

**CD42\_90A, CD47\_90A**  
**Dual SCR/Diode Isolated**  
**POW-R-BLOK™ Module**  
90 Amperes / Up to 1600 Volts

**Description:**

Powerex 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
- DBC Alumina (Al<sub>2</sub>O<sub>3</sub>) Insulator
- Copper Baseplate
- Low Thermal Impedance for Improved Current Capability
- UL Recognized (E78240)

**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
- Lighting Control
- Heat & Temperature Control
- Welders

**CD42, CD47 Outline Dimensions**

Dimension	Inches	Millimeters
A	3.62	92
B	0.83	21
C	3.15	80
D	1.18	30
F	0.59	15
G	0.79	20
H	0.79	20
J	0.16	4
K	0.23	5.8
L	0.61	15.5
M	1.14	29
N	0.25	6.3
P	0.94	24
Q	1.18	30
R	0.71	18
S	0.11 x .03	2.8 x 0.8
T	0.25	6.3
U	M5	M5

Note: Dimensions are for reference only.

**Ordering Information:**

Select the complete nine digit module part number from the table below. Example: CD421690A is a 1600Volt, 90 Ampere Dual SCR/Diode Isolated *POW-R-BLOK™* Module

Type	Voltage Volts (x100)	Current Amperes (x 1)
CD42	08	90
CD47	12	
	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)		$V_{RSM}$	$V_{RRM} + 100$	V
RMS Forward Current	180° Conduction, $T_C=87^\circ\text{C}$	$I_{T(RMS)}$	140	A
	180° Conduction, $T_C=87^\circ\text{C}$ (AC Switch)	$I_{T(RMS)}$	200	A
Average Forward Current	180° Conduction, $T_C=87^\circ\text{C}$	$I_{T(AV)}$	90	A
Peak One Cycle Surge Current, Non-Repetitive	60 Hz, 100% $V_{RRM}$ reapplied, $T_j=125^\circ\text{C}$	$I_{TSM}$	1570	A
	60 Hz, No $V_{RRM}$ reapplied, $T_j=125^\circ\text{C}$	$I_{TSM}$	1870	A
	60 Hz, No $V_{RRM}$ reapplied, $T_j=25^\circ\text{C}$	$I_{TSM}$	2100	A
	50 Hz, 100% $V_{RRM}$ reapplied, $T_j=125^\circ\text{C}$	$I_{TSM}$	1500	A
	50 Hz, No $V_{RRM}$ reapplied, $T_j=125^\circ\text{C}$	$I_{TSM}$	1785	A
	50 Hz, No $V_{RRM}$ reapplied, $T_j=25^\circ\text{C}$	$I_{TSM}$	2000	A
Peak Three Cycle Surge Current, Non-Repetitive	60 Hz, 100% $V_{RRM}$ reapplied, $T_j=125^\circ\text{C}$	$I_{TSM}$	1210	A
