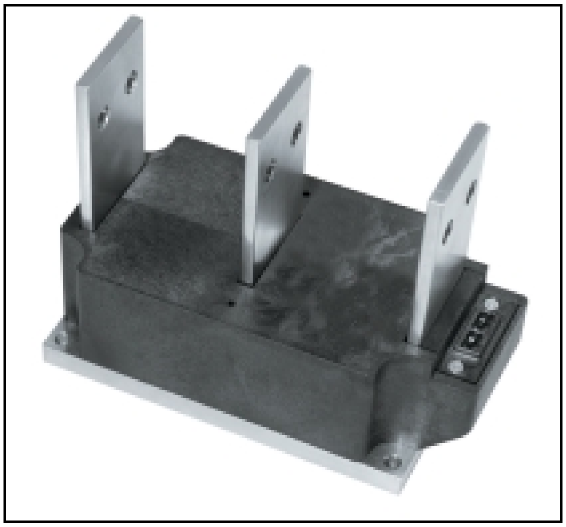
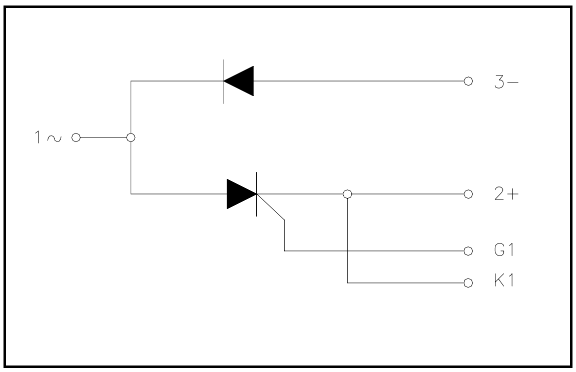
PRELIMINARY

PD42__07

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: PD421807 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	

10/04/2002

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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, T_C=74°C	$I_{T(RMS)}$	1775	A
(180 ° Conduction)	180° Conduction, T_C=78°C	$I_{T(RMS)}$	1665	A
	180° Conduction, T_C=82°C	$I_{T(RMS)}$	**1550**	A
	180° Conduction, T_C=86°C	$I_{T(RMS)}$	1440	A
RMS Current Per SCR	180° Conduction, T_C=74°C	$I_{T(RMS)}$	1256	A
(180 ° Conduction)	180° Conduction, T_C=78°C	$I_{T(RMS)}$	1178	A
	180° Conduction, T_C=82°C	$I_{T(RMS)}$	**1100**	A
	180° Conduction, T_C=86°C	$I_{T(RMS)}$	1020	A
Average Forward Current Per SCR	180° Conduction, T_C=74°C	$I_{T(AV)}$	800	A
(180 ° Conduction)	180° Conduction, T_C=78°C	$I_{T(AV)}$	750	A
	180° Conduction, T_C=82°C	$I_{T(AV)}$	**700**	A
	180° Conduction, T_C=86°C	$I_{T(AV)}$	650	A
Peak One Cycle Surge Current, Non-Repetitive Tj = 25C, Vr = 0	60 Hz 50 Hz	I_{TSM} I_{TSM}	69,000 63,000	A A
Peak One Cycle Surge Current, Non-Repetitive Tj = 25C, Vr = Vrrm	60 Hz 50 Hz	I_{TSM} I_{TSM}	46,000 42,000	A A
Peak One Cycle Surge Current, Non-Repetitive Tj = 125C, Vr = 0	60 Hz 50 Hz	I_{TSM} I_{TSM}	60,000 54,750	A A
Peak One Cycle Surge Current, Non-Repetitive Tj = 125C, Vr = Vrrm	60 Hz 50 Hz	I_{TSM} I_{TSM}	40,000 36,500	A A
Peak Three Cycle Surge Current, Non-Repetitive	60 Hz, Tj = 125C, Vr = Vrrm	I_{TSM}	32,100	A
Peak Ten Cycle Surge Current, Non-Repetitive	60 Hz, Tj = 125C, Vr = Vrrm	I_{TSM}	25,200	A
I^2t for Fusing for One Cycle Tj = 125C, Vr = Vrrm	8.3 milliseconds 10 milliseconds	I^2t I^2t	6.60×10^6 6.66×10^6	A^2 sec 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/μs
Maximum Rate-of-Rise of On-State Current, (Repetitive)	Per JEDEC Standard 397 5.2.2.6	di/dt	150	A/μs
Operating Temperature		T_J	-40 to +125	°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			455 11.75	g lb
V Isolation @ 25C		V_{rms}	3000	V

