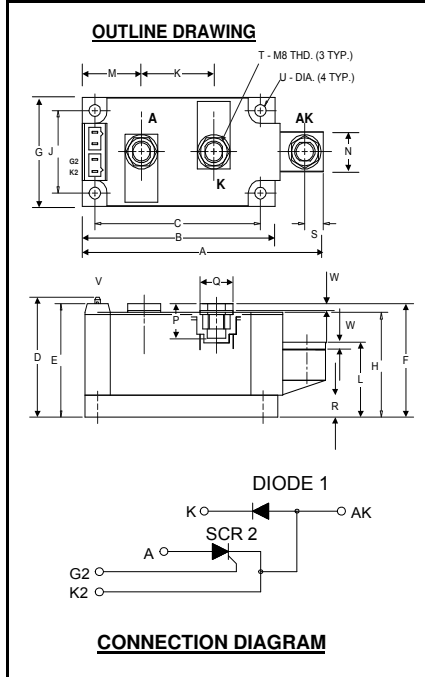


Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272  
www.pwr.com

### POW-R-BLOK™ Dual SCR/Diode Isolated Module 250 Amperes / Up to 1600 Volts



**ND47\_\_25**  
**Dual SCR/Diode Isolated**  
**POW-R-BLOK™ Module**  
250 Amperes / 600-1600 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. *POW-R-BLOK™* has been tested and recognized by the Underwriters Laboratories.

#### Features:

- Electrically Isolated Heatsinking
- Aluminum Nitride Insulator
- Compression Bonded Elements
- Metal Baseplate
- Low Thermal Impedance for Improved Current Capability
- Quick Connect Gate Terminal with Provision for Keyed Mating Plug
- UL Recognized

#### 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

#### ND47 Outline Dimensions

Dimension	Inches	Millimeters
A	4.57	116
B	3.66	93
C	3.15	80.0
D	2.17	55.1
E	2.06	52.3
F	2.07	52.0
G	1.97	50.0
H	1.90	48.3
J	1.50	38.1
K	1.38	35.0
L	1.26	32.0
M	1.122	28.5
N	.71	18.0
P	.57	14.5
Q	.625	15.9
R	.394	10.00
S	.350	8.9
T	M8 Metric	M8
U	.250 Dia.	6.35 Dia.
V	.110 x .032	2.8 x 0.8
W	.12	3.0

Note: Dimensions are for reference only.

#### Ordering Information:

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

Example: ND471625 is a 1600Volt, 250 Ampere Dual SCR/Diode Isolated *POW-R-BLOK™* Module

Type	Voltage Volts (x100)	Current Amperes (x 10)
ND47	06	25
	08	
	10	
	12	
	14	
	16	

