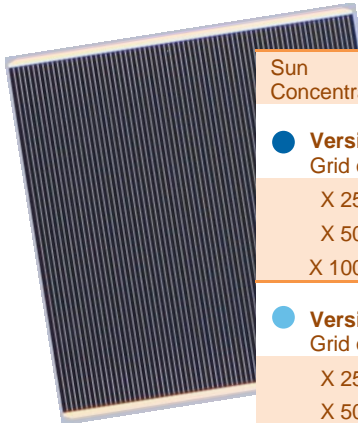


Concentrator Triple Junction Solar Cell

Cell Type: 3C44 – 10 x 10mm²
 Application: Concentrating Photovoltaic (CPV) Modules



Typical Average Electrical Data



Sun Concentration	I _{sc} [A]	V _{oc} [V]	I _{MPP} [A]	V _{MPP} [V]	P _{MPP} [W _{MPP}]	FF [%]	η [%]
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● Version MC/Air

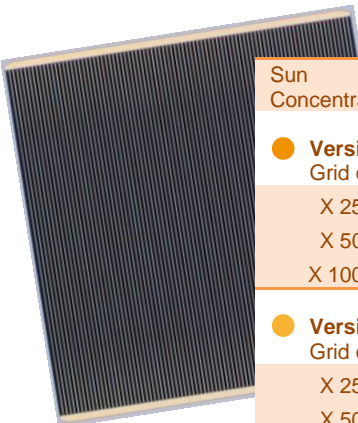
Grid optimized for medium concentration + Antireflective Coating adapted to air

X 250	3,85	3,06	3,77	2,80	10,59	89,9%	42,1
X 500	7,66	3,11	7,54	2,81	21,20	88,9%	42,0
X 1000	15,35	3,15	15,07	2,69	40,56	83,8%	40,3

● Version MC/Glass

Grid optimized for medium concentration + Antireflective Coating adapted to glass

X 250	3,82	3,07	3,76	2,80	10,55	89,9%	41,9
X 500	7,61	3,11	7,50	2,81	21,04	88,8%	41,8
X 1000	15,36	3,15	14,98	2,70	40,46	83,8%	40,2



Sun Concentration	I _{sc} [A]	V _{oc} [V]	I _{MPP} [A]	V _{MPP} [V]	P _{MPP} [W _{MPP}]	FF [%]	η [%]
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● Version HC/Air

Grid optimized for high concentration + Antireflective Coating adapted to air

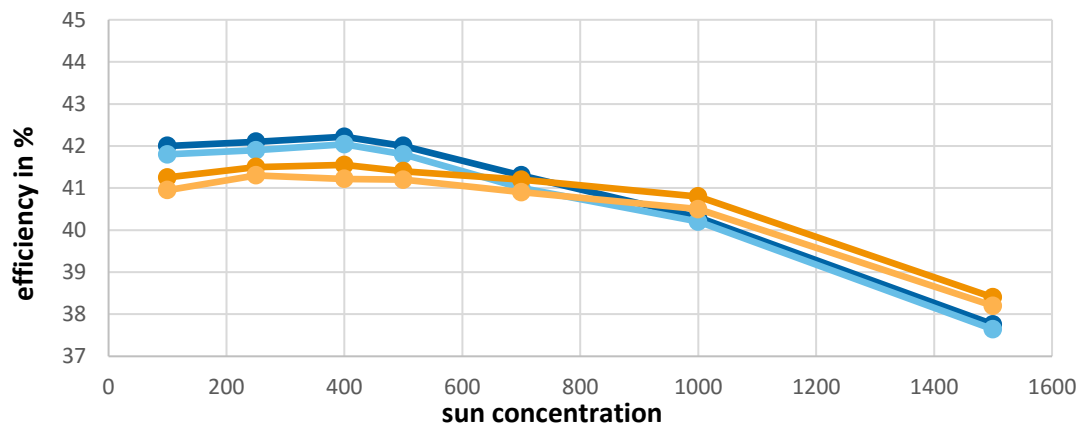
X 250	3,76	3,06	3,68	2,83	10,44	90,7%	41,5
X 500	7,49	3,11	7,38	2,83	20,88	89,6%	41,4
X 1000	15,17	3,14	14,82	2,77	41,08	86,4%	40,8

