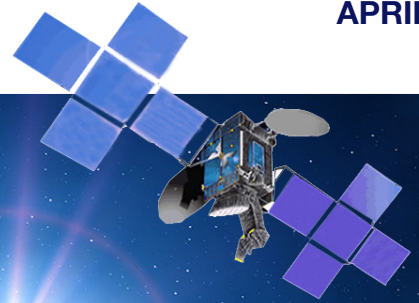


*The World Leader in
Space Power Solutions*

Over 3.5 million flight solar cells delivered!



ZTJM Space Solar Cell

Advanced Triple-Junction Solar Cell with Monolithically Integrated Bypass Diode

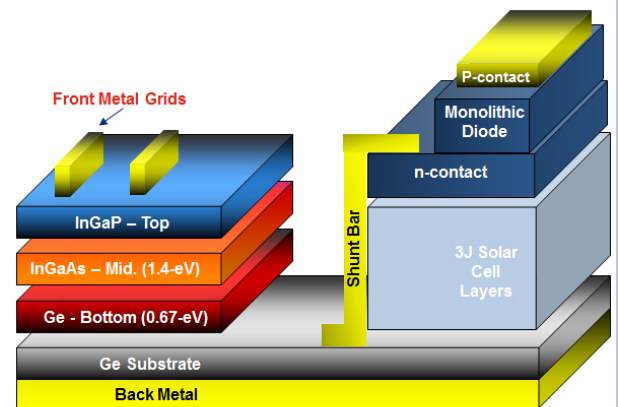


29.0%
Minimum Average Efficiency

Space Qualified & Characterized to the
AIAA-S111-2005 & AIAA-S112-2005 Standards

FEATURES & CHARACTERISTICS

- 3rd generation triple-junction (ZTJ) InGaP/InGaAs/Ge Solar Cells with n-on-p polarity
- Solar cell mass of 84 mg/cm²
- Fully space-qualified with proven large volume manufacturing and flight heritage
- Excellent radiation resistance with P/Po = 0.90 @ 1-MeV, 5E14 e/cm² fluence
- ESD-hard monolithically integrated bypass diode for individual cell reverse bias protection
- Excellent mechanical strength for reduced attrition during assembly and laydown
- Weldable or solderable contacts
- Custom sizes available



ZTJ Solar Cell & Monolithic Bypass Diode Structure

ZTJM Space Solar Cell

Advanced Triple-Junction Solar Cell with Monolithically Integrated Bypass Diode

Typical Performance Data

Electrical Parameters @ AM0 (135.3 mW/cm²)

BOL Efficiency at Maximum Power Point	29.5%
Voc (V)	2.72
Jsc (mA/cm ²)	17.1
Vmp (V)	2.38
Jmp (mA/cm ²)	16.5

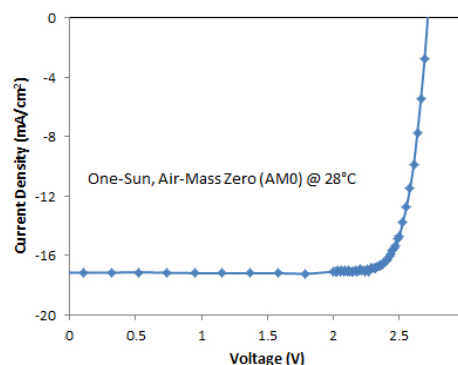
Temperature Coefficients

Fluence (e/cm ²)	Voc (mV/°C)	Jsc ⁽¹⁾ (μA/cm ² -°C)	Jmp ⁽²⁾ (μA/cm ² -°C)	Vmp (mv/°C)	Pmp (μW/cm ² -°C)
0	-6.3	11.7	9.1	-6.7	-85.7
1.00 E+ 14	-6.6	11.4	9.1	-7.0	-92.3
1.00 E+ 15	-6.9	11.3	10.6	-7.3	-89.9
1.00 E+ 16	-7.4	11.5	13.4	-6.6	-57.2

(1) Jsc is the symbol for normalized Isc (2) Jmp is the symbol for normalized Imp

Typical ZTJM Illuminated I-V

Cell Area Ranges from 20 cm² to 73 cm²



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

Fluence (e/cm ²)	Voc	Isc	Vmp	Imp	Pmp ⁽¹⁾
3.00 E+ 13	0.96	0.99	0.98	0.99	0.99
1.00 E+ 14	0.95	0.98	0.97	0.99	0.96
5.00 E+ 14	0.91	0.97	0.93	0.96	0.90
1.00 E+ 15	0.89	0.94	0.91	0.94	0.85
3.00 E+ 15	0.86	0.89	0.87	0.86	0.75
1.00 E + 16	0.82	0.82	0.83	0.74	0.62

(1) Per AIAA-S-111 Standards

Key Space Qualification Results

Test Performed	Industry Quality Standard	Typical Test Results
Metal Contact Thickness	4-8 μm	6 μm
Dark Current Degradation after reverse bias	ΔI _{spec} < 2%	< 0.4%
Electrical Performance after 2,000 thermal cycles -180°C to +95°C	< 2%	No Change
Contact Pull Strength	> 300 grams	> 600 grams
MBD ESD Exposure (64A/1.8us/10x, 30A/150us/10x, 10.5A/300us/100x)	N/A	I _{rb} < 50 uA @ -2.5V, V _{DT0} < 2.3 V @ 650 mA (pass)
Bias Testing	N/A	Pass

