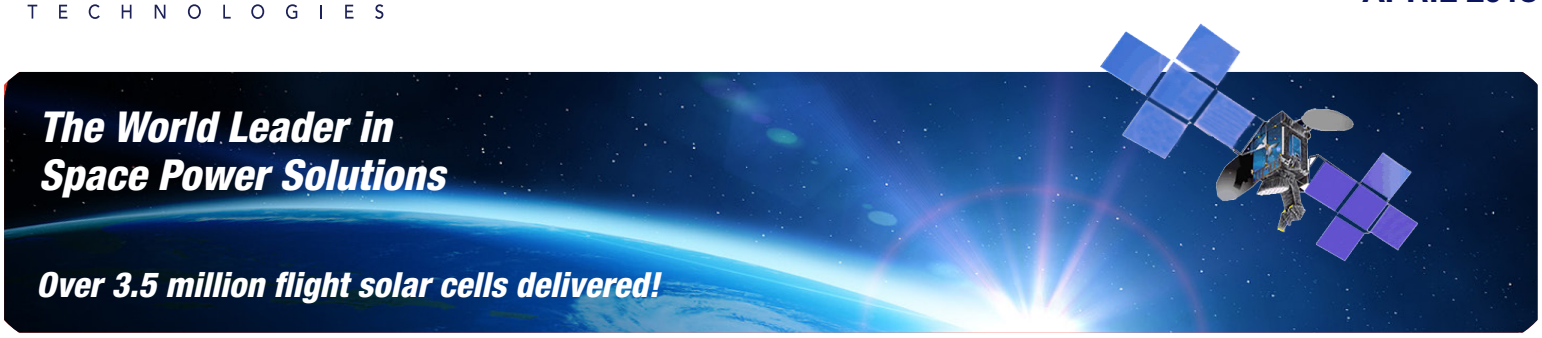
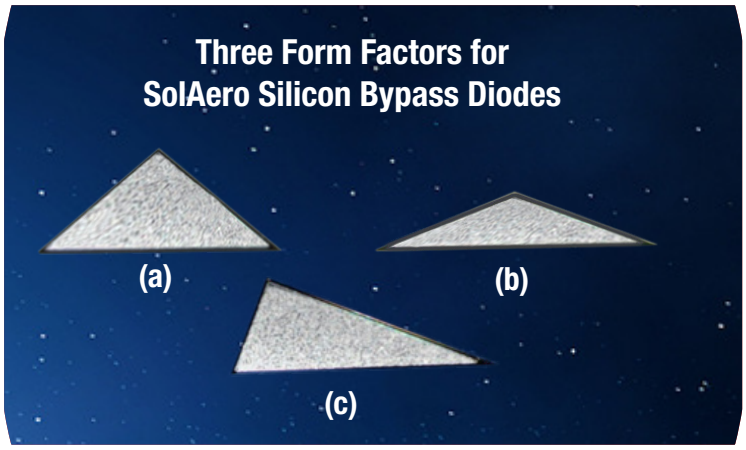
SolAero TECHNOLOGIES

DATASHEET
APRIL 2018



SILICON BYPASS DIODES



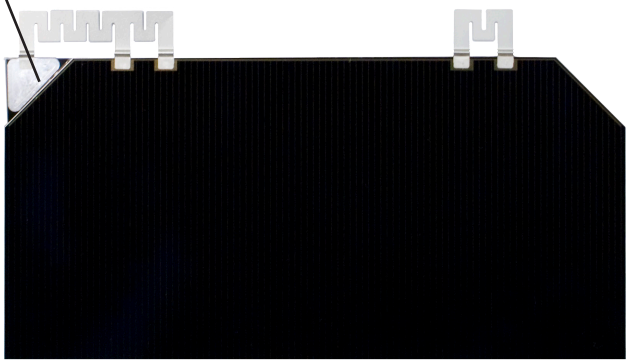
SolAero's Silicon Bypass Diodes are welded to the corner of SolAero Space Solar Cells and allow current to safely bypass cells in a string as required during string operation.

