

## Features

- Low Forward Voltage Drop
- Low Leakage Current
- Superior Reverse Avalanche Capability
- Excellent High Temperature Stability
- Patented Interlocking Clip Design for High Surge Current Capacity
- Patented Super Barrier Rectifier Technology
- Soft, Fast Switching Capability
- +150°C Operating Junction Temperature
- ±16KV ESD Protection (HBM, 3B)
- ±25KV ESD Protection (IEC61000-4-2 Level 4, Air Discharge)
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q 101 Standards for High Reliability**
- **PPAP Capable (See Note 4)**

## Mechanical Data

- Case: PowerDI<sup>®</sup>123
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Polarity Indicator: Cathode Band
- Terminals: Finish - Matte Tin Annealed over Copper Leadframe; Solderable per MIL-STD-202, Method 208 **(E3)**
- Weight: 0.018 grams (Approximate)

 PowerDI<sup>®</sup>123

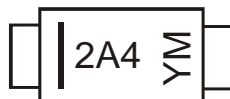

Top View

## Ordering Information (Notes 5 & 6)

Part Number	Compliance	Case	Packaging
SBR2A40P1-7	AEC-Q101	PowerDI <sup>®</sup> 123	3,000/Tape & Reel
SBR2A40P1Q-7	Automotive	PowerDI <sup>®</sup> 123	3,000/Tape & Reel

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
  4. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to [http://www.diodes.com/quality/product\\_compliance\\_definitions/](http://www.diodes.com/quality/product_compliance_definitions/).
  5. Product manufactured with Data Code 0924 (week 24, 2009) and newer are built with Green Molding Compound.
  6. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information

 PowerDI<sup>®</sup>123


2A4 = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: C = 2015)  
 M = Month (ex: 9 = September)

### Date Code Key

Year	2006	2015	2016	2017	2018	2019	2020	2021	2022	2023
Code	T	C	D	E	F	G	H	I	J	K

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

**Maximum Ratings** (@T<sub>A</sub> = +25°C unless otherwise specified.)

Single phase, half wave, 60Hz, resistive or inductive load.  
For capacitance load, derate current by 20%.

Characteristic	Symbol	Value	Unit
Peak Repetitive Reverse Voltage	V <sub>RRM</sub>	40	V
Working Peak Reverse Voltage	V <sub>RWM</sub>		
DC Blocking Voltage	V <sub>RM</sub>		
RMS Reverse Voltage	V <sub>R(RMS)</sub>	28	V
Average Rectified Output Current (See Figure 1)	I <sub>O</sub>	2.0	A
Non-Repetitive Peak Forward Surge Current 8.3ms Single Half Sine-Wave Superimposed on Rated Load	I <sub>FSM</sub>	50	A
Repetitive Peak Avalanche Power (1μs, +25°C)	P <sub>ARM</sub>	6,000	W

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Maximum Thermal Resistance			
Thermal Resistance Junction to Soldering (Note 7)	R <sub>θJS</sub>	5	°C/W
Thermal Resistance Junction to Ambient (Note 8)	R <sub>θJA</sub>	180	
Thermal Resistance Junction to Ambient (Note 9)	R <sub>θJA</sub>	115	
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-65 to +150	°C

**Electrical Characteristics** (@T<sub>A</sub> = +25°C unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Breakdown Voltage	V <sub>(BR)R</sub>	40	-	-	V	I <sub>R</sub> = 100μA
Forward Voltage Drop	V <sub>F</sub>	-	0.265	0.315	V	I <sub>F</sub> = 0.1A, T <sub>J</sub> = +25°C
		-	0.38	0.43		I <sub>F</sub> = 1.0A, T <sub>J</sub> = +25°C
		-	0.45	0.50		I <sub>F</sub> = 2.0A, T <sub>J</sub> = +25°C
		-	0.17	0.22		I <sub>F</sub> = 0.1A, T <sub>J</sub> = +125°C
		-	0.325	0.375		I <sub>F</sub> = 1.0A, T <sub>J</sub> = +125°C
		-	0.42	0.47		I <sub>F</sub> = 2.0A, T <sub>J</sub> = +125°C
Leakage Current (Note 5)	I <sub>R</sub>	-	8	40	μA	V <sub>R</sub> = 5V, T <sub>J</sub> = +25°C
		-	16	100	μA	V <sub>R</sub> = 40V, T <sub>J</sub> = +25°C
		-	1.3	8	mA	V <sub>R</sub> = 5V, T <sub>J</sub> = +125°C
		-	2.1	10	mA	V <sub>R</sub> = 40V, T <sub>J</sub> = +125°C

- Notes:
7. Theoretical R<sub>θJS</sub> calculated from the top center of the die straight down to the PCB cathode tab solder junction.
  8. FR-4 PCB, 2 oz. Copper, minimum recommended pad layout per <http://www.diodes.com/datasheets/ap02001.pdf>.
  9. Polyimide PCB, 2 oz. Copper, minimum recommended pad layout per <http://www.diodes.com/datasheets/ap02001.pdf>.
  10. Short duration pulse test used to minimize self-heating effect.