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Electrical Characteristics, T_J=25° C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Max.	Units
Repetitive Peak Forward Leakage Current	I_{DRM}	Up to 1800V, T_J=125° C		100	mA
Repetitive Peak Reverse Leakage Current	I_{RRM}	Up to 1800V, T_J=125° C		100	mA
Peak On-State Voltage	V_{TM}	I_{TM}=3000A, T_J=125° C		1.30	V
Threshold Voltage, Low-level Slope Resistance, Low-level	$V_{(TO)1}$ r_{T1}	T_J = 125° C, I = 15%$I_{T(AV)}$ to $\pi I_{T(AV)}$		0.703 0.184	V mΩ
Threshold Voltage, High-level Slope Resistance, High-level	$V_{(TO)2}$ r_{T2}	T_J = 125° C, I = $\pi I_{T(AV)}$ to I_{TSM}		1.01 0.117	V mΩ
V_{TM} Coefficients, Full Range		T_J = 125° C, I = 50A 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° C, Gate Open	600		V/μs
Typical Diode Reverse Recovery Time	T_{RR}	T_j=25° C, I_F=1500A, dI_R /dt = 25A/μs, T_P= 190 μs	22 Typ.		μs
Gate Trigger Current	I_{GT}	T_j=25° C, V_D=12V		200	mA
Gate Trigger Voltage	V_{GT}	T_j=25° C, V_D=12V		3.0	Volts
Non-Triggering Gate Voltage	V_{GDM}	T_j=125° C, V_D= ½ 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	$R_{\Theta J\text{-}C}$	Per Module, both conducting Per Junction, both conducting			0.029 0.058	°C/W °C/W
Thermal Impedance Coefficients	$Z_{\Theta J\text{-}C}$	$Z_{\Theta J\text{-}C}$= 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 = 5.04 E-04 K_2 = 2.31 E-03 K_3 = 2.83 E-03 K_4 =5.24 E-02	τ_1 = 2.47 E-03 τ_2 = 4.42 E-02 τ_3 = 1.370 τ_4 = 9.668		
Thermal Resistance, Case to Sink Lubricated	$R_{\Theta C\text{-}S}$	Per Module			0.009	°C/W

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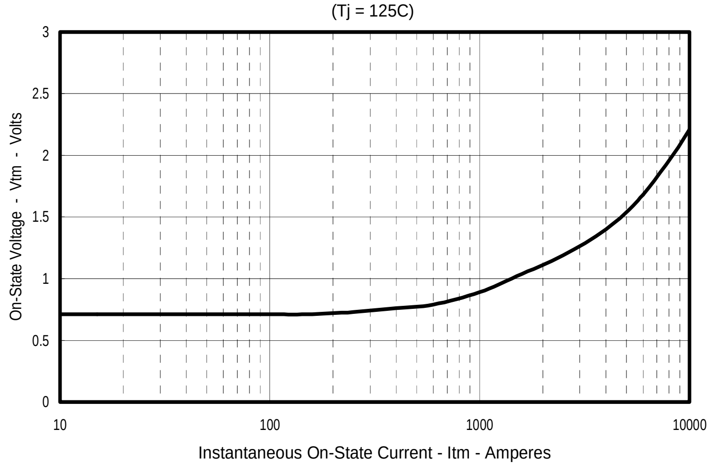
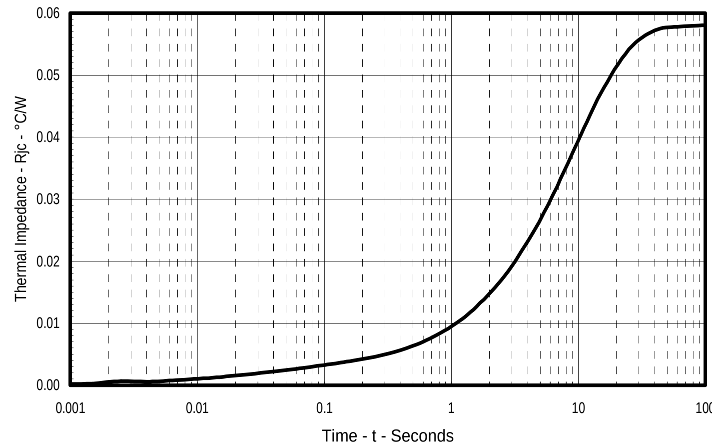
Typical On-State Forward Voltage Drop

(Tj = 125C)

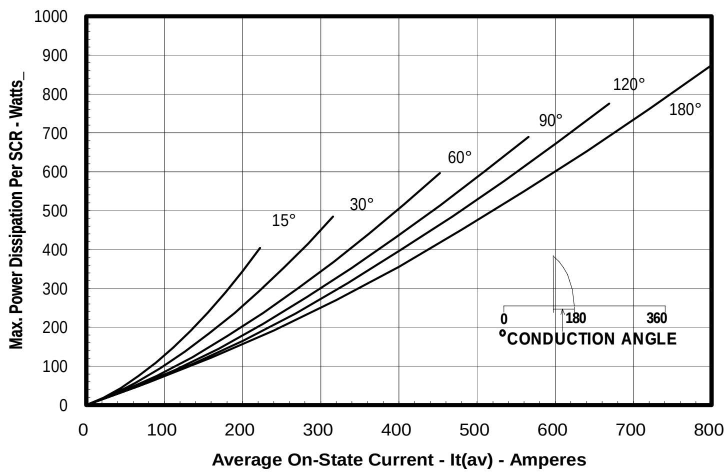


Maximum Transient Thermal Impedance
(Junction To Case)