**Absolute Maximum Ratings**

Characteristics	Conditions	Symbol		Units
Repetitive Peak Forward and Reverse Blocking Voltage		$V_{DRM}$ & $V_{RRM}$	up to 1600	V
Non-Repetitive Peak Reverse Blocking Voltage ( $t < 5$ msec)		$V_{RSM}$	1600	V
RMS Forward Current	180° Conduction, $T_C=89^\circ\text{C}$	$I_{T(RMS)}$	393	A
Average Forward Current	180° Conduction, $T_C=89^\circ\text{C}$	$I_{T(AV)}/I_{F(AV)}$	250	A
Peak One Cycle Surge Current, Non-Repetitive	60 Hz, 100% $V_{RRM}$ reapplied	$I_{TSM}/I_{FSM}$	8800	A
Peak Three Cycle Surge Current, Non-Repetitive	60 Hz, 100% $V_{RRM}$ reapplied	$I_{TSM}/I_{FSM}$	4685	A
Peak Ten Cycle Surge Current, Non-Repetitive	60 Hz, 100% $V_{RRM}$ reapplied	$I_{TSM}/I_{FSM}$	4040	A
$I^2t$ for Fusing for One Cycle, 8.3 milliseconds		$I^2t$	320,000	$\text{A}^2 \text{sec}$
Maximum Rate-of-Rise of On-State Current, (Non-Repetitive)	$T_J=25^\circ\text{C}$ , $I_G=500\text{mA}$ , $V_D=0.67 V_{DRM}(\text{Rated})$ , $I_{TM}=\pi I_{T(AV)}$ , $T_r < 0.5\mu\text{s}$ , $t_p > 6\mu\text{s}$	$di/dt$	800	$\text{A}/\mu\text{s}$
Peak Gate Power Dissipation		$P_{GM}$	16	W
Average Gate Power Dissipation		$P_{G(AV)}$	3	W
Peak Forward Gate Current		$I_{GFM}$	4	A
Peak Forward Gate Voltage		$V_{GFM}$	10	V
Peak Reverse Gate Voltage		$V_{GRM}$	5	V
Operating Temperature		$T_J$	-40 to +130	$^\circ\text{C}$
Storage Temperature		$T_{sig}$	-40 to +150	$^\circ\text{C}$
Max. Mounting Torque, M6 Mounting Screw			45 5	in.-Lb. Nm
Max. Mounting Torque, M8 Terminal Screw			110 12	in.-Lb. Nm
Module Weight, Typical			840 1.85	g lb
V Isolation @ 25C		$V_{rms}$	2500	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 1600V, $T_J=130^\circ\text{C}$		50	mA
Repetitive Peak Reverse Leakage Current	$I_{RRM}$	Up to 1600V, $T_J=130^\circ\text{C}$		50	mA
Peak On-State Voltage	$V_{TM}/V_{FM}$	$I_{TM}/I_{FM}=625\text{A}$		1.30	V
Threshold Voltage, Low-level	$V_{(TO)1}$	$T_J = 130^\circ\text{C}$ , $I = 15\%I_{T(AV)}$ to $I_{T(AV)}$		0.819	V
Slope Resistance, Low-level	$r_{T1}$			0.589	$\text{m}\Omega$
Threshold Voltage, High-level	$V_{(TO)2}$	$T_J = 130^\circ\text{C}$ , $I = I_{T(AV)}$ to $I_{TSM}$		0.47	V
Slope Resistance, High-level	$r_{T2}$			0.731	$\text{m}\Omega$
$V_{TM}$ Coefficients, Full Range		$T_J = 130^\circ\text{C}$ , $I = 15\%I_{T(AV)}$ to $I_{TSM}$	A =	0.5849	
			B =	0.1060	
		$V_{TM}/V_{FM} = A + B \ln I + C I + D \text{Sqrt } I$	C =	9.25 E-4	
			D =	-0.0286	
Minimum dV/dt	dV/dt	Exponential to $2/3 V_{DRM}$ $T_J=130^\circ\text{C}$ , Gate Open	500		V/ $\mu\text{s}$
Turn-On Time (Typical)	$t_{on}$	$I_{TM} = 100\text{A}$ , $V_D = 100\text{V}$	7	(Typical)	$\mu\text{s}$
Turn-Off Time (Typical)	$t_{off}$	$T_J = 130^\circ\text{C}$ , $I_T = 250\text{A}$ Re-Applied dV/dt = 20V/ $\mu\text{s}$ Linear to $0.8 V_{DRM}$	150	(Typical)	$\mu\text{s}$
Gate Trigger Current	$I_{GT}$	$T_J=25^\circ\text{C}$ , $V_D=12\text{V}$		150	mA
Gate Trigger Voltage	$V_{GT}$	$T_J=25^\circ\text{C}$ , $V_D=12\text{V}$		3.0	Volts
Non-Triggering Gate Voltage	$V_{GDM}$	$T_J=130^\circ\text{C}$ , $V_D= \frac{1}{2} V_{DRM}$		0.15	Volts

**Thermal Characteristics**

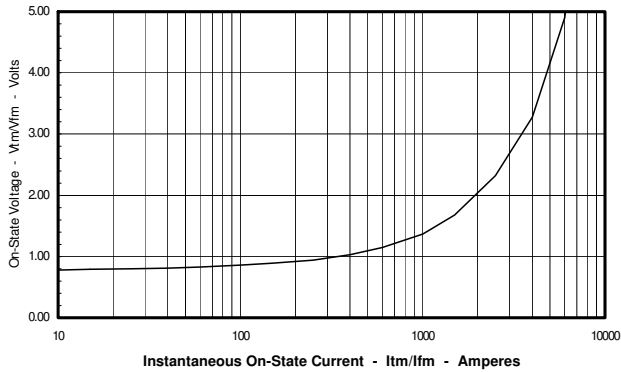
Characteristics	Symbol		Max.	Units
Thermal Resistance, Junction to Case	$R_{\theta J-C}$	Per Module, both conducting Per Junction both conducting	0.07 0.14	$^\circ\text{C}/\text{W}$ $^\circ\text{C}/\text{W}$
Thermal Impedance Coefficients	$Z_{\theta J-C}$	$Z_{\theta J-C} = K_1 (1 - \exp(-t/\tau_1))$ $+ K_2 (1 - \exp(-t/\tau_2))$ $+ K_3 (1 - \exp(-t/\tau_3))$ $+ K_4 (1 - \exp(-t/\tau_4))$	$K_1 = 5.27\text{E-}3$ $K_2 = 1.17\text{E-}2$ $K_3 = 5.26\text{E-}2$ $K_4 = 6.97\text{E-}2$	$\tau_1 = 1.69\text{E-}4$ $\tau_2 = 2.07\text{E-}2$ $\tau_3 = 2.37\text{E-}1$ $\tau_4 = 2.46$
Thermal Resistance, Case to Sink Lubricated	$R_{\theta C-S}$	Per Module	0.03	$^\circ\text{C}/\text{W}$

