Spectrolab

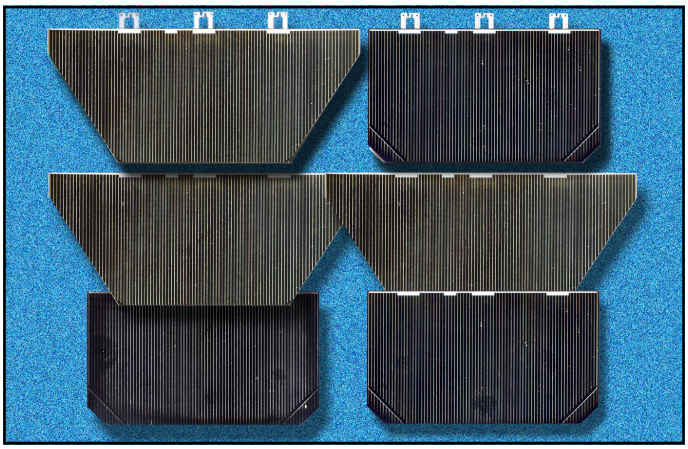
Photovoltaic Products

www.spectrolab.com

25.1% $GaInP_2$/GaAs/Ge Triple Junction Solar Cells

Features

- High efficiency n/p design
  - -BOL: up to 26% minimum average efficiency (28°C, AM0)
  - -EOL: up to 21% minimum average efficiency (28°C, AM0, 1E15 e/cm² 1 MeV equivalence)
  - -Integral bypass diode protection
  - -Transparent insertion into existing systems
- High volume production capability:
  - -Currently delivering 24.5% min. avg. efficiency solar cells
  - -26% minimum average efficiency available in year 2000



Product Description

Substrate	Germanium
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 30 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 2000 kW of multi-junction cells produced
- 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

ISO9001:2000 REGISTERED

SPECTROLAB

A BOEING COMPANY

Spectrolab Inc. 12500 Gladstone Avenue, Sylmar, California 91342 USA • Phone: 818.365.4611 • Fax: 818.361.5102

Spectrolab

Photovoltaic Products

www.spectrolab.com

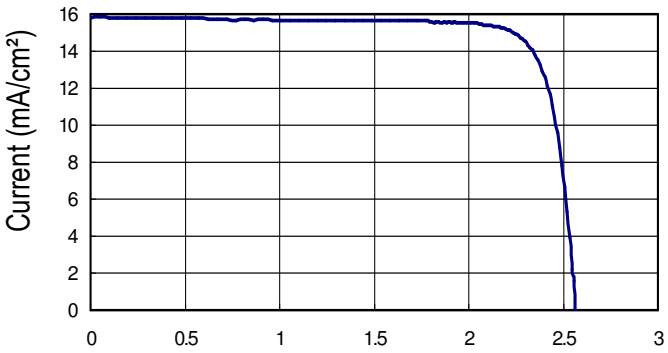
Typical Electrical Parameters

(AMO (135.3 mW/cm²) 28 ℃, Bare Cell)

J_{sc}= 15.60 mA/cm²
J_{mp}= 14.90 mA/cm²
$J_{load\ min\ avg}$= 14.93 mA/cm²
V_{oc}= 2.545 V
V_{mp}= 2.275 V
V_{load}= 2.220 V
Cff= 0.85
Eff_{load}= 24.5%
Eff_{mp}= 25.1%

Typical IV Characteristic

AMO (135.3 mW/cm²) 28°C, Bare Cell



Radiation Degradation

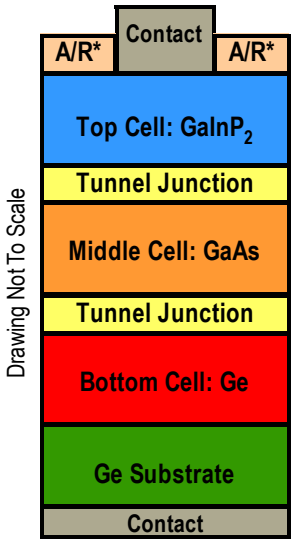
(Fluence 1MeV Electrons/cm²)

Parameters	1x10¹⁴	3x10¹⁴	1x10¹⁵
Imp/Imp_0	0.99	0.97	0.90
Vmp/Vmp_0	0.97	0.95	0.92
Pmp/Pmp_0	0.96	0.92	0.83

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.



*A/R: Anti-Reflective Coating

Thermal Properties

Solar Absorptance= 0.92 (Ceria Doped Microsheet)
Emittance (Normal)= 0.85 (Ceria Doped Microsheet)

Temperature Coefficients

Parameters	BOL	1x10¹⁵ (1 MeV e/cm²)
Jmp (µA/cm²/°C)	6	14
Jsc (µA/cm²/°C)	9	11
Vmp (mV/°C)	-6.7	-7.2
Voc (mV/°C)	-6.4	-6.8

ISO9001:2000 REGISTERED

The information contained on this sheet is for reference only. Specifications subject to change without notice. 4/29/2008

SPECTROLAB

A BOEING COMPANY

Spectrolab Inc. 12500 Gladstone Avenue, Sylmar, California 91342 USA • Phone: 818.365.4611 • Fax: 818.361.5102