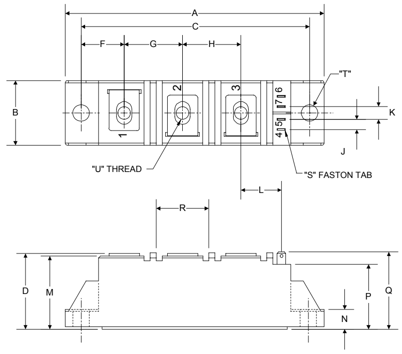
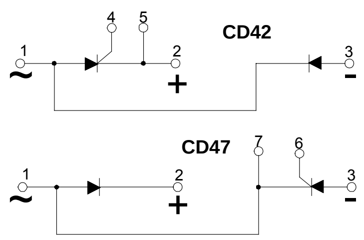
POWEREX

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

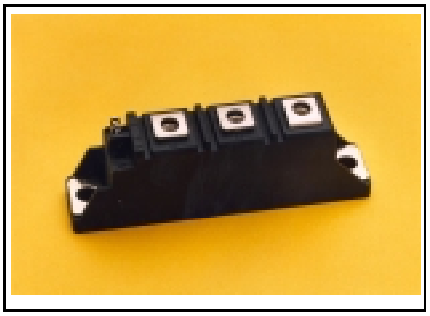
POW-R-BLOK™
Dual SCR/Diode Isolated Module
90 Amperes / Up to 1600 Volts

OUTLINE DRAWING





CONNECTION DIAGRAM



CD42__90, CD47__90
Dual SCR/Diode Isolated
POW-R-BLOK™ Module
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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:
Features:

- Electrically Isolated Heatsinking
- DBC Alumina (Al_2O_3) Insulator
- Glass Passivated Chips
- DBC Alumina (Al_2O_3) 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	0.81	20.5
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	0.24	6.1
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 eight digit module part number from the table below. Example: CD421690 is a 1600Volt, 90 Ampere Dual SCR/Diode Isolated *POW-R-BLOK™* Module

Type	Voltage Volts (x100)	Current Amperes (x 1)
CD42 CD47	08 12 16	90

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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°C	$I_{T(RMS)}$	140	A
	180° Conduction, T_C=87°C (AC Switch)	$I_{T(RMS)}$	200	A
Average Forward Current	180° Conduction, T_C=87°C	$I_{T(AV)}$	90	A
Peak One Cycle Surge Current, Non-Repetitive	60 Hz, 100% V_{RRM} reapplied, T_j=125°C	I_{TSM}	1570	A
	60 Hz, No V_{RRM} reapplied, T_j=125°C	I_{TSM}	1870	A
	60 Hz, No V_{RRM} reapplied, T_j=25°C	I_{TSM}	2100	A
	50 Hz, 100% V_{RRM} reapplied, T_j=125°C	I_{TSM}	1500	A
	50 Hz, No V_{RRM} reapplied, T_j=125°C	I_{TSM}	1785	A
	50 Hz, No V_{RRM} reapplied, T_j=25°C	I_{TSM}	2000	A
Peak Three Cycle Surge Current, Non-Repetitive	60 Hz, 100% V_{RRM} reapplied, T_j=125°C	I_{TSM}	1210	A
	50 Hz, 100% V_{RRM} reapplied, T_j=125°C	I_{TSM}	1155	A
Peak Ten Cycle Surge Current, Non-Repetitive	60 Hz, 100% V_{RRM} reapplied, T_j=125°C	I_{TSM}	960	A
	50 Hz, 100% V_{RRM} reapplied, T_j=125°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°C	I^2t	10,270	A^2 sec
	8.3 ms, No V_{RRM} reapplied, T_j=125°C	I^2t	14,520	A^2 sec
	8.3 ms, No V_{RRM} reapplied, T_j=25°C	I^2t	18,300	A^2 sec
	10 ms, 100% V_{RRM} reapplied, T_j=125°C	I^2t	11,250	A^2 sec
	10 ms, No V_{RRM} reapplied, T_j=125°C	I^2t	15,910	A^2 sec
	10 ms, No V_{RRM} reapplied, T_j=25°C	I^2t	20,000	A^2 sec
Maximum Rate-of-Rise of On-State Current, (Non-Repetitive)	T_j=25°C, I_G=0.5 A, V_D=0.67 $V_{DRM\ (Rated)}$, I_{TM}=300A , T_r < 0.5µs, t_p > 6µs	di/dt	150	A/µs
Peak Gate Power Dissipation	T_p < 5 ms, T_j = 125°C	P_{GM}	12	W
Average Gate Power Dissipation	F = 50 Hz, T_j = 125°C	$P_{G(AV)}$	3	W
Peak Forward Gate Current	T_p < 5 ms, T_j = 125°C	I_{GFM}	3	A
Peak Reverse Gate Voltage	T_p < 5 ms, T_j = 125°C	V_{GRM}	10	V
Operating Temperature		T_J	-40 to +125	°C
Storage Temperature		T_{stg}	-40 to +125	°C
Max. Mounting Torque, M5 Mounting Screw on Terminals			25 3	in.-Lb. Nm
Max. Mounting Torque, Module to Heatsink			44 5	in.-Lb. Nm
Module Weight, Typical			83 3	g 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