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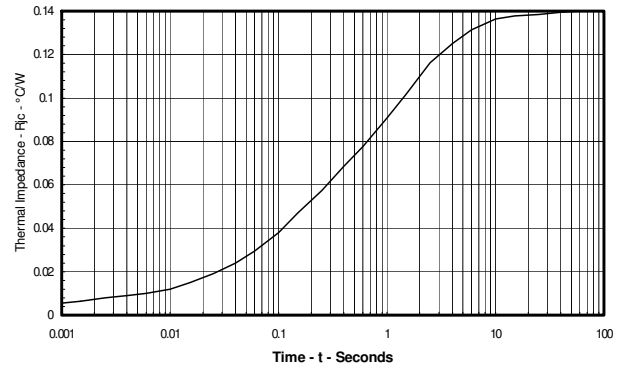
**Maximum On-State Forward Voltage Drop**

(T<sub>J</sub> = 130 °C)



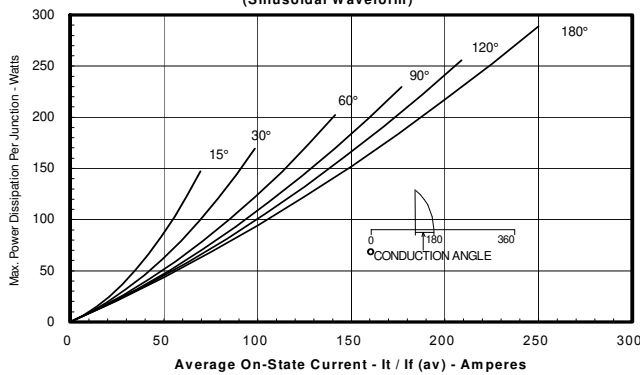
**Maximum Transient Thermal Impedance**

(Junction to Case, Per Junction)



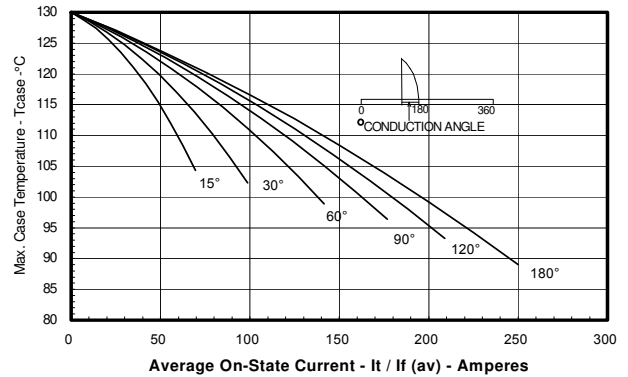
**Maximum On-State Power Dissipation**

(Sinusoidal Waveform)



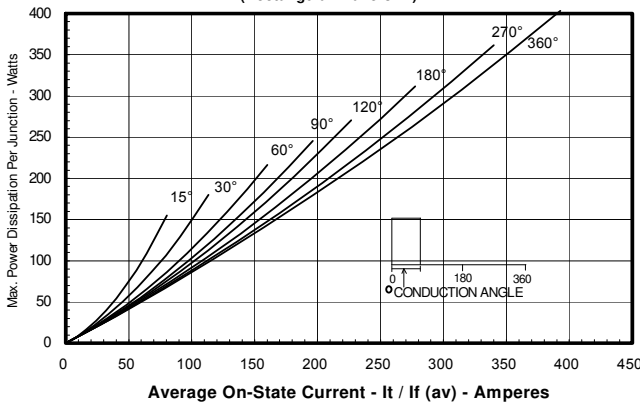
**Maximum Allowable Case Temperature**

(Sinusoidal Waveform)



