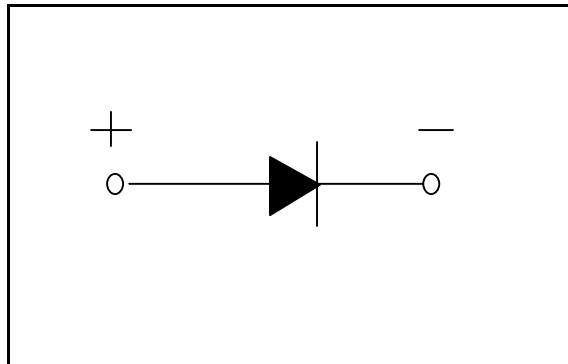


Powerex, Inc., Hillis Street, Youngwood, Pennsylvania 15697 (724) 925-7272  
www.pwr.com

**POW-R-BLOK™**  
**Single Diode Isolated Module**  
**2000 Amperes / Up to 4400 Volts**



**Ordering Information:**

Select the complete eight-digit module part number from the table below.

Example: PS414420 is a 4400 Volt, 2000A Average Dual Diode Isolated POW-R-BLOK™ Module

Type	Voltage Volts (x100)	Current Amperes (x100)
PS41	36	20
	38	
	40	
	42	
	44	

**Description:**

Powerex Single Diode Modules are designed for use in applications requiring rectification and isolated packaging. The modules are isolated for easy mounting with other components on a common heatsink.

**Features:**

- Electrically Isolated Heatsinking
- Compression Bonded Elements
- Metal Baseplate
- Low Thermal Impedance for Improved Current Capability

**Benefits:**

- No Additional Insulation Components Required
- Easy Installation
- No Clamping Components Required
- Reduce Engineering Time

**Applications:**

- Bridge Circuits
- AC & DC Motor Drives
- Battery Supplies
- Power Supplies
- Large IGBT Circuit Front Ends

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**Absolute Maximum Ratings**

Characteristics	Conditions	Symbol	Units
Repetitive Peak Reverse Blocking Voltage		$V_{RRM}$	Up to 4400 V
Non-Repetitive Peak Blocking Voltage ( $t < 5$ msec)		$V_{RSM}$	$V_{RRM} + 100V$ V
RMS Current Per Diode (180° Conduction)	180° Conduction, $T_C=92^\circ C$	$I_{F(RMS)}$	3455 A
	<b>180° Conduction, <math>T_C=99^\circ C</math></b>	$I_{F(RMS)}$	<b>3140</b> A
	180° Conduction, $T_C=105^\circ C$	$I_{F(RMS)}$	2825 A
Average Forward Current Per Diode (180° Conduction)	180° Conduction, $T_C=92^\circ C$	$I_{F(AV)}$	2200 A
	<b>180° Conduction, <math>T_C=99^\circ C</math></b>	$I_{F(AV)}$	<b>2000</b> A
	180° Conduction, $T_C=105^\circ C$	$I_{F(AV)}$	1800 A
Peak One Cycle Surge Current, Non-Repetitive $T_j = 25C, V_r = 0$	60 Hz	$I_{FSM}$	82,000 A
	50 Hz	$I_{FSM}$	69,800 A
Peak One Cycle Surge Current, Non-Repetitive $T_j = 25C, V_r = V_{rrm}$	60 Hz	$I_{FSM}$	54,750 A
	50 Hz	$I_{FSM}$	46,540 A
Peak One Cycle Surge Current, Non-Repetitive $T_j = 125C, V_r = 0$	60 Hz	$I_{FSM}$	71,400 A
	50 Hz	$I_{FSM}$	60,690 A
Peak One Cycle Surge Current, Non-Repetitive $T_j = 125C, V_r = V_{rrm}$	60 Hz	$I_{FSM}$	47,600 A
	50 Hz	$I_{FSM}$	40,460 A
Peak Three Cycle Surge Current, Non-Repetitive	60 Hz, $T_j = 125C, V_r = V_{rrm}$	$I_{FSM}$	38,220 A
Peak Ten Cycle Surge Current, Non-Repetitive	60 Hz, $T_j = 125C, V_r = V_{rrm}$	$I_{FSM}$	30,020 A
$I^2t$ for Fusing for One Cycle $T_j = 125C, V_r = V_{rrm}$	8.3 milliseconds	$I^2t$	$9.4 \times 10^6$ A <sup>2</sup> sec
	10 milliseconds	$I^2t$	$8.2 \times 10^6$ A <sup>2</sup> sec
$I^2t$ for Fusing for One Cycle $T_j = 25C, V_r = 0V$	8.3 milliseconds	$I^2t$	$28.0 \times 10^6$ A <sup>2</sup> sec
	10 milliseconds	$I^2t$	$24.4 \times 10^6$ A <sup>2</sup> sec
Operating Temperature		$T_J$	-40 to +150 °C
Storage Temperature		$T_{stg}$	-40 to +150 °C
Max. Mounting Torque, M6 Mounting Screw			132 in. – Lb.
			15 Nm
Max. Mounting Torque, M10 Terminal Screw			106 in. – Lb.
			12 Nm
Module Weight, Typical			455 g
			11.75 lb
V Isolation @ 25C	60Hz $V_{rms}$ 1 sec	$V_{rms}$	3600 V
	60Hz $V_{rms}$ 60 sec	$V_{rms}$	3000 V