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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 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 Slope Resistance, Low-level	$V_{(TO)1}$ r_{T1}	T_J = 125°C, I = 16.7% x $\pi I_{T(AV)}$ to $\pi I_{T(AV)}$		0.80 2.40	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}		0.85 2.25	V mΩ
V_{TM} Coefficients, Full Range		T_J = 125°C, I = 15% x $I_{T(AV)}$ to I_{TSM} V_{TM} = A+ B Ln I +C I + D Sqrt I	A = B = C = D =	0.7160 2.17E-02 2.20E-03 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	$R_{\Theta J\text{-}C}$	Per Module, both conducting Per Junction, both conducting		0.135 0.270	°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 = 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	$R_{\Theta C\text{-}S}$	Per Module		0.1	°C/W

Revision Date: 11/1/2001

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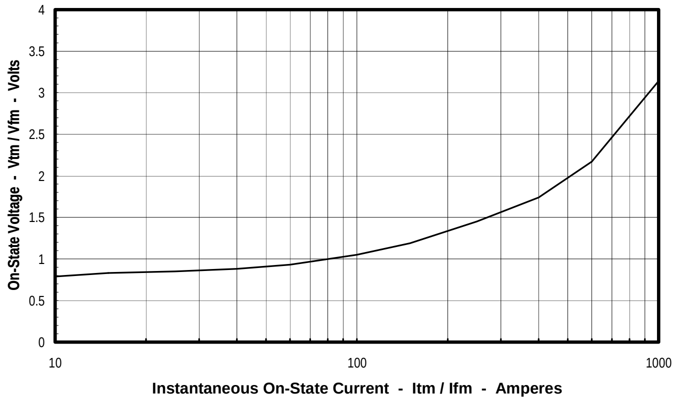
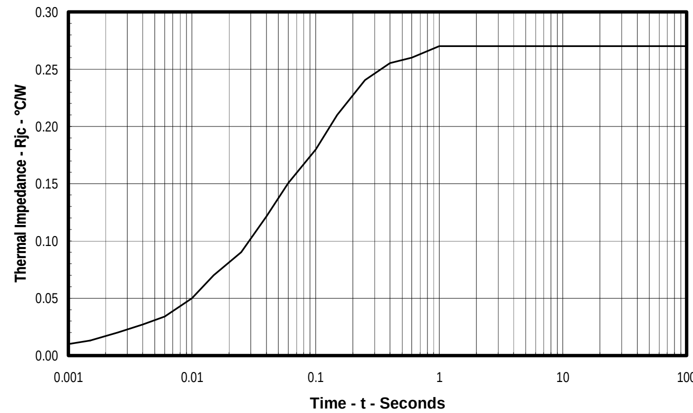
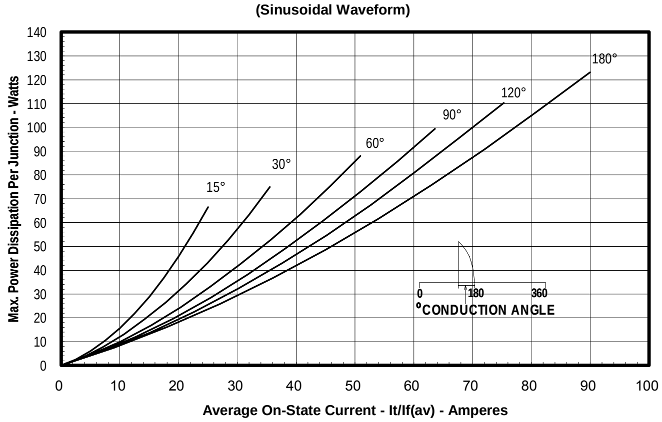
Maximum On-State Forward Voltage Drop
(Tj = 125 °C)



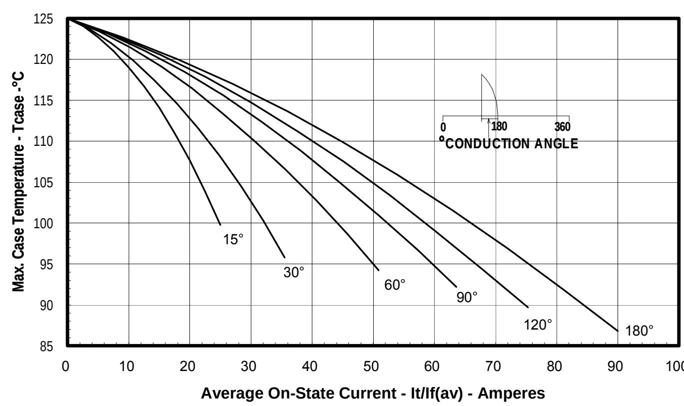
Maximum Transient Thermal Impedance
(Junction to Case)



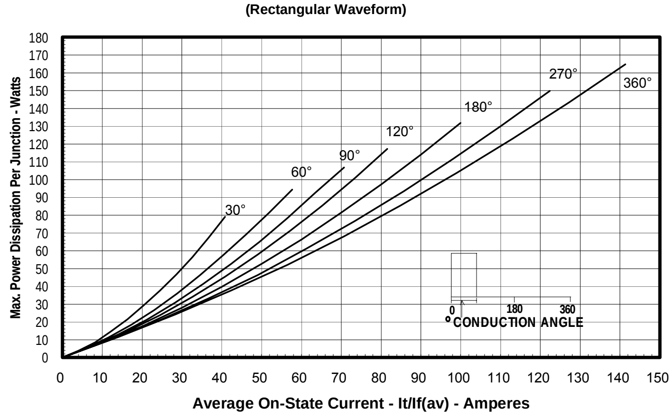
Maximum On-State Power Dissipation
(Sinusoidal Waveform)



Maximum Allowable Case Temperature
(Sinusoidal Waveform)



Maximum On-State Power Dissipation
(Rectangular Waveform)



Maximum Allowable Case Temperature
(Rectangular Waveform)