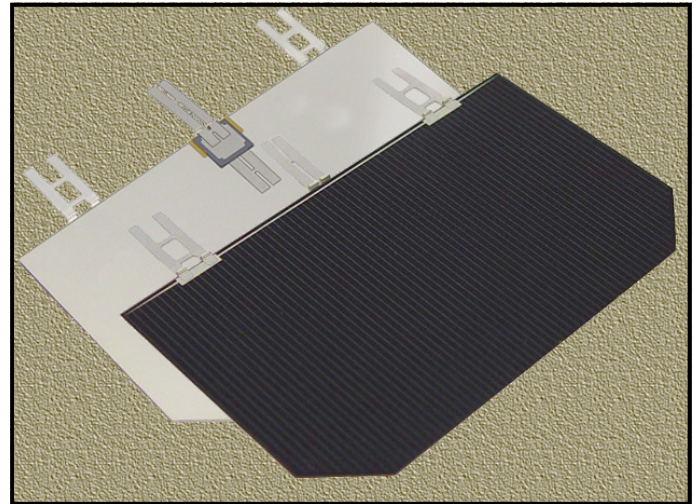


28.3% Ultra Triple Junction (UTJ) Solar Cells

Features

- High efficiency n/p design (28°C, AM0)
 - BOL: 28.3% min. average efficiency @ maximum power (28.0% @ load voltage)
 - EOL: 24.3% min. average efficiency @ maximum power, 1 MeV 1E15 e/cm²
- Heritage bypass diode protection
- 140 μm Ge wafer thickness



Product Description

Substrate	Germanium
Solar Cell Structure	GaInP ₂ /GaAs/Ge
Method of GaAs Growth	Metal Organic Vapor Phase Epitaxy
Device Design	Monolithic, two terminal triple junction. n/p GaInP ₂ , GaAs, and Ge solar cells interconnected with two tunnel junctions
Sizes	Up To 32 cm ²
Assembly Method	Multiple techniques including soldering, welding, thermocompression, or ultrasonic wire bonding

Note: Other Variations Are Available Upon Request

Heritage

- More than 2000 kW of multi-junction cells **delivered**
- More than 675 kW of multi-junction arrays **on orbit**
- 1 MW annual capacity - cells, panels & arrays
- On orbit performance for multi-junction solar cells validated to ± 1.5% of ground test results

Intellectual Property

This product is protected by the following patents:

- 6,380,601
- 6,150,603
- 6,255,580

ISO9001:2000
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AS9100
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Typical Electrical Parameters

(AM0 (135.3 mW/cm²) 28 °C, Bare Cell)

$J_{sc} = 17.05 \text{ mA/cm}^2$

$J_{mp} = 16.30 \text{ mA/cm}^2$

$J_{load \text{ min avg}} = 16.40 \text{ mA/cm}^2$

$V_{oc} = 2.665 \text{ V}$

$V_{mp} = 2.350 \text{ V}$

$V_{load} = 2.310 \text{ V}$

$Cff = 0.84$

$Eff_{load} = 28.0\%$

$Eff_{mp} = 28.3\%$

Radiation Degradation

(Fluence 1 MeV Electrons/cm²)

Parameters	1x10 ¹⁴	5x10 ¹⁴	1x10 ¹⁵
I_{mp}/I_{mp0}	0.99	0.98	0.96
V_{mp}/V_{mp0}	0.94	0.91	0.89
P_{mp}/P_{mp0}	0.93	0.89	0.86

Thermal Properties

Solar Absorptance= 0.92 (Ceria Doped Microsheet)

Emittance (Normal)= 0.85 (Ceria Doped Microsheet)

Weight

84 mg/ cm² (Bare) @ 140 μm (5.5 mil) Ge wafer thickness

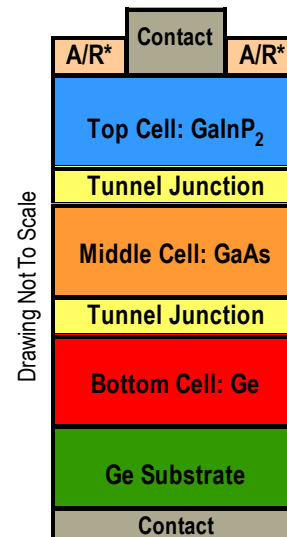
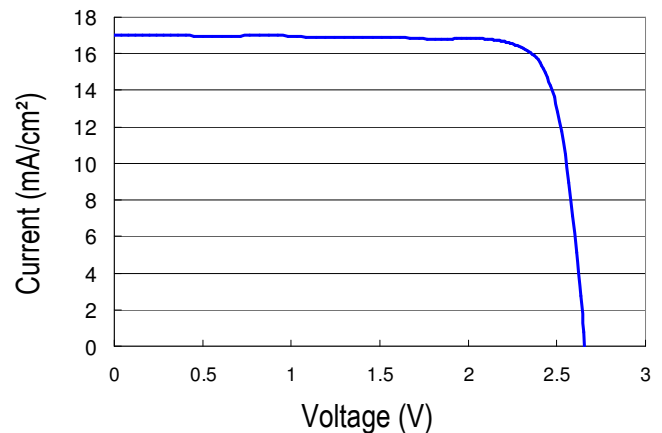
Temperature Coefficients (15 °C - 75 °C)

(Preliminary)

Parameters	BOL	5x10 ¹⁴ (1 MeV e/cm ²)
$J_{mp} (\mu\text{A/cm}^2/^{\circ}\text{C})$	1	5
$J_{sc} (\mu\text{A/cm}^2/^{\circ}\text{C})$	5	6
$V_{mp} (\text{mV}/^{\circ}\text{C})$	-6.5	-6.7
$V_{oc} (\text{mV}/^{\circ}\text{C})$	-5.9	-6.3

Typical IV Characteristic

AM0 (135.3 mW/cm²) 28 °C, Bare Cell



*A/R: Anti-Reflective Coating

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Specifications subject to change without notice. 4/21/2008