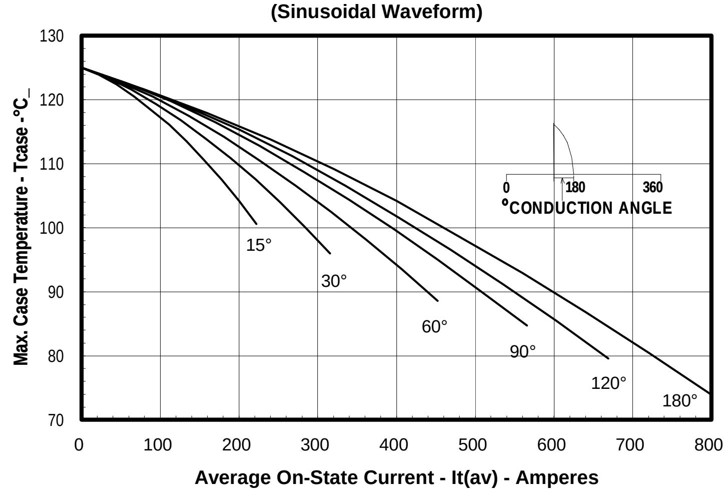
Maximum On-State Power Dissipation

(Sinusoidal Waveform)



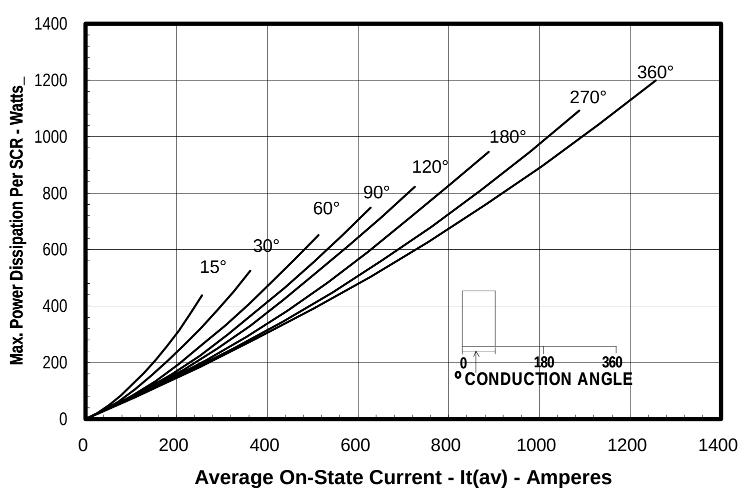
Maximum Allowable Case Temperature

(Sinusoidal Waveform)



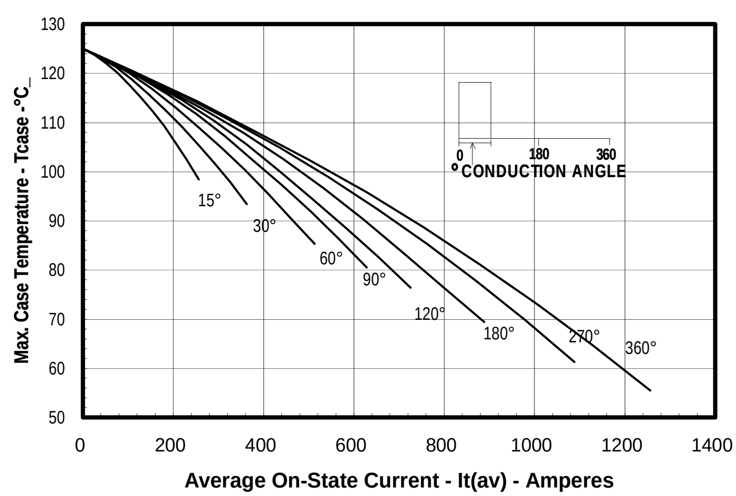
Maximum On-State Power Dissipation

(Rectangular Waveform)



Maximum Allowable Case Temperature

(Rectangular Waveform)



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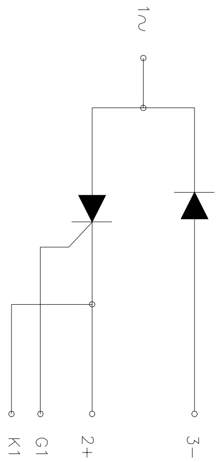

DIM.	INCHES	MILLIMETERS
A	7.80	198.1
B	4.00	101.6
C	2.68	68.1
D	6.44	163.6
E	3.44	87.4
F	.28	7.1
G	7.31	185.7
H	7.00	177.8
J	1.65	42
K	.21	5.3
L	.28	7.1
M	.281	7.1
N	.45	11.4
P	.54	13.7
Q	5.93	150.6
R	.19	4.8
S	.11	2.8
T	.48	12.2
U	2.28	58
V	2.54	64.5
W	4.93	125.2
X	3.81	96.8
Y	.03	.8
Z	2.00	50.8
AA	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