SCOPE /SDK

Version 4.0

Tutorials: *Circuit Design*

Main Table of Contents

Tutorial
Circuit Design

In this tutorial we want to have a close look on how modules and devices are displayed in the Project Window with all their functions.

To understand how a device is constructed we will drag in the ADSR EG (Circuit Design->Envelopes->) which we already know from the Quick Start. Instead of

putting it in the Project Window we can also drag it directly in the Project Explorer. Therefore we have to take the module and drop it when the mouse pointer is over 'New Project`. The *Project Explorer* automatically arranges the module in the module tree.

In order to analyze the *Pads* of the ADSR EG we have to open the *Pad List*. We can do this either through the *Project Explorer* or through the *context menu* of the module by right clicking on it.

If the ADSR EG module is selected, all the *Pads* of this module are displayed in the *Pad List.*

Pad value

Pad orientation

Pad type

Pad name
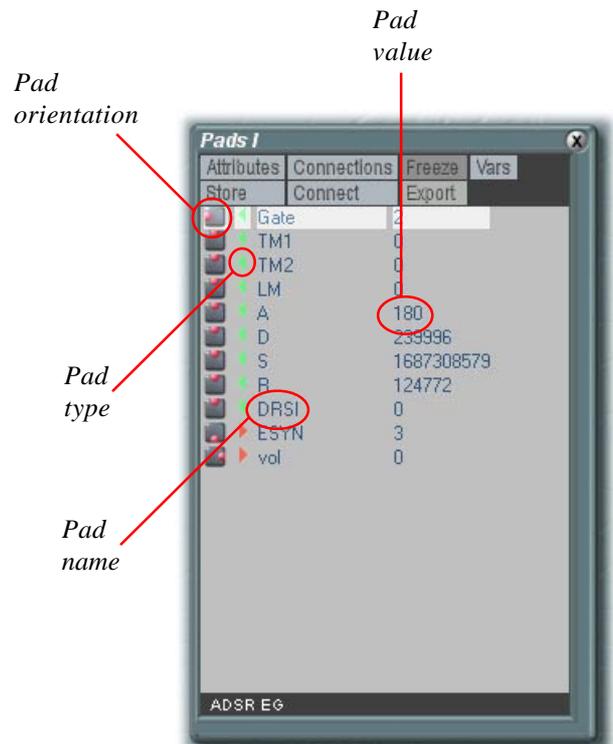
Pads are the connection points of modules. They are variables that can be connected to other *Pads*.

To change the value of a *Pad* select it and press F2. Now you can type in the desired value and press Enter to confirm it.

We can distinguish between asynchronous and synchronous outputs and inputs.

The asynchronous *Pads* display in capital letters, the synchronous *Pads* display in lower case letters.

In our example, the ADSR EG module, we only have one synchronous *Pad* namely the 'vol' output. The other output of the module is asynchronous. All the inputs are asynchronous because this module does not need synchronus inputs.

On five inputs we can see antennas. They indicate that the inputs are connected to other modules. If we hold the mouse cursor over one antenna, the appropriate control on the surface gets highlighted. In case you closed the surface interim you can open it again by rightclicking on the module and selecting 'Surfaces-> Open Panel' from the *context menu*.
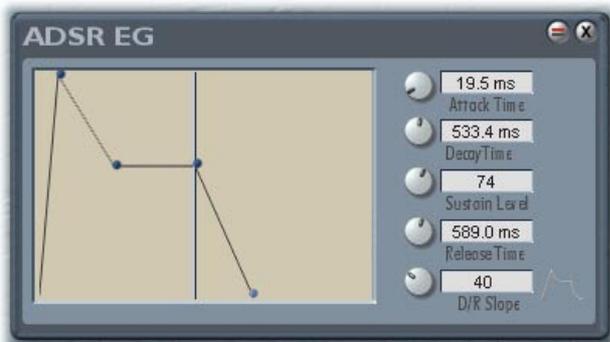
The short *Pad* names signify the adjustments of the module: Attack Time, Decay Time, Sustain Level, Release Time, D/R Slope.

On the surface we can edit the incoming signal by changing the values of the Attack Time, the Decay Time, the Sustain Level, the Release time or the D/R Slope. We can do this either by moving the potentiometers or by taking the spots at the transitions of the different levels and drag them around. To get a fine adjustment of the values we have to click on the potentiometer and draw a circle with the cursor around the potentiometer. By increasing the distance of the mouse from the control, it can be adjusted more finely. The pointer on the control always points towards the mouse pointer.

If we want to have a specific value we can also type it directly in a text field.

If we now establish connections to Pads on other modules we will see that the virtual wires, which represent the connections, have different colors.


The blue wire symbolizes a synchronous signal whereas the green wire represents an asynchronous signal.

The red wire pictures a MIDI signal.

To arrange the settings of the *Pads* we can open the *context menu* of a *Pad* by right clicking on the *Pad* name in the *Pad List*.

The *context menu* will show up.
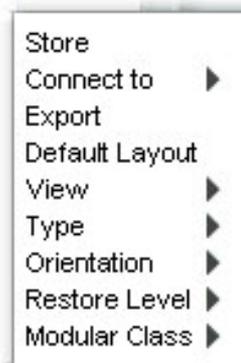
View ▶	Long Names
Type ▶	Enable HexView
Orientation ▶	Hide hidden pads
Restore Level ▶	
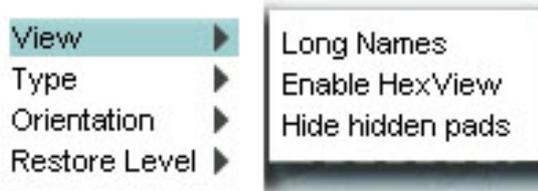
With the first command in the *context menu* we can 'Store' the Pad settings (shortcut: 'S' on your keyboard). Scope will then memorize that we want to connect this *Pad*. If we click on 'Connect to' it will automatically suggest the possible connections (shortcut: 'C').