	50 Hz, 100% $V_{RRM}$ reapplied, $T_j=125^\circ\text{C}$	$I_{TSM}$	1155	A
Peak Ten Cycle Surge Current, Non-Repetitive	60 Hz, 100% $V_{RRM}$ reapplied, $T_j=125^\circ\text{C}$	$I_{TSM}$	960	A
	50 Hz, 100% $V_{RRM}$ reapplied, $T_j=125^\circ\text{C}$	$I_{TSM}$	940	A
$I^2t$ for Fusing for One Cycle, 8.3 milliseconds	8.3 ms, 100% $V_{RRM}$ reapplied, $T_j=125^\circ\text{C}$	$I^2t$	10,270	$\text{A}^2 \text{sec}$
	8.3 ms, No $V_{RRM}$ reapplied, $T_j=125^\circ\text{C}$	$I^2t$	14,520	$\text{A}^2 \text{sec}$
	8.3 ms, No $V_{RRM}$ reapplied, $T_j=25^\circ\text{C}$	$I^2t$	18,300	$\text{A}^2 \text{sec}$
	10 ms, 100% $V_{RRM}$ reapplied, $T_j=125^\circ\text{C}$	$I^2t$	11,250	$\text{A}^2 \text{sec}$
	10 ms, No $V_{RRM}$ reapplied, $T_j=125^\circ\text{C}$	$I^2t$	15,910	$\text{A}^2 \text{sec}$
	10 ms, No $V_{RRM}$ reapplied, $T_j=25^\circ\text{C}$	$I^2t$	20,000	$\text{A}^2 \text{sec}$
Maximum Rate-of-Rise of On-State Current, (Non-Repetitive)	$T_j=25^\circ\text{C}$ , $I_G=0.5 \text{ A}$ , $V_D=0.67 V_{DRM}(\text{Rated})$ , $I_{TM}=300\text{A}$ , $T_r < 0.5\mu\text{s}$ , $t_p > 6\mu\text{s}$	di/dt	150	$\text{A}/\mu\text{s}$
Peak Gate Power Dissipation	$T_p < 5 \text{ ms}$ , $T_j = 125^\circ\text{C}$	$P_{GM}$	12	W
Average Gate Power Dissipation	$F = 50 \text{ Hz}$ , $T_j = 125^\circ\text{C}$	$P_{G(AV)}$	3	W
Peak Forward Gate Current	$T_p < 5 \text{ ms}$ , $T_j = 125^\circ\text{C}$	$I_{GFM}$	3	A
Peak Reverse Gate Voltage	$T_p < 5 \text{ ms}$ , $T_j = 125^\circ\text{C}$	$V_{GRM}$	10	V
Operating Temperature		$T_J$	-40 to +125	$^\circ\text{C}$
Storage Temperature		$T_{stg}$	-40 to +125	$^\circ\text{C}$
Max. Mounting Torque, M5 Mounting Screw on Terminals			25	in.-Lb.
			3	Nm
Max. Mounting Torque, Module to Heatsink			44	in.-Lb.
			5	Nm
Module Weight, Typical			110	g
			3.88	oz.
V Isolation @ 25C	50 – 60 Hz, 1 minute	$V_{rms}$	2500	V
Circuit to base, all terminals shorted together	50 – 60 Hz, 1 second	$V_{rms}$	3500	V

