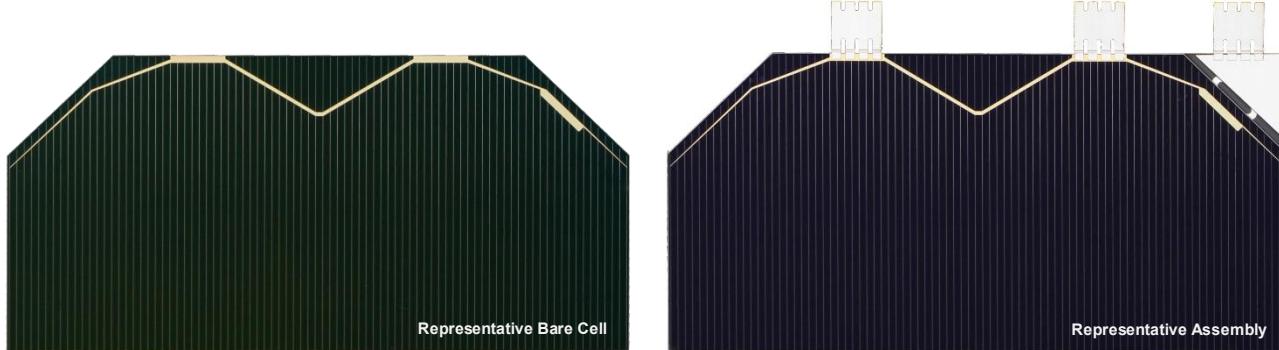


30% Triple-Junction (TJ) III-V Bare Solar Cells & Assemblies

Providing best cost-performance ratio for space applications



| AZUR SPACE Product Identifiers | Bare Cell | Assembly (SCA / CIC) |
|-----------------------------------|------------|----------------------|
| AZUR SPACE Material (Part) Number | 81441 | 81442 |
| AZUR SPACE Drawing Number | ZP-0004672 | ZP-0004289 |

AZUR SPACE's 3G30-Advanced bare solar cells and solar cell assemblies ("SCA"), or CICs (Cell-interconnect-coverglass) are the ideal solution for space power applications in conventional or in New Space segments. The award-winning 3G30-Advanced technology design offers proven best-in-class end-of-life (EOL) performance at lowest Cost-per-Watt, enabling a multitude of heritage options for all orbits and missions.

The 3G30C bare cell device is a space-qualified InGaP/GaAs/Ge triple-junction solar cell originating from a 100 mm germanium (Ge) substrate and provides 30% class beginning-of-life (BOL) efficiency. This device includes AZUR SPACE's proprietary radiation-hardened design for best EOL performance. Our standard cell features well-proven metallization as well as an improved busbar and grid-design with two contact pads plus one for a discrete bypass diode connection and a standard cell size of 30.18 cm² (4 cm x 8 cm, or "4x8"). This configuration offers a bare cell total thickness of 150 µm. The 3G30C solar cell is compatible with an external bypass diode, which is also available from AZUR SPACE together with bare cell orders.

The 3G30A assembly includes a bare 3G30C solar cell, a corner-mounted silicon bypass diode, welded out-of-plane silver-coated Kovar interconnectors ("ICs") and a 100 µm AR coated coverglass bonded with space-grade adhesive. This assembly has a standard size of 31.13 cm² (glass size) and has a device thickness of 290 µm. A digital CAD / CAM STEP file as well as digital device photographs of a bare cell or assembly are available upon request.

Other non-standard sizes, thicknesses and configurations are also available upon request. Thickness and mass values and variations of the above standard devices are shown below.

The 3G30 Advanced technology, cells and assemblies are ECSS-E-ST-20-08C (Rev. 1) qualified. These devices are all produced in our mature MRL-10 Heilbronn facility. Our technology and products have demonstrated on-orbit TRL-9 level heritage. AZUR SPACE is certified to ISO 9001:2015 (QMS), EN 9100:2018 (QMS, European equivalent to AS 9100D), as well as ISO 14001:2015 (Environmental) and ISO 45001:2018 (Health & Safety).



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AZUR SPACE Solar Power GmbH
Theresienstrasse 2
74072 Heilbronn, Germany
E-Mail: sales@azurspace.com
Web: www.azurspace.com



