

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

**POW-R-BLOK™**  
**Dual Diode Isolated Module**  
**1100 Amperes / Up to 2400 Volts**



**Description:**

Powerex Dual 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:**

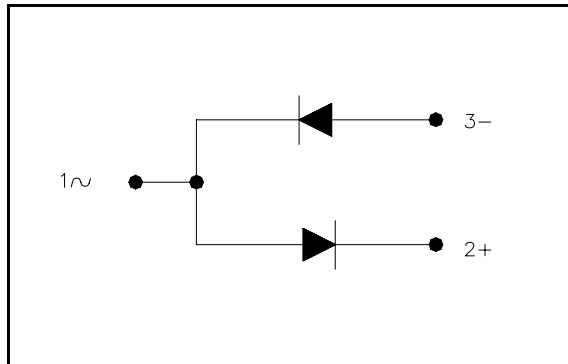
- Electrically Isolated Heatsinking
- Compression Bonded Elements
- Metal Baseplate
- Low Thermal Impedance for Improved Current Capability

**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: PD412411 is a 2400 Volt, 1100A Average Dual Diode Isolated POW-R-BLOK™ Module

Type	Voltage Volts (x100)	Current Amperes (x100)
PD41	18	11
	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, $T_C=80^\circ C$	$I_{F(RMS)}$	1885 A
	<b>180° Conduction, <math>T_C=87^\circ C</math></b>	$I_{F(RMS)}$	<b>1725</b> A
	180° Conduction, $T_C=95^\circ C$	$I_{F(RMS)}$	1570 A
	180° Conduction, $T_C=98^\circ C$	$I_{F(RMS)}$	1415 A
Average Forward Current Per Diode (180° Conduction)	180° Conduction, $T_C=80^\circ C$	$I_{F(AV)}$	1200 A
	<b>180° Conduction, <math>T_C=87^\circ C</math></b>	$I_{F(AV)}$	<b>1100</b> A
	180° Conduction, $T_C=95^\circ C$	$I_{F(AV)}$	1000 A
	180° Conduction, $T_C=98^\circ C$	$I_{F(AV)}$	900 A
Peak One Cycle Surge Current, Non-Repetitive $T_j = 25C, V_r = 0$	60 Hz	$I_{FSM}$	50,890 A
	50 Hz	$I_{FSM}$	46,400 A
Peak One Cycle Surge Current, Non-Repetitive $T_j = 25C, V_r = V_{rrm}$	60 Hz	$I_{FSM}$	33,925 A
	50 Hz	$I_{FSM}$	30,935 A
Peak One Cycle Surge Current, Non-Repetitive $T_j = 125C, V_r = 0$	60 Hz	$I_{FSM}$	44,250 A
	50 Hz	$I_{FSM}$	40,350 A
Peak One Cycle Surge Current, Non-Repetitive $T_j = 125C, V_r = V_{rrm}$	60 Hz	$I_{FSM}$	29,500 A
	50 Hz	$I_{FSM}$	26,900 A
Peak Three Cycle Surge Current, Non-Repetitive	60 Hz, $T_j = 125C, V_r = V_{rrm}$	$I_{FSM}$	23,690 A
Peak Ten Cycle Surge Current, Non-Repetitive	60 Hz, $T_j = 125C, V_r = V_{rrm}$	$I_{FSM}$	18,615 A
$I^2t$ for Fusing for One Cycle $T_j = 125C, V_r = V_{rrm}$	8.3 milliseconds	$I^2t$	$3.63 \times 10^6$ A <sup>2</sup> sec
	10 milliseconds	$I^2t$	$3.62 \times 10^6$ 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		$V_{rms}$	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 2400V, T <sub>J</sub> =125° C		100	mA
Peak On-State Voltage	V <sub>FM</sub>	I <sub>FM</sub> =3000A, T <sub>J</sub> =125° C		1.75	V
Threshold Voltage, Low-level	V <sub>(TO)1</sub>	T <sub>J</sub> = 125° C, I = 15%I <sub>T(AV)</sub> to $\pi$ I <sub>T(AV)</sub>		0.869	V
Slope Resistance, Low-level	r <sub>T1</sub>			0.237	mΩ
Threshold Voltage, High-level	V <sub>(TO)2</sub>	T <sub>J</sub> = 125° C, I = $\pi$ I <sub>T(AV)</sub> to I <sub>TSM</sub>		1.055	V
Slope Resistance, High-level	r <sub>T2</sub>			0.175	mΩ
V <sub>FM</sub> Coefficients, Full Range		T <sub>J</sub> = 125° C, I = 50A to 6kA V <sub>FM</sub> = A+ B Ln I +C I + D Sqrt I	A = B = C = D =	0.93159 -4.51 E-02 9.95 E-05 1.29 E-02	
Typical Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> = 25° C, I <sub>fm</sub> = 1500A. di <sub>r</sub> /dt = 25 A/us, t <sub>p</sub> = 190 us		22	us

