT						
8	8	8	8	AINP	I	Signal input to ADC
9	9	9	9	AINM	I	ADC input ground
MULTIPLEXER						
7	7	7	7	MXO	O	Multiplexer output
28	28	20	20	Ch0	I	Analog channels for multiplexer
27	27	19	18	Ch1	I	

Marking with pressed ALT+Shift keys allows copying text from tables.

TERMINAL FUNCTIONS - TSSOP PACKAGES

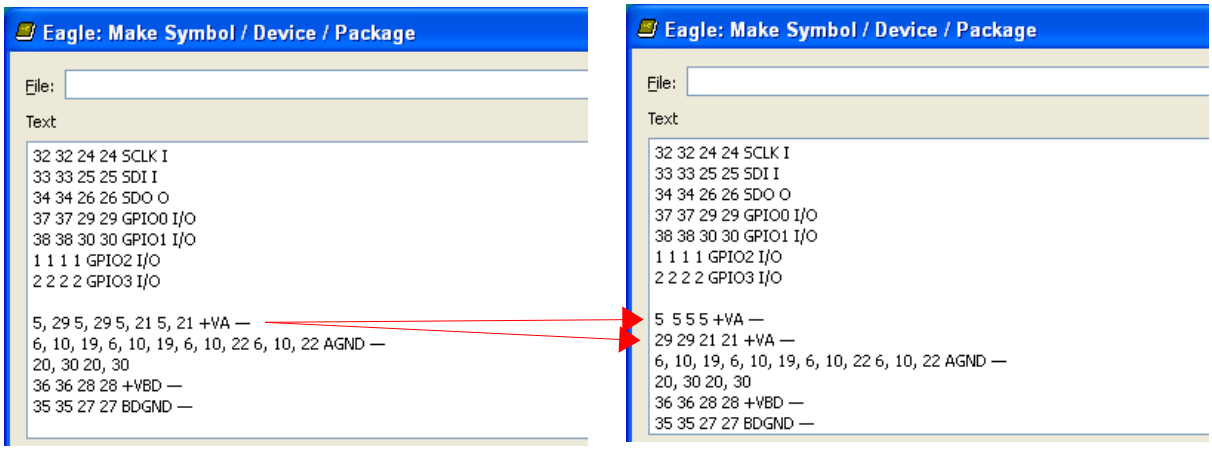
DEVICE NAME				PIN NAME	I/O	FUNCTION
ADS7953 ADS7957 ADS7961	ADS7952 ADS7956 ADS7960	ADS7951 ADS7955 ADS7959	ADS7950 ADS7954 ADS7958			
PIN NO.						
REFERENCE						
4	4	4	4	REFP	I	Reference input
3	3	3	3	REFM	I	Reference ground

Now CTRL+C to copy, go to the ULP window, click into the text field, and use CTRL+V for pasting.

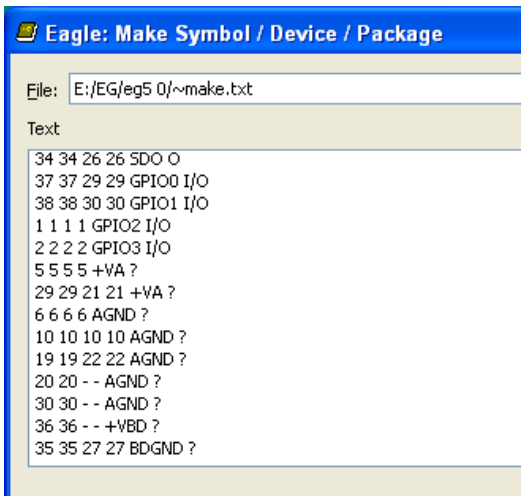
In most cases the power pins are treated in a special way in such tables.
Here an example:

				$\overline{PD}$	I	Active low power down input
POWER SUPPLY AND GROUND						
5, 29	5, 29	5, 21	5, 21	+VA	—	Analog power supply
6, 10, 19, 20, 30	6, 10, 19, 20, 30	6, 10, 22	6, 10, 22	AGND	—	Analog ground
36	36	28	28	+VBD	—	Digital I/O supply
35	35	27	27	BDGND	—	Digital ground
NC PINS						

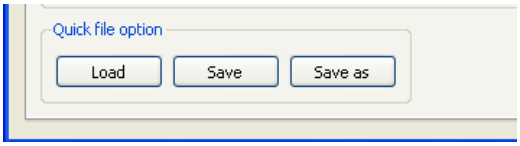
In such a case you have to arrange these pins manually in the ULP's text field. Copy and paste the line and delete every second column beginning with the second position in the first line, and in the second line every second column beginning with the first position.



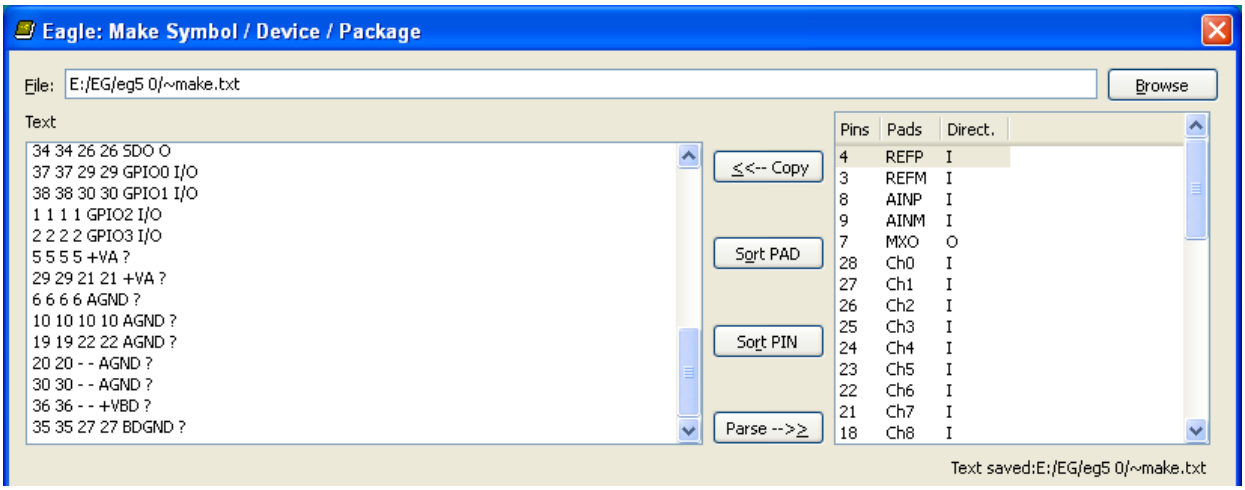
It should look like this finally.....



In case you did not edit all lines immediately or parsing results in an erroneous list you should save the text with the Quick file Option.

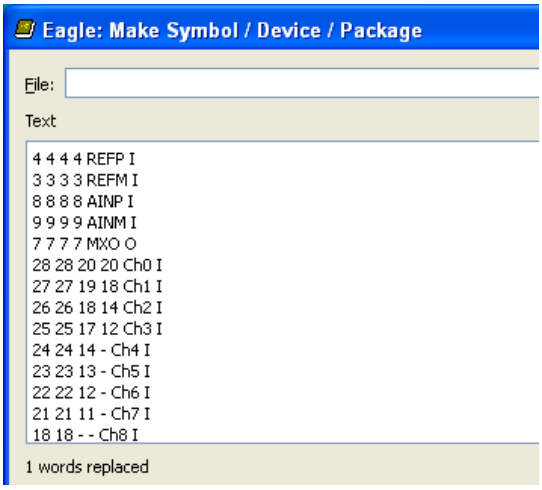


Text editing possibilities:



Eliminate double spaces with the text option
[Replace] character string | | with | |

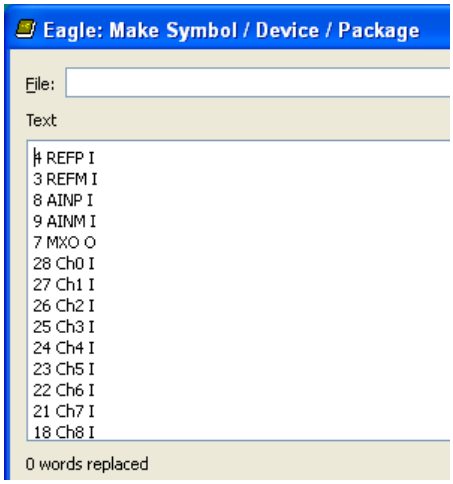
Enter two space characters in the first filed and one space in the second one. Now click the button [Replace]. The status bar below the text filed informs you about the number of replacements.



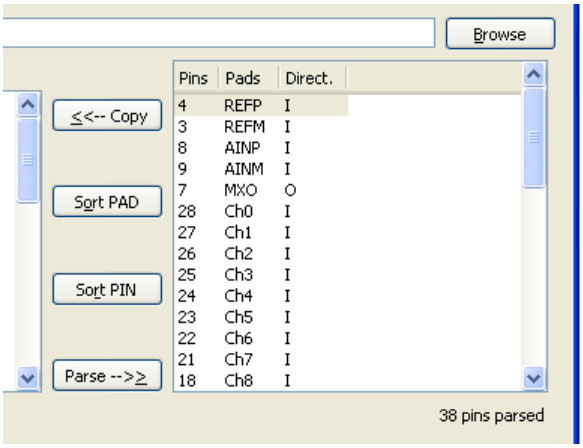
Click onto [Replace] repeatedly until it says 0 words replaced.

The list in the PDF file is created for four different variants, so we have to delete the unnecessary columns now. Set the value for column # to 2 and click three times onto [`Delete column`].