30% Triple-Junction Bare Solar Cells & Assemblies

TJ 3G30-Advanced (4x8)

| Design and Mechanical Data | | 3G30C-Adv. Bare Cell | | | | 3G30A-Adv. Assembly (SCA / CIC) | | | |
|-----------------------------------|--|--|--|--|--|--|--|--|--|
| AZUR SPACE Material (Part) Number | | 81441 | | | | 81442 | | | |
| Base Material | | InGaP/GaAs/Ge on Ge | | | | InGaP/GaAs/Ge on Ge | | | |
| AR-Coating | | TiO ₂ /Al ₂ O ₃ | | | | TiO ₂ /Al ₂ O ₃ | | | |
| Outer Dimensions (mm) | | 40.00 (± 0.1) x 80.00 (± 0.1) | | | | 40.15 (± 0.05) x 80.15 (± 0.05) | | | |
| Cell Area (cm ²) | | 30.18 | | | | 31.13 glassed area (cell area is 30.18) | | | |
| Average Weight | | ≤ 86 mg/cm ² / 2.6 grams | | | | ≤ 118 mg/cm ² / 3.6 grams | | | |
| Thickness (μm) | | 150 (± 20) | | | | 290 (± 50) | | | |
| Coverglass | | n/a | | | | 100 μm AR coated | | | |
| Contacts | | 2x front side pads (plus diode pad) | | | | 3x interconnects | | | |
| Interconnector Configuration | | n/a | | | | Out-of-Plane | | | |
| Interconnector Material | | n/a | | | | Silver (Ag) coated Kovar | | | |
| Interconnector Dimensions | | n/a | | | | 6.5 mm x 7.53 mm x 25 μm | | | |

| Typical Electrical Performance | BOL | | 5E13 | | 2.5E14 | | 5E14 | | 1E15 | | 1E16 | |
|--------------------------------|------|------|------|------|--------|------|------|------|------|------|------|------|
| | Cell | CIC | Cell | CIC | Cell | CIC | Cell | CIC | Cell | CIC | Cell | CIC |
| V _{oc} | [mV] | 2700 | 2700 | 2633 | 2633 | 2584 | 2584 | 2552 | 2552 | 2519 | 2519 | 2341 |
| I _{sc} | [mA] | 520 | 515 | 518 | 513 | 517 | 512 | 516 | 511 | 501 | 496 | 398 |
| V _{mp} | [mV] | 2411 | 2411 | 2336 | 2336 | 2298 | 2298 | 2262 | 2262 | 2230 | 2230 | 2127 |
| I _{mp} | [mA] | 504 | 499 | 501 | 496 | 500 | 495 | 498 | 494 | 484 | 480 | 360 |
| η (1367 W/m ²) | [%] | 29.5 | 29.2 | 28.4 | 28.1 | 27.8 | 27.6 | 27.3 | 27.1 | 26.2 | 25.9 | 18.6 |
| η (1353 W/m ²) | [%] | 29.8 | 29.5 | 28.7 | 28.4 | 28.1 | 27.9 | 27.6 | 27.3 | 26.5 | 26.2 | 18.6 |

QTR 3558-00-01, QTR 4151-01-01, QTR 4761-01-01. Standard: CASOLBA 2005 (05-20MV1, etc.); Spectrum: AM0 WRC, 1367 W/m²; T = 28°C, fluence 1 MeV e- [e/cm²], Other fluences and proton degradation data available on request. Radiation hardness is periodically assessed.

| Typical Temperature Coefficients | BOL | | 2.5E14 | | 5E14 | | 1E15 | |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | Cell or CIC |
| ΔV _{oc} /ΔT | [mV/°C] | -6.2 | | -6.5 | | -6.6 | | -6.7 |
| ΔI _{sc} /ΔT | [mA/°C] | 0.36 | | 0.33 | | 0.35 | | 0.38 |
| ΔV _{mp} /ΔT | [mV/°C] | -6.7 | | -6.8 | | -7.1 | | -7.2 |
| ΔI _{mp} /ΔT | [mA/°C] | 0.24 | | 0.20 | | 0.24 | | 0.28 |

QTR 3558-00-01, QTR 4151-01-01, QTR 4761-01-01; Temperature range 28°C – 140°C; fluence 1 MeV e- [e/cm²]

| Other Information | Item | Typical Value |
|------------------------|------------------------------|--|
| Diode (Assemblies) | External Si Protection Diode | V _{forward} (620 mA) ≤ 0.8 V (T = 25°C ± 3°C) I _{reverse} (4 V) ≤ 0.1 μA |
| Threshold Absorptivity | Absorptivity Value | ≤ 0.91 (100 μm AR coverglass) |
| Threshold Pull Test | Pull Test Values | > 1.6 N at 45° (with 12.5 μm Ag strips) > 7.0 N at 0° (with standard Kovar interconnectors) |

These performance data reflect a defined configuration at a specific mission environment across a large manufacturing population. Changes in configuration or production order volume may modify typical performance values.

Please refer to the AZUR SPACE **General Information Sheet** for additional information including in-orbit heritage, quality certifications, business licenses, product registrations and general company information at www.azurspace.com. Contact information is shown below and is also available on our website.

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AZUR SPACE Solar Power GmbH
Theresienstrasse 2
74072 Heilbronn, Germany
E-Mail: sales@azurspace.com
Web: www.azurspace.com

