

**CD42\_40A, CD47\_40A**  
**Dual SCR/Diode Isolated**  
**POW-R-BLOK™ Module**  
40 Amperes / Up to 1600 Volts

**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: CD421640A is a 1600Volt, 40 Ampere Dual SCR/Diode Isolated POW-R-BLOK™ Module

| Type | Voltage Volts (x100) | Current Amperes (x 1) |
|------|----------------------|-----------------------|
| CD42 | 08                   | 40                    |
| CD47 | 12                   | 16                    |

**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

**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, $T_C=91^\circ\text{C}$  | $I_{T(RMS)}$          | 63 A                     |
|  | 180° Conduction, $T_C=91^\circ\text{C}$ (AC Switch)  | $I_{T(RMS)}$          | 93 A                     |
| Average Forward Current  | 180° Conduction, $T_C=91^\circ\text{C}$  | $I_{T(AV)}$           | 40 A                     |
| Peak One Cycle Surge Current, Non-Repetitive                         | 60 Hz, 100% $V_{RRM}$ reapplied, $T_j=125^\circ\text{C}$   | $I_{TSM}$             | 750 A                    |
|  | 60 Hz, No $V_{RRM}$ reapplied, $T_j=125^\circ\text{C}$   | $I_{TSM}$             | 890 A                    |
|  | 60 Hz, No $V_{RRM}$ reapplied, $T_j=25^\circ\text{C}$  | $I_{TSM}$             | 985 A                    |
|  | 50 Hz, 100% $V_{RRM}$ reapplied, $T_j=125^\circ\text{C}$   | $I_{TSM}$             | 715 A                    |
|  | 50 Hz, No $V_{RRM}$ reapplied, $T_j=125^\circ\text{C}$   | $I_{TSM}$             | 850 A                    |
|  | 50 Hz, No $V_{RRM}$ reapplied, $T_j=25^\circ\text{C}$  | $I_{TSM}$             | 940 A                    |
| Peak Three Cycle Surge Current, Non-Repetitive                       | 60 Hz, 100% $V_{RRM}$ reapplied, $T_j=125^\circ\text{C}$   | $I_{TSM}$             | 570 A                    |
|  | 50 Hz, 100% $V_{RRM}$ reapplied, $T_j=125^\circ\text{C}$   | $I_{TSM}$             | 545 A                    |
| Peak Ten Cycle Surge Current, Non-Repetitive                         | 60 Hz, 100% $V_{RRM}$ reapplied, $T_j=125^\circ\text{C}$   | $I_{TSM}$             | 460 A                    |
|  | 50 Hz, 100% $V_{RRM}$ reapplied, $T_j=125^\circ\text{C}$   | $I_{TSM}$             | 445 A                    |
| $I^2t$ for Fusing for One Cycle, 8.3 milliseconds                    | 8.3 ms, 100% $V_{RRM}$ reapplied, $T_j=125^\circ\text{C}$  | $I^2t$                | 2,330 A <sup>2</sup> sec |
|  | 8.3 ms, No $V_{RRM}$ reapplied, $T_j=125^\circ\text{C}$  | $I^2t$                | 3,300 A <sup>2</sup> sec |
|  | 8.3 ms, No $V_{RRM}$ reapplied, $T_j=25^\circ\text{C}$   | $I^2t$                | 4,030 A <sup>2</sup> sec |
|  | 10 ms, 100% $V_{RRM}$ reapplied, $T_j=125^\circ\text{C}$   | $I^2t$                | 2,560 A <sup>2</sup> sec |
|  | 10 ms, No $V_{RRM}$ reapplied, $T_j=125^\circ\text{C}$   | $I^2t$                | 3,610 A <sup>2</sup> sec |
|  | 10 ms, No $V_{RRM}$ reapplied, $T_j=25^\circ\text{C}$  | $I^2t$                | 4,420 A <sup>2</sup> sec |
| Maximum Rate-of-Rise of On-State Current, (Non-Repetitive)           | $T_j=25^\circ\text{C}$ , $I_G=0.5$ A,<br>$V_D=0.67 V_{DRM}$ (Rated), $I_{TM}=300$ A ,<br>$T_r < 0.5\mu\text{s}$ , $t_p > 6\mu\text{s}$ | di/dt                 | 150 A/ $\mu\text{s}$     |
| Peak Gate Power Dissipation  | $T_p < 5$ ms, $T_j = 125^\circ\text{C}$  | $P_{GM}$              | 10 W                     |
| Average Gate Power Dissipation                                       | F = 50 Hz, $T_j = 125^\circ\text{C}$   | $P_{G(AV)}$           | 2.5 W                    |
| Peak Forward Gate Current  | $T_p < 5$ ms, $T_j = 125^\circ\text{C}$  | $I_{GFM}$             | 2.5 A                    |
| Peak Reverse Gate Voltage  | $T_p < 5$ ms, $T_j = 125^\circ\text{C}$  | $V_{GRM}$             | 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 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<br>Circuit to base, all terminals shorted together | 50 – 60 Hz, 1 minute   | $V_{rms}$             | 2500 V                   |
|  | 50 – 60 Hz, 1 second   | $V_{rms}$             | 3500 V                   |

