

High Efficiency Space Solar Cells



2 Per (26.6 cm²)



LEONE (59.6 cm²)



SuperCell (> 72 cm²)

NeXt Triple Junction (XTJ)

Product Features

- Small and large cell sizes offered for optimum packing factor and cost competitiveness
- All sizes qualified for LEO and GEO missions
- Discrete Si bypass diode protection
- Performance for cells <32 cm² is 29.5% efficiency (minimum average @ max power, 28°C, AM0)
- Performance for cells >32 cm² is 28.9% efficiency (minimum average @ max power, 28°C, AM0)
- Available as CIC assembly (Cell-Interconnect-Coverglass with diode) for ease of integration or delivered on completed solar panels (please see Panel Data Sheet)

Space Heritage

- Highest competitive EOL dollar per Watt solutions
- More than 4 million multi-junction cells (over 200K XTJ cells) **delivered**
- Large area LEONE cell (59.6 cm²) delivered on solar panels for LEO constellations and GEO missions
- Large area SuperCell (73 cm²) delivered on solar panels for LEO constellations and GEO missions
- 1 MW annual capacity - cells and panels
- On orbit performance for multi-junction solar cells validated to +1% of ground test results on average

Qualification

Key Qualification Results	
Low Earth Orbit (LEO)	> 75,000 cycles
Geostationary Orbit (GEO)	> 15,550 cycles
Testing	ESD Survivability Tested to ISO Standards
Qualification	AIAA-S111 and AIAA-S112

Product Description

Substrate	Germanium
Solar Cell Structure	GaInP ₂ /InGaAs/Ge
Method	Metal Organic Vapor Phase Epitaxy
Device Design	Monolithic, two terminal triple junction. n/p GaInP ₂ , InGaAs, and Ge solar cells interconnected with two tunnel junctions
Standard Sizes	26.6 cm ² , 59.6 cm ² and 73 cm ² are most cost effective and common standard sizes; other sizes available
Assembly Method	Welded
CIC Assembly	Coverglass thickness range from 3 mils to 30 mils with various coatings. Interconnects available with either out-of-plane or in-plane stress relief

NeXt Triple Junction (XTJ)

Typical Electrical Parameters

(AM0 (135.3 mW/cm²) 28°C, Bare Cell)

Parameters	< 32 cm ²	> 50 cm ²
Jsc	17.76 mA/cm ²	17.76 mA/cm ²
Jmp	17.02 mA/cm ²	17.02 mA/cm ²
Jload _{min avg}	17.14 mA/cm ²	17.14 mA/cm ²
Voc	2.633 V	2.633 V
Vmp	2.348V	2.300V
Vload	2.310 V	2.270 V
Cff	0.85	0.84
Effload	29.3%	28.8%
Effmp	29.5%	28.9%

Radiation Degradation

(Fluence 1MeV Electrons/cm²)

Parameters	1x10 ¹⁴	5x10 ¹⁴	1x10 ¹⁵
I _{mp} /I _{mp0}	1.00	0.99	0.95
V _{mp} /V _{mp0}	0.94	0.91	0.89
P _{mp} /P _{mp0}	0.95	0.90	0.85

Thermal Properties

Solar Absorptance	0.90 (5 mil CMG-AR, 0.90 for bare cells)
Emittance (Normal)	0.85 (Ceria Doped Microsheet)

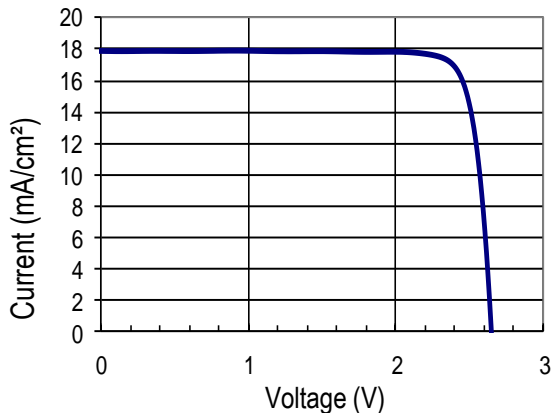
Temperature Coefficients (15°C - 75°C)

(Fluence 1MeV Electrons/cm²)

Parameters	BOL	5x10 ¹⁴	1x10 ¹⁵
Jmp (μA/cm ² /°C)	6.6	10.0	13.2
Jsc (μA/cm ² /°C)	11.6	10.9	11.9
Vmp (mV/°C)	-6.5	-6.8	-6.9
Voc (mV/°C)	-5.8	-6.5	-6.6

Typical IV Characteristic

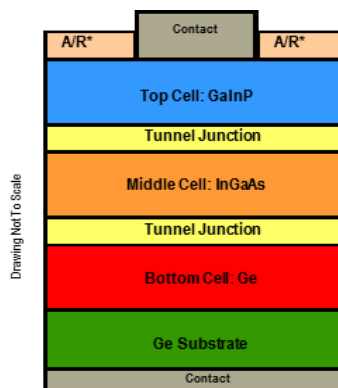
AM0 (135.3 mW/cm²) 28°C, Bare Cell



Weight

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

Solar Cell Structure



*A/R: Anti-Reflective Coating

Intellectual Property

This product is protected by Spectrolab's portfolio of patents including the following:

- 6,150,603
- 6,255,580
- 6,380,601
- 7,119,271
- 7,126,052

Regulatory

Spectrolab's products are fully qualified and are ISO9001 and AS9100 certified