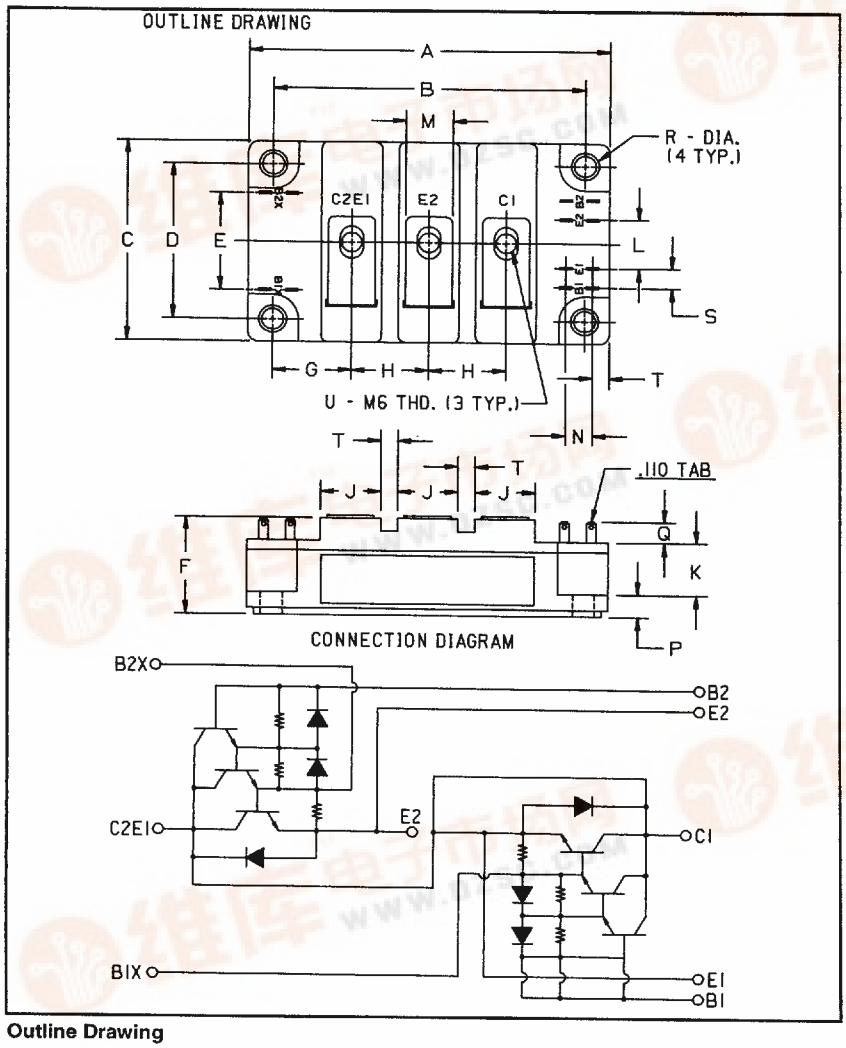
Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (412) 925-7272

# KD424520HB

## High-Beta Dual Darlington Transistor Module

### 200 Amperes/600 Volts




Outline Drawing

| Dimensions | Inches | Millimeters |
|---|---|---|
| A | 4.25 Max. | 108 Max. |
| B | 3.661 ± 0.01 | 93 ± 0.25 |
| C | 2.44 Max. | 62 Max. |
| D | 1.890 ± 0.01 | 48 ± 0.25 |
| E | 1.18 | 30 |
| F | 1.18 Max. | 30 Max. |
| G | 0.92 | 23.5 |
| H | 0.90 Min. | 23 Min. |
| J | 0.71 | 18 |
| K | 0.63 | 16 |

| Dimensions | Inches | Millimeters |
|---|---|---|
| L | 0.59 | 15 |
| M | 0.55 | 14 |
| N | 0.31 | 8 |
| P | 0.28 | 7 |
| Q | 0.25 Min. | 6.5 Min. |
| R | 0.25 Dia. | 6.5 Dia. |
| S | 0.24 | 6 |
| T | 0.20 | 5 |
| U | M6 Metric | M6 |

**Description:**
The Powerex High-Beta Dual Darlington Transistor Modules are high power devices designed for use in switching applications. The modules are isolated, consisting of two Darlington Transistors with each transistor having a reverse parallel connected high-speed diode.