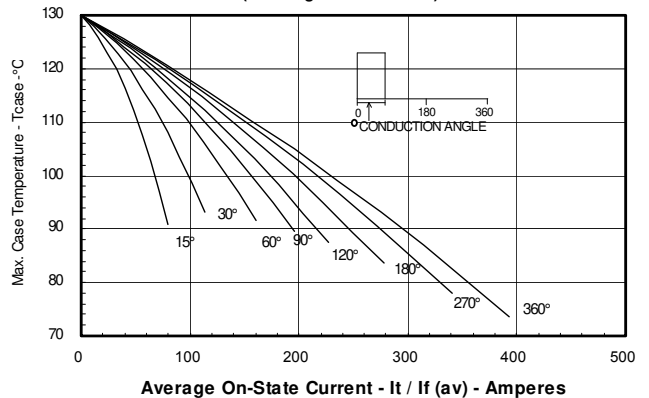
**Maximum On-State Power Dissipation**

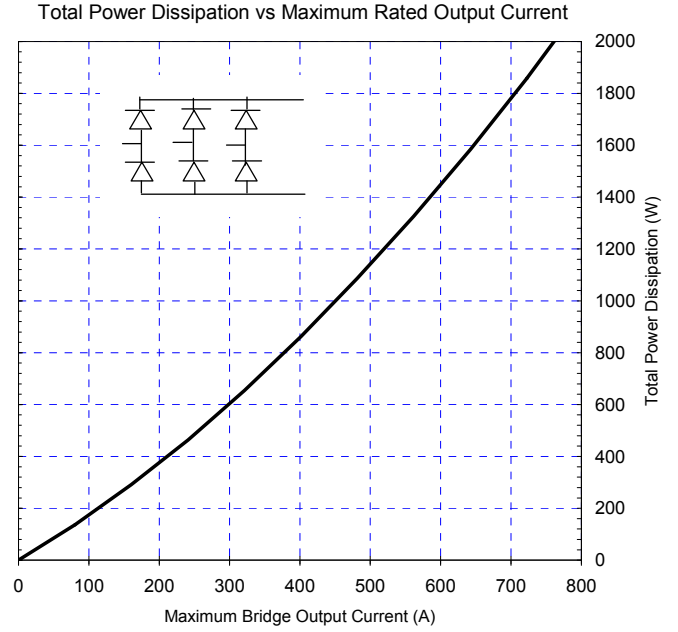
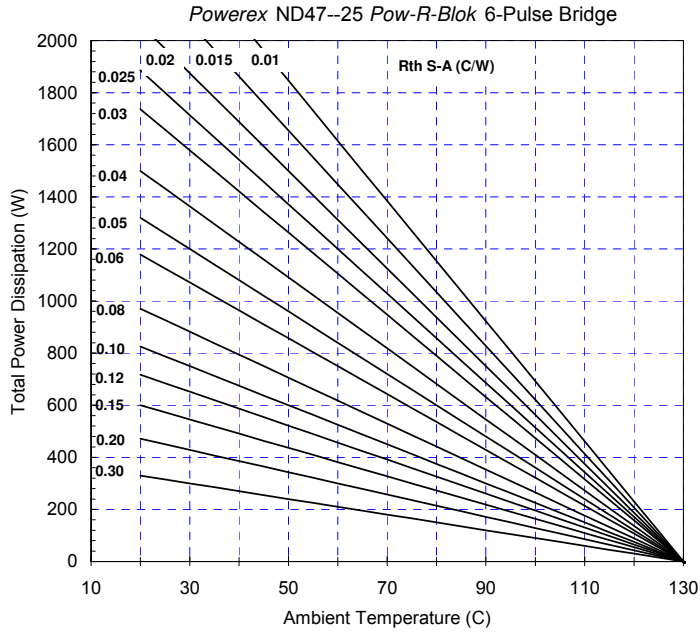
(Rectangular Waveform)



**Maximum Allowable Case Temperature**

(Rectangular Waveform)





Six-Pulse Bridge Circuit Total Power Dissipation & Maximum Rated Output Current With Sink to Ambient Resistance of Heatsink as a Parameter.