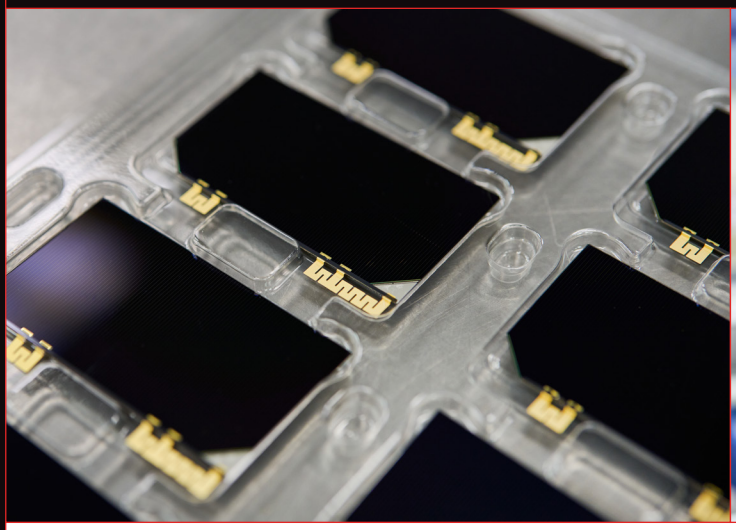
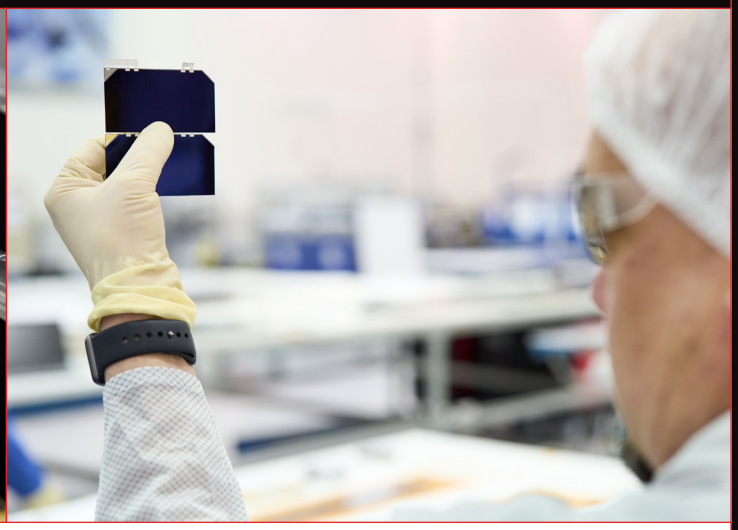
# ZTJ
# SPACE SOLAR CELL

3rd Generation Triple-Junction Solar Cell for Space Applications





## 29.5%

Minimum Average Efficiency

Space qualification and characterization to the AIAA-S111-2005 & AIAA-S112-2005 Standards.

## FEATURES

- 3rd generation triple-junction (ZTJ) InGaP/InGaAs/Ge Solar Cells with n-on-p polarity
- Solar cell mass of 84 mg/cm²
- Extensive flight heritage with more than 1 MW delivered to multitude of LEO, GEO and interplanetary missions
- Compatible with corner-mounted silicon 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

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## Typical Performance Data

| Electrical Parameters @ AM0 (135.3 mW/cm²) | |
|---|---|
| BOL Efficiency at Maximum Power Point (%) | 29.5 |
| Voc (V) | 2.726 |
| Jsc (mA/cm²) | 17.4 |
| Vmp (V) | 2.41 |
| Jmp (mA/cm²) | 16.5 |

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

| Fluence (e/cm²) | Voc | Isc | Vmp | Imp | Pmp(1) |
|---|---|---|---|---|---|
| 3.0E+13 | 0.96 | 0.99 | 0.98 | 0.99 | 0.99 |
| 1.0E+14 | 0.95 | 0.98 | 0.97 | 0.99 | 0.96 |
| 5.0E+14 | 0.91 | 0.97 | 0.93 | 0.96 | 0.90 |
| 1.0E+15 | 0.89 | 0.94 | 0.91 | 0.94 | 0.85 |
| 3.0E+15 | 0.86 | 0.89 | 0.87 | 0.86 | 0.75 |
| 1.0E+16 | 0.82 | 0.82 | 0.83 | 0.74 | 0.62 |

(1) Per AIAA-S-111 standards

## Temperature Coefficients

| Fluence (e/cm²) | Voc (mV/°C) | Jsc(2) (µA/cm²/°C) | Jmp(3) (µA/cm²/°C) | Vmp (mv/°C) | Pmp (µW/cm²/°C) |
|---|---|---|---|---|---|
| 0 | -6.3 | 11.7 | 9.1 | -6.7 | -85.7 |
| 1.0E+14 | -6.6 | 11.4 | 9.1 | -7.0 | -92.3 |
| 1.0E+15 | -6.9 | 11.3 | 10.6 | -7.3 | -89.9 |
| 1.0E+16 | -7.4 | 11.5 | 13.4 | -6.6 | -57.2 |

(2) Jsc is the symbol for normalized Isc, (3) Jmp is the symbol for normalized Imp

## 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 | ΔIspec<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 |
| Electrical Performance Degradation after 40-day humidity exposure at 60°C and 95% relative humidity | <1.5% | No measurable difference |