

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

POW-R-BLOK™
Dual SCR / Diode Isolated Module
700 Amperes / Up to 1800 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.

Features:

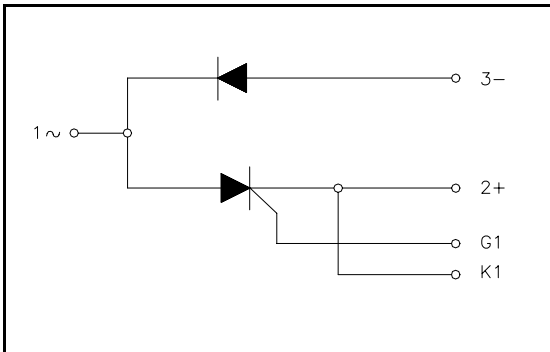
- Electrically Isolated Heatsinking
- Compression Bonded Elements
- Metal Baseplate
- Low Thermal Impedance for Improved Current Capability

Benefits:

- No Additional Insulation Components Required
- Easy Installation
- No Clamping Components Required
- Reduce Engineering Time

Applications:

- Bridge Circuits
- AC & DC Motor Drives
- Motor Soft Starters
- Battery Supplies
- Power Supplies
- Large IGBT Circuit Front Ends



Ordering Information:

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

Example: PD421807 is a 1800 Volt, 700A Average SCR/Diode Isolated POW-R-BLOK™ Module

| Type | Voltage Volts (x100) | Current Amperes (x100) |
|------|-------------------------|------------------------------|
| PD42 | 12 | 07 |
| | 14 | |
| | 16 | |
| | 18 | |