**Features:**
- ☐ Isolated Mounting
- ☐ Planar Chips
- ☐ Discrete Fast Recovery Feedback Diode
- ☐ Very High Gain ($h_{FE}$)
- ☐ Quick Connect Signal Terminals
- ☐ Base-Emitter Speed-up Diodes
- ☐ UL Recognized

**Applications:**
- ☐ AC Motor Control
- ☐ DC Motor Control
- ☐ Switching Power Supplies
- ☐ Inverters

**Ordering Information:**
Example: Select the complete ten digit module part number you desire from the table - i.e. KD424520HB is a 450 $V_{CEO(sus)}$ (600 $V_{CEV}$), 200 Ampere High-Beta Dual Darlington Module with a gain of 750 at rated current (200 Amperes).

| Type | $V_{CEO(sus)}$ Volts (X 10) | Current Rating Amperes (X 10) | High Beta |
|---|---|---|---|
| KD42 | 45 | 20 | HB |

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## Absolute Maximum Ratings, $T_j$ = 25 °C unless otherwise specified

| Ratings | Symbol | KD424520HB | Units |
|---|---|---|---|
| Junction Temperature | $T_j$ | -40 to 150 | °C |
| Storage Temperature | $T_{stg}$ | -40 to 125 | °C |
| Collector-Emitter Sustaining Voltage | $V_{CEO(sus)}$ | 450 | Volts |
| Collector-Emitter Sustaining Voltage, $V_{BE}$ = -2V | $V_{CEV(sus)}$ | 600 | Volts |
| Collector-Base Voltage | $V_{CBO}$ | 600 | Volts |
| Emitter-Base Voltage | $V_{EBO}$ | 7 | Volts |
| Collector-Emitter Voltage, $V_{BE}$ = -2V | $V_{CEV}$ | 600 | Volts |
| Continuous Collector Current | $I_C$ | 200 | Amperes |
| Diode Forward Current | $I_{FM}$ | 200 | Amperes |
| Continuous Base Current | $I_B$ | 12 | Amperes |
| Diode Surge Current | $I_{FSM}$ | 2000 | Amperes |
| Power Dissipation (Each Transistor) | $P_t$ | 1240 | Watts |
| Max. Mounting Torque M6 Terminal Screws | – | 26 | in.-lb. |
| Max. Mounting Torque M6 Mounting Screws | – | 26 | in.-lb. |
| Module Weight (Typical) | – | 470 | Grams |
| V Isolation | $V_{RMS}$ | 2500 | Volts |

## Electrical Characteristics, $T_j$ = 25 °C unless otherwise specified

| Characteristics | | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|---|
| Collector Cutoff Current | | $I_{CEV}$ | $V_{CE}$ = 600V, $V_{BE}$ = -2V | – | – | 4 | mA |
| Emitter Cutoff Current | | $I_{EBO}$ | $V_{EB}$ = 7V | – | – | 300 | mA |
| DC Current Gain | | $h_{FE}$ | $I_C$ = 200A, $V_{CE}$ = 2.5V | 750 | – | – | – |
| Diode Forward Voltage | | $V_{FM}$ | $I_{FM}$ = 200A | – | – | 1.8 | Volts |
| Collector-Emitter Saturation Voltage | | $V_{CE(sat)}$ | $I_C$ = 200A, $I_B$ = 260mA | – | – | 2.5 | Volts |
| Base-Emitter Saturation Voltage | | $V_{BE(sat)}$ | $I_C$ = 200A, $I_B$ = 260mA | – | – | 3.0 | Volts |
| Resistive | Turn-on | $t_{on}$ | $V_{CC}$ = 300V | – | – | 2.5 | µs |
| Load | Storage Time | $t_s$ | $I_C$ = 200A | – | – | 10 | µs |
| Switch Times | Fall Time | $t_f$ | $I_{B1}$ = 0.4A, $I_{B2}$ = -4.0A | – | – | 2.0 | µs |