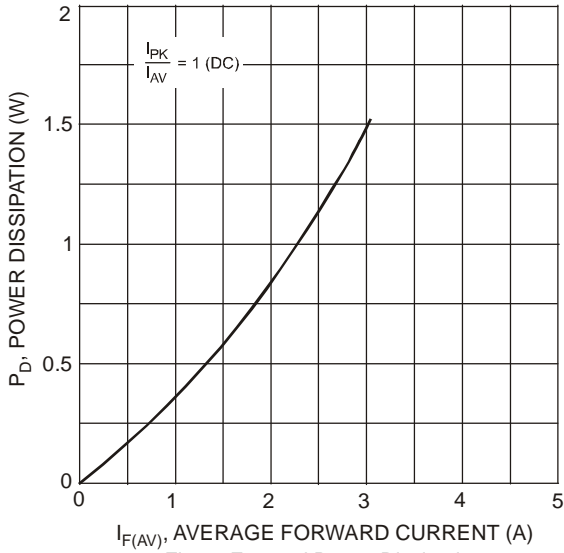


Fig. 1 Forward Power Dissipation

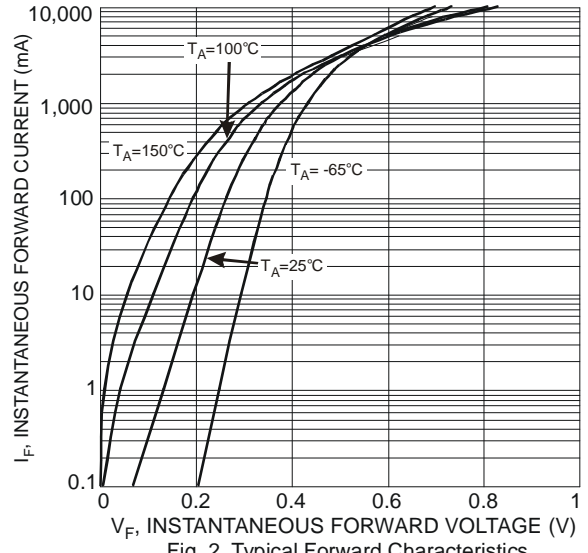


Fig. 2 Typical Forward Characteristics

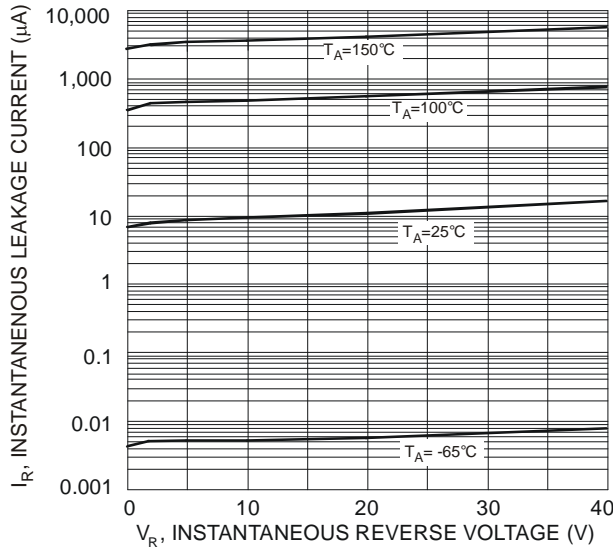


Fig. 3 Typical Reverse Characteristics

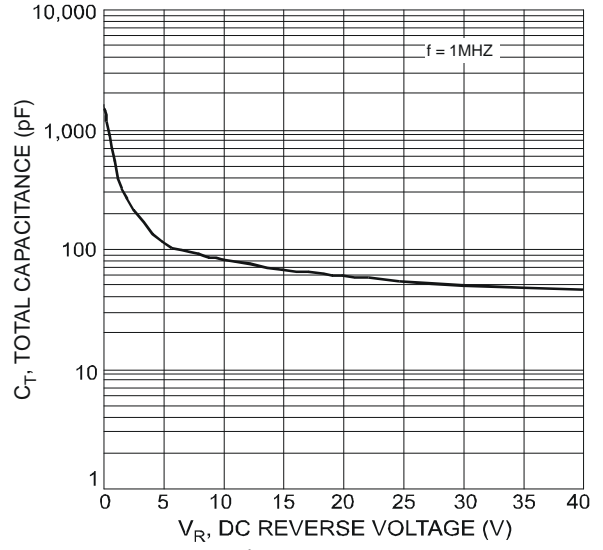


Fig. 4 Total Capacitance vs. Reverse Voltage

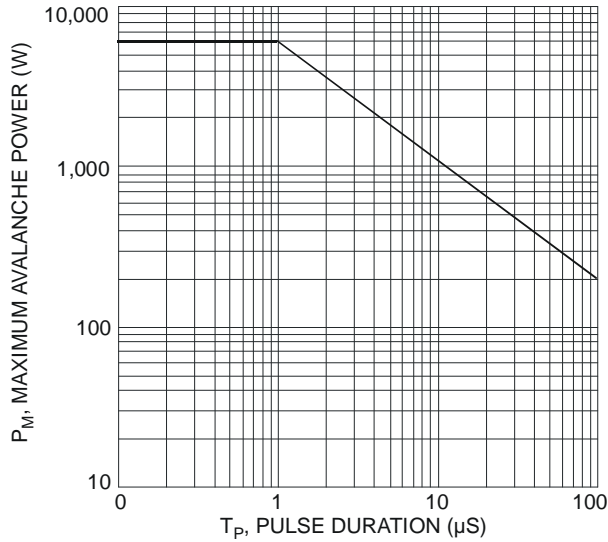


Fig. 5 Maximum Avalanche Power vs. Pulse Duration

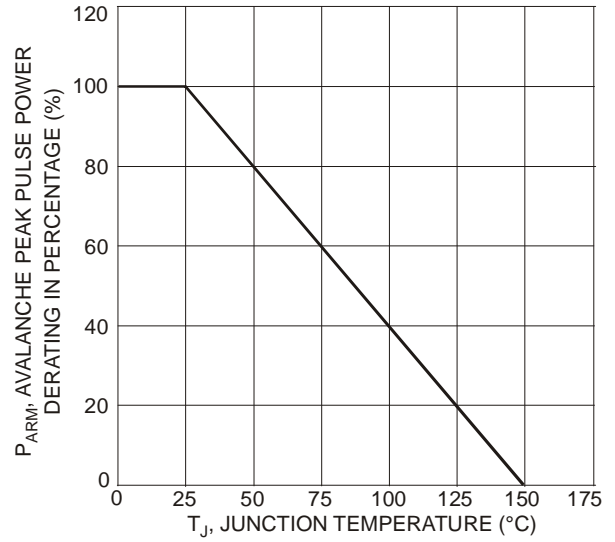


