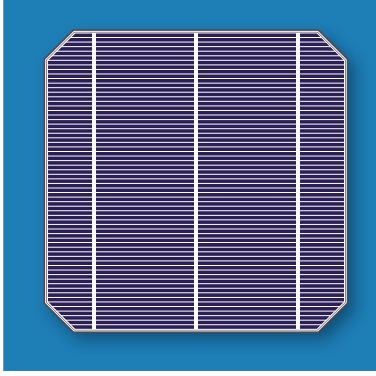




Suniva® *ARTisun*® Series 156.17X.3 -- 18X.3 Monocrystalline Photovoltaic Cells

Reduced Module Loss and Increased Cell Performance

Suniva's *ARTisun*® Series 3bus monocrystalline cells are in an elite performance category that few manufacturers ever achieve: consistently offering efficiencies of 17.4% to 18.2%, with increases in product performance at both the cell and module level.

Increased performance at the cell level allows our customers to achieve more power with the same or fewer modules. Additionally, *ARTisun*® Series 3bus cells provide efficiency gains at the string-to-string level and via the interconnect ribbon between cells, producing more power and a more effective path for energy flow and performance. Customers can expect to achieve .2% - .3% increases in efficiency at the cell level, with the potential to reduce series resistance loss in the module by up to 1.21%. Customers will also see power gains at the module level, as higher-efficiency solar cells allow for more effective balancing of energy across the entire module.

ARTisun® Series 3bus

MADE IN THE USA

Intersection of High Efficiency and Low Cost

At Suniva®, our vision has always been the intersection of high efficiency and low cost, to deliver leading-edge monocrystalline solar cell performance while dramatically cutting the cost of the PV value chain. Our team leads the industry in PV technology and manufacturing, and we will continue to lead the industry with high-quality cells and cost-effective processes.

Value of Leading Scientists and Manufacturers

Suniva's world-class manufacturing experts work with the best materials, from silicon to pastes, emitters to anti-reflection coating to cell contacts. More importantly, our Suniva® scientists have spent their careers understanding what it takes to extract the maximum performance from each part of the cell and deliver superior power. Our collaborative development approach, utilization patents and proprietary processes make Suniva® a sought-after cell provider to the world's most demanding customers.

Long-term Commitment to Quality

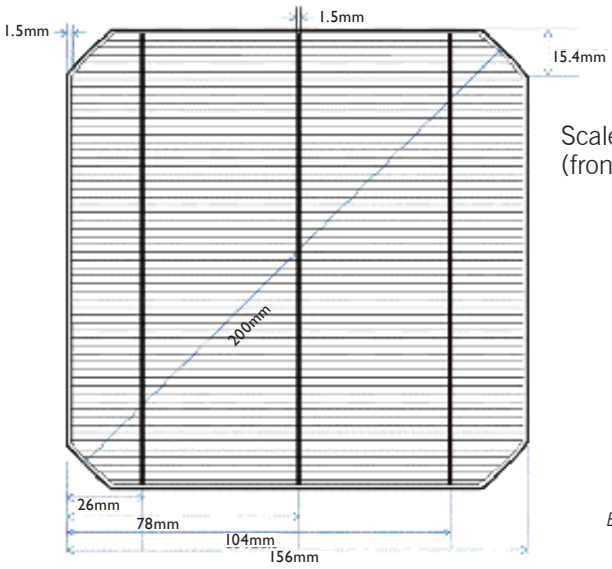
Suniva's state-of-the-art microcrack detection and uncompromising commitment to process control drives our reputation for superior quality, cell accuracy and product performance. Suniva® *ARTisun*® Series 3bus cell benefits include:

- Lower series resistance within modules
  - Minimizes power loss after stringing
- More power
  - Further reduces balance-of-system costs per watt
- Excellent low-light level performance
  - Offers broader geographical and climate application
- Quality visual and electrical characterization
  - Provides maximum performance reliability
- Consistent appearance of mono wafer
  - Provides visual appeal of module

