# SunPower<sup>®</sup> PV-Syst Modeling Guide: Modules

### **Transposition Model Selection**

SunPower has worked directly with Richard Perez to understand the most current representation of the Perez tilted-plane (transposition) model and has done an extensive validation to demonstrate that the plane-of-array irradiance calculations are accurate [Perez Diffuse Irradiance on Tilted Plane and PVSim white paper]. Therefore, select the Perez-Ineichen physical model under *Preferences*.

Files       Preferences       Licence       Help         Preferences       Edit hidden parameters       Content         Choose & concorr       Content       Internationalization         Choose & concorr       Content       Internationalization	
Preferences Edit hidden parameters Choose & Content Choose & Content	Default values Physical models Printer Forms Clipboard Exp
	s ansposition Model el (robust) sichen model (sophisticated) models used in the final report

### **Thermal Parameter Selection**

Free-standing systems (ground mount fixed tilt or trackers)

- Uc = 25.0 W/m <sup>2</sup> K	Thermal parameter Ohmic Losses Module quality - LID - Misma	tch   Soiling Loss   IAM Losses   Auxiliaries   Unavailability
- Uv = 3.0 W/m <sup>2</sup> K / m/s	You can define either the Field thermal Loss the program gives t	factor or the standard NOCT coefficient: he equivalence !
	Field Thermal Loss Factor	NOCT equivalent factor
$\sim$	Thermal Loss factor U = Uc + Uv * Wind vel	NOCT (Nominal Operating Cell temperature) is
	Constant loss factor Uc 25.0 W/m²k ? Wind loss factor Uv 3.0 W/m²k / m/s	often specified by manufacturers for the module itself. This is an alternative information to the U-value definition which doesn't make sense when applied to the operating array.
	Default value acc. to mounting  "Free" mounted modules with air circulation  Semi-integrated with air duct behind	Don"t use the NOCT approach. This is quite confusing when applied to an array !
	Integration with fully insulated back	pr∋ See the NOCT anyway ?

On roof or BIPV

Use default PV-Syst settings.



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### IAM Losses

Make sure to use the PV module definition for IAM Losses. You can also set those values manually:

#### E- and X-Series

Point #	Incid. angle	IAM
1	0.0	1.00
2	50.0	1.00
3	60.0	0.99
4	65.0	0.97
5	70.0	0.94
6	75.0	0.89
7	80.0	0.81
8	85.0	0.70
9	90.0	0.00



#### **P-Series**

Point #	Incid. angle	IAM
1	0.0	1.00
2	20.0	1.00
3	30.0	1.00
4	40.0	1.00
5	50.0	1.00
6	60.0	0.99
7	70.0	0.92
8	80.0	0.73
9	90.0	0.00

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### Module Quality – LID – Mismatch

Mismatch Losses

0.8% for E and X Series. 0.5% for P Series

LID – Light Induced Degradation

0% for E- and X-Series 1.2% for P17 2.0% for P18 1.4% for P19

Module quality

E20-327: -2.5% E20-327-COM: -1.0% E20-435-COM(-1500V): 0.0%

P-Series: -0.6%

X-Series: -1.0% for COM modules; -2.5% for all other X-Series modules

E.g.: X22-360: -2.5%; X22-360-COM: -1%

PV field detailed losses parameter	
Concerned subsystem	Apply this to all subsystems
Thermal parameter Ohmic Losses Module quality - LI	D - Mismatch   Soiling Loss   IAM Losses   Auxiliaries   Degradatic ▲ ▶
Module quality       defaul         Module efficiency loss       2.5       %         Deviation of the average effective module efficiency by respect to manufacturer specifications.       ?         (negative value indicates over-performance)       ?         LID - Light Induced Degradation LID loss factor       0.0       %         Degradation of crystalline silicon modules, in the first operating hours by respect to the       ?	It Mismatch Losses default Power Loss at MPP 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
Losses graph	Cancel



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### **Near Shadings**

E- and X-Series

Use According to module strings or Detailed, according to Module Layout options to simulate the shading scene of your project.

#### **P-Series**

The P-Series module has a much better response to shade than conventional c-Si modules when installed in landscape orientation.

To reflect this better response in PV-Syst, create a shading scene in the *Near Shadings* section and select the *Linear shadings* option.

Note: advanced PV-Syst users know that for conventional PV systems, the *Detailed, according to Module Layout* option yields more accurate results. However, this is not true for SunPower's P-Series modules.

Comment PVU	oject_Ombrage=pvShading	)		
Compatibility with O	rientation and System para Orient./System	meter Shadings	😤 Construction	n / Perspective
Active area Fields tilt Fields azimuth	17534 m² Tracking tilted axis	17724 m² Tracking tilted axis	Shading Factor tables	
Information			Table	Graph
Use in simulation	nCalcula	ation mode	Sustem overview	
Use in simulation No Shadings Linear shadings According to mu	n Calcula C F. C S odule strings	ation mode ast (table) low (simul.)	Bystem overview	Print
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