## Thermal and Mechanical Characteristics, $T_j$ = 25 °C unless otherwise specified

| Characteristics | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| Thermal Resistance, Case-to-Sink | $R_{\theta(c-s)}$ | Per Half Module | – | – | 0.075 | °C/W |
| Thermal Resistance, Junction-to-Case | $R_{\theta(j-c)}$ | Transistor Part | – | – | 0.1 | °C/W |
| Thermal Resistance, Junction-to-Case | $R_{\theta(j-c)}$ | Diode Part | – | – | 0.33 | °C/W |

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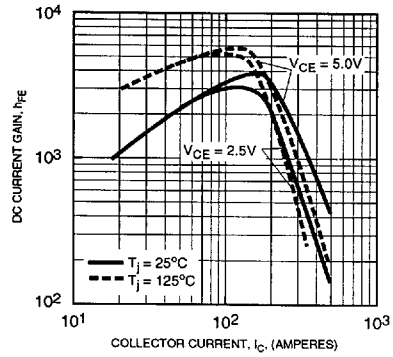
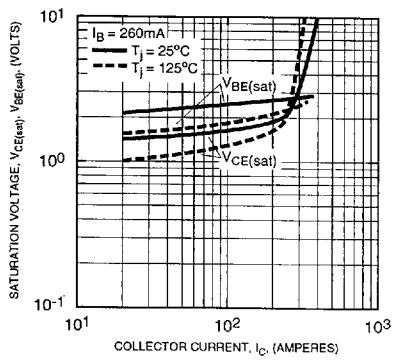
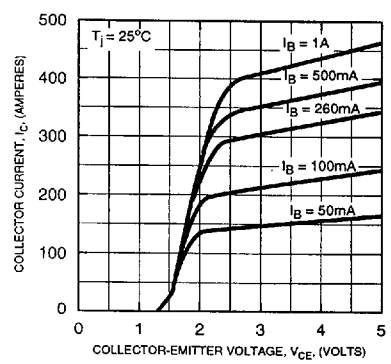
DC CURRENT GAIN (TYPICAL)




SATURATION VOLTAGE (TYPICAL)




COMMON EMITTER OUTPUT CHARACTERISTICS (TYPICAL)

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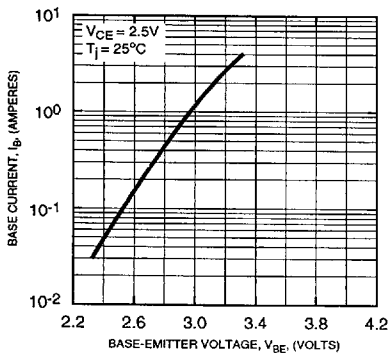
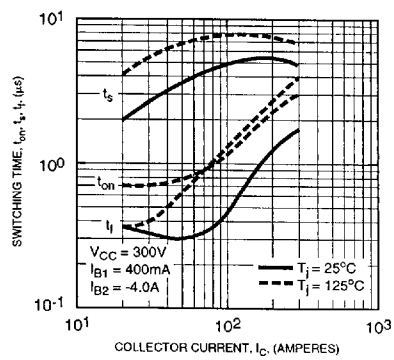
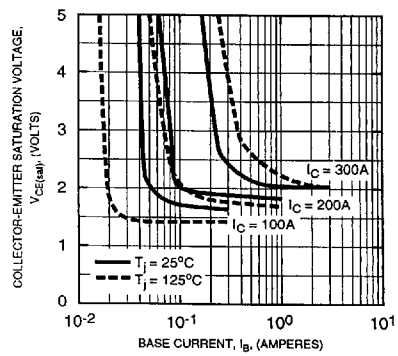


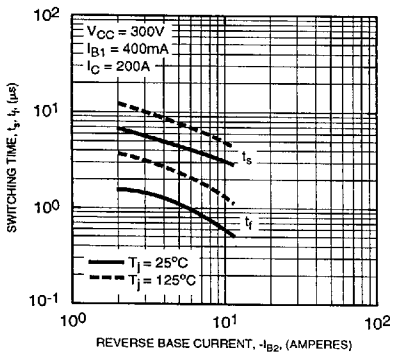

SWITCHING CHARACTERISTICS (TYPICAL)



