

Triple-Junction Terrestrial Concentrator Solar Cells

Features

- High efficiency GaInP₂/GaAs/Ge triple junction monolithic, two-terminal design
- Greater than 30% AM1.5D min. avg. efficiency from 200 to 400 Suns concentration in production
- Compatible with point focus, dense array and linear concentrators
- High Reliability
 - No degradation with multiple assembly methods

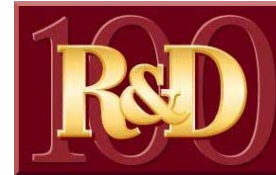
Product Description

Substrate	Germanium
Method of Cell Growth	Metal Organic Vapor Phase Epitaxy
Polarity	n/p
Thickness	7-8 mil
Size	Designed to customer request
Assembly Method	Multiple techniques including soldering, welding, thermocompression or ultrasonic wire bonding
Device Design	Monolithic, two terminal triple junction. n/p GaInP ₂ , GaAs, and Ge solar cells interconnected with two tunnel junctions.
Antireflective Coating	Multi-layer providing low reflectance over wavelength range 0.3 to 1.8µm.
Solar Cells Compatible with Optional Prismatic Covers and Secondary Optical Elements	
Note: Other Variations Are Available Upon Request	

Temperature Coefficients at 1 Sun

$J_{sc} = 8.2 \mu A/cm^2/^{\circ}C$	$V_{mp} = -6.7 mV/^{\circ}C$
$V_{oc} = -6.4 mV/^{\circ}C$	Efficiency = -0.062 abs%/°C

Winner of Year 2001 R&D 100 Award*



Typical Qualification Test Results (Nominal Degradation)

Test	Description	Results
Humidity	+45°C, 95% RH Min. 30 days	TBD
Thermal Cycle		TBD
Pull Test	Parallel Gap Welded Tabs (Ag, Ag Plated Kovar)	150 g min. 350 g avg. (typical)

*Established in 1963 by Research & Development Magazine, the R&D 100 Awards recognize the 100 most technologically significant new products and processes of the year. Winners are products and processes that can change people's lives for the better, through improvements attributable to significant breakthroughs in technology. Past recipients have included products such as the automated teller machine ('73), the fax machine ('75), the liquid crystal display ('80), Taxol anticancer drug ('93) and high-definition television ('98).



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Typical Cell Electrical Parameters

1000 Suns, AM1.5D (100.0 W/cm²) 25°C

$J_{sc} = 11.84 \text{ A/cm}^2$	$J_{mp} = 11.27 \text{ A/cm}^2$
$V_{oc} = 3.04 \text{ V}$	$V_{mp} = 2.54 \text{ V}$
$P_{mp} = 28.61 \text{ W/cm}^2$	Cff = 81.5 %
Efficiency = 28.61 %	