**Electrical Characteristics, T<sub>J</sub>=25° C unless otherwise specified**

Characteristics	Symbol	Test Conditions	Min.	Max.	Units
Repetitive Peak Reverse Leakage Current	I <sub>RRM</sub>	Up to 4400V, T <sub>J</sub> =150° C		200	mA
Peak On-State Voltage	V <sub>FM</sub>	I <sub>FM</sub> =3000A, T <sub>J</sub> =25° C		1.20	V
Threshold Voltage, Low-level	V <sub>(TO)1</sub>	T <sub>J</sub> = 150° C, I = 15%I <sub>T(AV)</sub> to $\pi$ I <sub>T(AV)</sub>		0.745	V
Slope Resistance, Low-level	r <sub>T1</sub>			0.064	mΩ
Threshold Voltage, High-level	V <sub>(TO)2</sub>	T <sub>J</sub> = 150° C, I = $\pi$ I <sub>T(AV)</sub> to I <sub>TSM</sub>		0.758	V
Slope Resistance, High-level	r <sub>T2</sub>			0.064	mΩ
V <sub>FM</sub> Coefficients, Full Range		T <sub>J</sub> = 150° C, I = 50A to 10kA V <sub>FM</sub> = A + B Ln I + C I + D Sqrt I	A = B = C = D =	0.8382 -2.04 E-02 5.93 E-05 1.51 E-03	
Typical Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> = 25° C, I <sub>fm</sub> = 3000A. di <sub>r</sub> /dt = 25 A/us, t <sub>p</sub> = 190 us		25	us