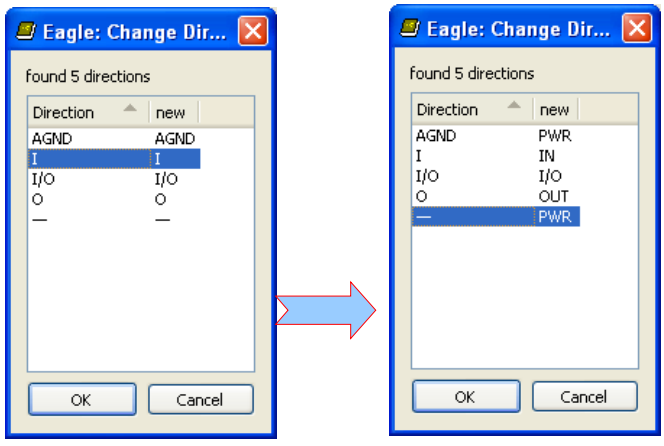
The result looks like this:



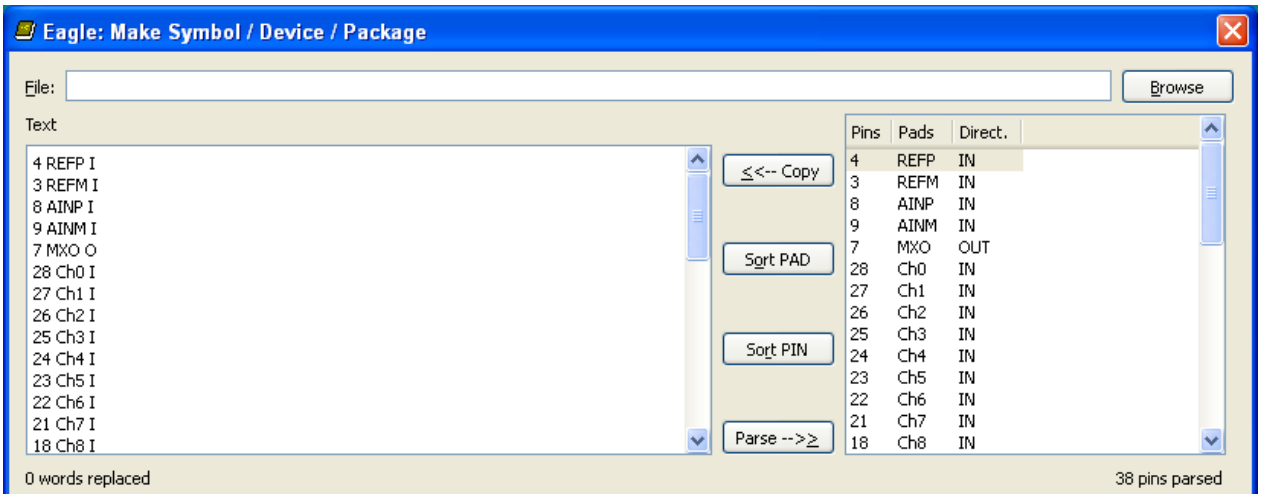
Now we have to parse it. Click onto [`Parse ->>`] in order to generate the list.



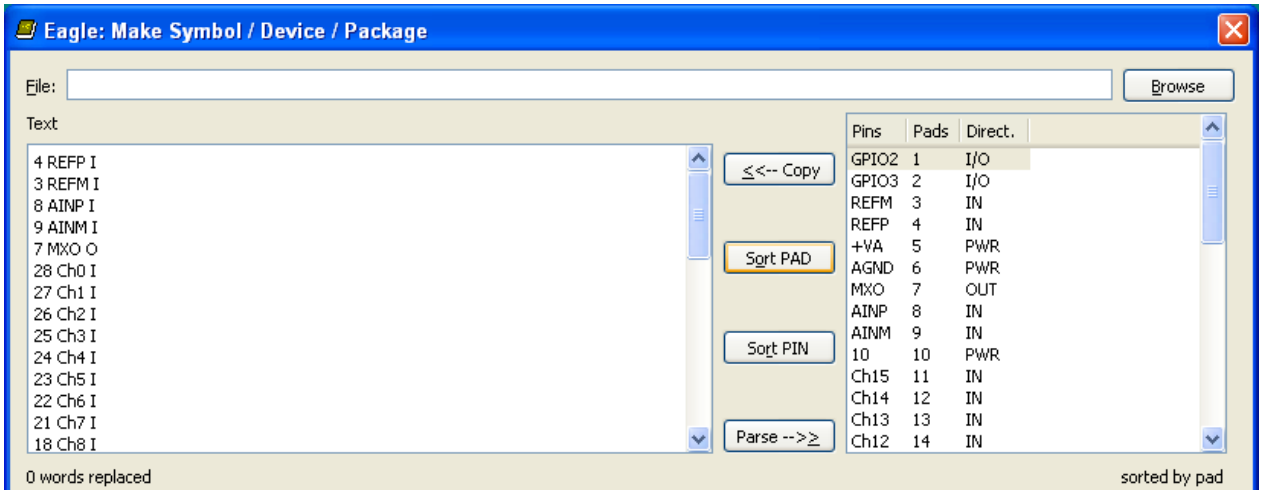
The status bar shows the number of parsed lines. Please check it for correctness and compare it with the list in the PDF file.
Next step: Adjust the Direction parameter. Therefore go to the List Options tab and click onto Direction [`Change`] and type in the possible EAGLE direction parameter names.
Click onto [`OK`], in order to transfer the corrected Direction parameters to the list.



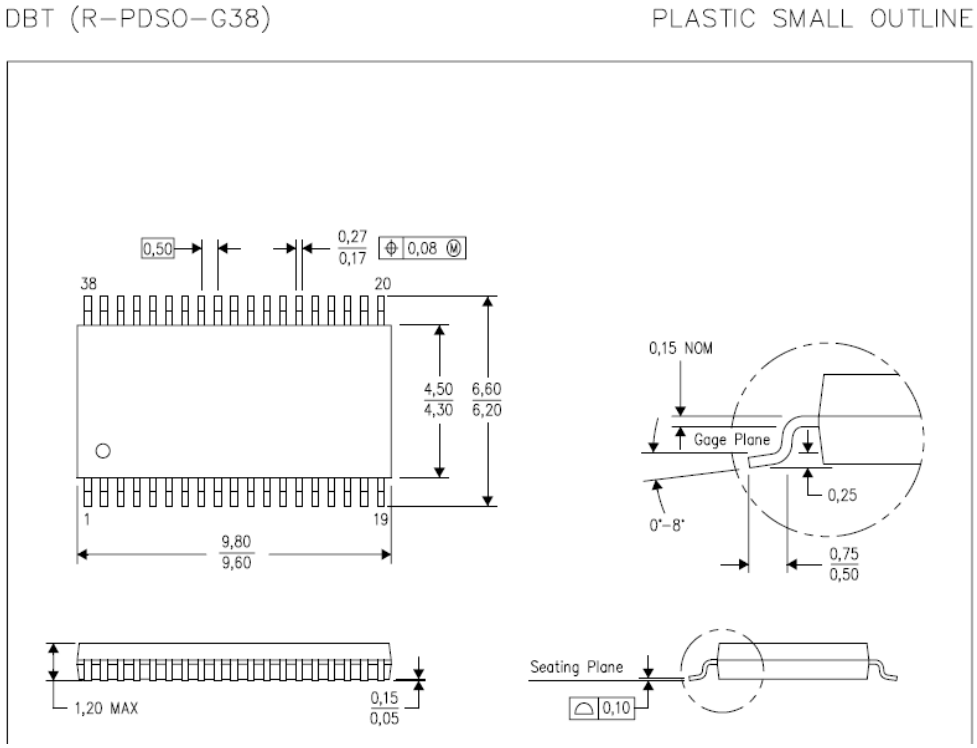
That's the result now:

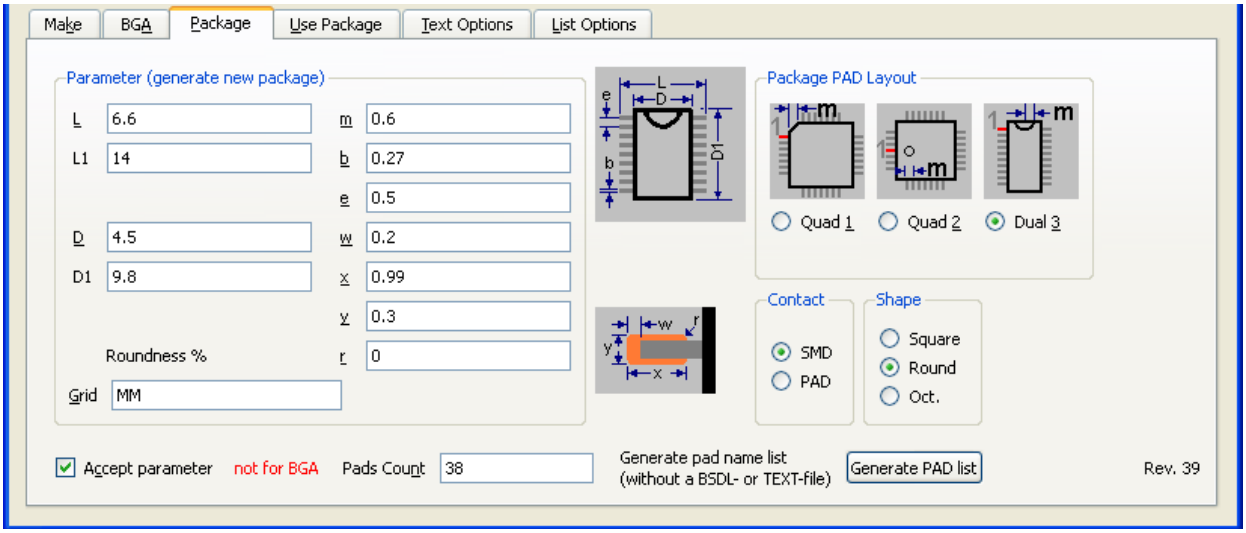


In this example the columns Pins and Pads are swapped. This can be corrected in the List Options tab with Swap [`PIN <-> PAD`], in the same way the order of the pins in the symbol (sorted by pin names or by pad numbers). Let's choose sorted by pad names, so click onto [`Sort PAD`].