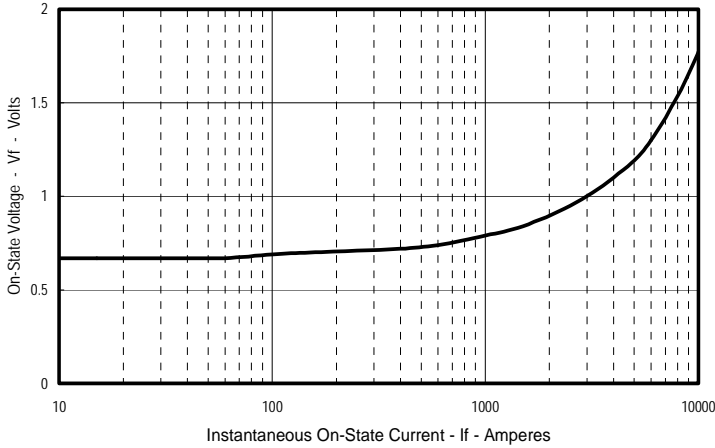
**Thermal Characteristics**

Characteristics	Symbol	Max.	Units	
Thermal Resistance, Junction to Case	R <sub>θJ-C</sub>	Per Module, both conducting Per Junction, both conducting	0.029 0.058	°C/W °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> = 5.04 E-04 K <sub>2</sub> = 2.31 E-03 K <sub>3</sub> = 2.83 E-03 K <sub>4</sub> =5.24 E-02	τ <sub>1</sub> = 2.47 E-03 τ <sub>2</sub> = 4.42 E-02 τ <sub>3</sub> = 1.370 τ <sub>4</sub> = 9.668
Thermal Resistance, Case to Sink Lubricated	R <sub>θC-S</sub>	Per Module	0.009	°C/W

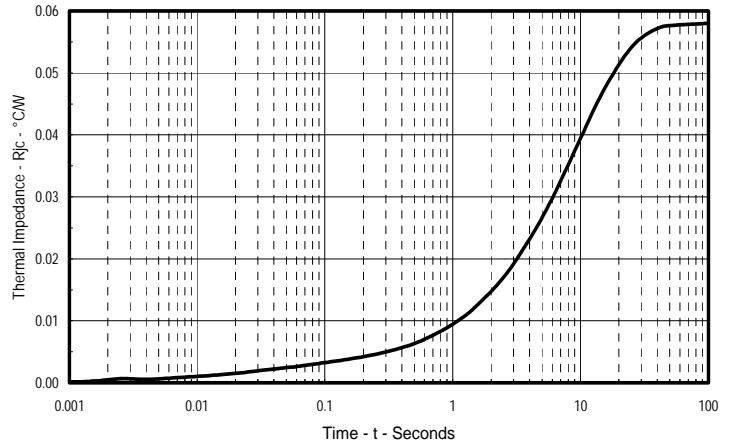
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### Dual Diode Module 1100 Amperes / Up to 2400 Volts

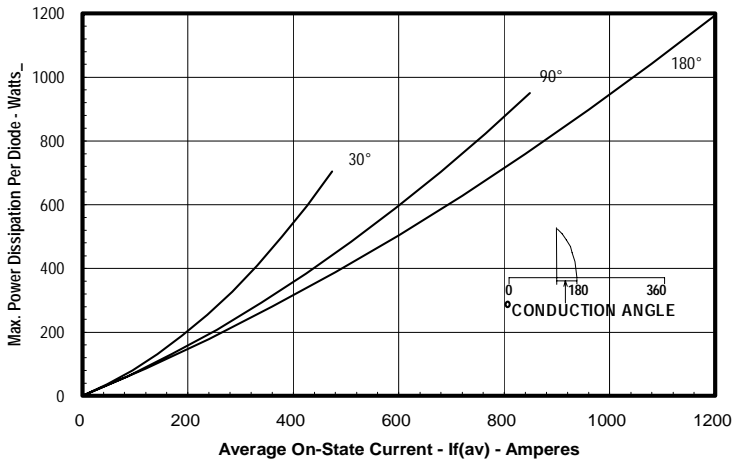
Typical On-State Forward Voltage Drop  
( $T_j = 150^\circ\text{C}$ )



