NILS Niedersächsische Lernwerkstatt für solare Energiesysteme
am Institut für Solarenergieforschung ISFH Hameln Geschäftsführer Prof. Dr. R. Brendel
An- Institut der Leibniz Universität Hannover
Am Ohrberg 1 – D-31860 Emmerthal Tel.: 05151 999 100 Fax: 05151 999 400
email: nils@isfh.de web: www.nils-isfh.de www.isfh.de mobil: 0175 766 06 07 (W.R. Schanz)
Niedersachsen

Photovoltaik-System SUSE

Solarthermiesystem Wärme von der Sonne

innovative Solarsysteme für Schule und Ausbildung

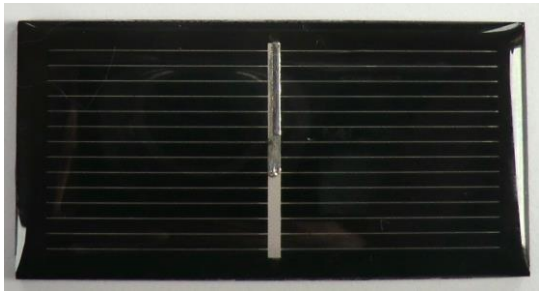
Leibniz Universität Hannover

MINT Begabungsförderung in Hannover und Region www.mint-hannover-region.de

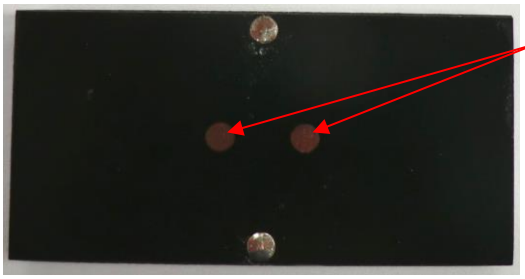
BNE Bildung für Nachhaltige Entwicklung

SUSEmod5 – an inexpensive, robust solar module for PV experiments

The small solar module SUSEmod5 contains a small solar cell with exactly half the area of the solar module SUSEmod215, solar cell dimensions 52 x 26 mm, module dimensions 60 x 30 mm



Front



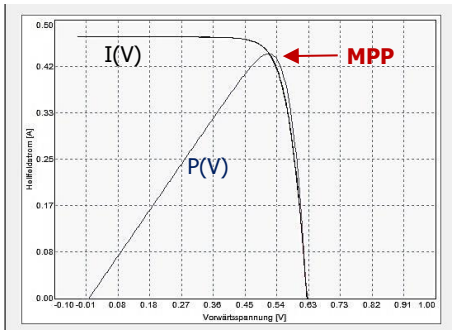
Back

The two Cu plates in the middle are the (marked) poles of the solar cell. Cell connectors or hookup wires can be soldered onto them.

The solar module **SUSEmod5** contains a solar cell with exactly half the area of the well-known SUSE solar cell SUSEmod215, the length of the solar cell is 52 mm, the width 26 mm. The solar cell is embedded break-proof in a plastic plate of the dimensions 60 x 30 mm. The surface on the solar cell is grouted/laminated super-transparent with plastic. On the back side there are 2 soldering contacts to solder on the positive and negative conductors (hookup wire). On the rear side the solar module can be stuck to smooth surfaces with double-faced adhesive tape or with glue. With this solar cell single experiments as well as experiments on series and parallel connections can be conducted, e.g. in the modules SUSE CM3xx, SUSE 4.31, and other devices.
Module: Plastic base plate 60 mm x 30 mm with super-transparent surface, mechanically very robust
Solar cell: Monocrystalline solar cell 52 x 26 mm

Technical data with an irradiation of 1000 W/m², T = 25°C, AM = 1.5

Physical value	Symbol	Numerical value	Physical unit	Annotations
Dimensions of the solar cell		52 x 26	mm	Monocrystalline cell
Open circuit voltage	U_{oc}	0.63	V	Typical for silicon
Short-circuit current	I_{sc}	0.468	A	Proportional to light intensity S
El. power	P	0.228	W	With solar spectrum, AM 1.5
Efficiency factor	η	17.0	%	Quality feature
Filling factor	FF	77,3	%	FF is a quality feature
Current density	j	34,7	mA/cm²	j is a quality feature
Thermal behaviour open circuit voltage U_{oc}		- 0.36	% /K	The voltage decreases with an increase in temperature with 0.36% per 1K
Thermal behaviour short-circuit current I_{sc}		+ 0.06	% /K	The short-circuit current increases with 0.06 % per 1K
Voltage at MPP	U_{MPP}	0.52	V	MPP = maximum power point The product of both values is the el. power.
Current at MPP	I_{MPP}	0.44	A	
Power at MPP	P_{MPP}	0.23	W	



The I(V) and P(V) characteristic curves

The I(V) characteristic curve shows the dependency oft he solar cell current on the solar cell voltage with a resistive load oft he solar cell. The intersection point with the x-axis ist he open circuit voltage (0,63V), the intersection point with the y-axis ist he short circuit current (0,468A). The power curve P(V) shows the maximum power point (MPP) = 0,23W at the highest point.

The V(S) (pink) and I(S) (blue) characteristic curves

The characteristic curves show the dependency of the open circuit voltage V and the short-circuit current I on the irradiance S (Light intensity)
0 = absolute darkness
1000 = bright sunshine in the summer half-year with deep blue sky

Characteristic curves V(S) and I(S) SUSE solare module 5
pink: open circuit voltage in V
blue: short circuit current in A