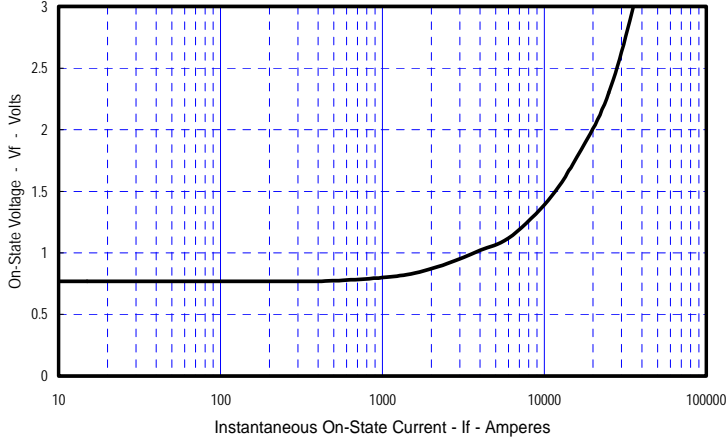
**Thermal Characteristics**

Characteristics	Symbol	Test Conditions	Max.	Units
Thermal Resistance, Junction to Case	R <sub>θJ-C</sub>	Per Module	0.024	°C/W
Thermal Impedance Coefficients	Z <sub>θJ-C</sub>	Z <sub>θJ-C</sub> = K <sub>1</sub> (1-exp(-t/τ <sub>1</sub> )) + K <sub>2</sub> (1-exp(-t/τ <sub>2</sub> )) + K <sub>3</sub> (1-exp(-t/τ <sub>3</sub> )) + K <sub>4</sub> (1-exp(-t/τ <sub>4</sub> ))	K <sub>1</sub> = 4.05 E-04 K <sub>2</sub> = 5.19 E-03 K <sub>3</sub> = 1.63 E-02 K <sub>4</sub> = 2.13 E-03	τ <sub>1</sub> = 6.24 E-03 τ <sub>2</sub> = 2.46 E-01 τ <sub>3</sub> = 8.20 τ <sub>4</sub> = 35.3
Thermal Resistance, Case to Sink Lubricated	R <sub>θC-S</sub>	Per Module	0.009	°C/W

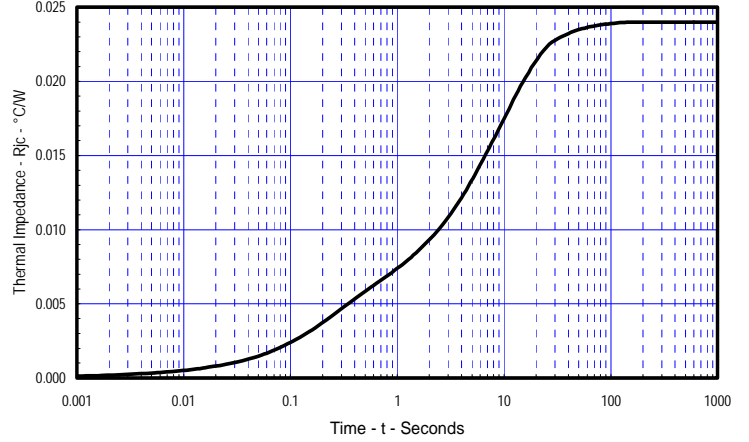
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### Single Diode Module 2000 Amperes / Up to 4400 Volts

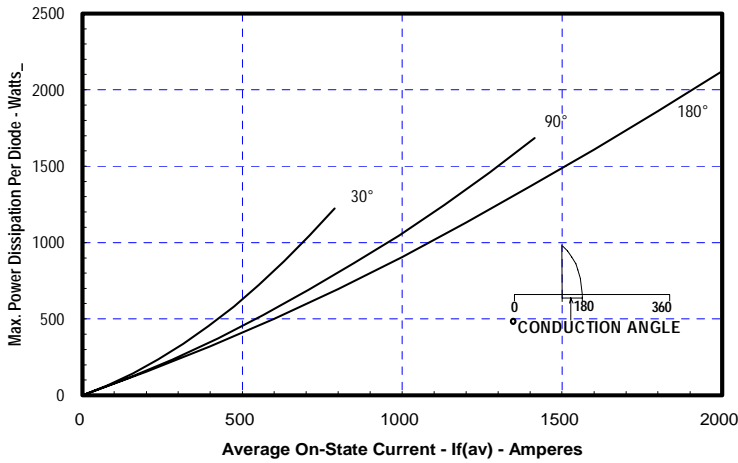
Typical On-State Forward Voltage Drop  
( $T_J = 150^\circ\text{C}$ )



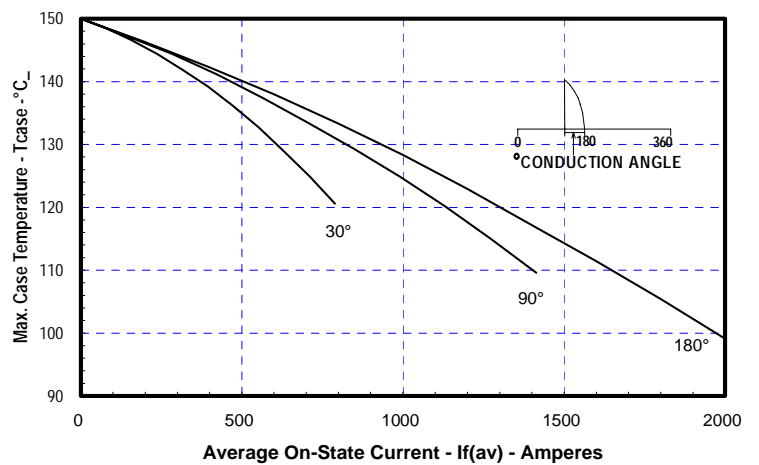
Maximum Transient Thermal Impedance  
(Junction To Case)



