

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

POW-R-BLOK™ Dual SCR / Diode Isolated Module 700 Amperes / Up to 1800 Volts



Description:

Powerex Dual SCR/Diode Modules are designed for use in applications requiring phase control and isolated packaging. The modules are isolated for easy mounting with other components on a common heatsink.

Features:

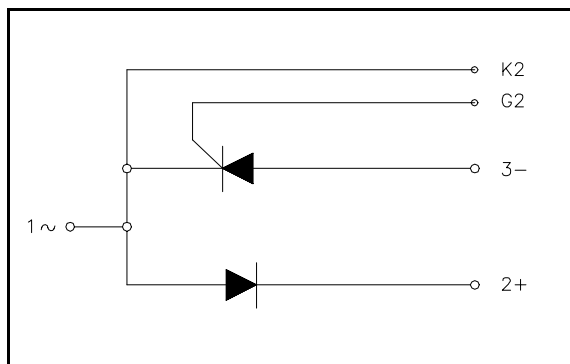
- Electrically Isolated Heatsinking
- Compression Bonded Elements
- Metal Baseplate
- Low Thermal Impedance for Improved Current Capability

Benefits:

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

Applications:

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



Ordering Information:

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

Example: PD471807 is a 1800 Volt, 700A Average SCR/Diode Isolated POW-R-BLOK™ Module