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Absolute Maximum Ratings

| Characteristics | Conditions | Symbol | Units |
|---|---|-----------------------|---------------------------------------|
| Repetitive Peak Forward and Reverse Blocking Voltage | | V_{DRM} & V_{RRM} | Up to 1800 V |
| Non-Repetitive Peak Blocking Voltage ($t < 5$ msec) | | V_{RSM} | $V_{RRM} + 100V$ V |
| RMS Current AC Switch Configuration (180° Conduction) | 180° Conduction, $T_C=74^\circ C$ | $I_{T(RMS)}$ | 1775 A |
| | 180° Conduction, $T_C=78^\circ C$ | $I_{T(RMS)}$ | 1665 A |
| | 180° Conduction, $T_C=82^\circ C$ | $I_{T(RMS)}$ | 1550 A |
| | 180° Conduction, $T_C=86^\circ C$ | $I_{T(RMS)}$ | 1440 A |
| RMS Current Per SCR (180° Conduction) | 180° Conduction, $T_C=74^\circ C$ | $I_{T(RMS)}$ | 1256 A |
| | 180° Conduction, $T_C=78^\circ C$ | $I_{T(RMS)}$ | 1178 A |
| | 180° Conduction, $T_C=82^\circ C$ | $I_{T(RMS)}$ | 1100 A |
| | 180° Conduction, $T_C=86^\circ C$ | $I_{T(RMS)}$ | 1020 A |
| Average Forward Current Per SCR (180° Conduction) | 180° Conduction, $T_C=74^\circ C$ | $I_{T(AV)}$ | 800 A |
| | 180° Conduction, $T_C=78^\circ C$ | $I_{T(AV)}$ | 750 A |
| | 180° Conduction, $T_C=82^\circ C$ | $I_{T(AV)}$ | 700 A |
| | 180° Conduction, $T_C=86^\circ C$ | $I_{T(AV)}$ | 650 A |
| Peak One Cycle Surge Current, Non-Repetitive $T_J = 25C, V_r = 0$ | 60 Hz | I_{TSM} | 69,000 A |
| | 50 Hz | I_{TSM} | 63,000 A |
| Peak One Cycle Surge Current, Non-Repetitive $T_J = 25C, V_r = V_{rrm}$ | 60 Hz | I_{TSM} | 46,000 A |
| | 50 Hz | I_{TSM} | 42,000 A |
| Peak One Cycle Surge Current, Non-Repetitive $T_J = 125C, V_r = 0$ | 60 Hz | I_{TSM} | 60,000 A |
| | 50 Hz | I_{TSM} | 54,750 A |
| Peak One Cycle Surge Current, Non-Repetitive $T_J = 125C, V_r = V_{rrm}$ | 60 Hz | I_{TSM} | 40,000 A |
| | 50 Hz | I_{TSM} | 36,500 A |
| Peak Three Cycle Surge Current, Non-Repetitive | 60 Hz, $T_J = 125C, V_r = V_{rrm}$ | I_{TSM} | 32,100 A |
| Peak Ten Cycle Surge Current, Non-Repetitive | 60 Hz, $T_J = 125C, V_r = V_{rrm}$ | I_{TSM} | 25,200 A |
| I^2t for Fusing for One Cycle $T_J = 125C, V_r = V_{rrm}$ | 8.3 milliseconds | I^2t | 6.60×10^6 A ² sec |
| | 10 milliseconds | I^2t | 6.66×10^6 A ² sec |
| Maximum Rate-of-Rise of On-State Current, (Non-Repetitive) | Per JEDEC Standard 397 5.2.2.6 | di/dt | 400 A/ μ s |
| Maximum Rate-of-Rise of On-State Current, (Repetitive) | Per JEDEC Standard 397 5.2.2.6 | di/dt | 150 A/ μ s |
| Operating Temperature | | T_J | -40 to +125 °C |
| Storage Temperature | | T_{stg} | -40 to +150 °C |
| Max. Mounting Torque, M6 Mounting Screw | | | 132 in. – Lb. |
| | | | 15 Nm |
| Max. Mounting Torque, M10 Terminal Screw | | | 106 in. – Lb. |
| | | | 12 Nm |
| Module Weight, Typical | | | 455 g |
| | | | 11.75 lb |
| V Isolation @ 25C | | V_{rms} | 3000 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 1800V, T _J =125° C | | 100 | mA |
| Repetitive Peak Reverse Leakage Current | I _{RRM} | Up to 1800V, T _J =125° C | | 100 | mA |
| Peak On-State Voltage | V _{TM} | I _{TM} =3000A, T _J =125° C | | 1.30 | V |
| Threshold Voltage, Low-level | V _{(TO)1} | T _J = 125° C, I = 15%I _{T(AV)} to π I _{T(AV)} | | 0.703 | V |
| Slope Resistance, Low-level | r _{T1} | | | 0.184 | mΩ |
| Threshold Voltage, High-level | V _{(TO)2} | T _J = 125° C, I = π I _{T(AV)} to I _{TSM} | | 1.01 | V |
| Slope Resistance, High-level | r _{T2} | | | 0.117 | mΩ |
| V _{TM} Coefficients, Full Range | | T _J = 125° C, I = 50A to 6kA V _{TM} = A+ B Ln I +C I + D Sqrt I | A = B = C = D = | 0.7999 -4.62 E-02 7.33 E-05 1.10 E-02 | |
| Minimum dV/dt | dV/dt | Exponential to 0.67V _{DRM} T _J =125° C, Gate Open | 600 | | V/μs |
| Typical Diode Reverse Recovery Time | T _{RR} | T _J =25° C, I _F =1500A, dI _R /dt = 25A/μs, T _P = 190 μs | 22 Typ. | | μs |
| Gate Trigger Current | I _{GT} | T _J =25° C, V _D =12V | 200 | | mA |
| Gate Trigger Voltage | V _{GT} | T _J =25° C, V _D =12V | 3.0 | | Volts |
| Non-Triggering Gate Voltage | V _{GDM} | T _J =125° C, V _D = ½ V _{DRM} | 0.15 | | Volts |
| Holding Current | I _H | | 300 | | mA |
| Peak Forward Gate Current | I _{GTM} | | 4.0 | | Amp |
| Peak Reverse Gate Voltage | V _{GDM} | | 5 | | Volts |
| Maximum Average Gate Power Dissipation | P _{GM(AVE)} | | 16 | | Watts |

