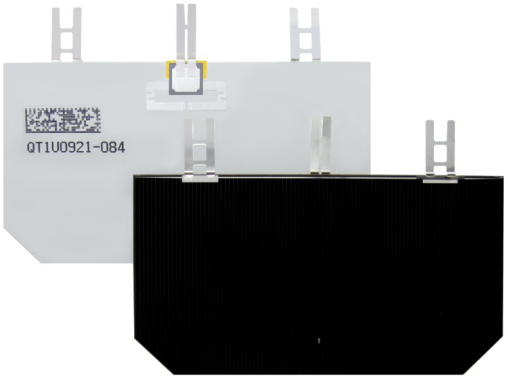
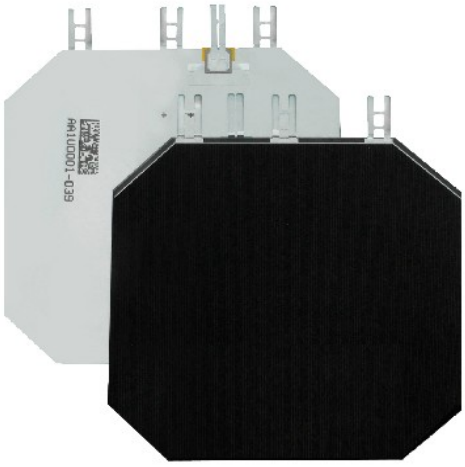
SPECTROLAB

A **BOEING** COMPANY

29.5% NeXt Triple Junction (XTJ) Solar Cells





Cells shown with interconnects, coverglass, and bypass diode

Features

- Small and large cell sizes offered for optimum packing factor and cost competitiveness
- Geostationary Orbit (GEO) mission qualified
- 29.5% efficiency (min. average @ max power, 28°C, AM0)
- 29.3% efficiency (min. average @ load, 28°C, AM0)
- Discrete Si bypass diode protection
- Available as CIC assembly (Cell-Interconnect-Coverglass with diode) for ease of integration or delivered on completed solar panels (see Panel Data Sheet)
- Also qualified as large area cell/CIC (59.65cm^2)

Key Qualification Results

- Qualified in accordance with AIAA-S111-2005
- Completed 2,000 GEO qualification cycles, including Combined Effects Test

Product Description

Substrate	Germanium
Solar Cell Structure	$GaInP_2$/GaAs/Ge
Method	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
Standard Sizes	26.62cm^2 and 59.65cm^2 are 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

Heritage

- More than 2.6 million multi-junction cells **delivered**
- More than 820 kW of multi-junction arrays ***on orbit***
- 1 MW annual capacity - cells and panels
- On orbit performance for multi-junction solar cells validated to ± 1.5% of ground test results

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

Specifications Subject to Change Without Notice

ISO9001:2000 REGISTERED

ENVIRONMENTAL MANAGEMENT SYSTEM CERTIFIED BY DNV ISO 14001

AS9100 REGISTERED

Spectrolab, Inc. 12500 Gladstone Avenue, Sylmar, California 91342 USA
● Phone 818.365.4611 ● FAX: 818.361.5102 Website: www.spectrolab.com

29.5% NeXt Triple Junction (XTJ) Solar Cells

Typical Electrical Parameters

(AM0 (135.3 mW/cm²) 28°C, Bare Cell)

Jsc= 17.76 mA/cm²
Jmp= 17.02 mA/cm²
Jload $_{min\ avg}$= 17.14 mA/cm²
Voc= 2.633 V
Vmp= 2.348 V
Vload= 2.310 V
Cff= 0.85
Effload= 29.3%
Effmp= 29.5%

Radiation Degradation

(Fluence 1MeV Electrons/cm²)

Parameters	1x10^{14}	5x10^{14}	1x10^{15}
Imp/Imp$_0$	1.00	0.99	0.95
Vmp/Vmp$_0$	0.94	0.91	0.89
Pmp/Pmp$_0$	0.95	0.90	0.85

Thermal Properties

Solar Absorptance= 0.90 (5 mil CMG/AR, 0.88 for bare cell)
Emittance (Normal)= 0.85 (Ceria Doped Microsheet)

Weight

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

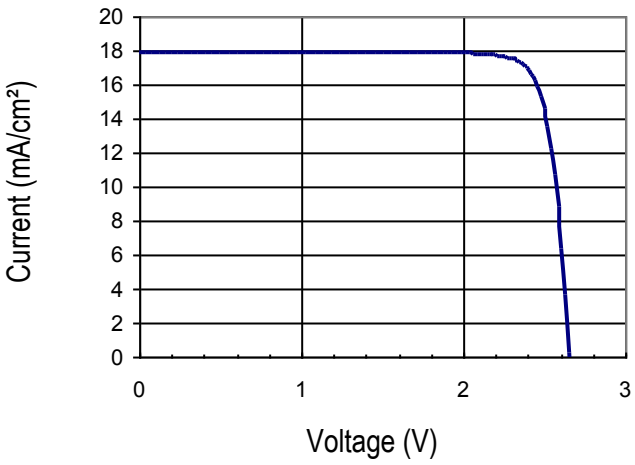
Temperature Coefficients *(15°C - 75°C)*

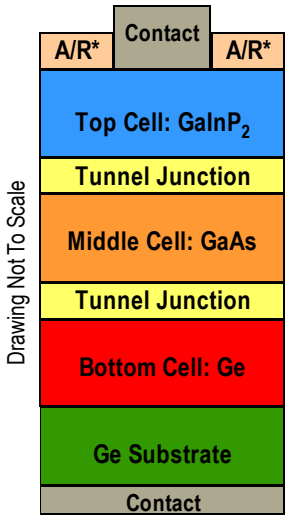
(Fluence 1MeV Electrons/cm²)

Parameters	BOL	5x10^{14}	1x10^{15}
Jmp (µA/cm²/°C)	6.6	10.0	13.2
Jsc (µA/cm²/°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





*A/R: Anti-Reflective Coating

The information contained on this sheet is for reference only. Specifications subject to change without notice.
Revised 5/20/2010

ISO9001:2000 REGISTERED

ENVIRONMENTAL MANAGEMENT SYSTEM CERTIFIED BY DNV ISO 14001

AS9100 REGISTERED

Spectrolab, Inc. 12500 Gladstone Avenue, Sylmar, California 91342 USA
● Phone 818.365.4611 ● FAX: 818.361.5102 Website: www.spectrolab.com