

26.8% Improved Triple Junction (ITJ) Solar Cells

Features

- High efficiency n/p design (28°C, AM0)
 - BOL: 26.8% min. average efficiency @ maximum power (26.5% @ load voltage)
 - EOL: 22.5% min. average efficiency @ maximum power (22.3% @ load voltage), 1 MeV 1E15 e/cm²
- Integral bypass diode protection
- Transparent insertion into existing systems



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 31 cm ²
Assembly Method	Multiple techniques including soldering, welding, thermocompression, or ultrasonic wire bonding
Integral Diode	Si diode integrated into recess on back side

Note: Other Variations Are Available Upon Request

Heritage

- More than 1400 kW of multi-junction cells **delivered**
- More than 375 kW of multi-junction arrays **on orbit**
- 1 MW annual capacity - cells, panels & arrays
- On orbit performance for multi-junction solar cells validated to $\pm 1.5\%$ 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
REGISTERED

AS9100
REGISTERED

S P E C T R O L A B

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Typical Electrical Parameters

(AM0 (135.3 mW/cm²) 28°C, Bare Cell)

J_{sc}= 16.90 mA/cm²

J_{mp}= 16.00 mA/cm²

J_{load min avg}= 16.10 mA/cm²

V_{oc}= 2.565 V

V_{mp}= 2.270 V

V_{load}= 2.230 V

Cff= 0.84

Eff_{load}= 26.5%

Eff_{mp}= 26.8%

Radiation Degradation

(Fluence 1MeV Electrons/cm²)

Parameters	1x10 ¹⁴	5x10 ¹⁴	1x10 ¹⁵
I _{mp} /I _{mp0}	1.00	0.98	0.96
V _{mp} /V _{mp0}	0.94	0.90	0.88
P _{mp} /P _{mp0}	0.94	0.88	0.84

Thermal Properties

Solar Absorptance= 0.92 (Ceria Doped Microsheet)

Emissance (Normal)= 0.85 (Ceria Doped Microsheet)

Weight

84 mg/ cm² (Bare) @ 140 μm (5.5 mil) Thickness

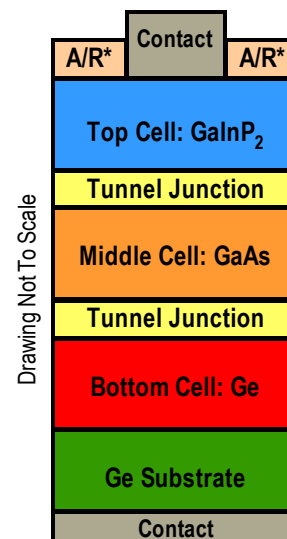
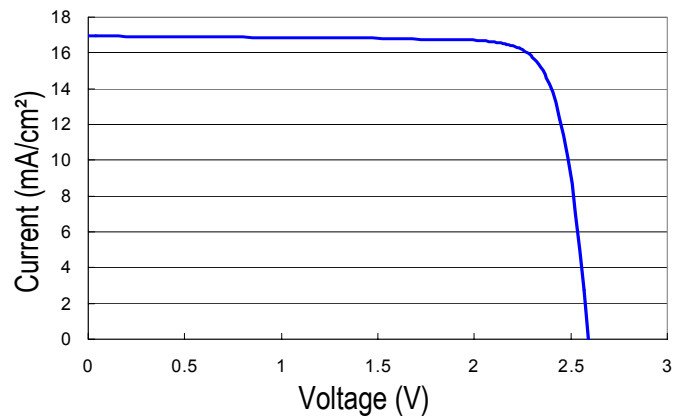
Thickness of 175 μm typical with weight equivalence of a 140 μm thick cell.

Temperature Coefficients (10°C - 80°C)

Parameters	BOL	1x10 ¹⁵ (1 MeV e/cm ²)
J _{mp} (μA/cm ² /°C)	7.3	9.5
J _{sc} (μA/cm ² /°C)	11.5	12.4
V _{mp} (mV/°C)	-6.2	-6.6
V _{oc} (mV/°C)	-5.9	-6.5

Typical IV Characteristic

AM0 (135.3 mW/cm²) 28°C, Bare Cell



*A/R: Anti-Reflective Coating

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