

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

POW-R-BLOK™
Single Diode Isolated Module
2500 Amperes / Up to 2400 Volts



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:

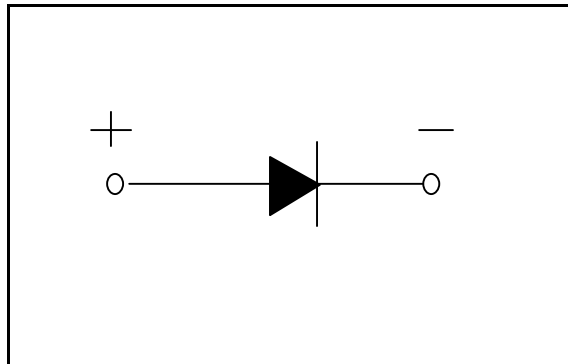
- Electrically Isolated Heatsinking
- Compression Bonded Elements
- Metal Baseplate
- Low Thermal Impedance for Improved Current Capability

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



Ordering Information:

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

Example: PS412425 is a 2400 Volt, 2500A Average Dual Diode Isolated POW-R-BLOK™ Module

Type	Voltage Volts (x100)	Current Amperes (x100)
PS41	18	25
	20	
	22	
	24	

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Absolute Maximum Ratings

Characteristics	Conditions	Symbol	Units
Repetitive Peak Reverse Blocking Voltage		V_{RRM}	Up to 2400 V
Non-Repetitive Peak Blocking Voltage ($t < 5$ msec)		V_{RSM}	$V_{RRM} + 100V$ V
RMS Current Per Diode (180° Conduction)	180° Conduction, $T_C=90° C$	$I_{F(RMS)}$	3925 A
	180° Conduction, $T_C=92° C$	$I_{F(RMS)}$	3768 A
	180° Conduction, $T_C=98° C$	$I_{F(RMS)}$	3454 A
	180° Conduction, $T_C=104° C$	$I_{F(RMS)}$	3140 A
Average Forward Current Per Diode (180° Conduction)	180° Conduction, $T_C=90° C$	$I_{F(AV)}$	2500 A
	180° Conduction, $T_C=92° C$	$I_{F(AV)}$	2400 A
	180° Conduction, $T_C=98° C$	$I_{F(AV)}$	2200 A
	180° Conduction, $T_C=104° C$	$I_{F(AV)}$	2000 A
Peak One Cycle Surge Current, Non-Repetitive $T_j = 25C, V_r = 0$	60 Hz	I_{FSM}	90,000 A
	50 Hz	I_{FSM}	83,000 A
Peak One Cycle Surge Current, Non-Repetitive $T_j = 25C, V_r = V_{rrm}$	60 Hz	I_{FSM}	61,000 A
	50 Hz	I_{FSM}	55,600 A
Peak One Cycle Surge Current, Non-Repetitive $T_j = 125C, V_r = 0$	60 Hz	I_{FSM}	79,600 A
	50 Hz	I_{FSM}	72,600 A
Peak One Cycle Surge Current, Non-Repetitive $T_j = 125C, V_r = V_{rrm}$	60 Hz	I_{FSM}	53,000 A
	50 Hz	I_{FSM}	48,400 A
Peak Three Cycle Surge Current, Non-Repetitive	60 Hz, $T_j = 125C, V_r = V_{rrm}$	I_{FSM}	42,000 A
Peak Ten Cycle Surge Current, Non-Repetitive	60 Hz, $T_j = 125C, V_r = V_{rrm}$	I_{FSM}	33,500 A
I^2t for Fusing for One Cycle $T_j = 125C, V_r = V_{rrm}$	8.3 milliseconds	I^2t	11.7×10^6 A ² sec
	10 milliseconds	I^2t	11.7×10^6 A ² 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		V_{rms}	3000 V