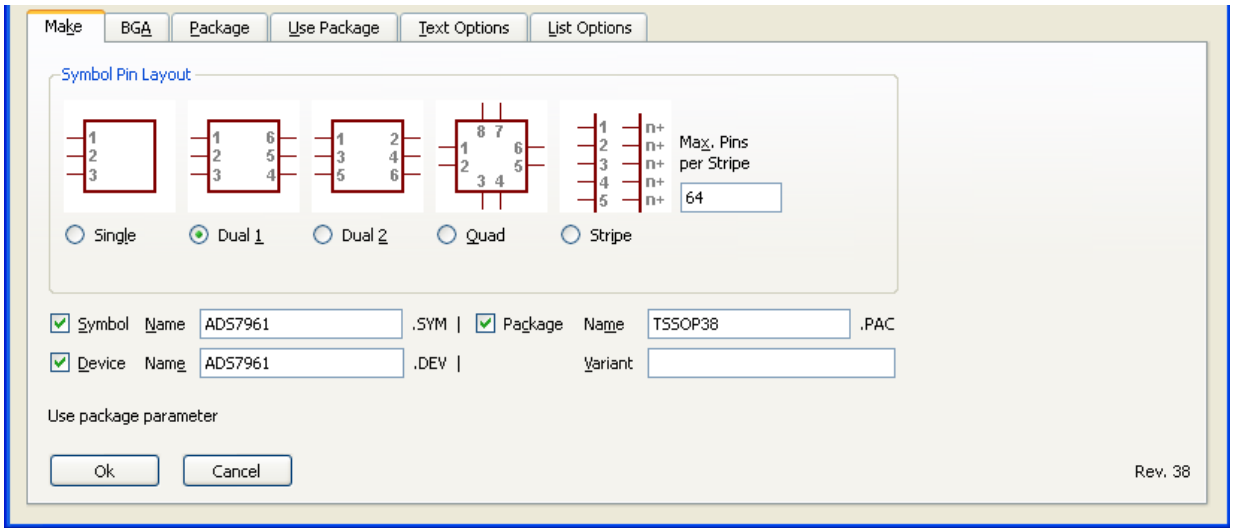
Now go to the tab Package, choose the package layout ◙ `Dual 3` and type in the values given in the PDF file.



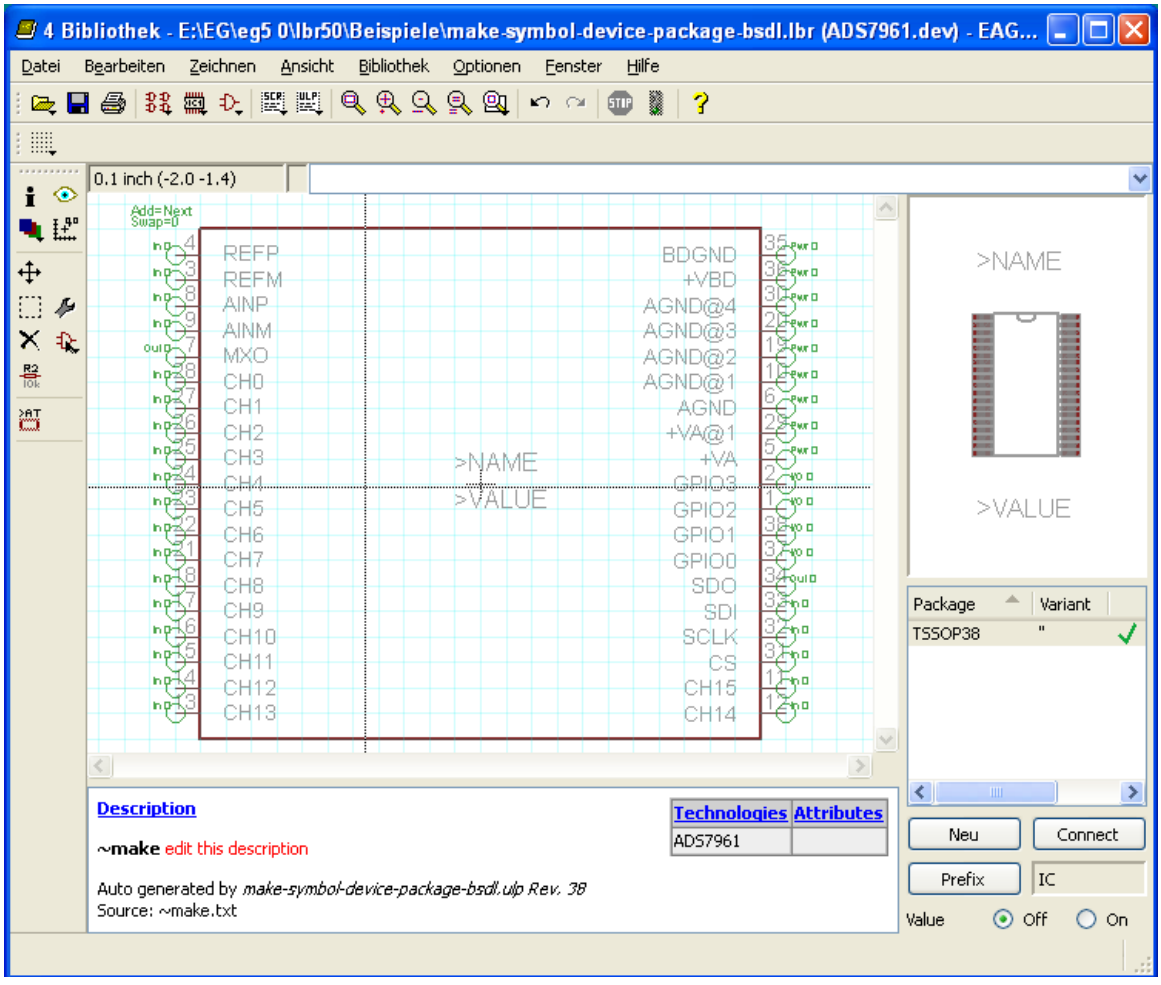


Don't forget to confirm the checkbox [√] `Accept parameter`, then go to the Make tab.

Choose the *Symbol Pin Layout* ◙ `Single` here, specify the names for Device, Symbol and Package and tick the checkboxes [√] `Symbol` [√] `Device` [√] `Package` in order to allow the creation of these objects. Now click onto the button [`Ok`].



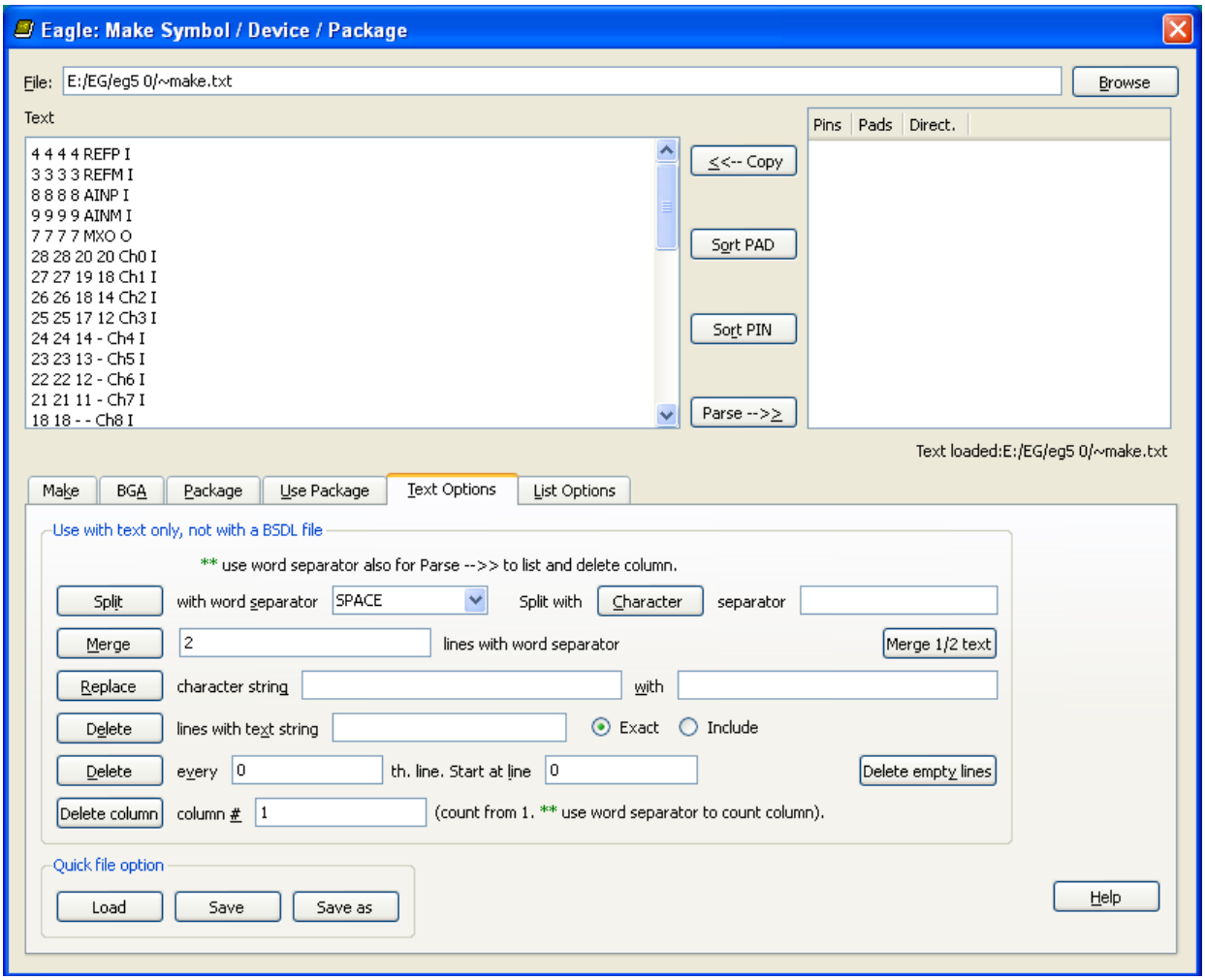
That's the result:



