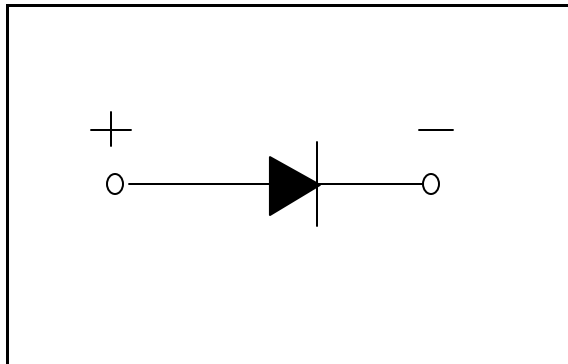


Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272
www.pwr.com

POW-R-BLOK™
Single Diode Isolated Module
1400 Amperes / Up to 5000 Volts



Ordering Information:

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

Example: PS415014 is a 5000 Volt, 1400A Average Single Diode Isolated POW-R-BLOK™ Module

Type	Voltage Volts (x100)	Current Amperes (x100)
PS41	45 50	14

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

Absolute Maximum Ratings

Characteristics	Conditions	Symbol	Units	
Repetitive Peak Reverse Blocking Voltage Derate V_{RRM} at $T_j < 25C$ – Consult Factory		V_{RRM}	Up to 5000	V
Non-Repetitive Peak Blocking Voltage ($t < 5$ msec) Derate V_{RSM} at $T_j < 25C$ - Consult Factory		V_{RSM}	$V_{RRM} + 100V$	V
RMS Current Per Diode (180° Conduction)	180° Conduction, $T_C=67°C$ 180° Conduction, $T_C=91°C$ 180° Conduction, $T_C=113°C$	$I_{F(RMS)}$ $I_{F(RMS)}$ $I_{F(RMS)}$	2820 2200 1570	A A A
Average Forward Current Per Diode (180° Conduction)	180° Conduction, $T_C=67°C$ 180° Conduction, $T_C=91°C$ 180° Conduction, $T_C=113°C$	$I_{F(AV)}$ $I_{F(AV)}$ $I_{F(AV)}$	1800 1400 1000	A A A
Peak One Cycle Surge Current, Non-Repetitive $T_j = 25C, V_r = 0$	60 Hz 50 Hz	I_{FSM} I_{FSM}	41,760 37,930	A A
Peak One Cycle Surge Current, Non-Repetitive $T_j = 25C, V_r = V_{RRM}$	60 Hz 50 Hz	I_{FSM} I_{FSM}	27,840 25,290	A A
Peak One Cycle Surge Current, Non-Repetitive $T_j = 125C, V_r = 0$	60 Hz 50 Hz	I_{FSM} I_{FSM}	36,000 32,700	A A
Peak One Cycle Surge Current, Non-Repetitive $T_j = 125C, V_r = V_{RRM}$	60 Hz 50 Hz	I_{FSM} I_{FSM}	24,000 21,800	A A
Peak Three Cycle Surge Current, Non-Repetitive	60 Hz, $T_j = 125C, V_r = V_{RRM}$	I_{FSM}	19,270	A
Peak Ten Cycle Surge Current, Non-Repetitive	60 Hz, $T_j = 125C, V_r = V_{RRM}$	I_{FSM}	15,140	A
I^2t for Fusing for One Cycle $T_j = 125C, V_r = V_{RRM}$	8.3 milliseconds 10 milliseconds	I^2t I^2t	2.39×10^6 2.38×10^6	$A^2 \text{ sec}$ $A^2 \text{ sec}$
I^2t for Fusing for One Cycle $T_j = 25C, V_r = 0$	8.3 milliseconds 10 milliseconds	I^2t I^2t	7.24×10^6 7.19×10^6	$A^2 \text{ sec}$ $A^2 \text{ sec}$
Operating Temperature		T_J	-40 to +150	°C
Storage Temperature		T_{stg}	-40 to +150	°C
Max. Mounting Torque, M6 Mounting Screw			132 15	in. – Lb. Nm
Max. Mounting Torque, M10 Terminal Screw			106 12	in. – Lb. Nm
Module Weight, Typical			5.33 11.75	kg lb
V Isolation @ 25C	60Hz V_{rms} 60 sec	V_{rms}	4000	V

Information presented is based upon manufacturers testing and projected capabilities.
 This information is subject to change without notice.
 The manufacturer makes no claim as to suitability of use, reliability, capability,
 or future availability of this product.