**Electrical Characteristics, T<sub>J</sub>=25°C unless otherwise specified**

Characteristics	Symbol	Test Conditions	Min.	Max.	Units
Repetitive Peak Forward Leakage Current	I <sub>DRM</sub>	Up to 1600V, T <sub>J</sub> =125°C		15	mA
Repetitive Peak Reverse Leakage Current	I <sub>RRM</sub>	Up to 1600V, T <sub>J</sub> =125°C		15	mA
Peak On-State Voltage	V <sub>TM</sub> / V <sub>FM</sub>	I <sub>TM</sub> / I <sub>FM</sub> =300A		1.58	V
Threshold Voltage, Low-level	V <sub>(TO)1</sub>	T <sub>J</sub> = 125°C, I = 16.7% x πI <sub>T(AV)</sub> to πI <sub>T(AV)</sub>		0.80	V
Slope Resistance, Low-level	r <sub>T1</sub>			2.40	mΩ
Threshold Voltage, High-level	V <sub>(TO)2</sub>	T <sub>J</sub> = 125°C, I = πI <sub>T(AV)</sub> to I <sub>TSM</sub>		0.85	V
Slope Resistance, High-level	r <sub>T2</sub>			2.25	mΩ
V <sub>TM</sub> Coefficients, Full Range		T <sub>J</sub> = 125°C, I = 15% x I <sub>T(AV)</sub> to I <sub>TSM</sub>	A =	0.7160	
			B =	2.17E-02	
		V <sub>TM</sub> = A + B Ln I + C I + D Sqrt I	C =	2.20E-03	
			D =	1.58E-03	
Minimum dV/dt	dV/dt	Linear to 2/3 V <sub>DRM</sub> T <sub>J</sub> =125°C, Gate Open Circuit	500		V/μs
Turn-Off Time (Typical)	t <sub>off</sub>	T <sub>J</sub> = 25°C, I <sub>T</sub> = 2A V <sub>r</sub> = 50V, -dI/dt=10 A/μs Re-Applied dV/dt = 200 V/μs, Linear to 900 V	40 - 100	(Typical)	μs
Gate Trigger Current	I <sub>GT</sub>	T <sub>J</sub> = -40°C, V <sub>D</sub> =6V, Resistive Load T <sub>J</sub> = 25°C, V <sub>D</sub> =6V, Resistive Load T <sub>J</sub> =125°C, V <sub>D</sub> =6V, Resistive Load		270 150 80	mA mA mA
Gate Trigger Voltage	V <sub>GT</sub>	T <sub>J</sub> = -40°C, V <sub>D</sub> =6V, Resistive Load T <sub>J</sub> = 25°C, V <sub>D</sub> =6V, Resistive Load T <sub>J</sub> =125°C, V <sub>D</sub> =6V, Resistive Load		4.0 2.5 1.7	Volts Volts Volts
Non-Triggering Gate Voltage	V <sub>GDM</sub>	T <sub>J</sub> =125°C, V <sub>D</sub> =V <sub>DRM</sub>		0.25	Volts
Non-Triggering Gate Current	I <sub>GDM</sub>	T <sub>J</sub> =125°C, V <sub>D</sub> =V <sub>DRM</sub>		6	mA
Holding Current	I <sub>H</sub>	V <sub>D</sub> =6V, Resistive Load, Gate Open		200	mA
Latching Current	I <sub>L</sub>	V <sub>D</sub> =6V, Resistive Load		400	mA

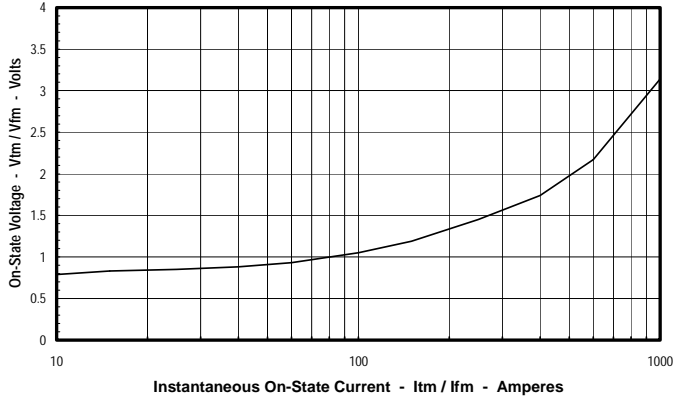
**Thermal Characteristics**

Characteristics	Symbol		Max.	Units
Thermal Resistance, Junction to Case DC Operation	R <sub>ΘJ-C</sub>	Per Module, both conducting Per Junction, both conducting	0.135 0.270	°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> = 6.48 E-3 K <sub>2</sub> = 6.02 E-2 K <sub>3</sub> = 1.64 E-1 K <sub>4</sub> = 3.94 E-2	τ <sub>1</sub> = 5.80 E-4 τ <sub>2</sub> = 1.70 E-2 τ <sub>3</sub> = 9.54 E-2 τ <sub>4</sub> = 3.53 E-1
Thermal Resistance, Case to Sink Lubricated	R <sub>ΘC-S</sub>	Per Module	0.1	°C/W

