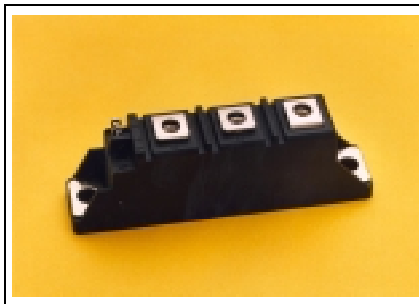
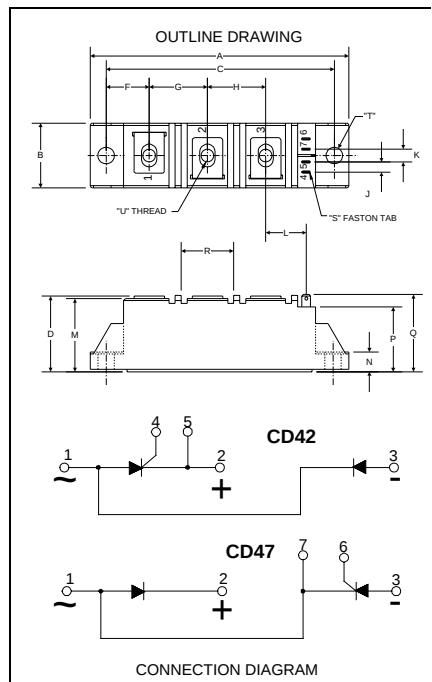


## POW-R-BLOK™

**Dual SCR / Diode Isolated Module**  
**60 Amperes / Up to 1600 Volts**



**CD42\_\_60, CD47\_\_60**  
**Dual SCR Isolated**  
**POW-R-BLOK™ Module**  
**60 Amperes / Up to 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
- DBC Alumina (Al<sub>2</sub>O<sub>3</sub>) Insulator
- Glass Passivated Chips
- DBC Alumina (Al<sub>2</sub>O<sub>3</sub>) Baseplate
- Low Thermal Impedance for Improved Current Capability
- Quick Connect Gate Terminal with Provision for Keyed Mating Plug
- 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:

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

Example: CD421660 is a 1600Volt, 60 Ampere Dual SCR/Diode Isolated POW-R-BLOK™ Module

