

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 (Al₂O₃) 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_J=25°C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Max.	Units
Repetitive Peak Forward Leakage Current	I _{DRM}	Up to 1600V, T _J =125°C		15	mA
Repetitive Peak Reverse Leakage Current	I _{RRM}	Up to 1600V, T _J =125°C		15	mA
Peak On-State Voltage	V _{TM} / V _{FM}	I _{TM} / I _{FM} =300A		1.58	V
Threshold Voltage, Low-level	V _{(TO)1}	T _J = 125°C, I = 16.7% x πI _{T(AV)} to πI _{T(AV)}		0.80	V
Slope Resistance, Low-level	r _{T1}			2.40	mΩ
Threshold Voltage, High-level	V _{(TO)2}	T _J = 125°C, I = πI _{T(AV)} to I _{TSM}		0.85	V
Slope Resistance, High-level	r _{T2}			2.25	mΩ
V _{TM} Coefficients, Full Range		T _J = 125°C, I = 15% x I _{T(AV)} to I _{TSM}	A =	0.7160	
			B =	2.17E-02	
		V _{TM} = 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 _{DRM} T _J =125°C, Gate Open Circuit	500		V/μs
Turn-Off Time (Typical)	t _{off}	T _J = 25°C, I _T = 2A V _r = 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 _{GT}	T _J = -40°C, V _D =6V, Resistive Load T _J = 25°C, V _D =6V, Resistive Load T _J =125°C, V _D =6V, Resistive Load		270 150 80	mA mA mA
Gate Trigger Voltage	V _{GT}	T _J = -40°C, V _D =6V, Resistive Load T _J = 25°C, V _D =6V, Resistive Load T _J =125°C, V _D =6V, Resistive Load		4.0 2.5 1.7	Volts Volts Volts
Non-Triggering Gate Voltage	V _{GDM}	T _J =125°C, V _D =V _{DRM}		0.25	Volts
Non-Triggering Gate Current	I _{GDM}	T _J =125°C, V _D =V _{DRM}		6	mA
Holding Current	I _H	V _D =6V, Resistive Load, Gate Open		200	mA
Latching Current	I _L	V _D =6V, Resistive Load		400	mA

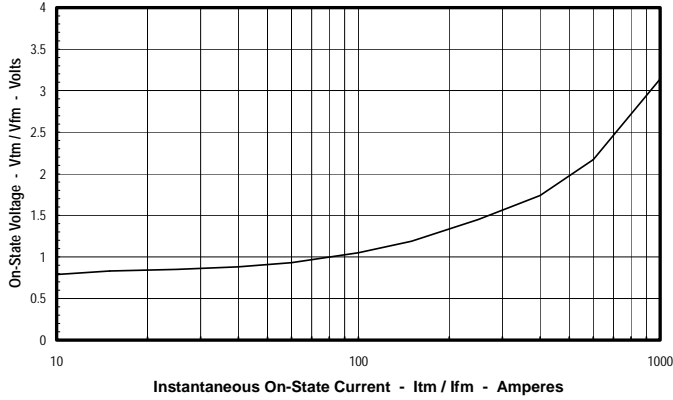
Thermal Characteristics

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

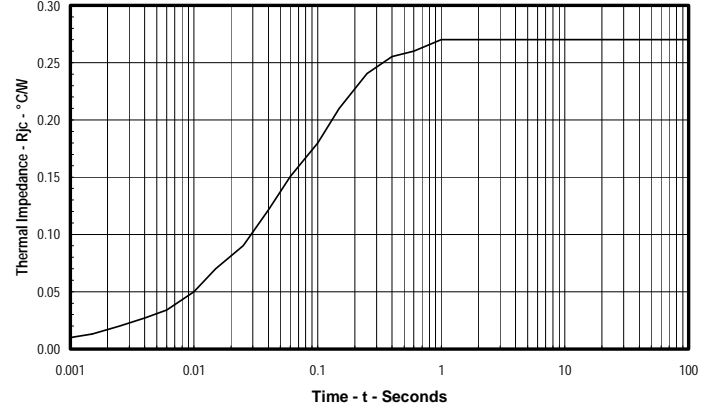
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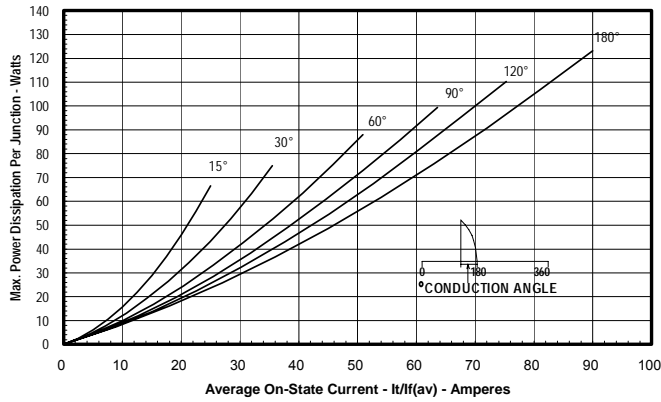
Maximum On-State Forward Voltage Drop
($T_j = 125^\circ\text{C}$)



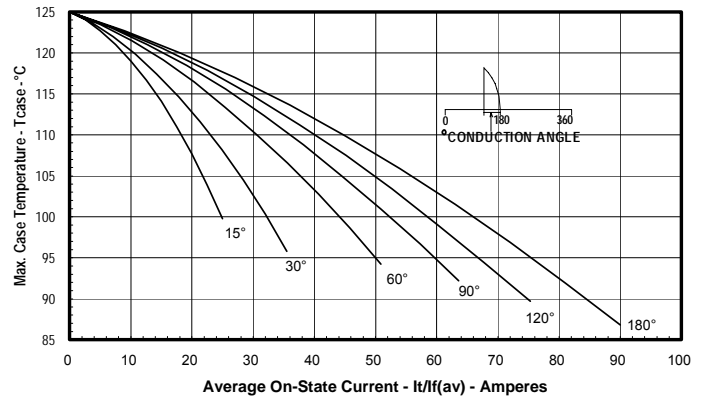
Maximum Transient Thermal Impedance
(Junction to Case)



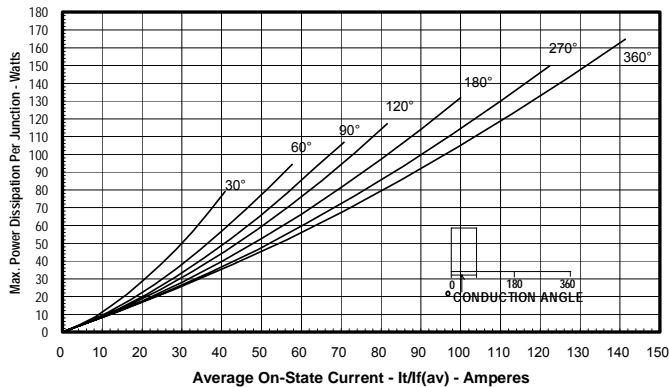
Maximum On-State Power Dissipation
(Sinusoidal Waveform)



Maximum Allowable Case Temperature
(Sinusoidal Waveform)



Maximum On-State Power Dissipation
(Rectangular Waveform)



Maximum Allowable Case Temperature
(Rectangular Waveform)