Electrical Characteristics, $T_J=25^\circ\text{C}$ unless otherwise specified

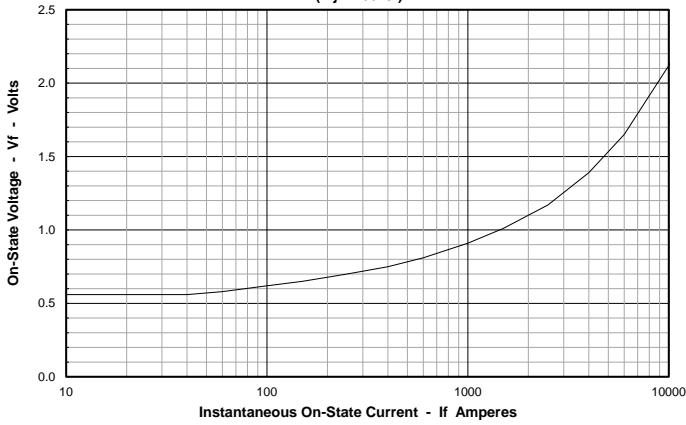
Characteristics	Symbol	Test Conditions	Min.	Max.	Units
Repetitive Peak Reverse Leakage Current	I_{RRM}	Up to 5000V, $T_J=150^\circ\text{C}$		400	mA
Peak On-State Voltage	V_{FM}	$I_{FM}=3000\text{A}$, $T_J=150^\circ\text{C}$		1.30	V
Threshold Voltage, Low-level	$V_{(TO)1}$	$T_J = 150^\circ\text{C}$, $I = 15\%I_{T(AV)}$ to $1I_{T(AV)}$		0.710	V
Slope Resistance, Low-level	r_{T1}			0.170	$\text{m}\Omega$
Threshold Voltage, High-level	$V_{(TO)2}$	$T_J = 150^\circ\text{C}$, $I = 1I_{T(AV)}$ to I_{TSM}		0.956	V
Slope Resistance, High-level	r_{T2}			0.120	$\text{m}\Omega$
V_{FM} Coefficients, Full Range		$T_J = 150^\circ\text{C}$, $I = 50\text{A}$ to 10kA	A =	0.5357	
			B =	-0.00112	
		$V_{FM} = A + B \ln I + C I + D \text{Sqrt } I$	C =	6.68 E-05	
			D =	9.29 E-03	
Typical Reverse Recovery Time	t_{rr}	$T_J = 25^\circ\text{C}$, $I_{fm} = 1500\text{A}$. $di/dt = 25 \text{ A/us}$, $t_p = 190 \text{ us}$		30	us

Thermal Characteristics

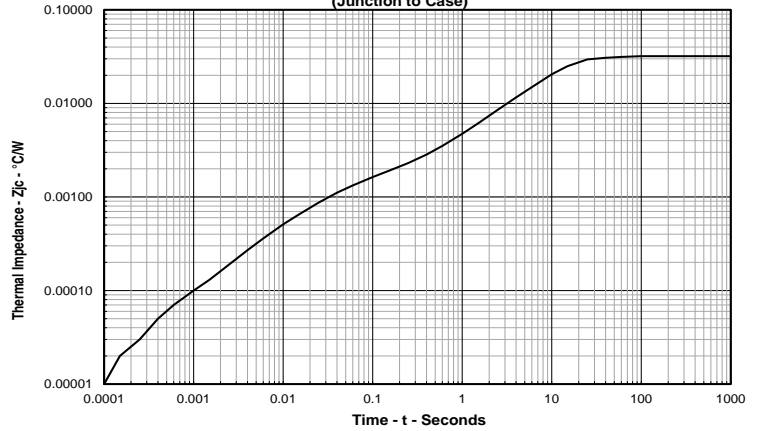
Characteristics	Symbol		Max.	Units
Thermal Resistance, Junction to Case	$R_{\Theta J-C}$	Per Module	0.032	$^\circ\text{C/W}$
Thermal Impedance Coefficients	$Z_{\Theta J-C}$	$Z_{\Theta J-C} = K_1 (1 - \exp(-t/\tau_1))$ $+ K_2 (1 - \exp(-t/\tau_2))$ $+ K_3 (1 - \exp(-t/\tau_3))$ $+ K_4 (1 - \exp(-t/\tau_4))$	$K_1 = 8.58 \text{ E-}04$ $K_2 = 9.78 \text{ E-}04$ $K_3 = 2.92 \text{ E-}02$ $K_4 = 9.72 \text{ E-}04$	$\tau_1 = 1.36 \text{ E-}02$ $\tau_2 = 1.80 \text{ E-}01$ $\tau_3 = 9.86$ $\tau_4 = 59.4$
Thermal Resistance, Case to Sink Lubricated	$R_{\Theta C-S}$	Per Module	0.009	$^\circ\text{C/W}$