| Type | Voltage<br>Volts<br>(x100) | Current<br>Amperes<br>(x 1) |
|------|----------------------------|-----------------------------|
| CD42 | 08                         | 60                          |
| CD47 | 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<br>( $t < 5$ msec) |                                                                                                                        | $V_{RSM}$             | $V_{RRM} + 100$ V       |
| RMS Forward Current                                             | 180° Conduction, $T_C=95^{\circ}C$                                                                                     | $I_{T(RMS)}$          | 95 A                    |
|                                                                 | 180° Conduction, $T_C=95^{\circ}C$ (AC Switch)                                                                         | $I_{T(RMS)}$          | 135 A                   |
| Average Forward Current                                         | 180° Conduction, $T_C=95^{\circ}C$                                                                                     | $I_{T(AV)}$           | 60 A                    |
| Peak One Cycle Surge Current, Non-Repetitive                    | 60 Hz, 100% $V_{RRM}$ reapplied, $T_j=125^{\circ}C$                                                                    | $I_{TSM}$             | 1,470 A                 |
|                                                                 | 60 Hz, No $V_{RRM}$ reapplied, $T_j=125^{\circ}C$                                                                      | $I_{TSM}$             | 1,740 A                 |
|                                                                 | 60 Hz, No $V_{RRM}$ reapplied, $T_j=25^{\circ}C$                                                                       | $I_{TSM}$             | 1,940 A                 |
|                                                                 | 50 Hz, 100% $V_{RRM}$ reapplied, $T_j=125^{\circ}C$                                                                    | $I_{TSM}$             | 1,400 A                 |
|                                                                 | 50 Hz, No $V_{RRM}$ reapplied, $T_j=125^{\circ}C$                                                                      | $I_{TSM}$             | 1,665 A                 |
|                                                                 | 50 Hz, No $V_{RRM}$ reapplied, $T_j=25^{\circ}C$                                                                       | $I_{TSM}$             | 1,850 A                 |
| Peak Three Cycle Surge Current, Non-Repetitive                  | 60 Hz, 100% $V_{RRM}$ reapplied, $T_j=125^{\circ}C$                                                                    | $I_{TSM}$             | 1,120 A                 |
|                                                                 | 50 Hz, 100% $V_{RRM}$ reapplied, $T_j=125^{\circ}C$                                                                    | $I_{TSM}$             | 1,080 A                 |
| Peak Ten Cycle Surge Current, Non-Repetitive                    | 60 Hz, 100% $V_{RRM}$ reapplied, $T_j=125^{\circ}C$                                                                    | $I_{TSM}$             | 900 A                   |
|                                                                 | 50 Hz, 100% $V_{RRM}$ reapplied, $T_j=125^{\circ}C$                                                                    | $I_{TSM}$             | 870 A                   |
| $I^2t$ for Fusing for One Cycle, 8.3 milliseconds               | 8.3 ms, 100% $V_{RRM}$ reapplied, $T_j=125^{\circ}C$                                                                   | $I^2t$                | 8,960 $A^2$ sec         |
|                                                                 | 8.3 ms, No $V_{RRM}$ reapplied, $T_j=125^{\circ}C$                                                                     | $I^2t$                | 12,560 $A^2$ sec        |
|                                                                 | 8.3 ms, No $V_{RRM}$ reapplied, $T_j=25^{\circ}C$                                                                      | $I^2t$                | 15,600 $A^2$ sec        |
|                                                                 | 10 ms, 100% $V_{RRM}$ reapplied, $T_j=125^{\circ}C$                                                                    | $I^2t$                | 9,800 $A^2$ sec         |
|                                                                 | 10 ms, No $V_{RRM}$ reapplied, $T_j=125^{\circ}C$                                                                      | $I^2t$                | 13,860 $A^2$ sec        |
|                                                                 | 10 ms, No $V_{RRM}$ reapplied, $T_j=25^{\circ}C$                                                                       | $I^2t$                | 17,110 $A^2$ sec        |
| Maximum Rate-of-Rise of On-State Current,<br>(Non-Repetitive)   | $T_j=25^{\circ}C$ , $I_G=0.5$ A,<br>$V_D=0.67 V_{DRM}$ (Rated), $I_{TM}=300A$ ,<br>$T_r < 0.5 \mu s$ , $t_p > 6 \mu s$ | $di/dt$               | 150 $A/\mu s$           |
| Peak Gate Power Dissipation                                     | $T_p < 5$ ms, $T_j = 125^{\circ}C$                                                                                     | $P_{GM}$              | 12 W                    |
| Average Gate Power Dissipation                                  | $F = 50$ Hz, $T_j = 125^{\circ}C$                                                                                      | $P_{G(AV)}$           | 3 W                     |
| Peak Forward Gate Current                                       | $T_p < 5$ ms, $T_j = 125^{\circ}C$                                                                                     | $I_{GFM}$             | 3 A                     |
| Peak Reverse Gate Voltage                                       | $T_p < 5$ ms, $T_j = 125^{\circ}C$                                                                                     | $V_{GRM}$             | 10 V                    |
| Operating Temperature                                           |                                                                                                                        | $T_J$                 | -40 to +125 $^{\circ}C$ |
| Storage Temperature                                             |                                                                                                                        | $T_{stg}$             | -40 to +125 $^{\circ}C$ |
| Max. Mounting Torque, M5 Mounting Screw on<br>Terminals         |                                                                                                                        |                       | 25 in.-Lb.<br>3 Nm      |
| Max. Mounting Torque, Module to Heatsink                        |                                                                                                                        |                       | 44 in.-Lb.<br>5 Nm      |
| Module Weight, Typical                                          |                                                                                                                        |                       | 83 g<br>3 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> = 235A                                                                                                                                                 |                          | 1.59                                        | V                       |
| Threshold Voltage, Low-level             | V <sub>(TO)1</sub>                | T <sub>J</sub> = 125°C, I = 16.7% x I <sub>T(AV)</sub> to I <sub>T(AV)</sub>                                                                                                             |                          | 0.82                                        | V                       |
| Slope Resistance, Low-level              | r <sub>T1</sub>                   |                                                                                                                                                                                          |                          | 3.00                                        | mΩ                      |
| Threshold Voltage, High-level            | V <sub>(TO)2</sub>                | T <sub>J</sub> = 125°C, I = I <sub>T(AV)</sub> to I <sub>TSM</sub>                                                                                                                       |                          | 0.85                                        | V                       |
| Slope Resistance, High-level             | r <sub>T2</sub>                   |                                                                                                                                                                                          |                          | 2.90                                        | 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><br><br>V <sub>TM</sub> = A + B Ln I + C I + D Sqrt I                                                            | A =<br>B =<br>C =<br>D = | 0.8127<br>5.23E-03<br>2.90E-03<br>-9.17E-05 |                         |
| Minimum dV/dt                            | dV/dt                             | Linear to 2/3 V <sub>DRM</sub><br>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<br>V <sub>r</sub> = 50V, -di/dt = 10 A/μs<br>Re-Applied dV/dt = 200 V/μs,<br>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<br>T <sub>J</sub> = 25°C, V <sub>D</sub> = 6V, Resistive Load<br>T <sub>J</sub> = 125°C, V <sub>D</sub> = 6V, Resistive Load |                          | 270<br>150<br>80                            | mA<br>mA<br>mA          |
| Gate Trigger Voltage                     | V <sub>GT</sub>                   | T <sub>J</sub> = -40°C, V <sub>D</sub> = 6V, Resistive Load<br>T <sub>J</sub> = 25°C, V <sub>D</sub> = 6V, Resistive Load<br>T <sub>J</sub> = 125°C, V <sub>D</sub> = 6V, Resistive Load |                          | 4.0<br>2.5<br>1.7                           | Volts<br>Volts<br>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                      |

