

ENERGY SOLAR

Triple Junction GaAs Solar Cell - High-Efficiency Solar Power for Space Applications

Discover the Triple Junction GaAs Solar Cell - TJ30 CICs, a high-efficiency solar cell assembly designed for advanced space applications. With its superior radiation resistance and impressive efficiency, this solar cell is perfect for satellites, space exploration vehicles, high-altitude UAVs, and more.

Product Introduction

The **Triple Junction GaAs Solar Cell - TJ30 CICs** is a GaInP/GaAs/Ge on Ge substrate solar cell assembly, featuring a triple junction design for optimal performance. Equipped with an external Si bypass diode, interconnectors, and cover glass, this cell offers unparalleled energy efficiency for a range of demanding applications.

Product Image

Design and Mechanical Data

Parameter	Specification
Substrate material	P-Ge
Base material	GaInP/GaAs/Ge
Cell thickness	150μm±20μm
AR-coating	TiOx/Al ₂ O ₃
Cover glass	KFG120
Cover glass thickness	120μm
CICs dimensions	(40.1±0.05)mm×(80.1±0.05)mm
CICs thickness	300μm±25μm
Interconnector thickness	30μm
Average weight	≤115mg/cm ²
Bypass protection	External Si diode
Extra option	ITO cover glass

Appearance and Dimensions

The solar cell assembly features precise dimensions of 40.1mm × 80.1mm with a total thickness of 300μm±25μm, including the cover glass and interconnectors. The compact design ensures optimal integration into solar arrays while maintaining structural integrity.

Typical Performance Data

Parameter	Value @ AM0 (1353W/m ² , T=25°C)
Efficiency η _{bare}	30.00%
Open Circuit Voc	2740mV
Short Circuit Jsc	17.4 mA/cm ²
Current @ Max. Power Jm	16.8 mA/cm ²

Parameter	Value @ AM0 (1353W/m², T=25°C)
Voltage @ Max. Power Vm	2.42V

Cell Structure

The triple junction cell structure consists of multiple layers optimized for maximum light absorption across different wavelengths:

- **Top Junction:** GaInP layer for high-energy photon absorption
- **Middle Junction:** GaAs layer for mid-spectrum efficiency
- **Bottom Junction:** Ge substrate for low-energy photon capture
- **AR Coating:** TiOx/Al₂O₃ anti-reflection coating for enhanced light transmission
- **Cover Glass:** KFG120 protective layer with 120µm thickness
- **Bypass Diode:** External Si diode for shadow protection

Radiation Degradation

Performance retention after 1 MeV electron radiation exposure:

Parameter	1×10 ¹⁴ /cm²	5×10 ¹⁴ /cm²	1×10 ¹⁵ /cm²
Isc	0.99	0.98	0.96
Voc	0.94	0.90	0.88
Pmax	0.94	0.88	0.84

The cell demonstrates excellent radiation hardness, maintaining over 84% of maximum power output even after exposure to 1×10¹⁵/cm² electron fluence, making it ideal for long-duration space missions.

Typical Performance Curves

The I-V and P-V characteristic curves demonstrate stable performance across varying operating conditions. The cell maintains high efficiency under AM0 spectrum with minimal temperature coefficient, ensuring reliable power generation throughout the mission lifetime.

Typical Applications

These triple-junction GaAs solar cells are renowned for their superior radiation resistance and high efficiency, making them ideal for various high-tech and demanding applications.

Space Applications

- **Satellites:** Used in communication and Earth observation satellites for reliable energy support.
- **Space Exploration:** Ideal for deep-space missions, lunar, and Martian bases.
- **Space Stations:** Crucial for energy systems of the International Space Station and future space infrastructures.

Earth Applications

- **UAVs and Aircraft:** Used in high-altitude long-endurance unmanned aerial vehicles (HALE UAVs) and solar-powered aircraft.
- **Independent Energy Systems:** Suitable for remote areas or emergency response in disaster situations.

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