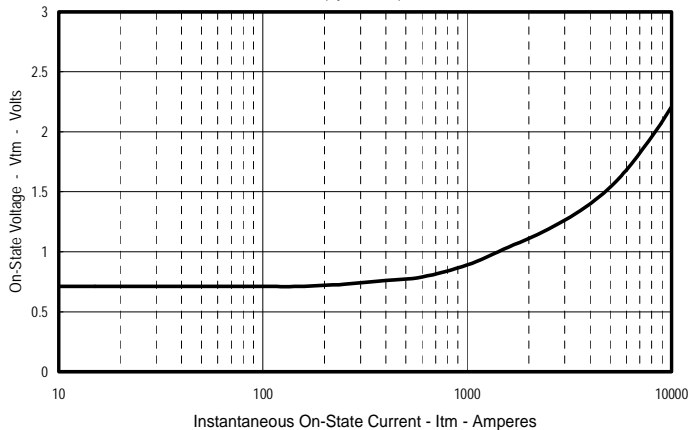
Thermal Characteristics

| Characteristics | Symbol | | Max. | Units |
|---|-------------------|--|---|--|
| Thermal Resistance, Junction to Case | R _{ΘJ-C} | Per Module, both conducting Per Junction, both conducting | 0.029 0.058 | ° 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 = 5.04 E-04 K ₂ = 2.31 E-03 K ₃ = 2.83 E-03 K ₄ =5.24 E-02 | τ ₁ = 2.47 E-03 τ ₂ = 4.42 E-02 τ ₃ = 1.370 τ ₄ = 9.668 |
| Thermal Resistance, Case to Sink Lubricated | R _{ΘC-S} | Per Module | 0.009 | ° C/W |

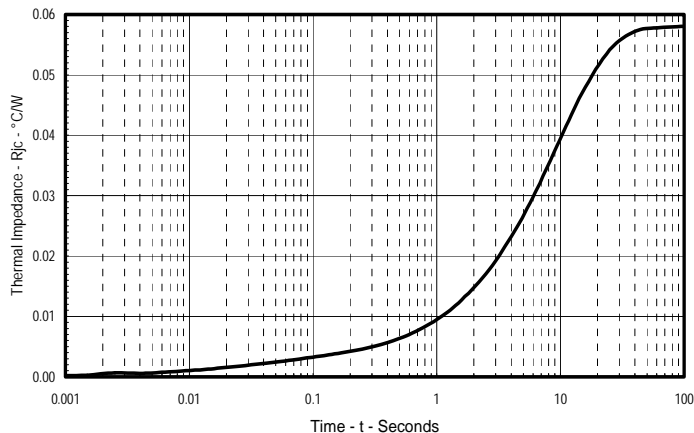
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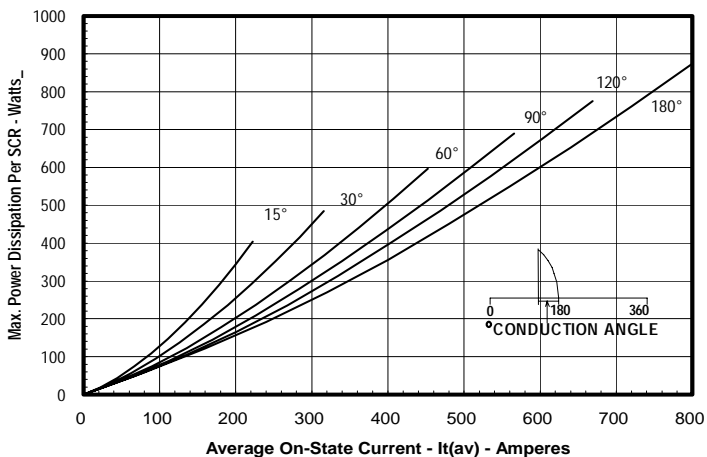
Typical On-State Forward Voltage Drop
($T_J = 125^\circ\text{C}$)



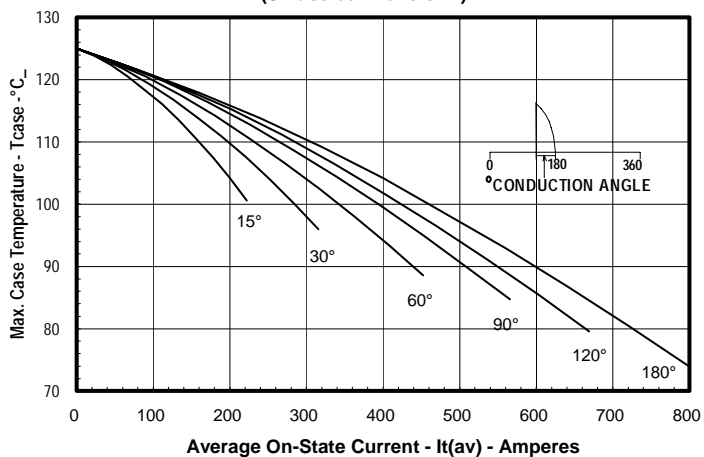
Maximum Transient Thermal Impedance
(Junction To Case)