● Version HC/Glass

Grid optimized for high concentration + Antireflective Coating adapted to glass

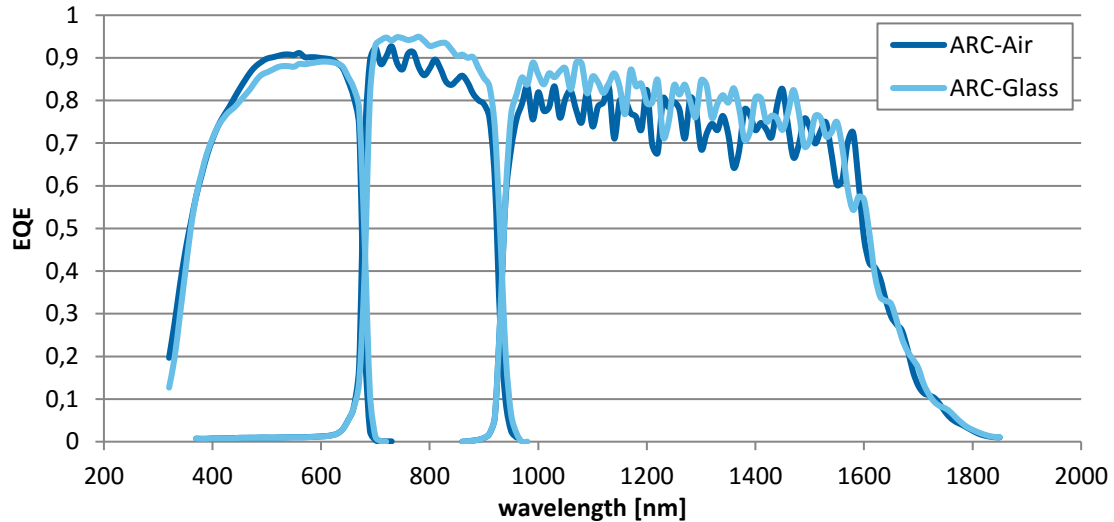
X 250	3,75	3,06	3,68	2,82	10,39	90,5%	41,3
X 500	7,47	3,10	7,35	2,82	20,73	89,5%	41,2
X 1000	14,97	3,14	14,71	2,77	40,77	86,9%	40,5

Efficiency versus Sun Concentration



Measurement conditions: 1.5 AMd – 1000 W/m² (ASTM G 173-03), T = 25 °C, designated measurement area = 100,51 mm²

Spectral Response



Typical Temperature Coefficients

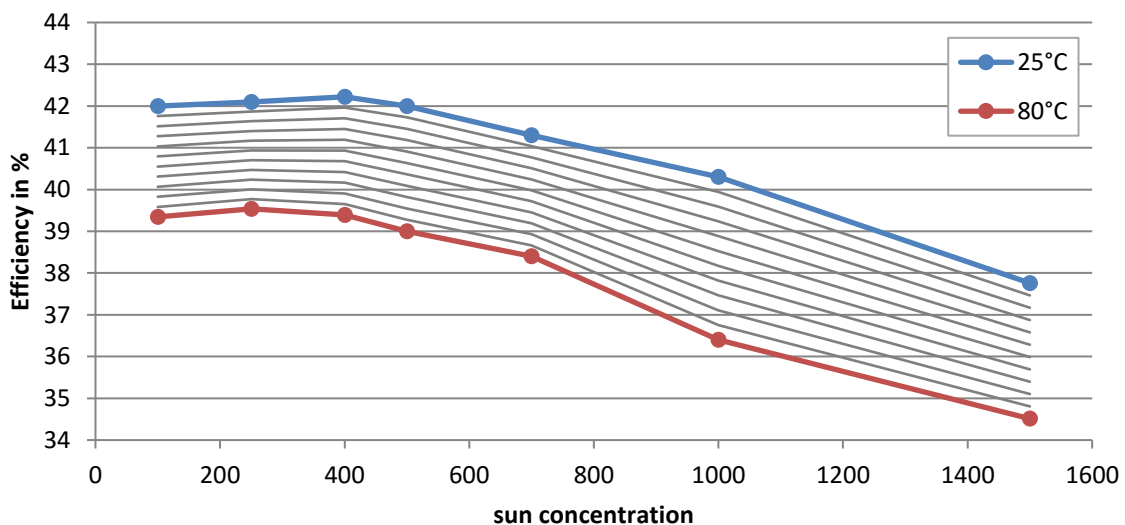
Temperature range (25 – 80 °C)

