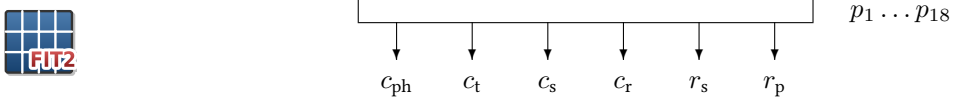
Block PVFIT2

The PVFIT2 block performs a two-diode-model fit on I-V curves of a PV module connected to the block's inputs.



Name	PVFIT2
Function	se0026
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Group	I

Inputs

1 Global radiation / $\mathrm{W\,m^{-2}}$
2 Module temperature / °
3 Module voltage / V
4 Module current / A

Outputs

1 Coefficient of short-circuit current density c_{ph} / $\mathrm{V^{-1}}$
2 Temperature coefficient of short-circuit current c_t / $\mathrm{V^{-1}\,K^{-1}}$
3 Coefficient of saturation current density (Shockley diode) c_s / $\mathrm{A\,m^{-2}\,K^{-3}}$
4 Coefficient of recombination current density (Recombination diode) c_r / $\mathrm{A\,m^{-2}\,K^{-5/2}}$
5 Series resistance parameter r_s / $\Omega\,\mathrm{m^2}$
6 Parallel resistance parameter r_p / $\Omega\,\mathrm{m^2}$
7 Deviation χ

Parameters

1 Fit procedure
  0 Christian Obst

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 $R_{\mathrm{s,min}}$ / $\Omega\,\mathrm{m}^2$
7 $R_{\mathrm{s,max}}$ / $\Omega\,\mathrm{m}^2$
8 Coefficient of short-circuit current density C_0 / V^{-1}
9 Temperature coefficient of short-circuit current C_1 / $\mathrm{V}^{-1}\,\mathrm{K}^{-1}$ (0: C_0 and C_1 by linear regression of I_{sc}/G over the module temperature)
10 Module tolerance plus / %
11 Module tolerance minus / % (< 0)
12 Characteristic module length / m
13 Module mass / kg
14 Absorption coefficient
15 Emission coefficient
16 Specific module heat capacity / $\mathrm{J\,kg}^{-1}\,\mathrm{K}^{-1}$
17 NOCT temperature / °C
18 Overwrite mode
  0 Generate error (default)
  1 Overwrite

Strings

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

Remarks

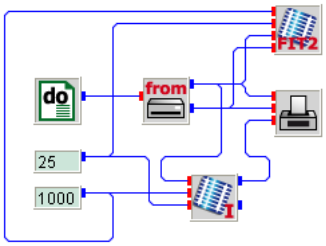
The PVFIT2 block performs a fit to given data points provided by the inputs. The block requires increasing values for the voltage and a unique ($V = 0\,\mathrm{V}, I = I_{\mathrm{sc}}$) point for each curve. If the short-circuit current is not provided, the result of the PVFIT2 block is unpredictable.

It is recommended to determine the photocurrent parameters c_{ph} and c_{t} via block PVA2C before using the PVFIT2 block, since the quality of the fit depends very much on these initial values.

Please notice that the block (in its current version) can not be used to determine the two-diode model parameters from operational data but from complete I-V-curves only.

It is not possible to determine the Bishop parameters with the PVFIT2 block.

pvfit2.vseit



A file with measured I-V curve data named `pvfit2.dat`, located in the `examples/data` directory for standard test conditions is read by a READ block driven by a DO block. The radiation and module temperature are set by two CONST blocks to 1000 W/m^2 and 25 °C, respectively.

The tupels (G, T, V, I) are fed to the PVFIT2 block which performs the parameter fit. As a result a file named `pvfit2.bp` is generated.

pvfit2.bp

```
                % Filename       pvfit2.bp
                % Module         pvfit2
                % 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)

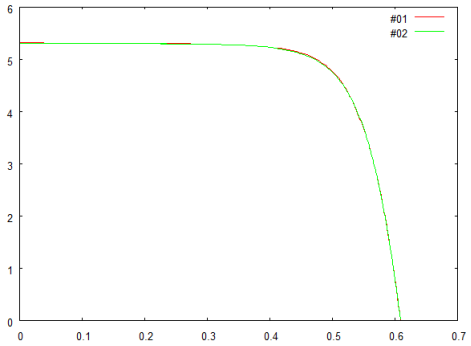
                % Electrical parameters
1.12            % Band gap (eV)
0.273035E+00 % Short-circuit current parameter C_0 (V^-1)
0.224599E-03 % Isc temperature coefficient  C_1 (V^-1 K-^1)
0.293476E+04 % Shockley saturation parameter C_01 (A m-2 K^-3)
0.223146E+01 % Recombination saturation parameter C_02 (A m-2 K^-5/2)
0.678692E-04 % Series resistance r_s (Ohm m^2)
0.689963E+00 % Parallel resistance r_p (Ohm m^2)
0.100000E+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
0.0             % Module tolerance plus
0.0             % Module tolerance minus

                % Thermal parameters
1.000           % Characteristic module length l_m (m)
```

```
  1.000        % 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)
 47.0          % 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 `pvfit2.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).



See also Blocks PVI, PVV, PVFIT1.