

## Suniva® ARTisun® Series 156.17X.2 Monocrystalline Photovoltaic Cells

### High Efficiency at Low Cost is Our Heritage

You know that cell efficiency and high quality are important in PV -- they impact the entire value chain from raw materials to balance-of-system costs. That's why you should choose Suniva's ARTisun® Series. Our team has well over a century of experience in PV technology and manufacturing. Our monocrystalline cells offer the highest levels of efficiencies available on the market today, and we will continue to lead our industry with innovations to produce even higher efficiencies at lower costs. Most cell vendors rarely achieve efficiencies over 17%, particularly at a reasonable cost. For Suniva®, it's what we do everyday.

### Expertly Crafted

Great solar cells start with the best materials. From wafers to pastes, the Suniva® team of world class experts understands how to work with materials, and more importantly, how to make materials work better by optimizing processing conditions. There is an art to forming each part of the cell: the front surface texturing; the emitter, the anti-reflection (AR) coating and both front and rear contacts. Suniva® scientists have spent their careers understanding what it takes to extract the maximum performance from the device and deliver superior power from each cell. That's what you get from Suniva®, every time.

### Quality You Can Trust

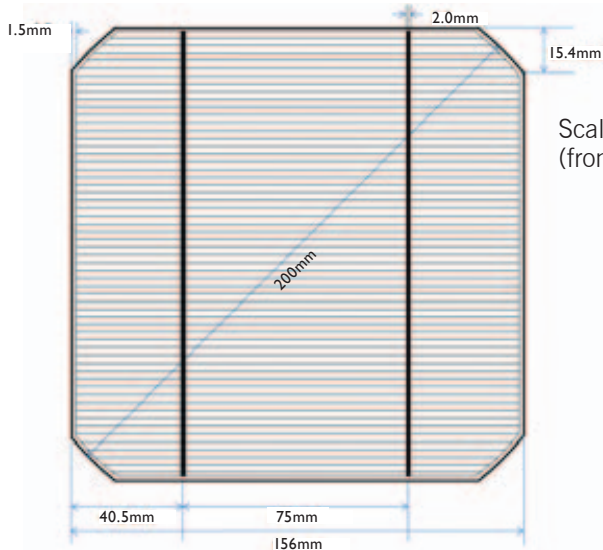
Our state-of-the-art microcrack detection and relentless dedication to tight process monitoring and control result in uncompromising quality and product performance. Our well-calibrated test equipment assures reliable and accurate cell matching and the highest performing modules. With Suniva® ARTisun® 2bus cells you get:

- Consistently higher conversion efficiency:
  - More power from less area; lower balance-of-system costs
- Excellent low-light level performance:
  - Applicability over range of geography & climates
- Visual/electrical characterization for each cell:
  - Reliable performance; reduced warranty costs
- Consistent appearance from mono wafer:
  - Visually pleasing look for module

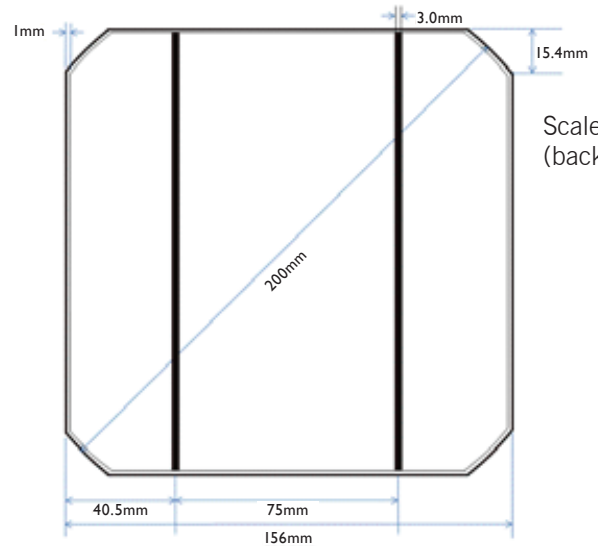
### ARTisun® Series 2bus



## Reference Dimensions: ARTisun® Series 156.17X.2 Monocrystalline Photovoltaic Cells



Scaled drawing  
(front of wafer)



Scaled drawing  
(back of wafer)

Average Cell  
Bow Amount:  $\leq 1.5$  mm

## Typical Cell Electrical Properties<sup>1</sup>

Model	ARTisun® 156-17.2	ARTisun® 156-17.4	ARTisun® 156-17.6	ARTisun® 156-17.8	ARTisun® 156-18.0
Efficiency Eff (%)	17.1-17.3	17.3-17.5	17.5-17.7	17.7-17.9	17.9-18.1
Power $P_{pm}$ (W)	4.09-4.13	4.13-4.18	4.18-4.23	4.23-4.28	4.28-4.32
Max. Power Current $I_{pm}$ (A)	8.01	8.06	8.09	8.12	8.21
Short Circuit Current $I_{sc}$ (A)	8.60	8.64	8.67	8.71	8.79
Max Power Voltage $V_{pm}$ (V)	0.514	0.517	0.520	0.523	0.523
Open Circuit Voltage $V_{oc}$ (V)	0.619	0.620	0.622	0.623	0.624

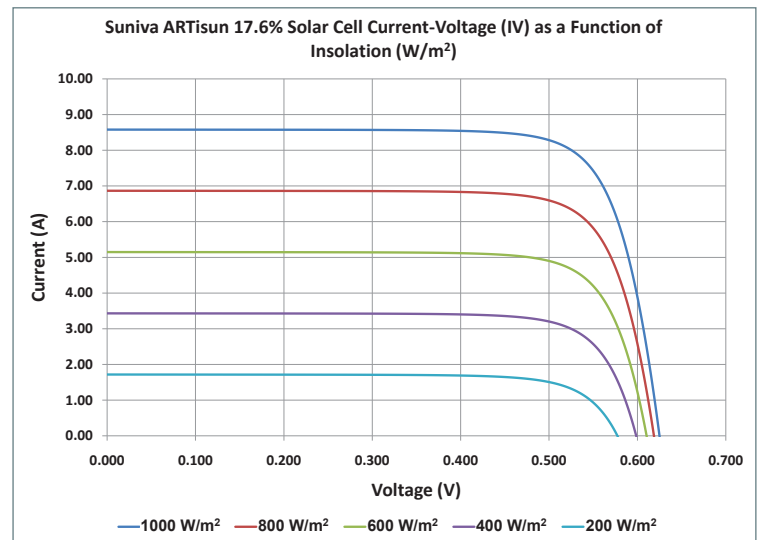
<sup>1</sup> All electrical parameters valid under Standard Testing Conditions (STC): Intensity - 1000 W/m<sup>2</sup>; Spectrum - AM1.5 Global; Temperature - 25 °C

## Cell Temperature Coefficients

Parameter	Value
Voltage $\beta(V_{oc})$	- 2.2mV/°C
Current $\alpha(I_{sc})$	+2.9mA/°C
Power $\gamma(P_{max})$	- 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 cm <sup>2</sup>
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)



SS/156.17++2/02-08-10