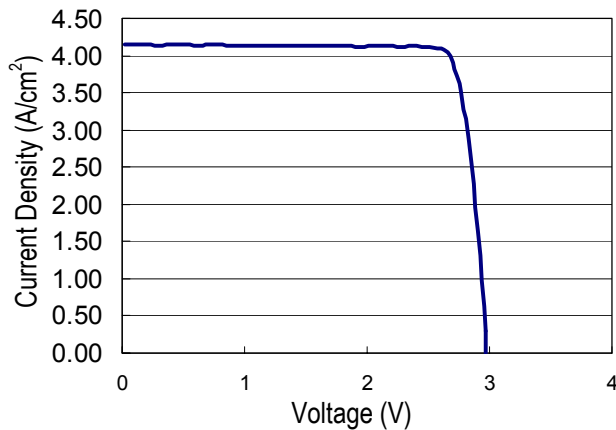
Typical Cell Electrical Parameters

350 Suns, AM1.5D (37.2 W/cm²) 25°C

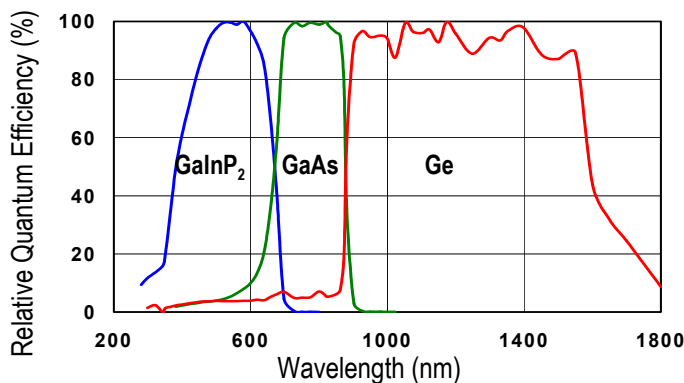
$J_{sc} = 4.14 \text{ A/cm}^2$	$J_{mp} = 4.05 \text{ A/cm}^2$
$V_{oc} = 2.97 \text{ V}$	$V_{mp} = 2.64 \text{ V}$
$P_{mp} = 10.68 \text{ W/cm}^2$	Cff = 86.9 %
Efficiency = 30.5 %	

Typical Cell Light IV Characteristic

350 Suns, AM1.5D (35 W/cm²) 25°C

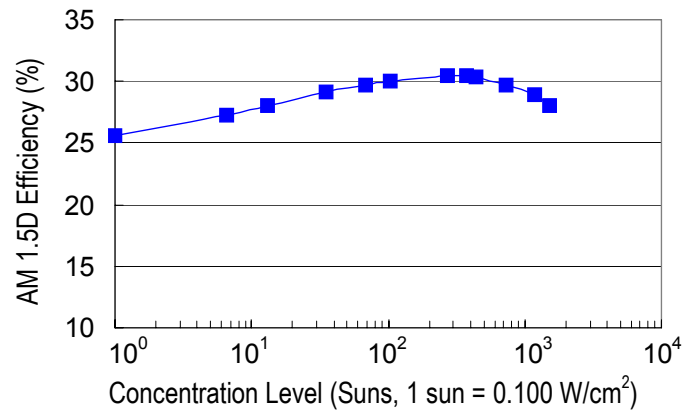


Quantum Efficiency

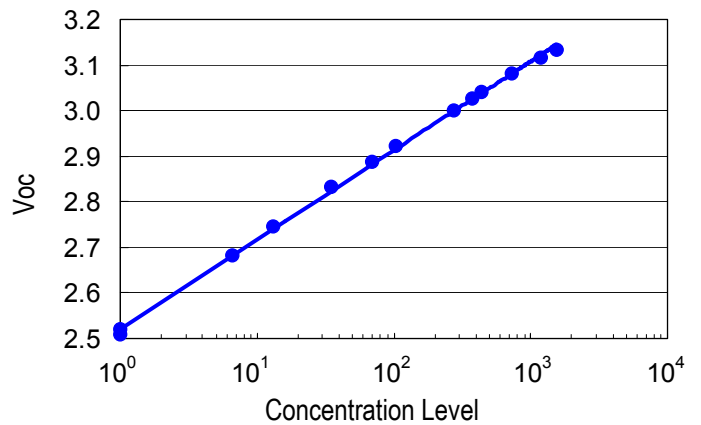


Key Performance Characteristics

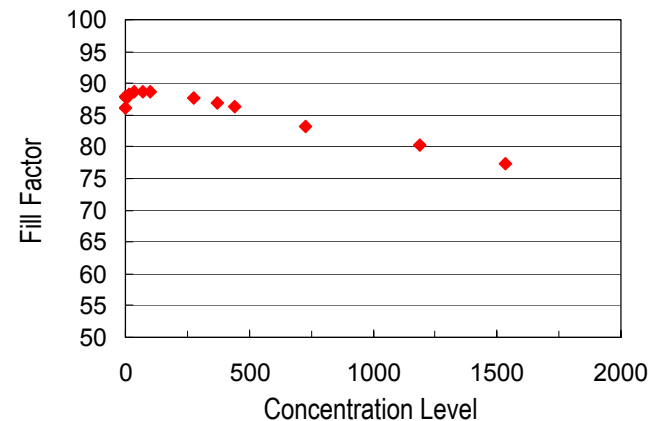
a. Conversion Efficiency Performance



b. Open Circuit Voltage Performance



c. Fill Factor Performance



The information contained on this sheet is for reference only. Actual specifications for delivered products may vary. 9/12/00