Electrical Characteristics, T_J=25° C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Max.	Units
Repetitive Peak Reverse Leakage Current	I _{RRM}	Up to 2400V, T _J =125° C		200	mA
Peak On-State Voltage	V _{FM}	I _{FM} =3000A, T _J =150° C		1.00	V
Threshold Voltage, Low-level	V _{(TO)1}	T _J = 150° C, I = 15%I _{T(AV)} to π I _{T(AV)}		0.681	V
Slope Resistance, Low-level	r _{T1}			0.051	mΩ
Threshold Voltage, High-level	V _{(TO)2}	T _J = 150° C, I = π I _{T(AV)} to I _{TSM}		0.681	V
Slope Resistance, High-level	r _{T2}			0.051	mΩ
V _{FM} Coefficients, Full Range		T _J = 150° C, I = 50A to 10kA V _{FM} = A+ B Ln I +C I + D Sqrt I	A = B = C = D =	0.6245 1.68 E-02 6.74 E-05 -2.44 E-03	
Typical Reverse Recovery Time	t _{rr}	T _J = 25° C, I _{fm} = 3000A. di _r /dt = 25 A/us, t _p = 190 us		22	us

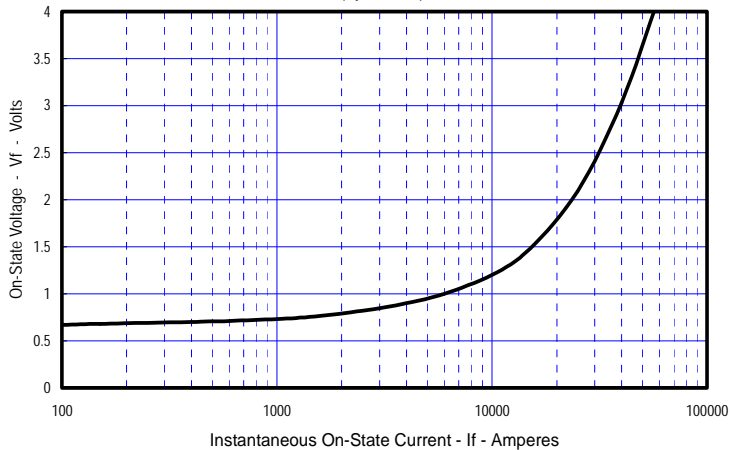
Thermal Characteristics

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

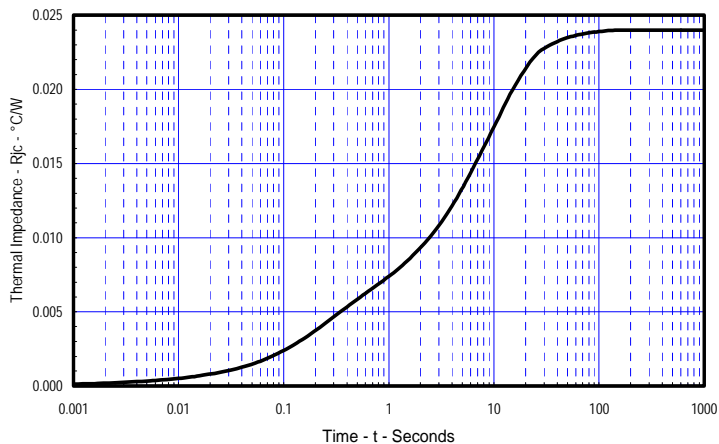
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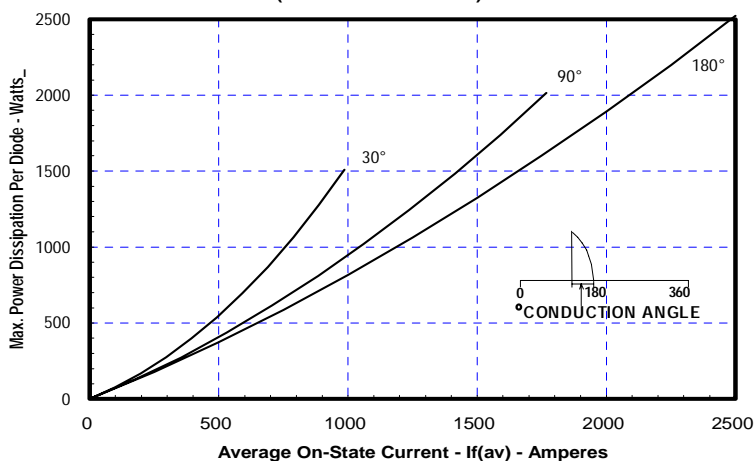
Typical On-State Forward Voltage Drop
($T_j = 150^\circ\text{C}$)