Example 4 with a table in the PDF file

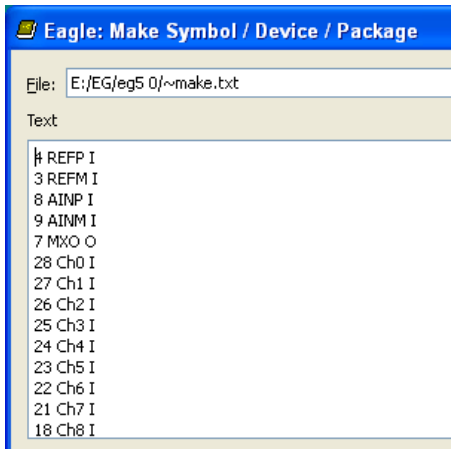
RUN make-symbol-device-package-bsdl

Goto the tab Text Options and load the previously saved text file with a click onto [Load].

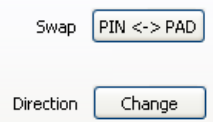


Delete the first column now [Delete] column # [1], set the value for column to 2 then, and click twice onto the button [Delete] column # [2].

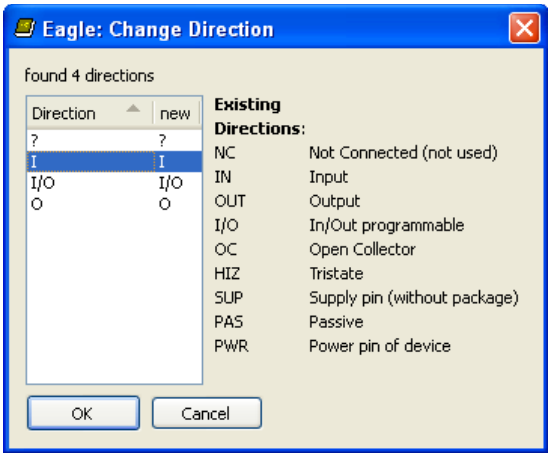
The result should look like this:



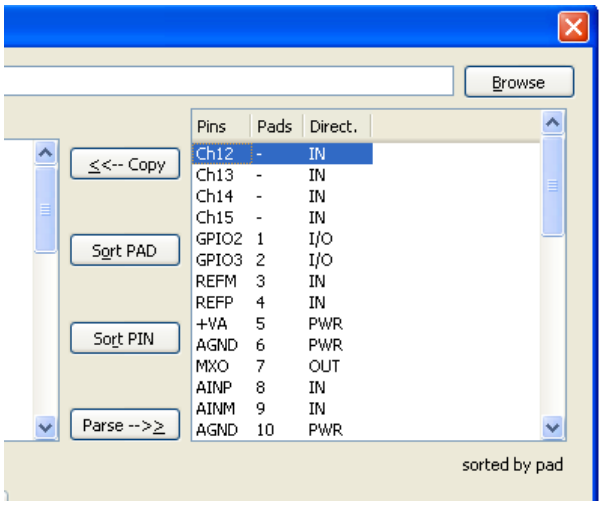
Click the [Parse -->>] button, go to the List Options tab and swap the colums Pins and Pads by clicking Swap [PIN <--> PAD].



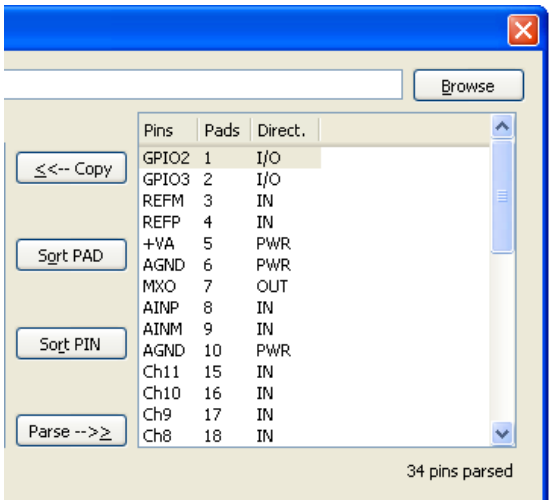
Adjust the pin directions with Direction [Change] as described in the previous example.



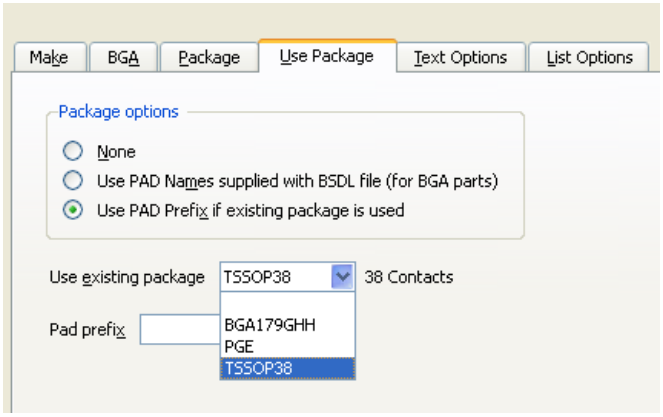
Click [Sort PAD] in order to sort the list by pad names.



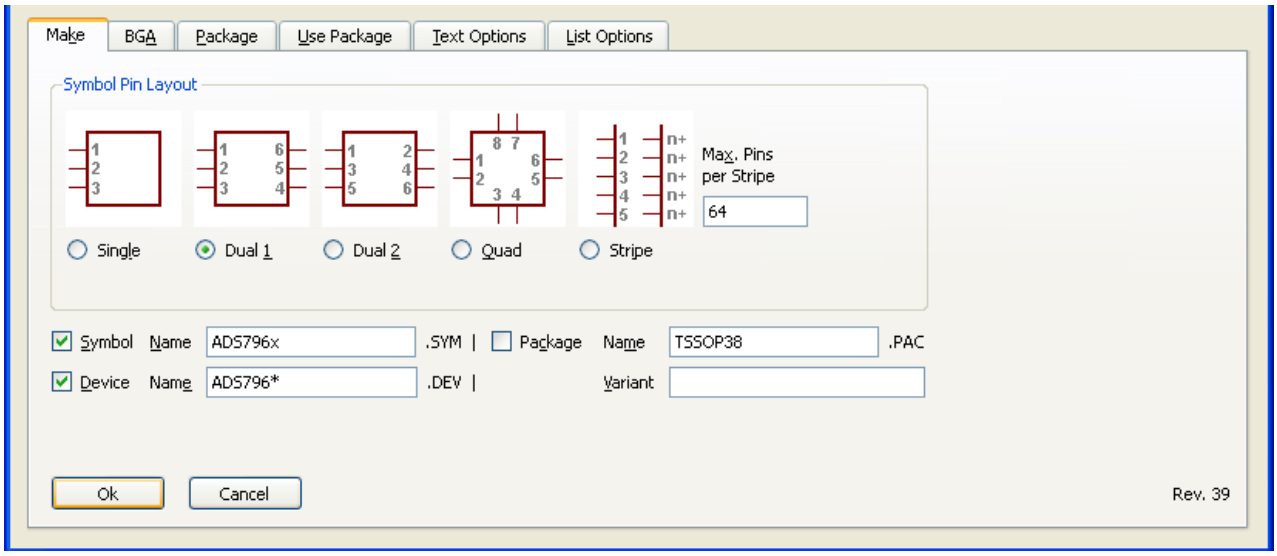
In this example the name '-' in the pads list indicates that this pin is not used. Use [<<-- Copy] in order to copy this list into the text field. Mark the first 4 lines, delete them and click [Parse -->>] for transferring them back into the list. The result looks like this:



Go to the tab Use Package and select Used PAD Prefix if existing package used.

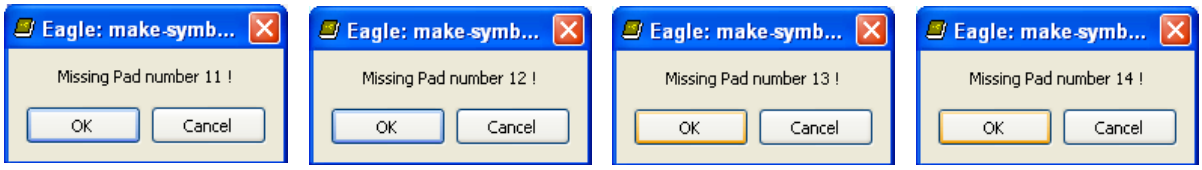


Select the package TSSOP38 in the Use existing package section. Now go to the Make tab.