Parameter	$(\Delta I_{sc} / I_{sc(25^\circ C)}) / \Delta T$	$(\Delta V_{oc} / V_{oc(25^\circ C)}) / \Delta T$	$(\Delta P_{mpp} / P_{mpp(25^\circ C)}) / \Delta T$	$(\Delta \eta / \eta_{(25^\circ C)}) / \Delta T$
Value	0,080%/K	-0,135%/K	-0,106%/K	-0,106% _(rel) /K
Parameter	$\Delta I_{sc} / \Delta T$	$\Delta V_{oc} / \Delta T$	$\Delta P_{mpp} / \Delta T$	$\Delta \eta / \Delta T$
Value	6,1 mA/K	-4,2 mV/K	-22,5 mW/K	-0,045% _(abs) /K

Exemplary values measured with version MC/Air, at 500 suns

Typical Performance over Temperature

Exemplary for version MC/Air



Version Comparison

Opto Electrical Behaviour		Influence of Cell Dimension	
Antireflective Coating	Efficiency change on glass covered cells	Active Area	Typical efficiency (Version MC/Air at 250 suns)
Version Air	-3,2 % _(rel)	3 x 3 mm	44,0 %
Version Glass	-0,4 % _(rel)	5,5 x 5,5 mm	42,9 %
		10 x 10 mm	42,1 %

Efficiency comparison at 500 suns

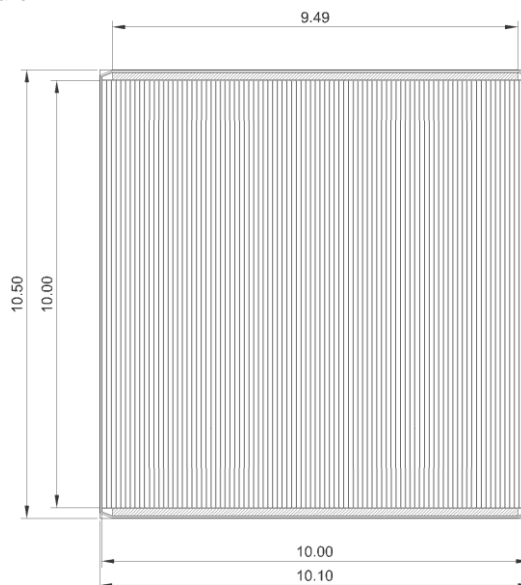


Design and Mechanical Data

Base Material	GaInP/GaInAs/Ge on Ge substrate
AR coating	TiO _x /AlO _x
Chip size	10,1 mm x 10,5 mm = 106,05 mm ²
Active Cell Area	10,0 mm x 10,0 mm = 100 mm ²
Cell thickness	190 μm ± 20 μm
Polarity	N on P
Thickness of front contact	≥ 2,8 μm (finish is an Ag/Au alloy)
Thickness of back contact	≥ 2,6 μm (finish is an Ag/Au alloy)
Assembly methods	suitable for welding, soldering and bonding

Layout details

Drawing dimension are mm



Sample drawing shows version with HC-grid design; More details in drawing HNR 0003782 and HNR 0003783, available on request.



Storage and Operation Conditions Requirements

- Humidity protection is strongly recommended
- Storage in dry air or nitrogen atmosphere is requested
- As front side interconnector material we recommend gold or silver
- We recommend to use Sn96.5/Ag3.5-solder or another solder with saturated silver for rear side assembly
- A void free rear side assembly (heat sink) is requested to avoid hot spots
- The cell junction shall not exceed a maximum operation temperature of 110° C
- Secondary glass glue on the front side has to be flexible (prefer silicone glue or similar)

Additional Information

- Current values at specific operating voltage can be offered on customer request
- Explanation of ARC versions:
 - o AIR:
The antireflective coating on top of the solar cell is optimized for the interface to air. In this kind of application the light enters the solar cell directly from air. The indoor test measurement (flash test) will be done at air atmosphere.
 - o GLASS:
The antireflective coating on top of the solar cell is optimized for the interface to glass or similar ($n \approx 1.43$). At this kind of application the light enters the solar cell through a glass component or similar (e.g. secondary element, homogenizer element, cover glass). However, the indoor test measurement (flash test) will be done at air atmosphere without glass interface. Therefore the flash test results will underestimate the potential cell performance. The performance of a system with glass interfaces is expected to be higher using cells with ARC Glass than with ARC Air.
- Acceptance test rules for delivery lots:
 - o Minimum average efficiency = typical average value minus 2% (rel.)
 - o Minimum individual cell efficiency = typical average value minus 5% (rel.)

Order Information

Product Version	 wafer (not diced)	 diced wafer, mounted on a tape
 MC/Air	81244	81245
 MC/Glass	81246	81247
 HC/Air	81248	81249
 HC/Glass	81250	81251