Type	Voltage Volts (x100)	Current Amperes (x100)
PD42	12	07
	14	
	16	
	18	

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Absolute Maximum Ratings

Characteristics	Conditions	Symbol	Units
Repetitive Peak Forward and Reverse Blocking Voltage		V_{DRM} & V_{RRM}	Up to 1800 V
Non-Repetitive Peak Blocking Voltage ($t < 5$ msec)		V_{RSM}	$V_{RRM} + 100V$ V
RMS Current AC Switch Configuration (180° Conduction)	180° Conduction, $T_C=74^\circ C$	$I_{T(RMS)}$	1775 A
	180° Conduction, $T_C=78^\circ C$	$I_{T(RMS)}$	1665 A
	180° Conduction, $T_C=82^\circ C$	$I_{T(RMS)}$	1550 A
	180° Conduction, $T_C=86^\circ C$	$I_{T(RMS)}$	1440 A
RMS Current Per SCR (180° Conduction)	180° Conduction, $T_C=74^\circ C$	$I_{T(RMS)}$	1256 A
	180° Conduction, $T_C=78^\circ C$	$I_{T(RMS)}$	1178 A
	180° Conduction, $T_C=82^\circ C$	$I_{T(RMS)}$	1100 A
	180° Conduction, $T_C=86^\circ C$	$I_{T(RMS)}$	1020 A
Average Forward Current Per SCR (180° Conduction)	180° Conduction, $T_C=74^\circ C$	$I_{T(AV)}$	800 A
	180° Conduction, $T_C=78^\circ C$	$I_{T(AV)}$	750 A
	180° Conduction, $T_C=82^\circ C$	$I_{T(AV)}$	700 A
	180° Conduction, $T_C=86^\circ C$	$I_{T(AV)}$	650 A
Peak One Cycle Surge Current, Non-Repetitive $T_j = 25C, V_r = 0$	60 Hz	I_{TSM}	69,000 A
	50 Hz	I_{TSM}	63,000 A
Peak One Cycle Surge Current, Non-Repetitive $T_j = 25C, V_r = V_{rrm}$	60 Hz	I_{TSM}	46,000 A
	50 Hz	I_{TSM}	42,000 A
Peak One Cycle Surge Current, Non-Repetitive $T_j = 125C, V_r = 0$	60 Hz	I_{TSM}	60,000 A
	50 Hz	I_{TSM}	54,750 A
Peak One Cycle Surge Current, Non-Repetitive $T_j = 125C, V_r = V_{rrm}$	60 Hz	I_{TSM}	40,000 A
	50 Hz	I_{TSM}	36,500 A
Peak Three Cycle Surge Current, Non-Repetitive	60 Hz, $T_j = 125C, V_r = V_{rrm}$	I_{TSM}	32,100 A
Peak Ten Cycle Surge Current, Non-Repetitive	60 Hz, $T_j = 125C, V_r = V_{rrm}$	I_{TSM}	25,200 A
I^2t for Fusing for One Cycle $T_j = 125C, V_r = V_{rrm}$	8.3 milliseconds	I^2t	6.60×10^6 A ² sec
	10 milliseconds	I^2t	6.66×10^6 A ² sec
Maximum Rate-of-Rise of On-State Current, (Non-Repetitive)	Per JEDEC Standard 397 5.2.2.6	di/dt	400 A/ μ s
Maximum Rate-of-Rise of On-State Current, (Repetitive)	Per JEDEC Standard 397 5.2.2.6	di/dt	150 A/ μ s
Operating Temperature		T_J	-40 to +125 °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, $T_J=25^\circ\text{C}$ unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Max.	Units
Repetitive Peak Forward Leakage Current	I_{DRM}	Up to 1800V, $T_J=125^\circ\text{C}$		100	mA
Repetitive Peak Reverse Leakage Current	I_{RRM}	Up to 1800V, $T_J=125^\circ\text{C}$		100	mA
Peak On-State Voltage	V_{TM}	$I_{TM}=3000\text{A}$, $T_J=125^\circ\text{C}$		1.30	V
Threshold Voltage, Low-level	$V_{(TO)1}$	$T_J = 125^\circ\text{C}$, $I = 15\%I_{T(AV)}$ to $\pi I_{T(AV)}$		0.703	V
Slope Resistance, Low-level	r_{T1}			0.184	$m\Omega$
Threshold Voltage, High-level	$V_{(TO)2}$	$T_J = 125^\circ\text{C}$, $I = \pi I_{T(AV)}$ to I_{TSM}		1.01	V
Slope Resistance, High-level	r_{T2}			0.117	$m\Omega$
V_{TM} Coefficients, Full Range		$T_J = 125^\circ\text{C}$, $I = 50\text{A}$ to 6kA $V_{TM} = A + B \ln I + C I + D \sqrt{I}$	A = B = C = D =	0.7999 -4.62 E-02 7.33 E-05 1.10 E-02	
Minimum dV/dt	dV/dt	Exponential to $0.67V_{DRM}$ $T_J=125^\circ\text{C}$, Gate Open	600		V/ μs
Typical Diode Reverse Recovery Time	T_{RR}	$T_J=25^\circ\text{C}$, $I_F=1500\text{A}$, $dI_R/dt = 25\text{A}/\mu\text{s}$, $T_P=190\mu\text{s}$	22 Typ.		μs
Gate Trigger Current	I_{GT}	$T_J=25^\circ\text{C}$, $V_D=12\text{V}$		200	mA
Gate Trigger Voltage	V_{GT}	$T_J=25^\circ\text{C}$, $V_D=12\text{V}$		3.0	Volts
Non-Triggering Gate Voltage	V_{GDM}	$T_J=125^\circ\text{C}$, $V_D= \frac{1}{2} V_{DRM}$		0.15	Volts
Holding Current	I_H			300	mA
Peak Forward Gate Current	I_{GTM}			4.0	Amp
Peak Reverse Gate Voltage	V_{GRM}			5	Volts
Maximum Average Gate Power Dissipation	$P_{GM(AVE)}$			16	Watts

