

29.5% NeXt Triple Junction (XTJ)



2 Per (26.6 cm²)



LEONE (59.6 cm²)



SuperCell (> 72 cm²)

High Efficiency Space Photovoltaics

Product Features

- Cell sizes available from 4 to 73 cm² for optimal packing factor. Custom sizes are available
- Small and large cell sizes offered for optimum packing factor and cost competitiveness
- Qualified for all near earth missions
- All welded construction
- Discrete Si bypass diode protection
- Available as bare cell, CIC assembly, or CIC on solar panels
- Lowest EOL dollar per Watt solutions

Space Heritage

- More than 4 million multi-junction cells (over 200K XTJ cells) delivered
- Large area LEONE cell (53.3 cm² and 59.6 cm²) delivered on solar panels for LEO and GEO missions
- Large area SuperCell (>65 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
- > 125K Supercells produced and >150 solar panels delivered with Supercells

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-S111-2005 and AIAA-S112-2005

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)

Parameter	Unit	100 mm 2 per	100 mm 1 per	150 mm 2 per
Eff _{mp}	[%]	29.5%	28.9%	29.5%
V _{oc}	[V]	2.633	2.633	2.633
J _{sc}	[mA/cm ²]	17.76	17.76	17.76
V _{mp}	[V]	2.348	2.300	2.323
J _{mp}	[mA/cm ²]	17.02	17.02	17.02

Performance Retention Under Radiation

(1 MeV e-fluence (e-/cm²))

Parameter	1 MeV e- fluence (e-/cm ²)				
	3E+13	1E+14	1E+15	3E+15	1E+16
J _{mp} /J _{mp,o}	1.00	1.00	0.97	0.93	0.84
V _{mp} /V _{mp,o}	0.96	0.95	0.89	0.84	0.77
P _{mp} /P _{mp,o}	0.96	0.94	0.85	0.78	0.65
Eff _{mp} %	28.3%	27.7%	25.1%	23.0%	19.2%

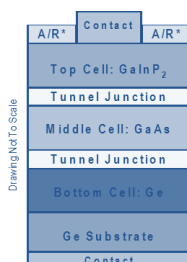
* per AIAA S-111-2005 Standard

Parameter	1 MeV e- fluence (e-/cm ²)				
	3E+13	1E+14	1E+15	3E+15	1E+16
J _{mp} /J _{mp,o}	n/c	n/c	0.96	0.94	0.84
V _{mp} /V _{mp,o}	n/c	n/c	0.91	0.86	0.82
P _{mp} /P _{mp,o}	n/c	n/c	0.87	0.81	0.69
Eff _{mp}	n/c	n/c	25.7%	23.9%	20.4%

* Characterized per ECSS-E-ST-20-08C (Sec. 7.5.15) (48 hr 25°C photon soak & 24 hr 60°C dark anneal)

n/c: not characterized

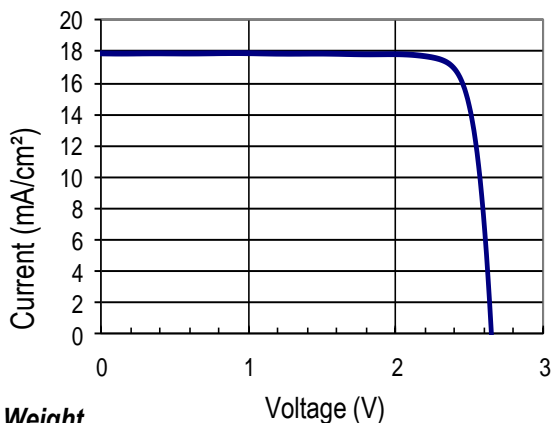
Solar Cell Structure



*A/R: Anti-Reflective Coating

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

Temperature Coefficients (15°C - 75°C)

(Fluence 1MeV Electrons/cm²)

Parameter	1 MeV e- fluence (e-/cm ²)				
	BOL	1E+14	1E+15	3E+15	1E+16
DV _{oc} /DT	-6.1	-6.4	-6.7	-7.0	-7.0
DJ _{sc} /DT	10.6	8.8	9.8	10.7	10.0
DV _{mp} /DT	-6.5	-6.7	-6.9	-7.1	-6.9
DJ _{mp} /DT	6.6	7.3	13.2	13.9	14.9

* per AIAA S-111-2005 Standard

Thermal Properties

Parameters	Value
Solar Absorptance	0.90 (5 mil CMG-AR, 0.88 for bare cells)
Emissance (Normal)	0.85 (Ceria Doped Microsheet)

Intellectual Property

Space products are protected by Spectrolab's portfolio of patents > 90 U.S. patents.

Regulatory



ENVIRONMENTAL MANAGEMENT SYSTEM
CERTIFIED BY DNV
ISO 14001

7/16/18

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