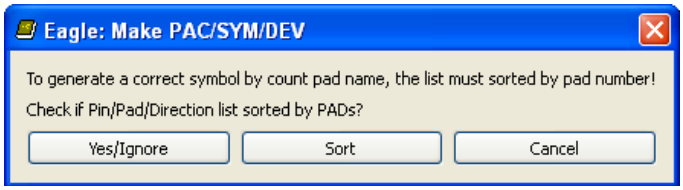


Type in Device Name and Symbol Name for this variant and click [Ok].

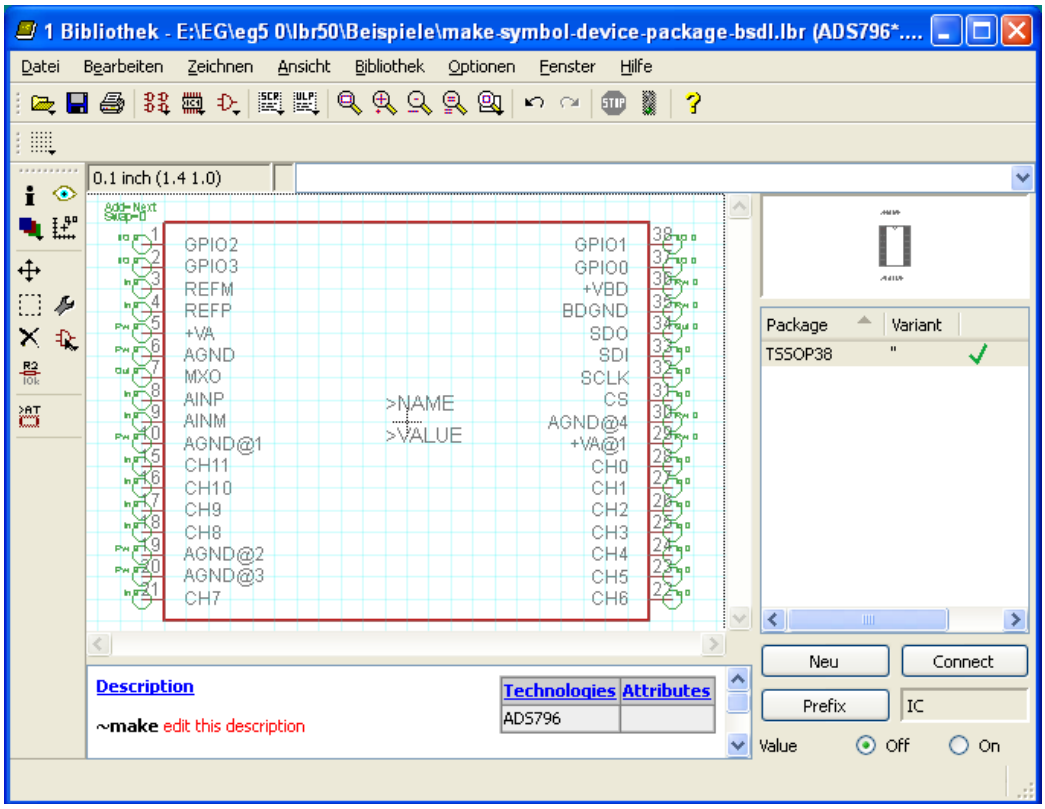
The pad numbers will be checked for completeness.



The following message will be prompted. You have to confirm it with [`Yes/Ignore`].



Symbol and device will be generated:

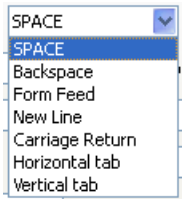


End of example 4.

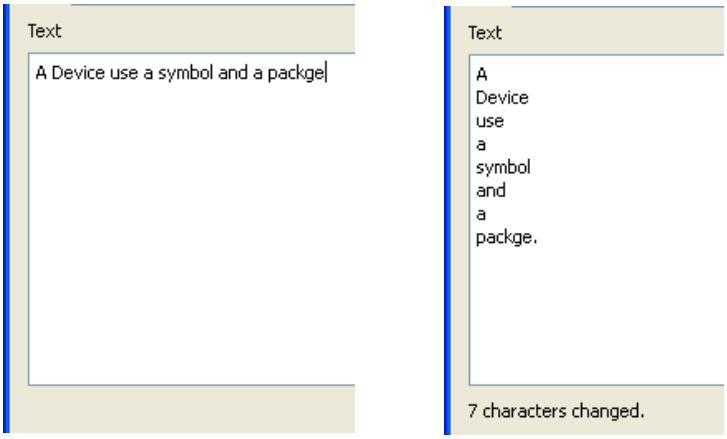
Text Options

Split and merge text lines:

Can be used to split lines. It is possible to use non-printable characters, as shown in the list box.

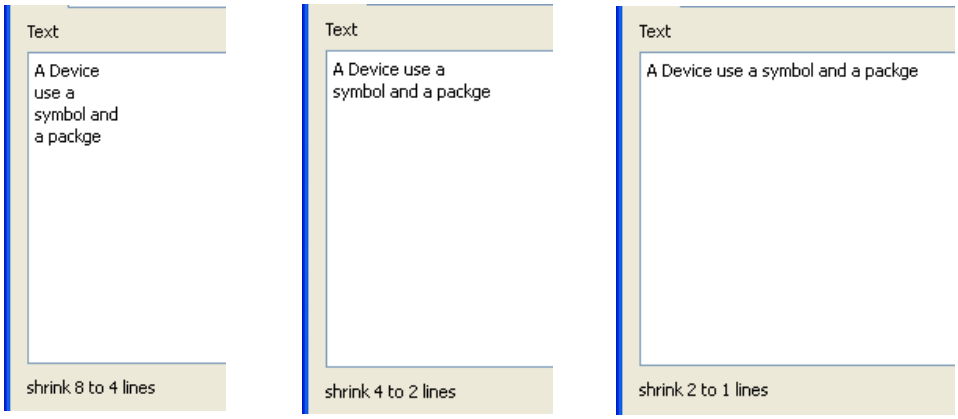


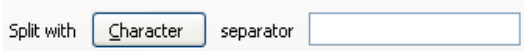
Example: Separate the sentence “A Device use a symbol and a packge“ with spaces.



Can be used to merge lines again. This option uses the same separator character as [`Split`]. The counter, here 2, decides about the number of lines to be merged.

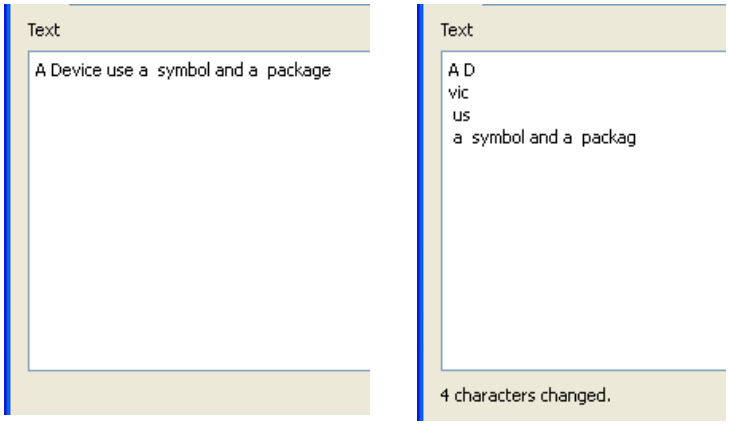
Results after clicking the Merge button (1,2,3 times):

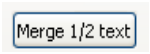




This allows to split a line at a certain character.
For example the separator character '`e`'.

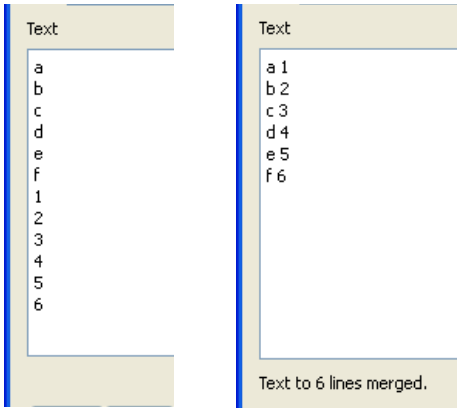
Result:





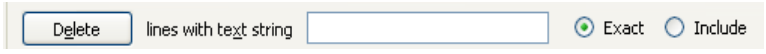
Here you can attach the lines of the second half of the text to the lines of the first half of the text. While copying tables from a PDF file into the text field (CTRL+C...CTRL+V) it can happen that the table is splitted into two parts. The first part contains the pin names, the second part the pad names only. With this option it is possible to re-assign them.

Result:

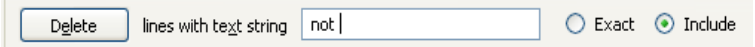


This is a replace function, as it is know from a usual text editor.

These two options allow to delete whole text lines.

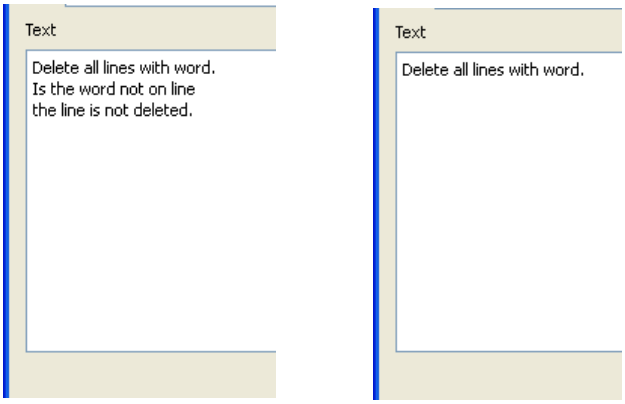


The option Exact says that the text, here the whole text line, must be exactly the same as the search patern.