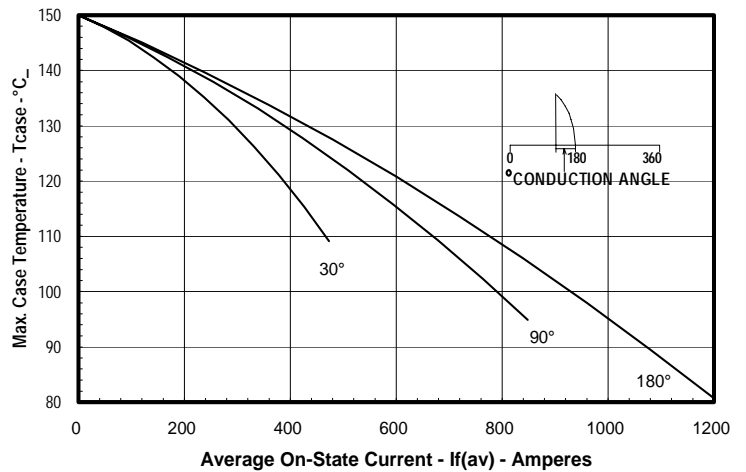
Maximum Transient Thermal Impedance  
(Junction To Case)



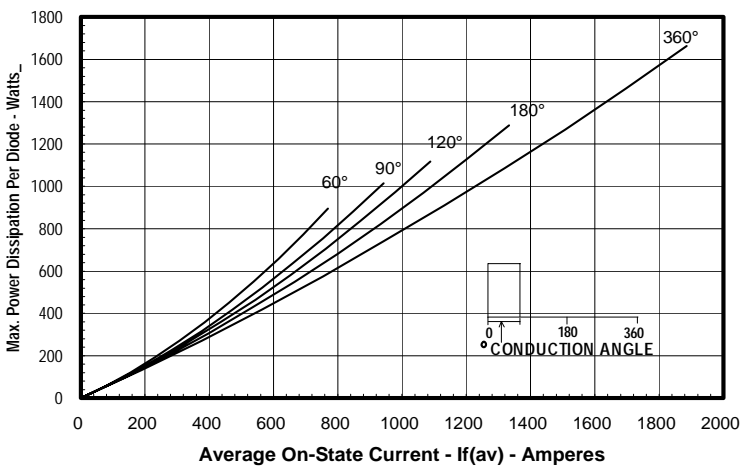
Maximum On-State Power Dissipation  
(Sinusoidal Waveform)



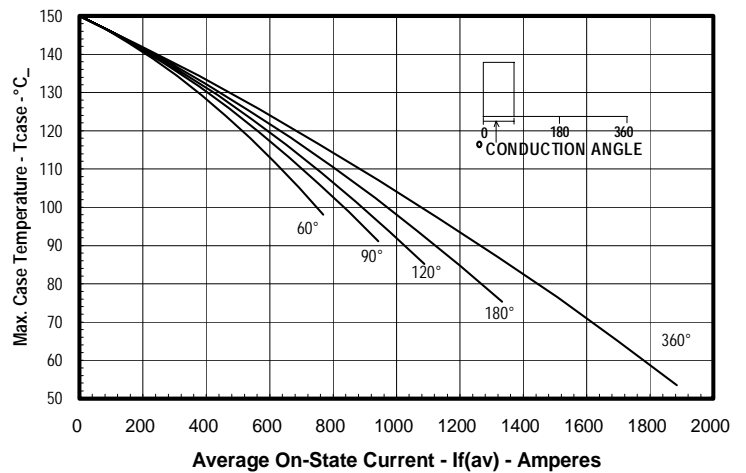
Maximum Allowable Case Temperature  
(Sinusoidal Waveform)



Maximum On-State Power Dissipation  
(Rectangular Waveform)



Maximum Allowable Case Temperature  
(Rectangular Waveform)



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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
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
EE	2.87	72.9
FF	.66	16.8

