ATJ Photovoltaic Cell

Advanced Triple-Junction Solar Cell for Space Applications

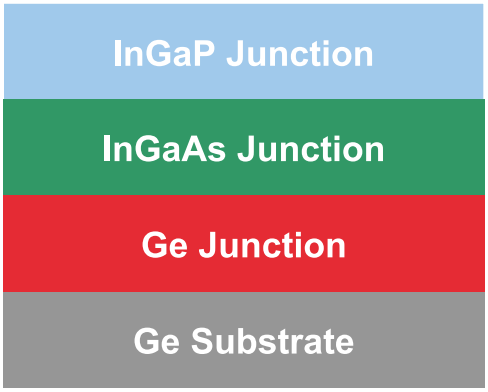
emcore
empower with light™

SPACE PHOTOVOLTAICS

Typical Performance Data

Electrical Parameters @ AM0 (135.3 mW/cm²)	28°C
BOL Efficiency at Maximum Power Point	27.5%
Voc	2.60V
Jsc	17.1 mA/cm²
Vmp	2.30V
Jmp	16.2 mA/cm⁷

ATJ Cell Structure



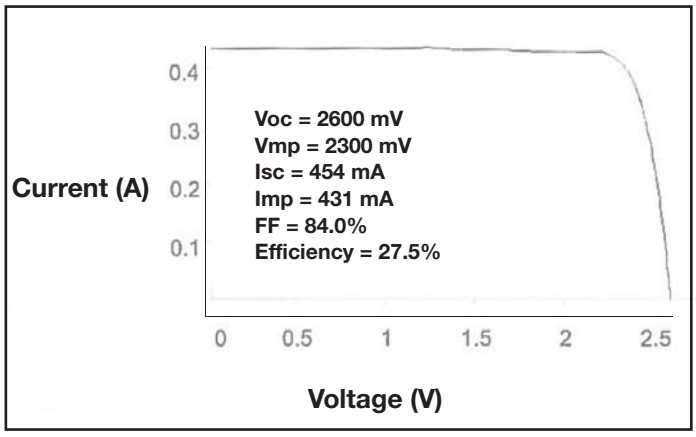
27.5% Minimum Average Efficiency

Features & Characteristics

- Lowest solar cell mass of 84 mg/cm²
- 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
- Excellent radiation resistance with P/Po = 0.89 @ 1-MeV, 5E14 e/cm² fluence
- Designed to accept corner-mounted silicon bypass diode for invidual cell reverse bias protection
- Good mechanical strength for reduced attrition during assembly and laydown
- Weldable or Solderable contacts
- Available at EPI, cell, CIC or panel configuration

Typical ATJ Illuminated I-V Plot

Solar Cell Area = 26.6 cm²



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Optional Covered Interconnect Cell (CIC) Configurations

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. 700 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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