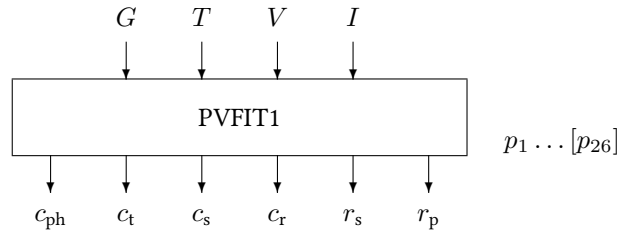


Block PVFIT1

The PVFIT1 block performs a one-diode-model fit on I-V curves of a PV module connected to the block's inputs.



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Function	se0034
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Group	I

Inputs

- 1 Global radiation / W m^{-2}
- 2 Module temperature / $^{\circ}\text{C}$
- 3 Module voltage / V
- 4 Module current / A

Outputs

- 1 Coefficient of short-circuit current density $c_{\text{ph}} / \text{V}^{-1}$
- 2 Temperature coefficient of short-circuit current $c_{\text{t}} / \text{V}^{-1} \text{K}^{-1}$
- 3 Coefficient of saturation current density (Shockley diode) $c_{\text{s}} / \text{A m}^{-2} \text{K}^{-3}$
- 4 Diode ideality factor α
- 5 Series resistance parameter $r_{\text{s}} / \Omega \text{m}^2$
- 6 Parallel resistance parameter $r_{\text{p}} / \Omega \text{m}^2$
- 7 Deviation χ

Parameters

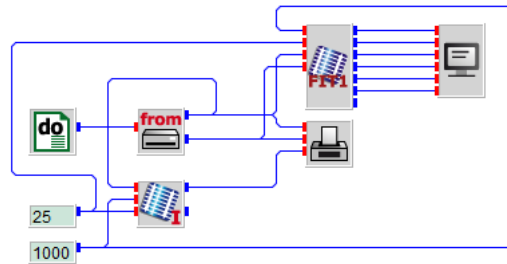
- 1 Fit procedure
 - 0 Nelder Mead downhill simplex method
 - 1 Marquard Levenberg algorithm (not yet implemented)

- 2 Number of cells in series
- 3 Number of cells in parallel
- 4 Area of a single cell / m^2
- 5 Module area / m^2
- 6 Minimum photocurrent parameter / V^{-1}
- 7 Maximum photocurrent parameter / V^{-1}
- 8 Minimum temperature coefficient / $\text{V}^{-1} \text{K}^{-1}$
- 9 Maximum temperature coefficient / $\text{V}^{-1} \text{K}^{-1}$
- 10 Minimum saturation-current parameter
- 11 Maximum saturation-current parameter
- 12 Minimum diode-quality parameter
- 13 Maximum diode-quality parameter
- 14 Minimum series resistance / Ωm^2
- 15 Maximum series resistance / Ωm^2
- 16 Minimum parallel resistance / Ωm^2
- 17 Maximum parallel resistance / Ωm^2
- 18 Module tolerance plus / % > 0
- 19 Module tolerance minus / % < 0
- 20 Characteristic module length / m
- 21 Module weight / kg
- 22 Absorption coefficient a
- 23 Emission coefficient ϵ
- 24 Specific module heat capacity / $\text{J kg}^{-1} \text{K}^{-1}$
- 25 NOCT temperature / $^{\circ}\text{C}$
- 26 Overwrite mode
 - 0 Generate error (default)
 - 1 Overwrite

Strings

- 1 INSEL module ID (max. eight characters)
 - 2 Path to .bp file
 - 3 Module name
 - 4 Manufacturer
 - 5 Cell type (e. g., monocrystalline)
-

pvfit1.vseit



The tuples (G, T, V, I) are fed to the **PVFIT1** block which performs the parameter fit. As a result a file named `pvfit1.bp` is generated and the results are displayed by a **SCREEN** block.

pvfit1.bp

```

% Filename          pvfit1.bp
% Module            pvfit1
% Manufacturer      Manufacturer
% Cell type         crystalline

% Mode must be set externally

1 % Number of cells in series N_s per module
1 % Number of cells in parallel N_p per module
1 % Number of modules in series M_s
1 % Number of modules in parallel M_p
0.0156 % Cell area A_c (m^2)
0.016 % Module area A_m (m^2)

% Electrical parameters

1.12 % Band gap (eV)
0.267307E+00 % Short-circuit current parameter C_0 (V^-1)
0.243551E-03 % Isc temperature coefficient C_1 (V^-1 K^-1)
0.542419E+08 % Shockley saturation parameter C_01 (A m^-2 K^-3)
0.000000E+00 % Recombination saturation parameter C_02 (A m^-2 K^-5/2)
0.386289E-04 % Series resistance r_s (Ohm m^2)
0.277769E+00 % Parallel resistance r_p (Ohm m^2)
0.163165E+01 % Shockley diode ideality factor alpha
2.000000 % Recombination diode quality beta

```

```

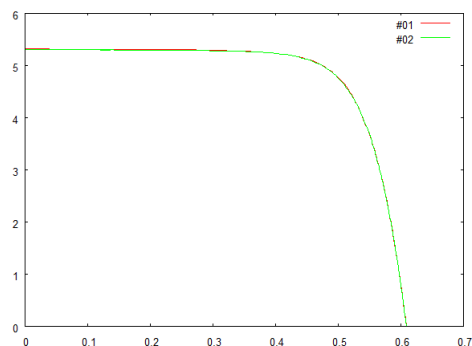
0.000000E+00 % Bishop parameter-1
0.000000E+00 % Bishop parameter-2
0.000000E+00 % Bishop parameter-3
5.0          % Module tolerance plus
-5.0         % Module tolerance minus

% Thermal parameters
1.409        % Characteristic module length l_m (m)
19.000       % Module mass m_m (kg)
0.70         % Default absorption coefficient a
0.85         % Default emission factor epsilon
900.0        % Default specific heat of a module C_mod (J kg^-1 K^-1)
1.0          % Nominal operating cell temperature NOCT (degrees C)
25.0         % Intial value of cell temperature (degrees C)

% Numerical parameters (optional)
1E-5         % Error tolerance of voltage of single cell (V)
100          % Maximal number of iterations to solve I/V-equation

```

The parameters have been incorporated into the `pvfit1.vseit` example using a [PVI](#) block in order to demonstrate the quality of the fit. The [PLOT](#) block then shows the measured data (red curve) and the simulated points (green curve).



Temperature dependency Please note that there is no guarantee that the temperature dependency of the cell is modeled correctly if only one curve is provided to the fit procedure. The most critical parameters are c_{ph} and c_t . Their search intervals can be narrowed if the values are known from data sheet information, for instance.

See also Blocks [PVI](#), [PVV](#), [PVFIT2](#).