Spectrolab

Photovoltaic Products

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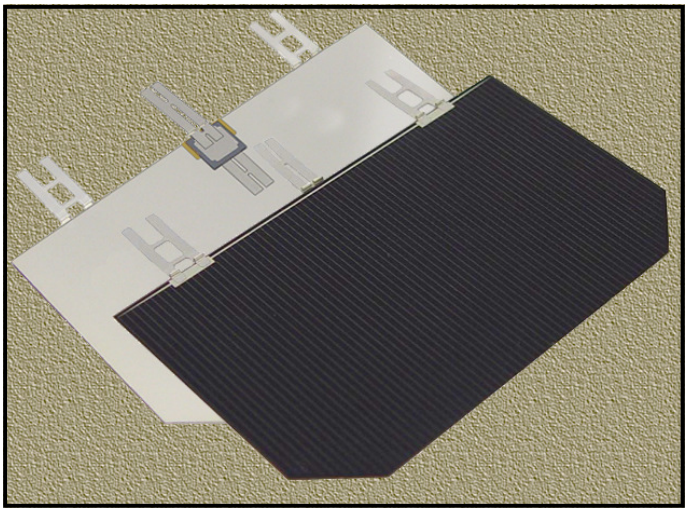
29.9% Next Triple Junction (XTJ) Solar Cells

Features

- High efficiency n/p design (28°C, AM0)
  -BOL: 29.9% min. average efficiency @ maximum power (29.7% @ load voltage)
  -EOL: 26.6% min. average efficiency @ maximum power, 1 MeV 5E14 e/cm²
- Heritage bypass diode protection
- 140 µm Ge wafer thickness
- Qualification to AIAA S-111-2005 by mid 2009 [TRL (5), MRL (6)]



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 60 cm^2
Assembly Method	Multiple techniques including soldering, welding, thermocompression, or ultrasonic wire bonding

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 REGISTERED

AS9100 REGISTERED

SPECTROLAB

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Typical Electrical Parameters

(AM0 (135.3 mW/cm²) 28°C, Bare Cell) (Preliminary)

J_{sc}= 18.10 mA/cm²
J_{mp}= 17.32 mA/cm²
$J_{load\ min\ avg}$= 17.52 mA/cm²
V_{oc}= 2.628 V
V_{mp}= 2.333 V
V_{load}= 2.29 V
Cff= 0.85
Eff_{load}= 29.7%
Eff_{mp}= 29.9%

Radiation Degradation *(Preliminary)*

(Fluence 1MeV Electrons/cm²)

Parameters	1x10¹⁴	5x10¹⁴	1x10¹⁵
Imp/Imp_0	1.00	0.98	0.95
Vmp/Vmp_0	0.94	0.90	0.88
Pmp/Pmp_0	0.94	0.89	0.84

Thermal Properties

Solar Absorptance= 0.90 (Ceria Doped Microsheet)
Emittance (Normal)= 0.85 (Ceria Doped Microsheet)

Weight

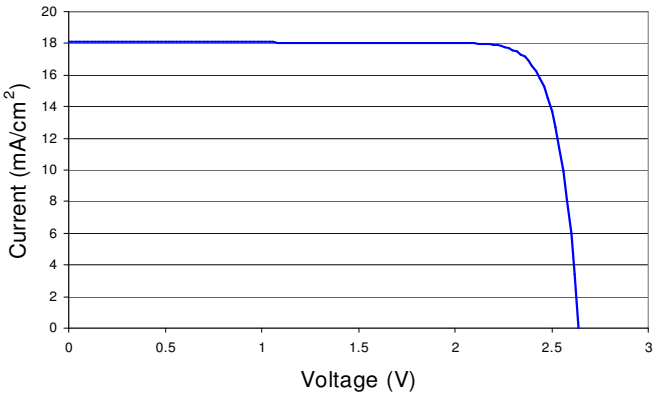
84 mg/ cm² (Bare) @ 140 µm (5.5 mil) Ge wafer thickness

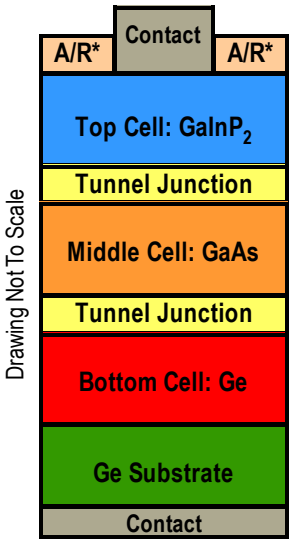
Temperature Coefficients *(15°C - 75°C) (Preliminary)*

Parameters	BOL	5x10¹⁴ (1 MeV e/cm²)
Jmp (µA/cm²/°C)	8.8	10.5
Jsc (µA/cm²/°C)	13.0	13.2
Vmp (mV/°C)	-6.5	-6.9
Voc (mV/°C)	-5.9	-6.7

Typical IV Characteristic

AM0 (135.3 mW/cm²) 28°C, Bare Cell





*A/R: Anti-Reflective Coating

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