Spectrolab

Photovoltaic Products

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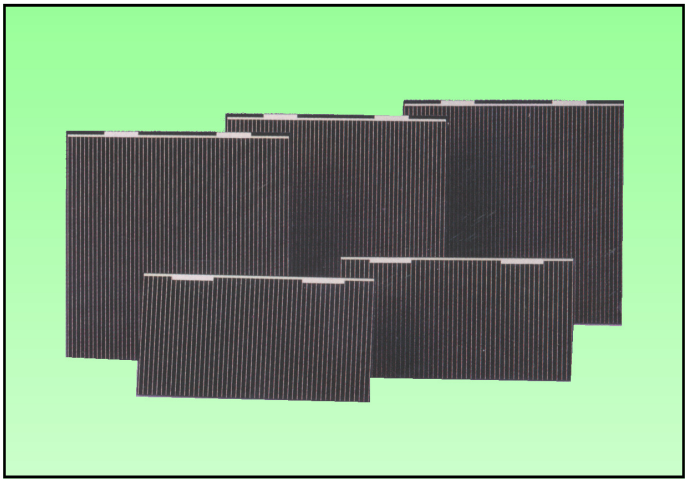
$GaInP_2/GaAs/Ge$ Dual Junction Solar Cells

Features

- High efficiency n/p design
  -Integral bypass diode protection
  -Transparent insertion into existing systems

- High volume production capability:
  -Currently delivering 21.5% minimum average efficiency solar cells



Product Description

Substrate	Germanium
Method of GaAs Growth	Metal Organic Vapor Phase Epitaxy
Device Design	Monolithic, two terminal dual junction. n/p $GaInP_2$ and GaAs solar cells interconnected with a tunnel junction
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

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Typical Electrical Parameters

(AMO (135.3 mW/cm²) 28°C, Bare Cell)

J_{sc}= 15.05 mA/cm²
J_{mp}= 14.15 mA/cm²
$J_{load\ min\ avg}$= 14.20 mA/cm²
V_{oc}= 2.360 V
V_{mp}= 2.085 V
V_{load}= 2.050 V
Cff= 0.83
Eff_{load}= 21.5%
Eff_{mp}= 21.8%

Radiation Degradation

(Fluence 1MeV Electrons/cm²)

Parameters	1x10¹⁴	5x10¹⁴	1x10¹⁵
Imp/Imp_0	1.00	0.96	0.92
Vmp/Vmp_0	0.96	0.93	0.91
Pmp/Pmp_0	0.96	0.89	0.83

Thermal Properties

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

Weight

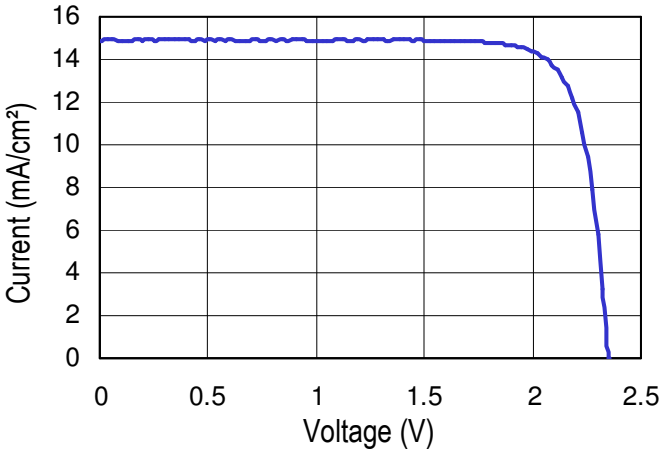
84 mg/ cm² (Bare) @ 140 µm (5.5 mil) Thickness
Thickness of 175 µm typical with weight equivalence of a 140 µm thick cell.

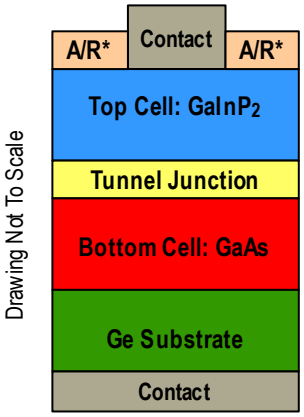
Temperature Coefficients

Parameters	BOL	1x10¹⁵ (1 MeV e/cm²)
Jmp (µA/cm²/°C)	8	13
Jsc (µA/cm²/°C)	10	12
Vmp (mV/°C)	-4.6	-5.0
Voc (mV/°C)	-4.2	-4.8

Typical IV Characteristic

AMO (135.3 mW/cm²) 28°C, Bare Cell





*A/R: Anti-Reflective Coating

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