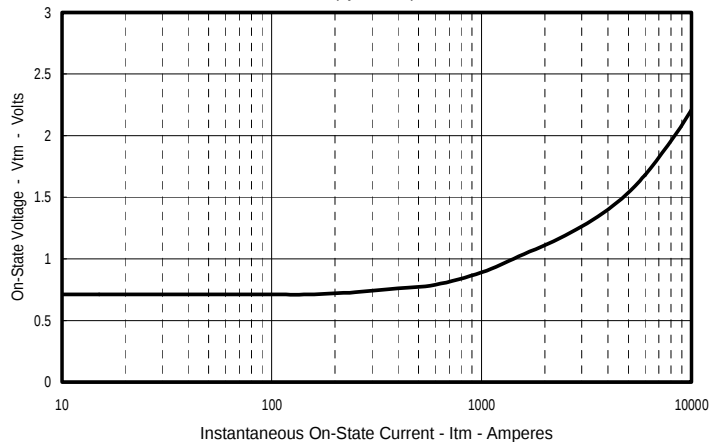
Thermal Characteristics

Characteristics	Symbol		Max.	Units
Thermal Resistance, Junction to Case	$R_{\theta J-C}$	Per Module, both conducting Per Junction, both conducting	0.029 0.058	$^\circ\text{C/W}$ $^\circ\text{C/W}$
Thermal Impedance Coefficients	$Z_{\theta J-C}$	$Z_{\theta J-C} = K_1 (1 - \exp(-t/\tau_1))$ $+ K_2 (1 - \exp(-t/\tau_2))$ $+ K_3 (1 - \exp(-t/\tau_3))$ $+ K_4 (1 - \exp(-t/\tau_4))$	$K_1 = 5.04 \text{ E-04}$ $K_2 = 2.31 \text{ E-03}$ $K_3 = 2.83 \text{ E-03}$ $K_4 = 5.24 \text{ E-02}$	$\tau_1 = 2.47 \text{ E-03}$ $\tau_2 = 4.42 \text{ E-02}$ $\tau_3 = 1.370$ $\tau_4 = 9.668$
Thermal Resistance, Case to Sink Lubricated	$R_{\theta C-S}$	Per Module	0.009	$^\circ\text{C/W}$

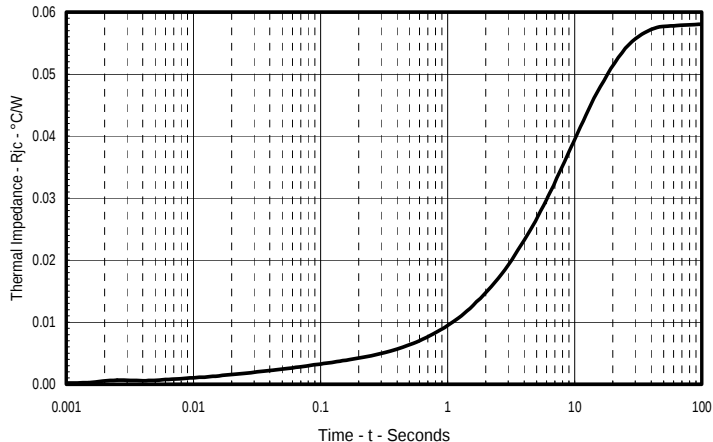
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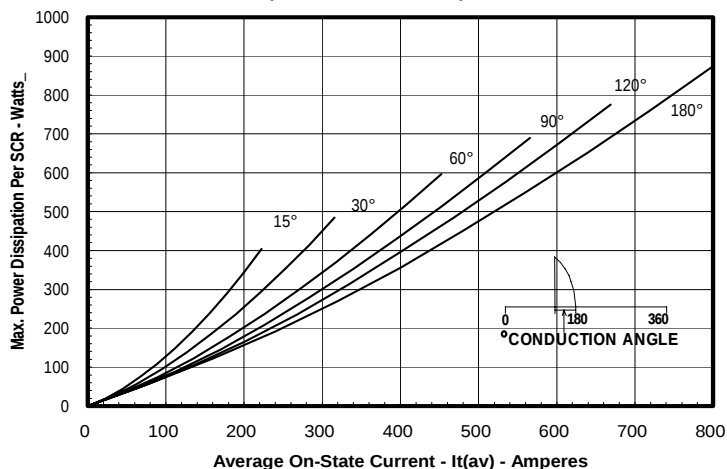
Typical On-State Forward Voltage Drop
($T_j = 125^\circ\text{C}$)