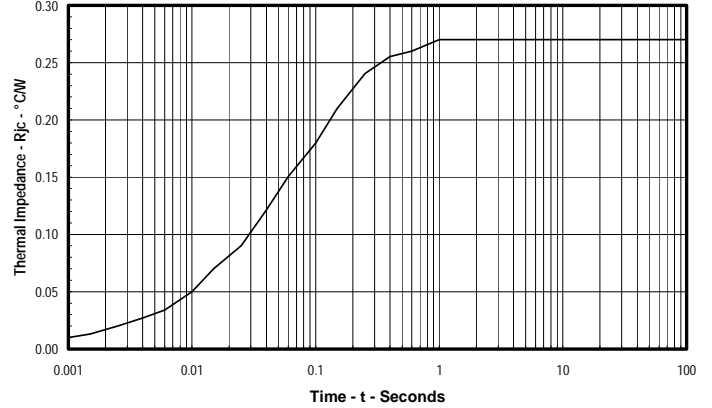
Powerex, Inc., Hillis Street, Youngwood, Pennsylvania 15697 (724) 925-7272

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90 Amperes / Up to 1600 Volts

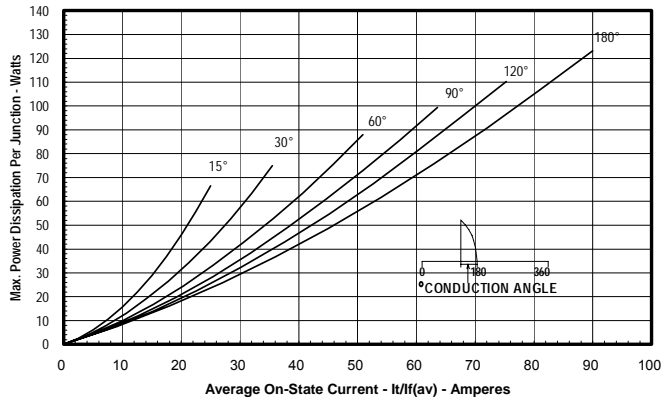
**Maximum On-State Forward Voltage Drop**  
( $T_j = 125^\circ\text{C}$ )



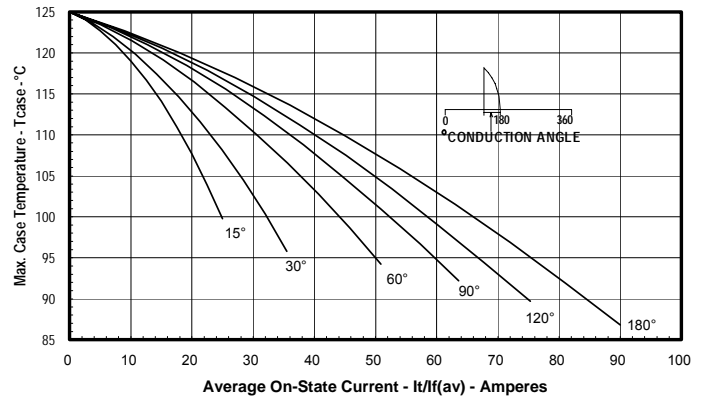
**Maximum Transient Thermal Impedance**  
(Junction to Case)



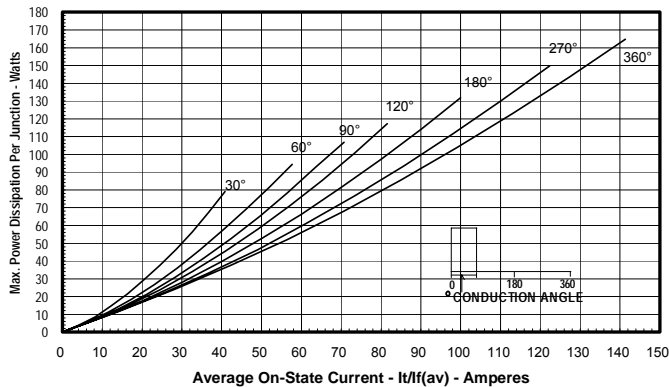
**Maximum On-State Power Dissipation**  
(Sinusoidal Waveform)



**Maximum Allowable Case Temperature**  
(Sinusoidal Waveform)



**Maximum On-State Power Dissipation**  
(Rectangular Waveform)



**Maximum Allowable Case Temperature**  
(Rectangular Waveform)