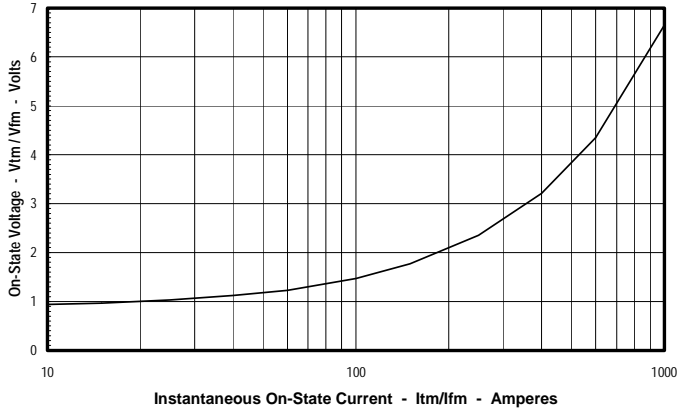
**Electrical Characteristics, T<sub>J</sub>=25°C unless otherwise specified**

| 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> = 140A   |          | 1.81              | 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 πI <sub>T(AV)</sub>  |          | 0.88              | V                       |
| Slope Resistance, Low-level              | r <sub>T1</sub>                   |  |          | 5.90              | 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>  |          | 0.91              | V                       |
| Slope Resistance, High-level             | r <sub>T2</sub>                   |  |          | 5.74              | 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 =      | 0.872             |                         |
|  |                                   |  | B =      | -1.86 E-3         |                         |
|  |                                   | V <sub>TM</sub> = A + B Ln I + C I + D Sqrt I  | C =      | 5.65 E-3          |                         |
|  |                                   |  | D =      | 4.33 E-3          |                         |
| 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> = 2 A<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                      |

