ATJM Photovoltaic Cell

Advanced Triple-Junction with Monolothic Diode Solar Cell for Space Applications

emcore
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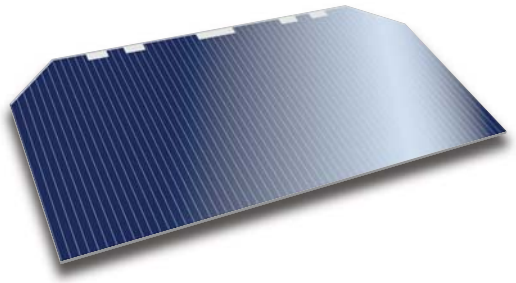
SPACE PHOTOVOLTAICS

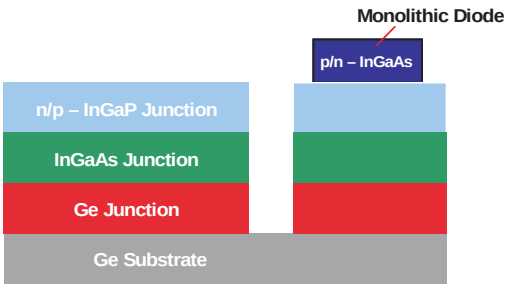


Typical Performance Data

Solar Cell Electrical Output Parameters	
Electrical Parameters @ AM0 (135.3 mW/cm^2)	27%
Voc	2.575V
Jsc	16.9 mA/cm^2
Vmp	2.285V
Jmp	16.0 mA/cm^7

Monolithic Diode Electrical Performance	
V_{RB} <2.0 V @ I_{RB}	500 mA, 28°
I_{RB} <50 µA @ V_{RB}	2.5V (Dark), 28°C
I_{RB} <200 µA @ V_{RB}	2.5V (Illuminated), 28°C
I_{RB} <10 µA @ V_{RB}	2.5V (Dark), –150°C
I_{RB} <1 µA @ V_{RB}	2.5V (Dark), +120°C

ATJM Cell Structure



Schematic Cross-Sectional View

27.0% Minimum Average Efficiency

Features & Characteristics

- Advanced Triple-Junction (ATJ) InGaP/InGaAs/Ge Solar Cells with n-on-p Polarity on 140-µm Uniform Thickness Substrate
- Fully space-qualified with proven flight heritage in LEO and GEO environments
- Fully Space-Qualified Monolithic Bypass Diode Protection
- Lowest solar cell mass of 84 mg/cm2
- Excellent radiation resistance with P/Po = 0.89 @ 1-MeV, 5E14 e/cm2 fluence
- Excellent Mechanical Strength for Reduced Attrition during Assembly and Laydown
- Weldable or Solderable contacts
- Available at EPI, cell, CIC or panel configuration
- Standard and Custom Sizes Available

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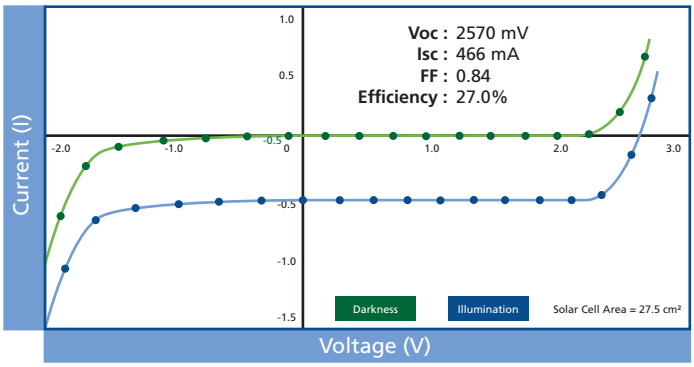
Typical Current (I) / Voltage(V) Plot



Key Space Qualification Results

Test Performed	Industry Quality Standard	Typical Test Results
Metal Contact Thickness	4-10 µm	6 µm
Dark Current degradation after reverse bias	Δ Ispec <2%	<0.4%
Electrical performance after 2,000 thermal cycles -180°C to +95°C	<2%	<0.7%
High-Temperature Anneal at 200°C for >5,000 hrs.	<2%	No measurable difference
Contact pull strength	>300 grams	>600 grams
Electrical performance degradation after 40 day humidity exposure at 60°C and 95% relative humidity	<1.5%	No measurable difference

- For complete qualification results, please request EMCORE's ATJ Qual Report EWRP036

About EMCORE Corporation

Emcore Photovoltaics Albuquerque, NM

- Incorporated in 1984
- Appx. 900 Employees
- Nasdaq: EMKR

Radiation Performance at 1 MeV Electron Irradiation, EOL/BOL Ratios

Fluence (e/cm²)	Voc	Isc	Vmp	Imp	Pmp	Efficiency
5E 13	0.97	1.00	0.97	1.00	0.97	0.97
1E 14	0.96	1.00	0.96	1.00	0.96	0.96
5E 14	0.92	0.98	0.92	0.96	0.89	0.89
1E 15	0.90	0.96	0.90	0.94	0.85	0.85
3E 15	0.86	0.90	0.85	0.87	0.74	0.74

Temperature Coefficients

Fluence (e/cm²)	ΔVoc/ΔT (mV/°C)	Jsc/ΔT [1] (µA/°C)	Vm/ΔT (mV/°C)	Jmp/ΔT [2] (µA/°Ccm)
BOL	-5.48	+12	-5.93	+11
5E 13	-5.49	+10	-5.68	+7
1E 14	-5.46	+11	-5.66	+7
5E 14	-5.61	+12	-5.92	+12
1E 15	-5.77	+12	-6.14	+13

- [1] Jsc is the symbol for normalized Isc
- [2] Jmp is the symbol for normalized Imp

Regulatory

ISO 9001 — EMCORE CORPORATION ISO 9001 CERTIFIED

AS9100 — EMCORE PHOTOVOLTAICS AS9100 CERTIFIED

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