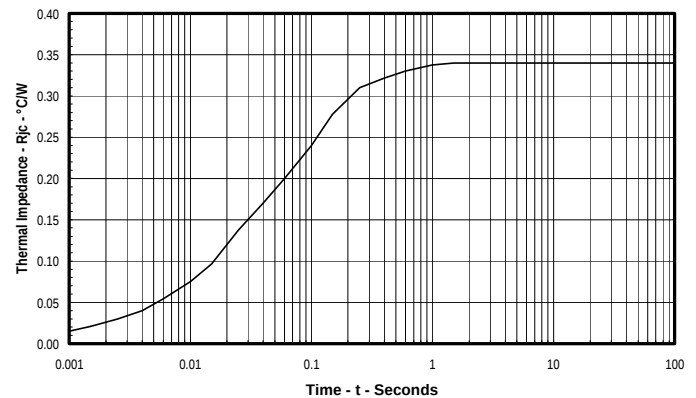
**Thermal Characteristics**

| Characteristics                                      | Symbol            |                                                                                                                                                                                                                | Max.                                                                                                             | Units                                                                                                            |
|------------------------------------------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| Thermal Resistance, Junction to Case<br>DC Operation | R <sub>ΘJ-C</sub> | Per Module, both conducting<br>Per Junction, both conducting                                                                                                                                                   | 0.165<br>0.330                                                                                                   | °C/W<br>°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> ))<br>+ K <sub>2</sub> (1-exp(-t/τ <sub>2</sub> ))<br>+ K <sub>3</sub> (1-exp(-t/τ <sub>3</sub> ))<br>+ K <sub>4</sub> (1-exp(-t/τ <sub>4</sub> )) | K <sub>1</sub> = 2.68 E-3<br>K <sub>2</sub> = 9.52 E-3<br>K <sub>3</sub> = 1.26 E-1<br>K <sub>4</sub> = 2.01 E-1 | τ <sub>1</sub> = 3.10 E-5<br>τ <sub>2</sub> = 1.07 E-3<br>τ <sub>3</sub> = 2.02 E-2<br>τ <sub>4</sub> = 1.39 E-1 |
| Thermal Resistance, Case to Sink Lubricated          | R <sub>ΘC-S</sub> | Per Module                                                                                                                                                                                                     | 0.1                                                                                                              | °C/W                                                                                                             |

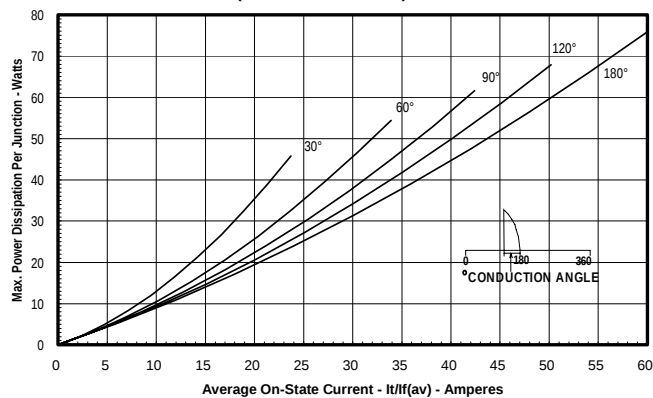
**Maximum On-State Forward Voltage Drop**  
( $T_J = 125^\circ\text{C}$ )



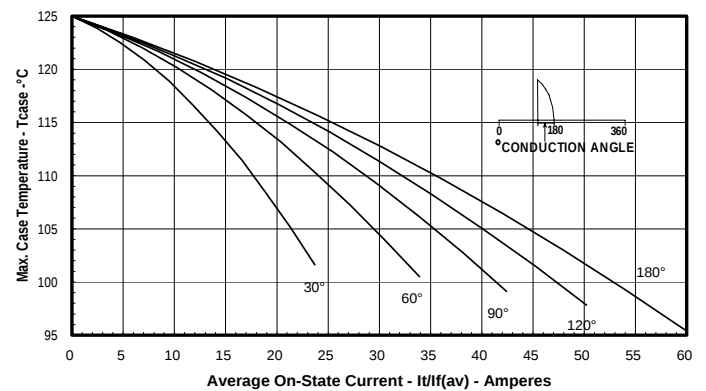
**Maximum Transient Thermal Impedance**  
(Junction to Case)



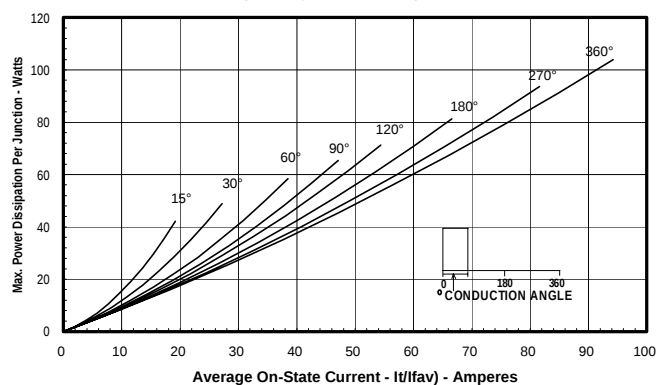
**Maximum On-State Power Dissipation**  
(Sinusoidal Waveform)



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



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



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