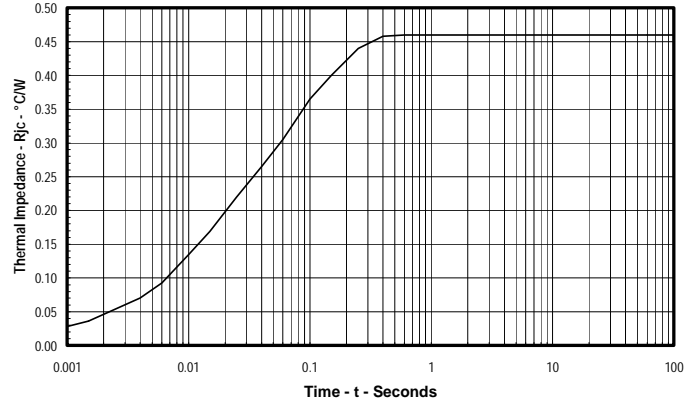
**Thermal Characteristics**

| Characteristics                                   | Symbol            |  | Max.  | Units  |
|---|-------------------|--|---|--|
| Thermal Resistance, Junction to Case DC Operation | R <sub>ΘJ-C</sub> | Per Module, both conducting<br>Per Junction, both conducting   | 0.230<br>0.460  | °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> = 1.77 E-2<br>K <sub>2</sub> = -1.00 E-2<br>K <sub>3</sub> = 1.46 E-1<br>K <sub>4</sub> = 3.07 E-1 | τ <sub>1</sub> = 4.73 E-4<br>τ <sub>2</sub> = 1.67 E-3<br>τ <sub>3</sub> = 9.77 E-3<br>τ <sub>4</sub> = 8.76 E-2 |
| Thermal Resistance, Case to Sink Lubricated       | R <sub>ΘC-S</sub> | Per Module   | 0.1   | °C/W   |

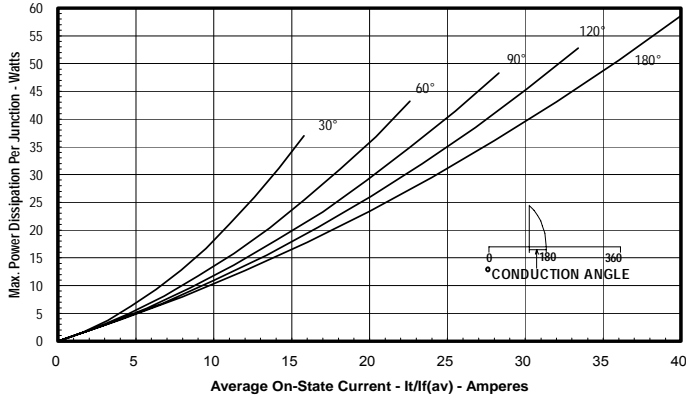
**Maximum On-State Forward Voltage Drop**  
(T<sub>J</sub> = 125 °C)



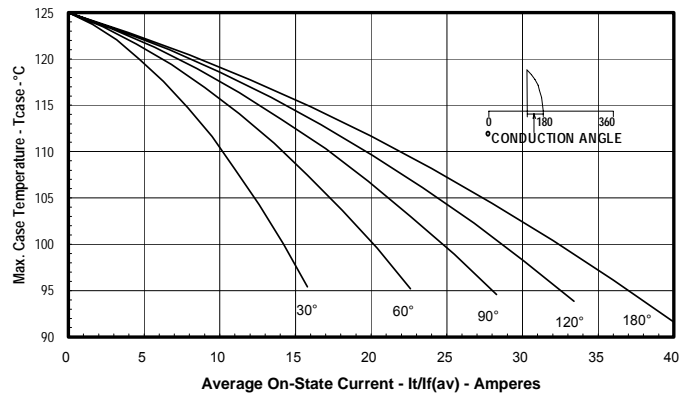
**Maximum Transient Thermal Impedance**  
(Junction to Case)



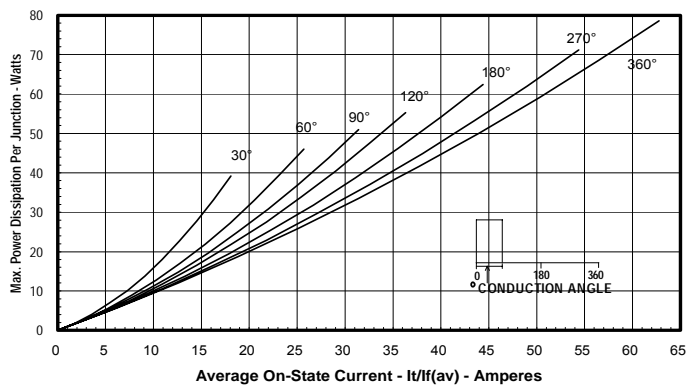
**Maximum On-State Power Dissipation**  
(Sinusoidal Waveform)



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



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



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