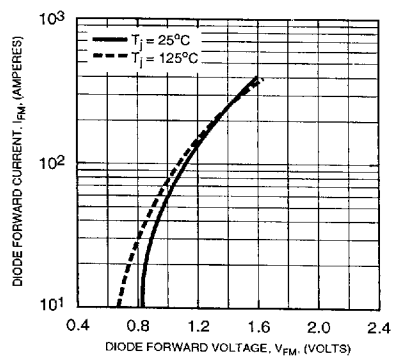

COLLECTOR-EMITTER SATURATION VOLTAGE (TYPICAL)



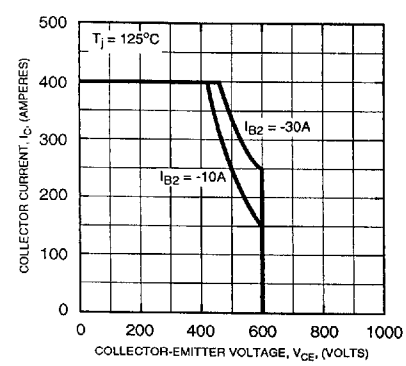

SWITCHING TIME VS. BASE CURRENT (TYPICAL)




DIODE CHARACTERISTICS (TYPICAL)




REVERSE BIAS SAFE OPERATING AREA (RBSOA)



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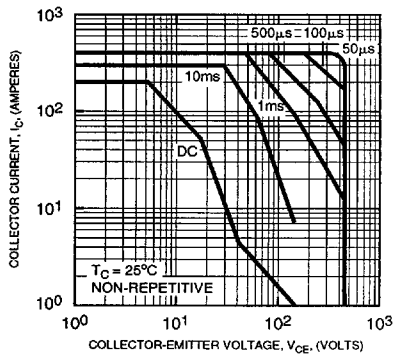
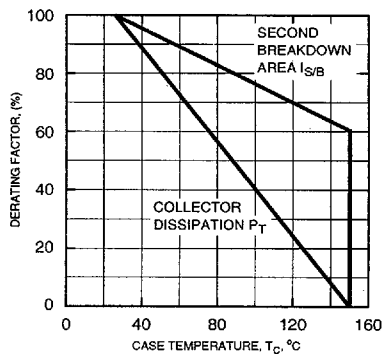
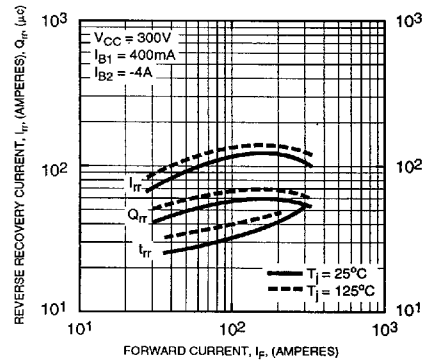
**FORWARD BIAS SAFE OPERATING AREA (SOA)**



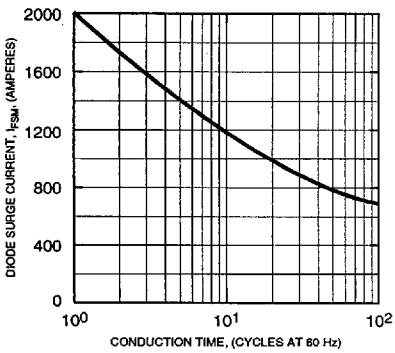

**DERATING FACTOR OF SAFE OPERATING AREA (SOA)**



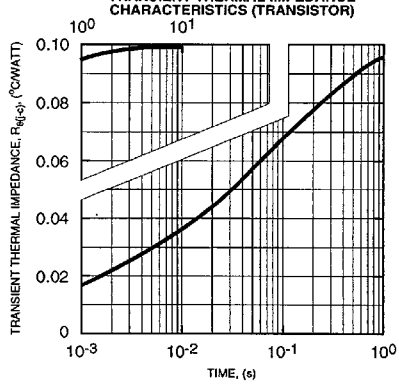

**REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)**




**DIODE FORWARD SURGE CURRENT**




**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (TRANSISTOR)**




**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (DIODE)**