		Average	
Diode Form Factor	Area (cm^2)	Mass (mg)	Thickness (µm)
a	0.32	15	160
b	0.32	15	160
c	0.45	21	160

FEATURES & CHARACTERISTICS

- Small size and light weight
- Low leakage current under reverse bias
- Low series resistance under forward bias
- Qualified by an extensive series of reliability tests
- The diode assemblies also include welded back-side interconnects

Corner-mounted Silicon Bypass Diode (shown interconnected with a SolAero Solar Cell to make a CIC).



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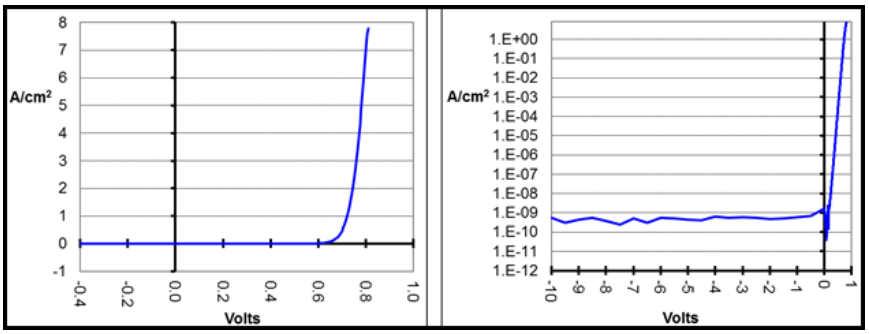
Electrical Specifications and Performance of ~0.32cm² Diodes (Dark IV Testing)

Temperature	Test	Condition	Max for Condition	Typical for Condition
23˚C	Reverse Leakage Current	Vr = 50 V	1.0 mA	<5E-9 A
		Vr = 2.5 V	0.05 mA	<5E-9 A
	Forward Voltage	If = 1.2 A	0.85 V	0.77 V
		If = 2 A	1.1 V	0.81 V
-180˚C	Forward Voltage	If = 1.2 A	1.2 V	1.08 V
150˚C	Reverse Leakage Current	Vr = 2.5 V	1.2 mA	7E-7 A
	Forward Voltage	If = 1.2 A	0.7 V	0.57 V

Typical Diode Dark JV Curve at 22˚C



Mechanical Performance (Average Weld Pull Strength)

- Interconnect pulled at 0˚ angle from diode front contact: >1500 gf
- Interconnect pulled at 45˚ angle from diode front contact: 775 gf
- Interconnect pulled at 0˚ angle from diode back contact: >3500 gf
- Interconnect pulled at 45˚ angle from diode front contact: >790 gf

Note: Back contact pull tests are done one interconnect at a time. The pull strengths of the five weld system will be greater than those shown above.

Qualification Testing Successfully Done on Silicon Bypass Diode

Name of Test	Description of Test
Electrical Cycling	100,000 Cycles at 150˚C, alternating between forward current of 1.2 A and reverse bias of 2.5 V
Electron Irradiation	Exposure to irradiation levels of 5E13, 3E14, 5E14, 1E15 and 3E15 e^-/cm^2 (1 MeV electrons)
Forward Bias Life Test	1000 hours forward biased at 2.0 A at T=220˚C
Gamma Radiation	Exposure to 120 Mrad Gamma radiation while biased to 2.30 V reverse bias
Human Body Model ESD	Exposure to 4,000 V electrostatic discharge, forward and reverse polarity
Humidity Exposure	720 hours at T_c = 65˚C and a relative humidity of 95%
Reverse Bias Life Test (HTRB)	1000 hours reverse biased to -50 V at T=150˚C
Thermal Cycling	1980 thermal cycles from T_c = -180˚C to T_c= +150˚C
Thermal Shock	5 cycles of -180˚C to +180˚C by liquid-to-air immersion

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