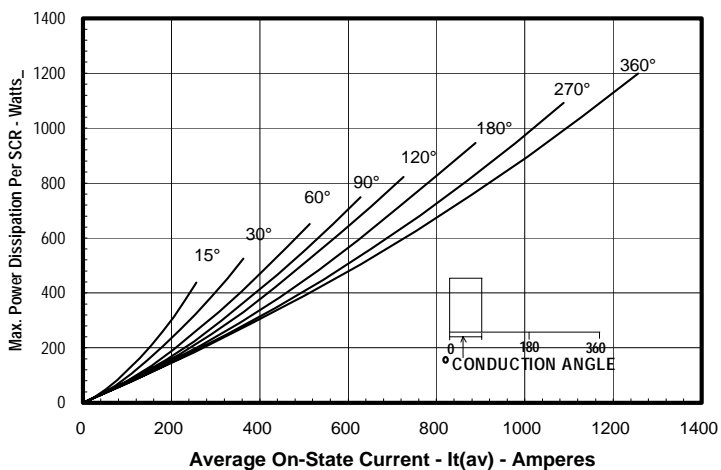
Maximum On-State Power Dissipation
(Sinusoidal Waveform)



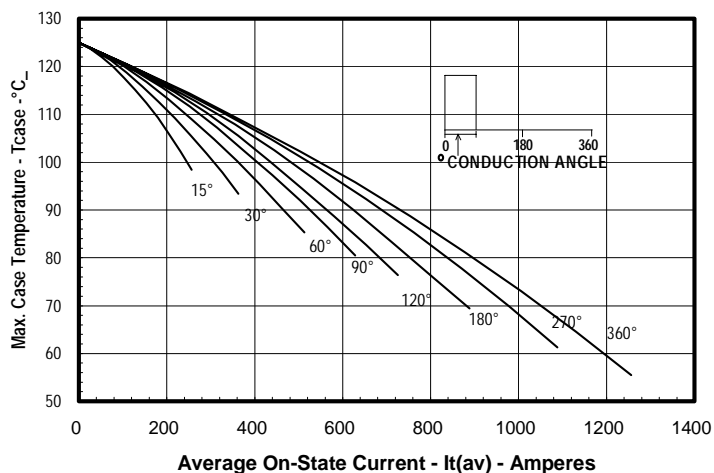
Maximum Allowable Case Temperature
(Sinusoidal Waveform)



Maximum On-State Power Dissipation
(Rectangular Waveform)



Maximum Allowable Case Temperature
(Rectangular Waveform)



| DIM. | INCHES | MILLIMETERS |
|------|--------|-------------|
| A | 7.80 | 198.1 |
| B | 4.00 | 101.6 |
| C | 2.68 | 68.1 |
| D | 6.44 | 163.6 |
| E | 3.44 | 87.4 |
| F | .28 | 7.1 |
| G | 7.31 | 185.7 |
| H | 7.00 | 177.8 |
| J | 1.65 | 42 |
| K | .21 | 5.3 |
| L | .28 | 7.1 |
| M | .281 | 7.1 |
| N | .45 | 11.4 |
| P | .54 | 13.7 |
| Q | 5.93 | 150.6 |
| R | .19 | 4.8 |
| S | .11 | 2.8 |
| T | .48 | 12.2 |
| U | 2.28 | 58 |
| V | 2.54 | 64.5 |
| W | 4.93 | 125.2 |
| X | 3.81 | 96.8 |
| Y | .03 | .8 |
| Z | 2.00 | 50.8 |
| AA | 1.00 | 25.4 |
| BB | .50 | 12.7 |
| CC | 1.00 | 25.4 |
| DD | .406 | 10.3 |
| EE | 2.87 | 72.9 |
| FF | .66 | 16.8 |