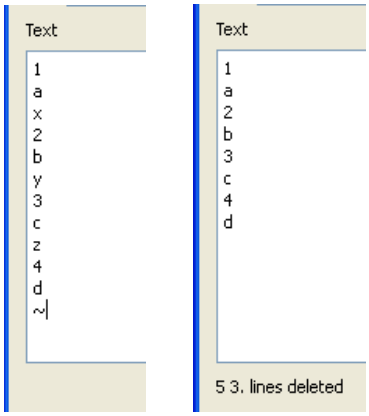


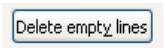
The Delete option Include indicated that the search pattern has to be part of the line or the word Space characters will be recognized.

The result:

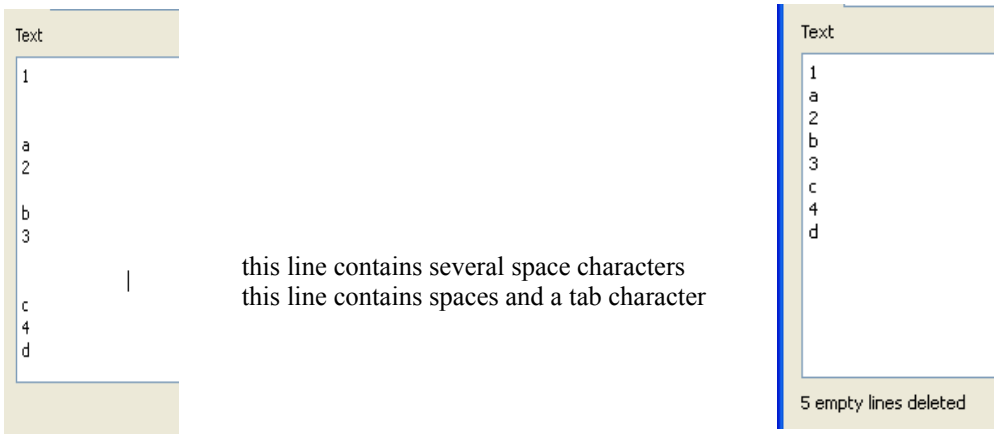


This option allows to delete undesired repeating characters.
Result:



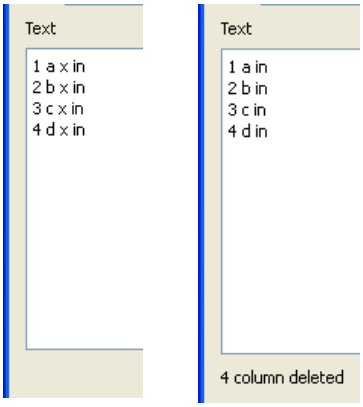


This option deletes empty lines. Even lines that consist of non-printable characters only, like space, tab, linefeed …. The number of characters doesn't matter.
Example:

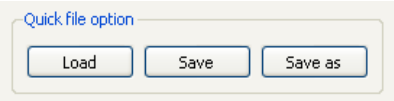


This option deletes columns in lines. The separator character is given in '`word separator`'.

Example:

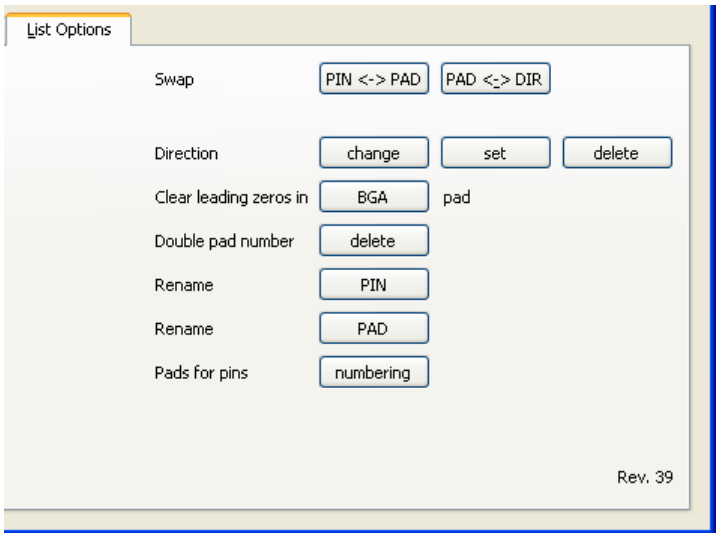


Quick file options:



After copying text from a table into the text field and modifying it you can save it for later.
Therefore click onto [Save].
This option generates a file named ~make.txt. You can [Load] it at any time again. Even after the next ULP start.
In case you click [Save as] you are allowed to use any file name and folder. But this file can't be loaded automatically with [Load]. You had to use the button [Browse], close to the File [ ] menu line.

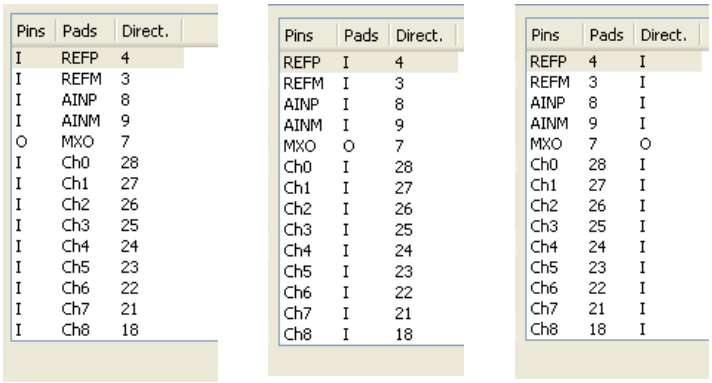
List Options



In most of the manufacturer's datasheets the order of the tables for `Pins` - `Pads` - `Direction` do not follow our expectations. So there is an option to arrange them.

This option swaps the columns. With correct manipulation it is possible to swap the column `Direction` with the column `Pins`.

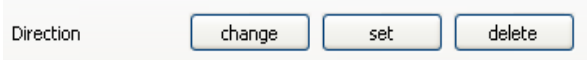
Swap [`PIN ↔ PAD`], then [`PAD ↔ DIR`]. Now the order is correct for generating the SCRIPT file.



Pins	Pads	Direct.
I	REFP	4
I	REFM	3
I	AINP	8
I	AINM	9
O	MXO	7
I	Ch0	28
I	Ch1	27
I	Ch2	26
I	Ch3	25
I	Ch4	24
I	Ch5	23
I	Ch6	22
I	Ch7	21
I	Ch8	18

Pins	Pads	Direct.
REFP	I	4
REFM	I	3
AINP	I	8
AINM	I	9
MXO	O	7
Ch0	I	28
Ch1	I	27
Ch2	I	26
Ch3	I	25
Ch4	I	24
Ch5	I	23
Ch6	I	22
Ch7	I	21
Ch8	I	18

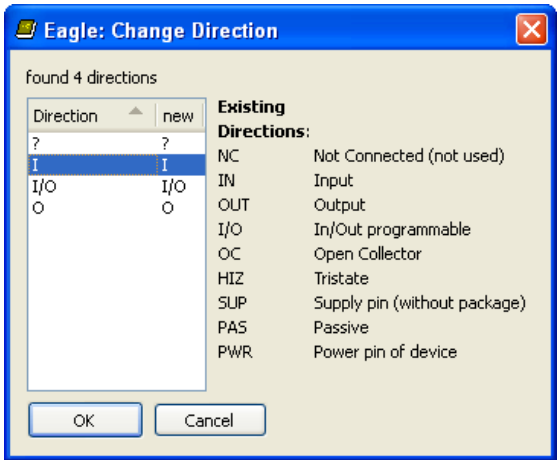
Pins	Pads	Direct.
REFP	4	I
REFM	3	I
AINP	8	I
AINM	9	I
MXO	7	O
Ch0	28	I
Ch1	27	I
Ch2	26	I
Ch3	25	I
Ch4	24	I
Ch5	23	I
Ch6	22	I
Ch7	21	I
Ch8	18	I



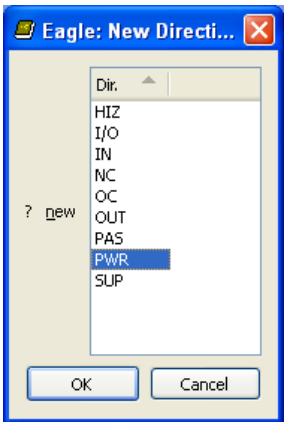
In hardly any case the pin direction will be named in EAGLE usual notation. Therefore we can use the following option:

[`Change`] can beused for changeing the given values.

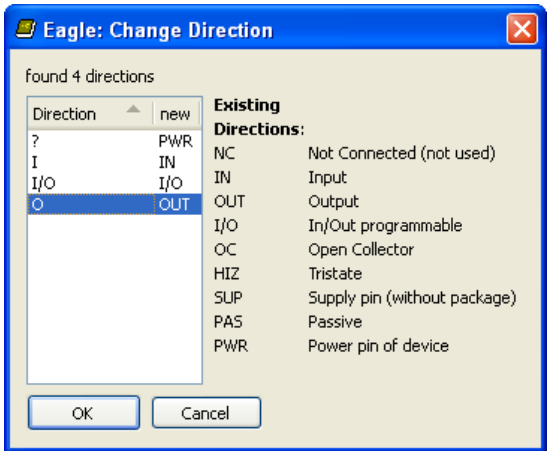
A list with detected directions is shown. Double-clicking one of the entries opens menu. Here you can select and assign the EAGLE direction.
In our example here we replace:
? = PWR
I = IN
I/O = I/O (no action needed)
O = OUT



Assign the chosen direction '?' with PWR, and all other directions as listed above.