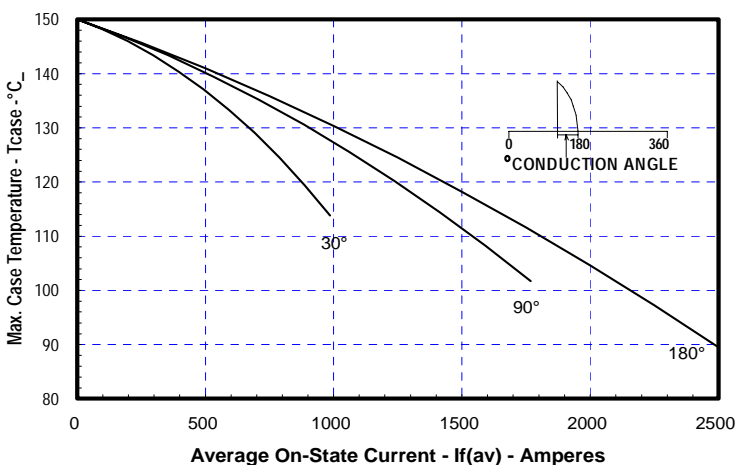
Maximum Transient Thermal Impedance
(Junction To Case)



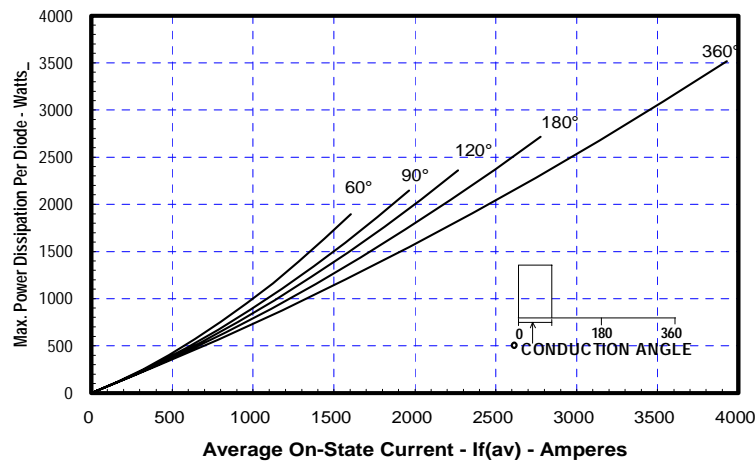
Maximum On-State Power Dissipation
(Sinusoidal Waveform)



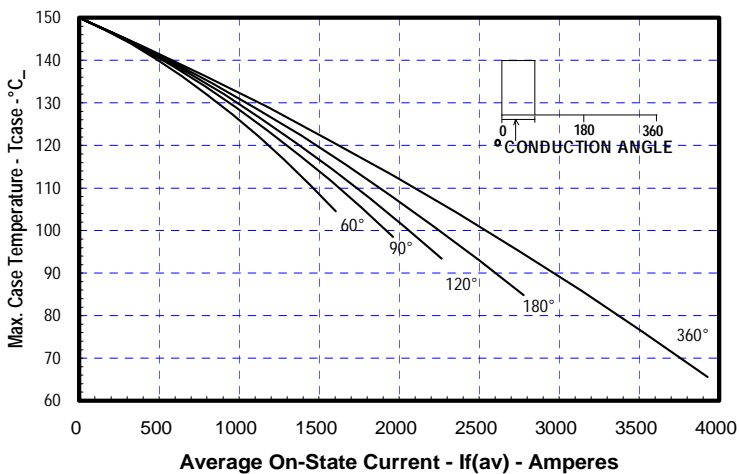
Maximum Allowable Case Temperature
(Sinusoidal Waveform)



Maximum On-State Power Dissipation
(Rectangular Waveform)



Maximum Allowable Case Temperature
(Rectangular Waveform)



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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