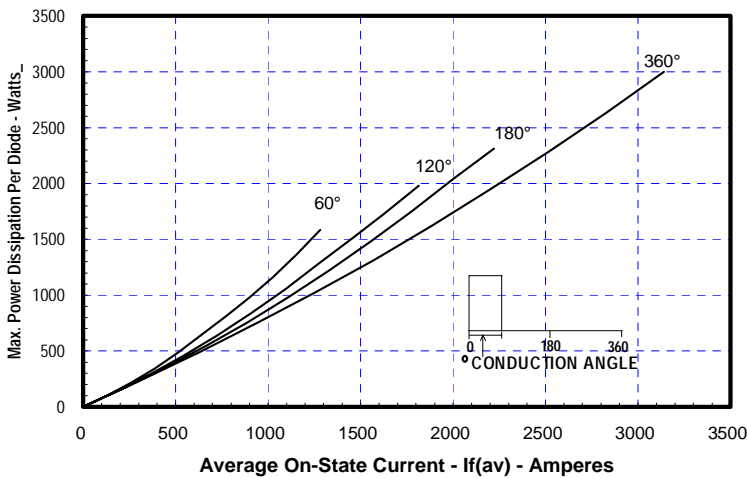
Maximum On-State Power Dissipation  
(Sinusoidal Waveform)



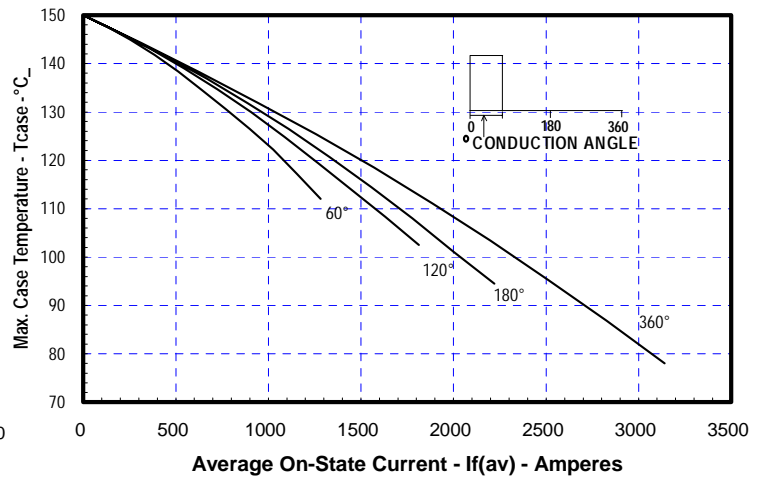
Maximum Allowable Case Temperature  
(Sinusoidal Waveform)



Maximum On-State Power Dissipation  
(Rectangular Waveform)



Maximum Allowable Case Temperature  
(Rectangular Waveform)



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**Single Diode Module**  
2000 Amperes / Up to 4400 Volts

DIM.	INCHES	MILLIMETERS
A	7.80	198.1
B	4.00	101.6
C	2.68	68.1
D	6.44	163.6
E	3.44	87.4
F	.28	7.1
G	7.31	185.7
H	7.00	177.8
M	.281	7.1
N	.45	11.4
P	.54	13.7
Q	5.93	150.6
R	.19	4.8
T	.48	12.2
U	2.28	58
V	2.54	64.5
W	4.93	125.2
X	3.81	96.8
Z	2.00	50.8
AA	1.00	25.4
BB	.50	12.7
CC	1.00	25.4
DD	.406	10.3
FF	.66	16.8