The result:

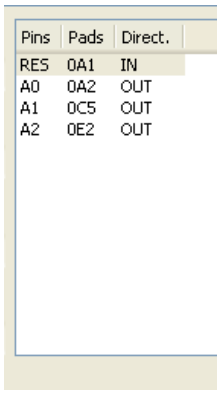


The [Set] option allows to assagn each pin the same direction. In case there is no predefined direction in the datasheet and (nearly) all of the pins will have the same direction. This option can be very useful for generating connectors where usually all pins have direction PAS (passive).

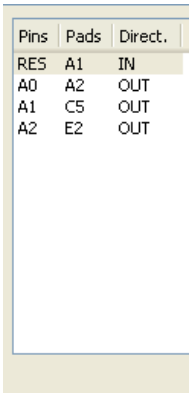
[Delete] earases the directions of all pins; in case you want to copy the list back into the text field [<<-- Copy] in order to define the direction in each line manually. With [Parse -->>] you can re-transfer it into the list again.

This option deletes all leading zeroes in pad names. Sometimes the pad names in BSDL files and other datasheets begin with a leading '0'. In case you are using an already existing package from one of the EAGLE libraries (no leading zeroes by default), EAGLE won't recognize the pad correctly and prompt an error message. To avoid this, we can use this option and delete leading zeroes.

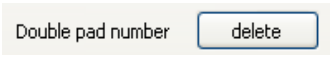
Example:



Pins	Pads	Direct.
RES	0A1	IN
A0	0A2	OUT
A1	0C5	OUT
A2	0E2	OUT



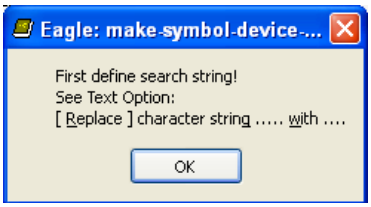
Pins	Pads	Direct.
RES	A1	IN
A0	A2	OUT
A1	C5	OUT
A2	E2	OUT



It can happen that the tables have a pad listed twice or that you copied a pad more than once from data sheets into the table. This option checks this and deletes all the copies.

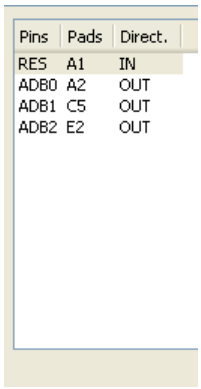
This option renames the pin or pad names in the list.
For searching and replacing the ULP takes the [`Replace`] parameters used in the Text Options.

If there is no valid parameter used, the following message will be prompted.

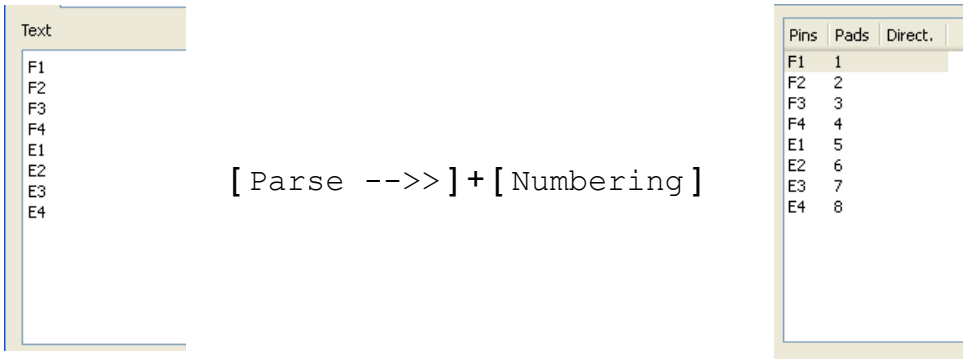


Example:

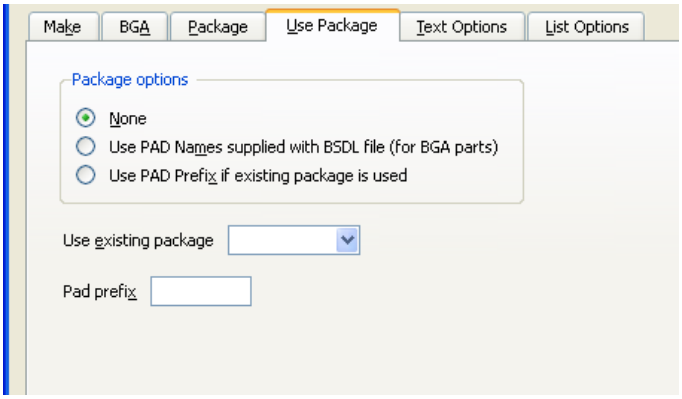
[Rename PIN] results in:



This option can be used in case you have a list of pin names, but no pad names for the package.



Use Package



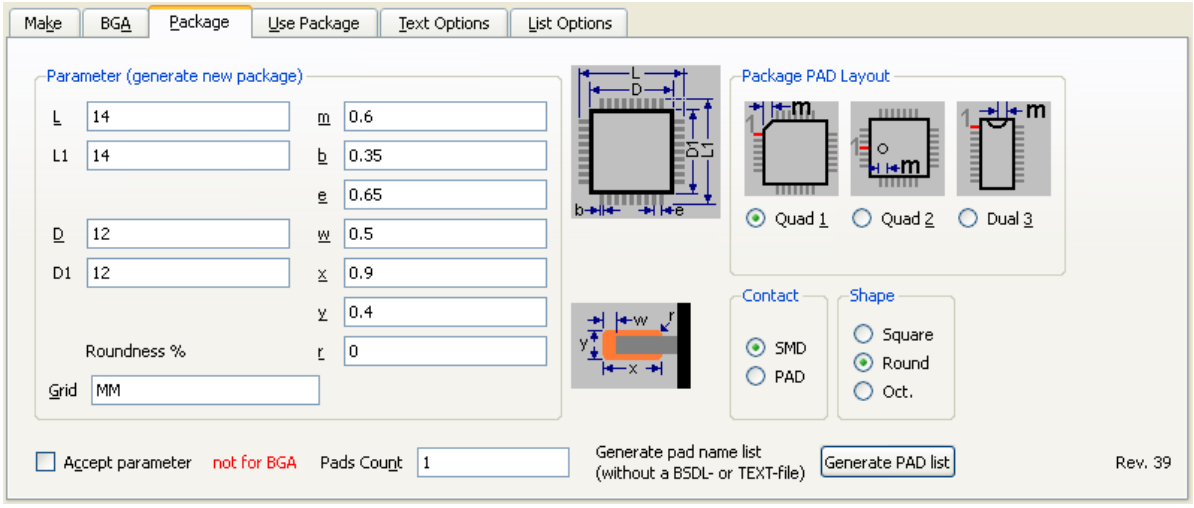
Option None is set automatically, if a BSDL file is used.

Option `Use PAD Names supplied with BSDL File (for BGA parts)` should be taken in case you want to use an already existing BGA package `Use existing package` and create the device from a list (no BSDL file).

Option `Use PAD-Prefix if existing package is used` combines `Pad prefix[]` and pad name. If you do not specify a pad name while creating the pads, EAGLE genearates a pad name with the prefix `P$`. `P` for pad and `$` as indentifier for automatic name generation. In this case you have to use `Pad prefix [P$ ]`.

Package

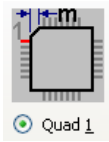
Contact SMD



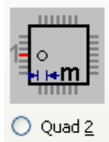
Here you can also create packages only.

Options Package PAD Layout:

For PLCCs and all types with the first pad located at a corner

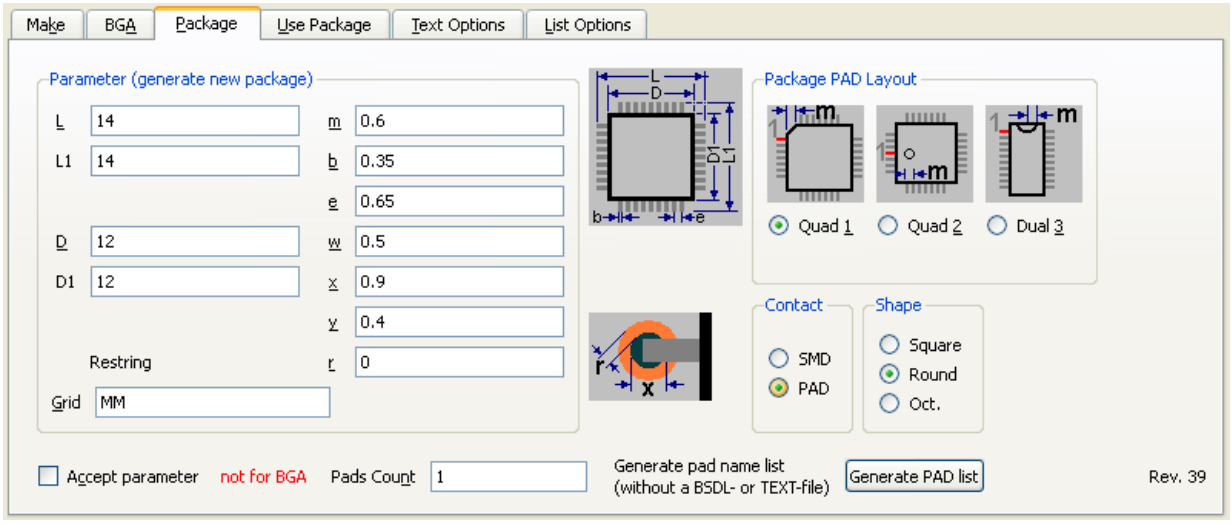


For QFPs and all types with the first pad in the middle of one side



For Dual In Line packages and all other types with the marker at the front side.