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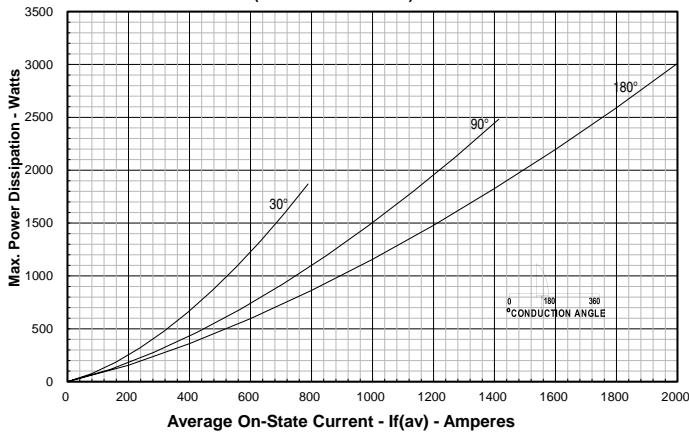
Maximum On-State Forward Voltage Drop
($T_j = 150^\circ\text{C}$)



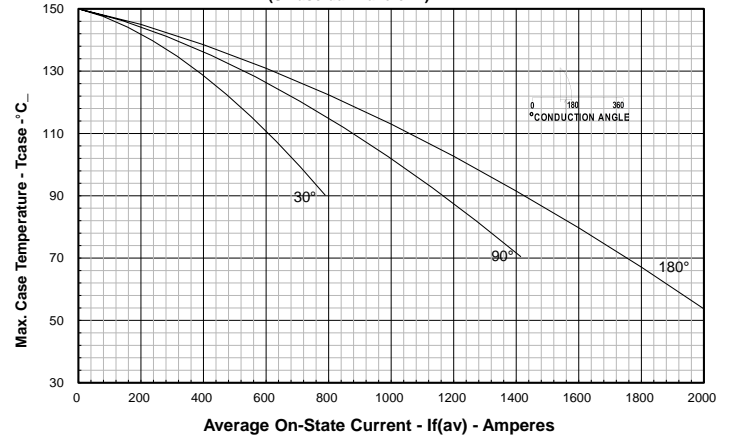
Maximum Transient Thermal Impedance
(Junction to Case)



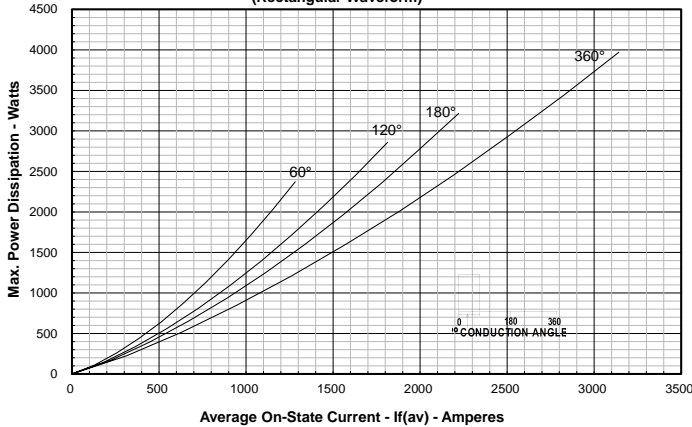
Maximum On-State Power Dissipation
(Sinusoidal Waveform)



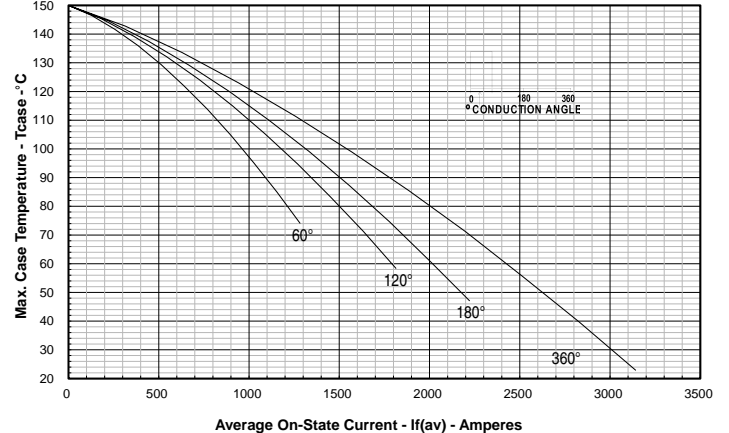
Maximum Allowable Case Temperature
(Sinusoidal Waveform)