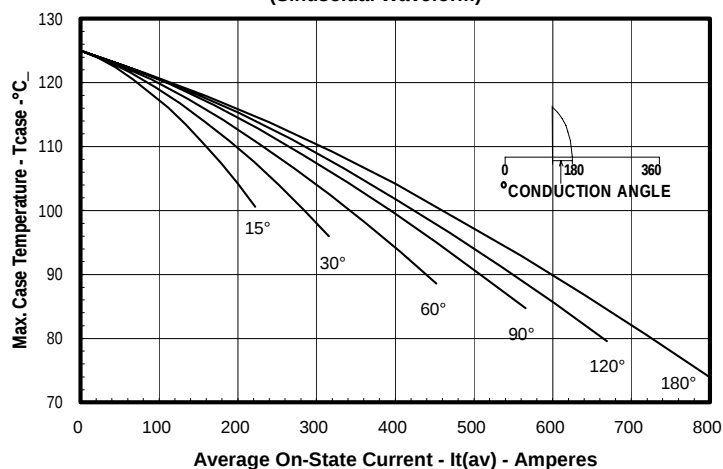
Maximum Transient Thermal Impedance
(Junction To Case)



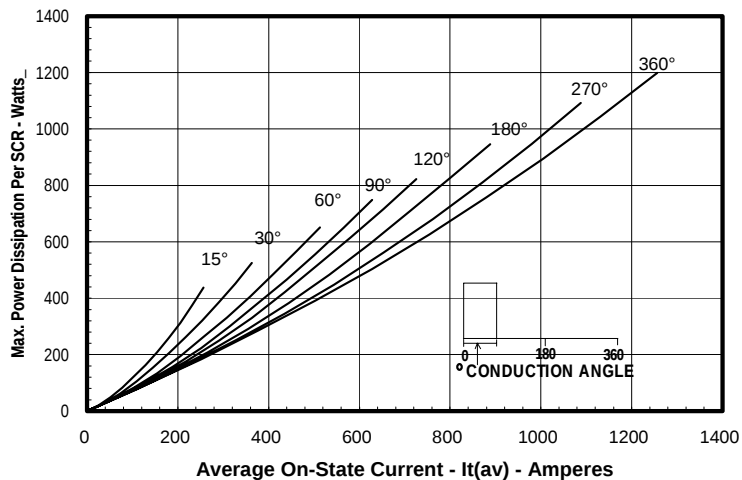
Maximum On-State Power Dissipation
(Sinusoidal Waveform)



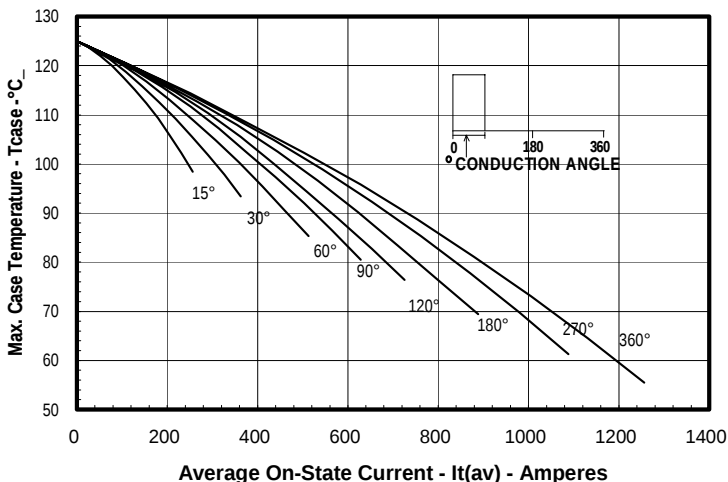
Maximum Allowable Case Temperature
(Sinusoidal Waveform)



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
J	1.65	42
K	.21	5.3
L	.28	7.1
M	.281	7.1
N	.45	11.4
P	.54	13.7
Q	5.93	150.6
R	.19	4.8
S	.11	2.8
T	.48	12.2
U	2.28	58
V	2.54	64.5
W	4.93	125.2
X	3.81	96.8
Y	.03	.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