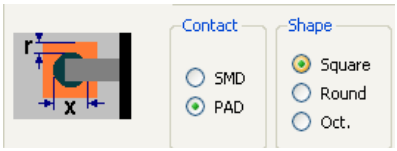
Contact PAD



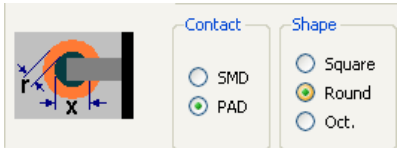
Here parameter X for the drill and parameter r for restring is used. The pad's diameter results from drill diameter x + 2 * restring.

The following pad diameters are available:

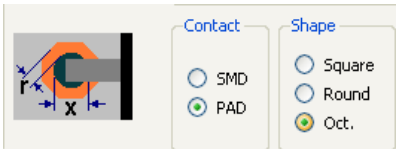
Square



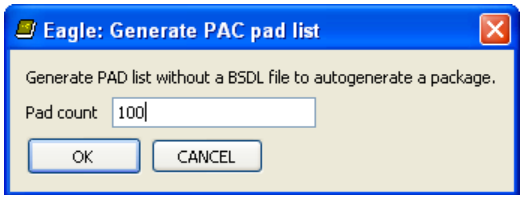
Round



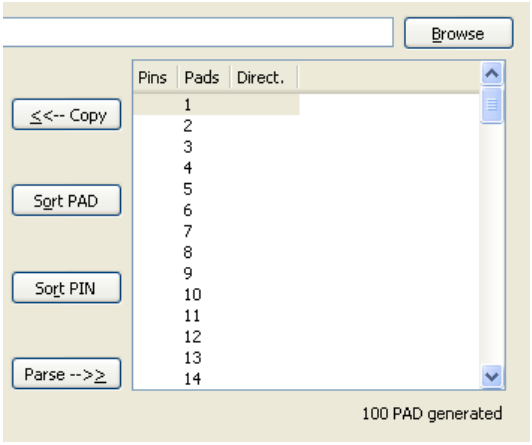
Octagon



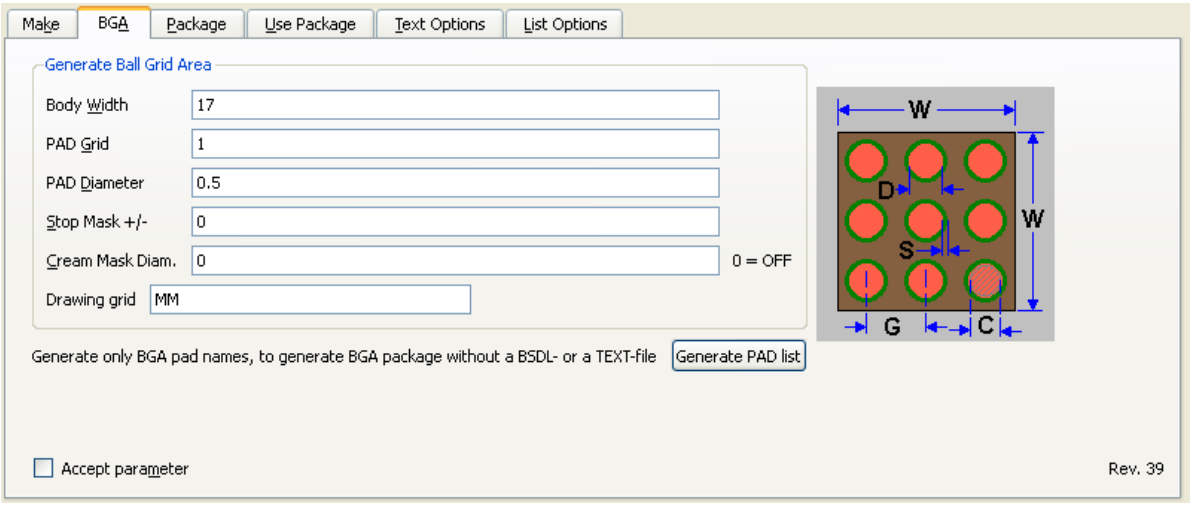
The Generate PAD list option is needed for generating a package only without using further data from the BSDL or list file.



The pads will be named from 1 up to xxx and the message `xxx PAD generated` will be shown in the status bar.

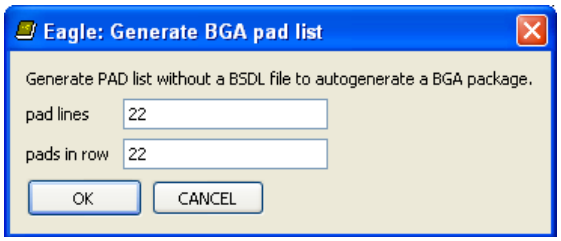


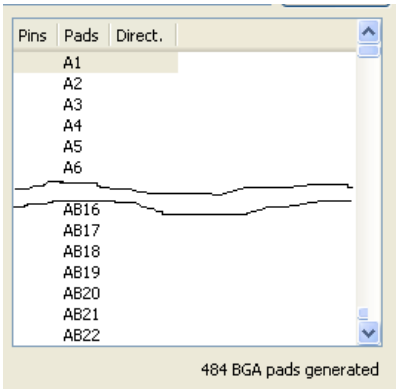
BGA



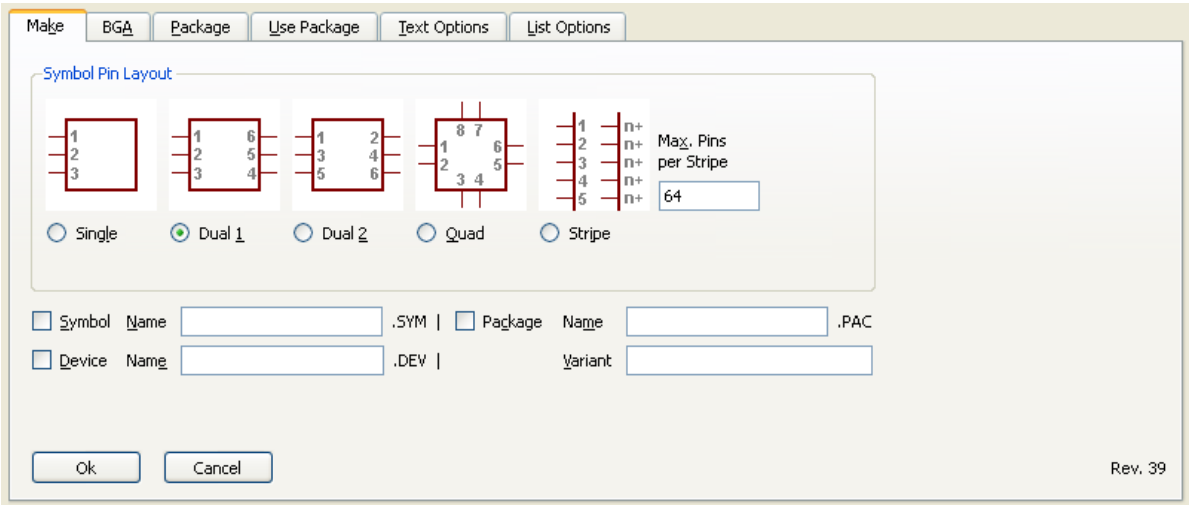
These parameters are self-explaining. ;)

Use the option [`Generate PAD list`] in case you want to create a BGA package without BSDL file. The enumeration of BGA pads is alphabetical and numerical. It always starts with *`A1`* and ends with *`Ynn`*. If the number of rows exceeds 20, the alphabetic part conists of two characters and starts with *`AA1`*.





Make



Symbol Pin Layout

`Single` the symbol consists of a frame with pins arranged on the left side only.

`Dual 1` the symbol consists of a frame with pins arranged on the left and on the right side. The enumeration of the pins is according to Dual In Line components.

`Dual 2` the symbol consists of a frame with pins arranged on the left and on the right side. The enumeration of the pins is according to connectors, left - right alternating.

`Quad` the symbol consists of a frame with pins arranged on all four sides. According to a QFP package.

`Stripe` no symbol frame, but stripes with the pins arranged on the left side. How many pins at a stripe defines `Max Pins per Stripe` [ ]. The ULP will create as many stripes as necessary. Depending on the total number of pins the last stripe can have less pins than the others. This option is useful for high-pin symbols which size would be too big. So you will get a more compact symbol. Use GROUP ... CUT and EDIT .. new symbol .. PASTE .. for splitting up this symbol into several separate symbols and create a device with symbols that can be placed easily on different locations.
Further details for creating devices with separate gates can be found in the help of *connect-device-split-symbol.ulp.*

The additional options in this tab decide about using or creating a new symbol, package or device. The checkboxes [ ] determine what to do. Create a new object or simply use it.

[√] `Symbol` creates a new symbol with Name.
[ ] `Symbol` no action

[√] `Package` a new package will be created
[ ] `Package` the package of the given device will be used

[√] `Device` creates a new device. Symbol- and package names are needed. It is possible to create a new symbol and package!
[ ] `Device` a package name is needed in order to create a variant, or if [√] `Package` to create a new package including the variant in the device.

2011-05-30 alf@cadsoft.de