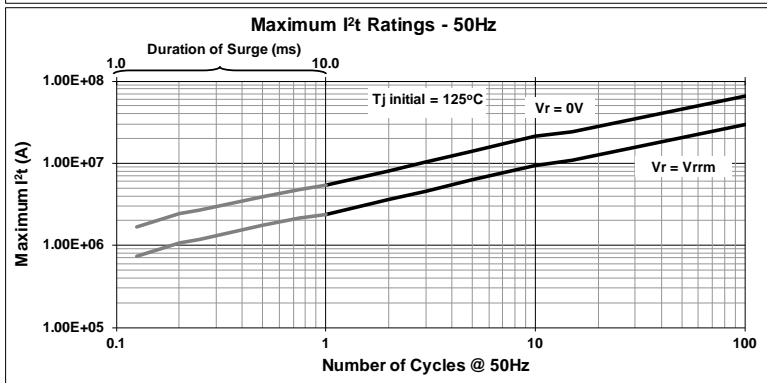
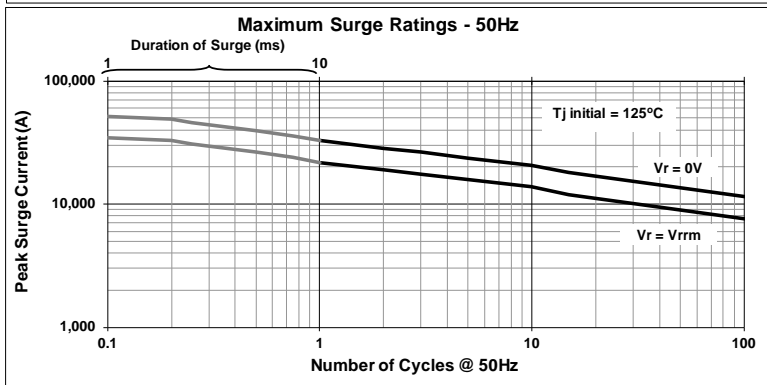
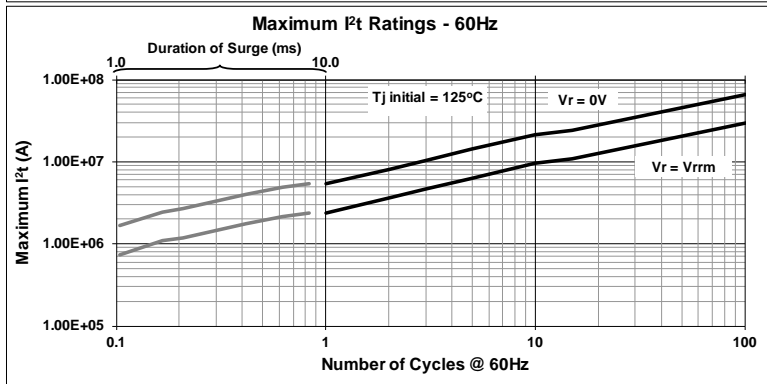
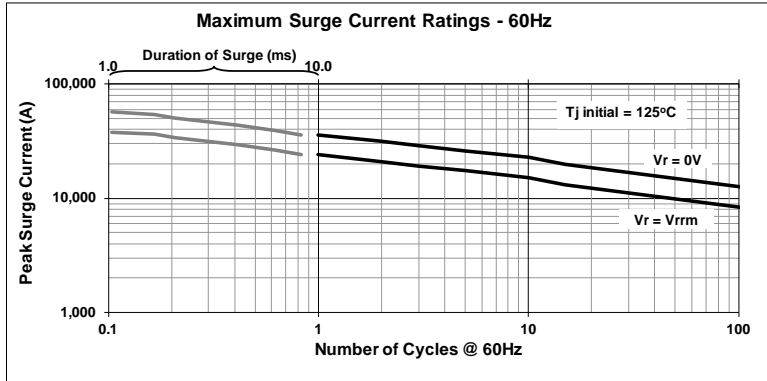


Maximum On-State Power Dissipation
(Rectangular Waveform)



Maximum Allowable Case Temperature
(Rectangular Waveform)





POW-R-BLOK[™]
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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

