

Reference: 2024-0412	Issue: 02	Date: 04/11/2023
Performance Specification and Quality Test of SC-3GA-4 Solar Cell		

Project Information

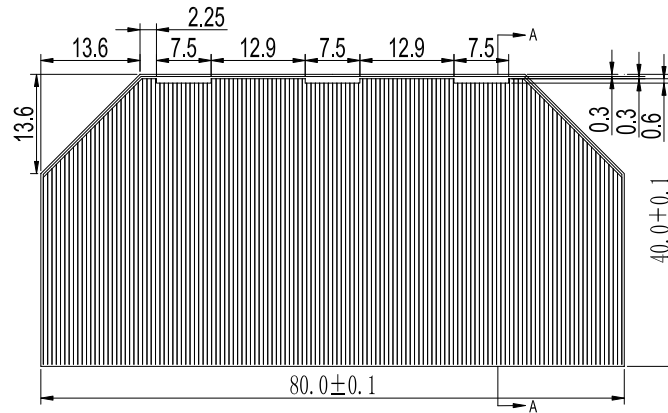
Program: Cover Glass Integrated Cell	Product: SC-3GA-4
Customer:	Contract:

☐ Cell ☐ Glass ☐ CIC ☐ PDU

- Product code: CIC-3GA-4 32% Triple Junction
- Qty: pcs.
- Description: side, each: mm * mm
- Application: ☐ LEO ☐ GEO
- Test/ Inspection requirements: To Be Acknowledge by Client
 - ☐ Visual inspection
 - ☐ Mechanical defect
 - ☐ Electrode appearance
 - ☐ Dimension
 - ☐ Electrical performance
 - ☐ Electrical performance degradation after welding
 - ☐ Fastness and defects of antireflection film
 - ☐ Thermal shock
 - ☐ Electro irradiation
 - ☐ Reverse bias test
 - ☐ Humidity and temperature
 - ☐ Absorptance and hemispherical radiance
 - ☐ Pull strength of welding spot after thermal shock
 - ☐ Sampling size
 - ☐ Disqualified number
- Package/ Delivery requirements: To Be Acknowledge by Client

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Default Technical Specifications



Dimensions of bare cell

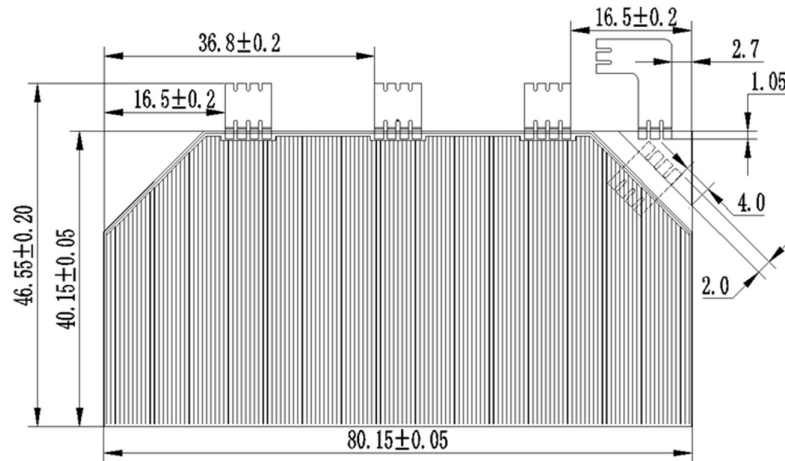
Default Design and Mechanical Data

PN junction structure	n/p triple-junction, GaInP ₂ /GaInP/GaInP/Ge
Top electrode	AuGeNi/Au/Ag/Au
Bottom electrode	Pd/Ag/Au
Antireflection film	TiO _x /Al ₂ O ₃
Bypass diode	External bypass diode
Dimension (mm)	(80.0±0.1)×(40.0±0.1)×(0.155±0.020)
Area (cm ²)	30.15
Weight (g)	2.40±0.35
Default Electrical Parameters (Final Parameters customized for Client)	
Average Open Voltage Voc (mV)	2680
Average Short Circuit Isc (mA)	580
Average Efficiency (1353W/m ²)	32% (AM0, 1sun, 1353W/m ² , 25°C)
Average Fill Factor	0.855
Electro irradiation	Degradation≤18% (1MeV, 1×10 ¹⁵ e/cm ²)
αS Absorptance	≤0.92
εH Radiance	0.84±0.03

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Solar Cell Assembly

The solar cell assembly is equipped with an discrete Si bypass diode, interconnectors and cover glass. Cover glass is manufactured by British manufacture & assembly in-house clean room.



Dimension drawing of solar cell assembly

Design and Mechanical Data:

Base Material	GaInP ₂ /GaAs/Ge on Ge substrate
AR-coating	TiO _x /Al ₂ O ₃
Dimensions	(40.15±0.05)mm×(80.15±0.05)mm
Cell Area	30.15cm ²
Weight	(125±12)mg/cm ²
Thickness	0.36±0.01mm
Cover glass	QIOPTIQ CMX
Cover glass thickness	120±20μm
Interconnectors(3× front side/1× diode)	KOVAR Ag
Interconnector thickness	25μm

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Default Electrical Parameters:

Average Open Circuit Voc (mV)	2680
Average Short Circuit Jsc (mA/cm ²)	19.2
Average Efficiency η_{bare} (1353W/m ²)	32% (AM0, 1sun, 1353W/m ² , 25°C)
Average Fill Factor	0.855

Radiation Degradation (Fluence 1MeV):

Parameters	1×10 ¹⁴ e/cm ²	5×10 ¹⁴ e/cm ²	1×10 ¹⁵ e/cm ²
I _m /I _{m0}	0.99	0.95	0.93
V _m /V _{m0}	0.94	0.92	0.90
P _m /P _{m0}	0.94	0.87	0.83

Acceptance Values:

Voltage V _L	2300mV
Min. average current I _{L min} @ V _L	500mA
Min. individual current I _{L ave} @ V _L	480mA

Shadow Protection (Discrete bypass diode) :

V _{forward} (620mA)	≤1.0V
I _{reverse} (4.0V)	≤0.2mA

Temperature Coefficients (15°C ~ 75°C) :

Parameters	BOL	1 MeV, 5×10 ¹⁴ e/cm ²
Jsc (uA/cm ² /°C)	5.0	6.0
Voc (mV/°C)	-6.2	-6.6

Threshold Values:

Absorptivity	≤ 0.92
Emittance (Normal)	0.84±0.02
Pull Test(at 45°)	≥0.83N/mm ²
Status	Qualified

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Test Results

All qualification tests of bare SC-3GA-3 cell passed at once and test equipment is within the validity. Test results conform to Ru020.0020JT SC-3GA-3 *GaInP₂/InGaAs/Ge solar cell technical requirements*.

Item	Requirement	Result	Criteria
Dimension (mm)	$(80.0 \pm 0.1) \times (40.0 \pm 0.1) \times (0.155 \pm 0.020)$		☐
Area (cm ²)	30.15		☐
Weight (g)	2.40±0.35		☐
Efficiency	32.0% @AM0, 25°C, 135.3mW/cm ²		☐
V _m (mV)	-		☐
J _m (mA/cm ²)	-		☐
Electro irradiation	≤18% (1MeV, 1×10 ¹⁵ e/cm ²)		☐
α _S Absorptance	≤0.92		☐
ε _H Radiance	0.84±0.03		☐

The qualified degradation factors

Factor	Average Value (%)
Welding	
Thermal shock	
Electro irradiation	
Reverse bias	
Humidity and temperature	