Suniva®
The Brilliance of Solar Made Sensible

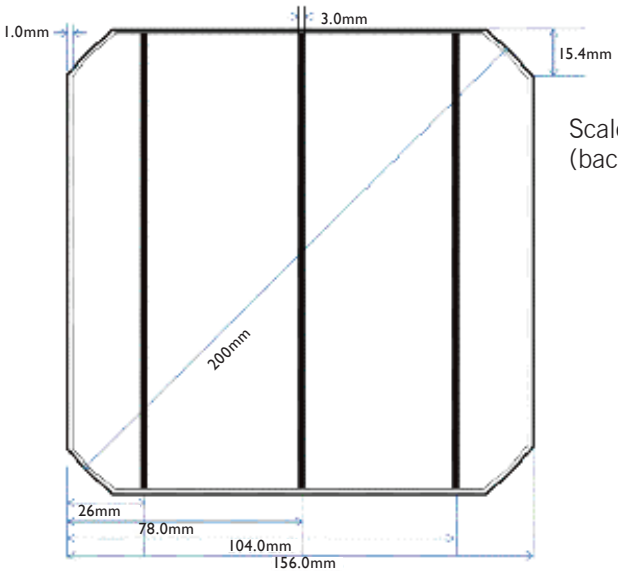
5775 Peachtree Industrial Blvd., Norcross, GA 30092 +1 404.477.2700, +1 404.477.2709 (fax)
www.suniva.com

Reference Dimensions: *ARTisun*® Series 156.17X.3 -- 18X.3 Monocrystalline Photovoltaic Cells



Scaled drawing
(front of wafer)

Average Cell
Bow Amount: ≤1.5 mm



Scaled drawing
(back of wafer)

Typical Cell Electrical Properties[1]

Model	ARTisun® 156-17.7	ARTisun® 156-17.8	ARTisun® 156-17.9	ARTisun® 156-18.0	ARTisun® 156-18.1
Efficiency Eff (%)	17.65-17.75	17.75-17.85	17.85-17.95	17.95-18.05	18.05-18.15
Power P_{pm} (W)	4.22-4.24	4.24-4.27	4.27-4.29	4.29-4.31	4.31-4.34
Max. Power Current I_{pm} (A)	8.07	8.10	8.13	8.16	8.19
Short Circuit Current I_{sc} (A)	8.63	8.66	8.69	8.72	8.74
Max Power Voltage V_{pm} (V)	0.524	0.525	0.526	0.527	0.528
Open Circuit Voltage V_{oc} (V)	0.621	0.622	0.622	0.623	0.623

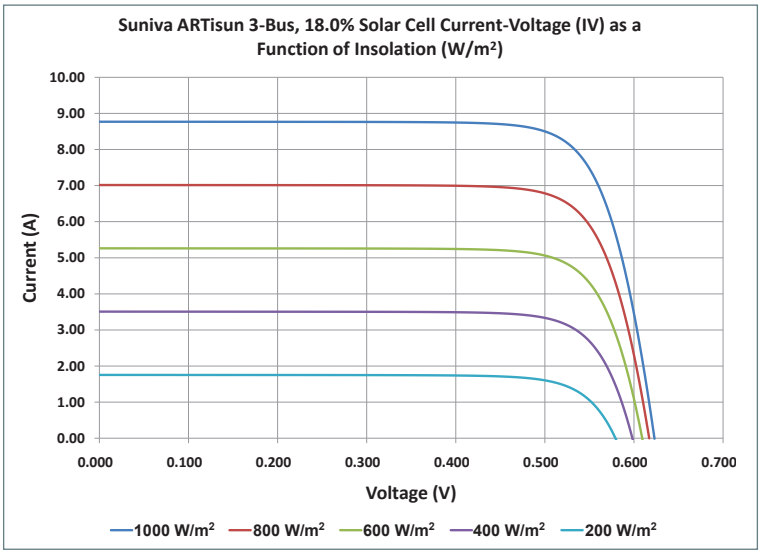
[1] *All electrical parameters valid under Standard Testing Conditions (STC): Intensity - 1000 W/m²; Spectrum - AM1.5 Global; Temperature - 25 °C*

Cell Temperature Coefficients

Parameter		Value
Voltage	ß(Voc)	- 2.2mV/°C
Current	α(Isc)	+2.9mA/°C
Power	γ(Pmax)	- 0.46%/°C

Wafer and Cell Specifications & Geometry

Parameter	Value
Crystal Growth Technique	Czochralski
Crystal Type	Monocrystalline
Crystal Orientation	<100>
Dopant Species	Boron, P Type
Wafer Shape	Pseudo-square
Wafer Size	156.0 ± 0.5mm cut from 200 diameter ± 0.5 mm
Wafer Area	239 cm²
Wafer Thickness	200 ± 20 microns
Cell Configuration	Front and Rear screen print; Aluminum Back Surface Field (BSF)
Cell Visual Appearance	Uniform dark blue (Silicon Nitride AR coating with fine pyramidal texture)



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