We can use the 'Export' dialog box if we want to transfer a *Pad* into another layer (shortcut: 'E').

To reset the settings we can use the option 'Default : Layout'. SCOPE will automatically restore the settings of the changed *Pads*. With the next commands in the *context menu* we can change the *Pads* the way that they suit to our needs while designing a circuit.

We have the option to change, for example, the *View* of the *Pad* names. Normally the *Pads* in the *Pad List* are written in short names.

In order to get the full name of a *Pad* we can change this setting by clicking on 'Long Names'. The long name of the *Pad* will now be displayed in the *Pad List.*
Clicking again on this dialog box will set this option back to 'Short Names'.

If we enabled 'Long Names' it is reasonable to activate the *Tool Tips* in the *Tool Bar.* This can be done by clicking on the lightbulb icon. Hold the mouse cursor over a *Pad* to see a *Tool Tip*.

Attack Time 3.750 msec

TM1   TM2   LM   A
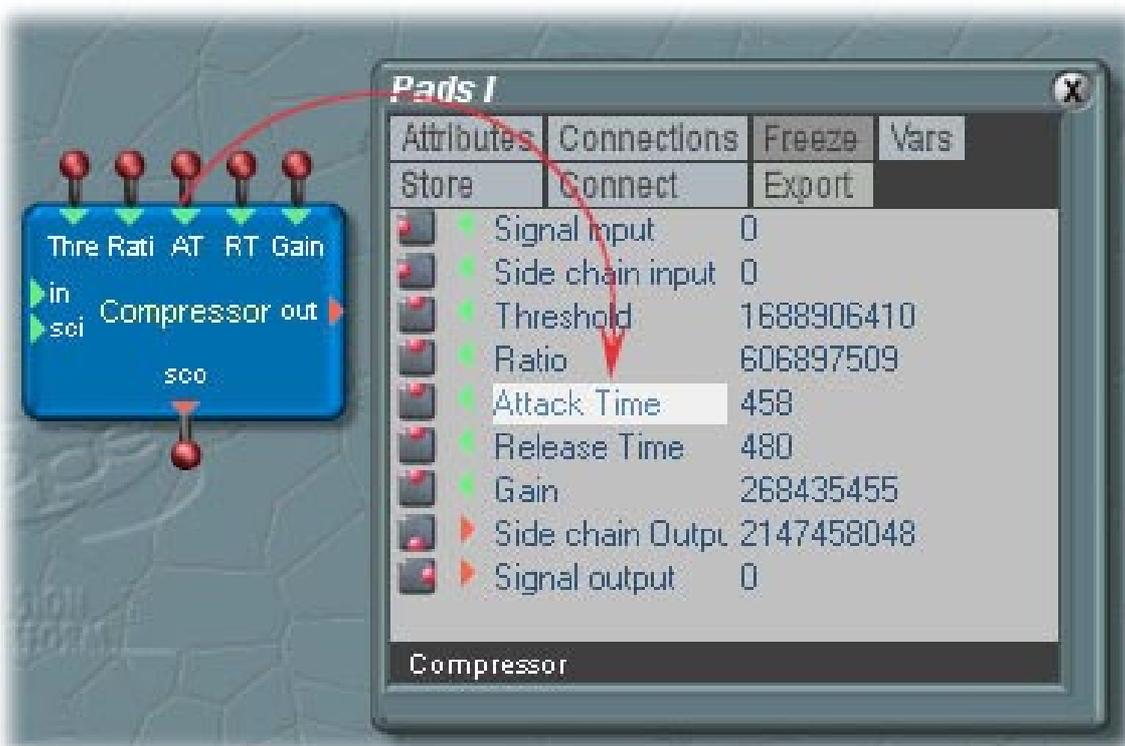
The *Tool Tips* are always of assistance when working with *Pads* because they give us the full names as well.

If we have to change the type (*I/O Pad, input Pad* or *output Pad*) of a *Pad*, we can also do this through the *context menu.*

Orientation ▶	Left
Restore Level ▶	Top
Modular Class ▶	Right
	Bottom
	Hide

Type ▶	IOPad
Orientation ▶	InPad
Restore Level ▶	OutPad

While changing the type in the dialog box, the actual *Pads* on the module change their appearance. In order to get familiar with this just take one *Pad* on the ADSR EG module and transform it into another *Pad.* For this action we have also the possibility to use shortcuts:

I   *Input Pad*
O   *Output Pad*
P   *I/O Pad*

On the module as well as in the *Pad List* the *input Pads* display as green triangle, the *output Pads* display as red triangles and the *I/O Pads* can be identified by a white rhomb.

Sometimes it is useful to change the orientation of a *Pad* to keep track of the circuit. Therefore the *Pads* can be positioned on every side of the module or become hidden if they are not needed. To change the orientation we have to open the menu from the 'Orientation' dialog box in the *context menu* and choose the *Pad* position we need. This can as well be done with the following shortcuts:

L   Left
T   To
R   Right
B   Bottom
H   Hide

input Pad   *output Pad*

I/O Pad