Fig. 6 Pulse Derating Curve

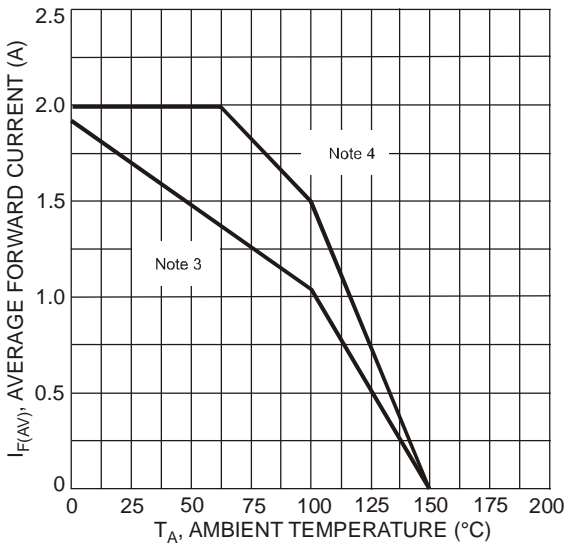


Fig. 7 Forward Current Derating Curve

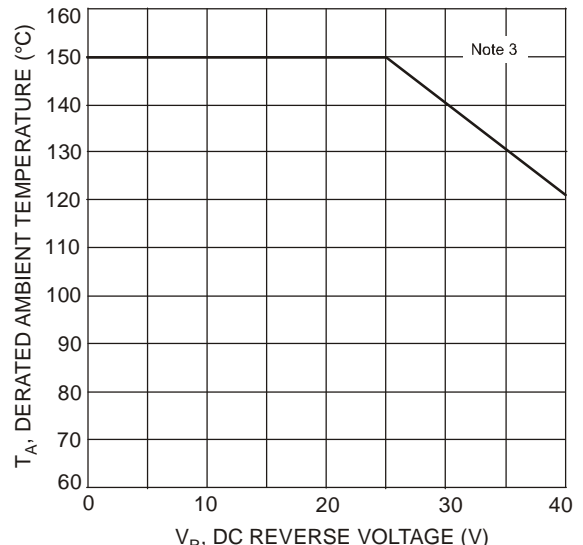


Fig. 8 Operating Temperature Derating

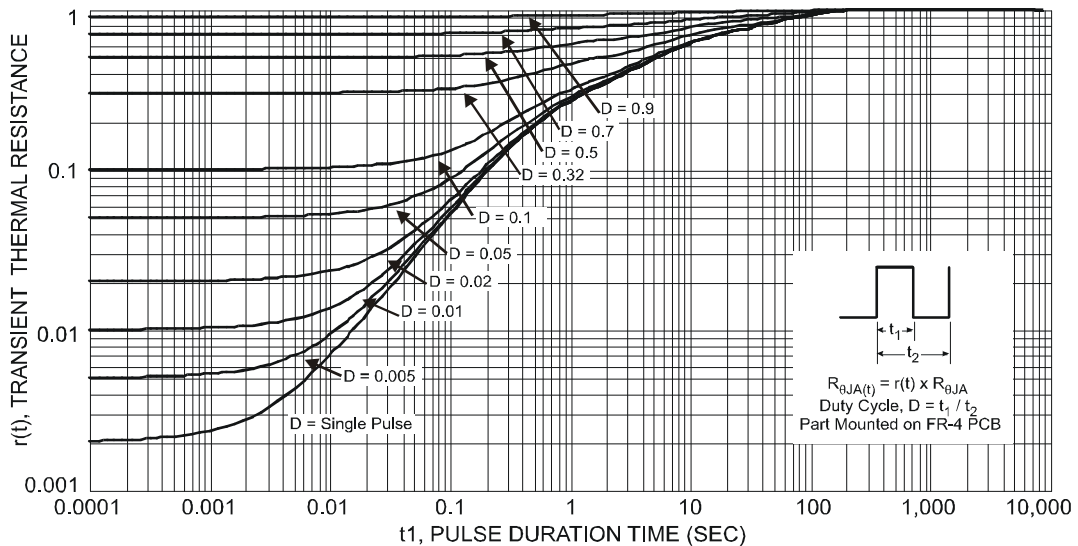
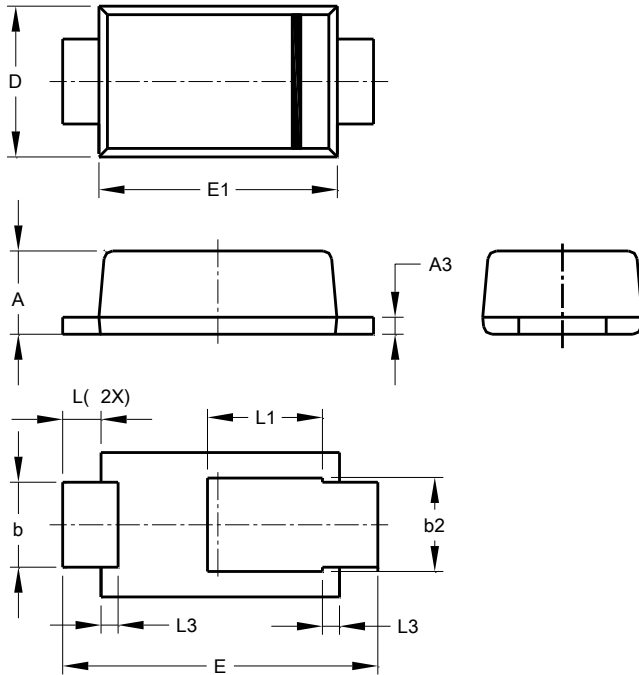


Fig. 9 Transient Thermal Resistance

**Package Outline Dimensions**

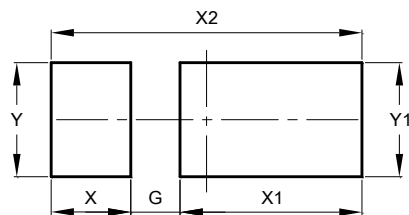
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



POWERDI <sup>®</sup> 123			
Dim	Min	Max	Typ
A	0.93	1.00	0.98
A3	0.15	0.25	0.20
b	0.85	1.25	1.00
b2	1.025	1.125	1.10
D	1.63	1.93	1.78
E	3.50	3.90	3.70
E1	2.60	3.00	2.80
L	0.40	0.50	0.45
L1	1.25	1.40	1.35
L3	0.125	0.275	0.20
All Dimensions in mm			

**Suggested Pad Layout**

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



Dimensions	Value (in mm)
G	0.65
X	1.05
X1	2.40
X2	4.10
Y	1.50
Y1	1.50

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