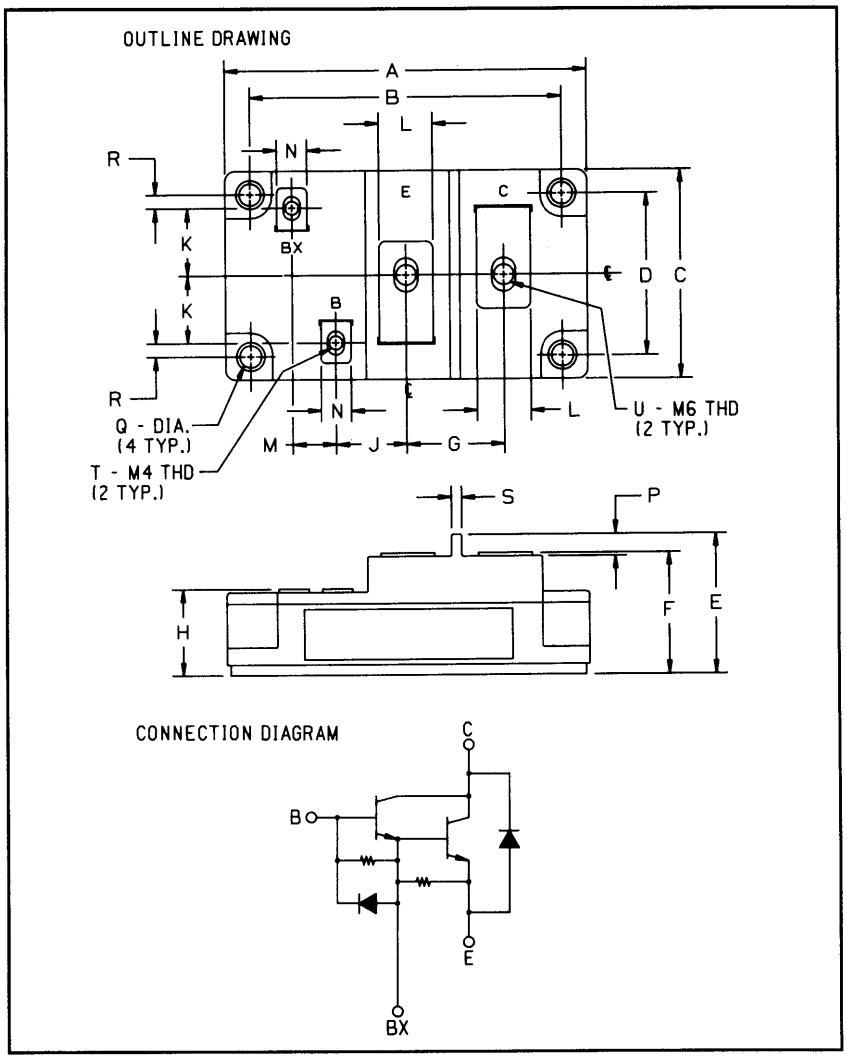
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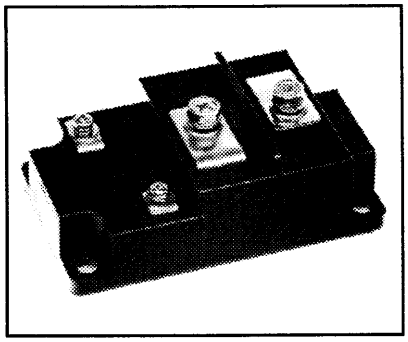
# Single Darlington Transistor Module
## 300 Amperes/600 Volts




**Outline Drawing**

| Dimensions | Inches | Millimeters |
|---|---|---|
| A | 4.252 Max. | 108 Max. |
| B | 3.661 ± 0.012 | 93 ± 0.3 |
| C | 2.441 Max. | 62 Max. |
| D | 1.890 ± 0.012 | 48 ± 0.3 |
| E | 1.634 Max. | 41.5 Max. |
| F | 1.417 Max. | 36 Max. |
| G | 1.142 | 29 |
| H | 1.004 | 25.5 |
| J | 0.827 | 21 |
| K | 0.787 | 20 |

| Dimensions | Inches | Millimeters |
|---|---|---|
| L | 0.630 | 16 |
| M | 0.512 | 13 |
| N | 0.354 | 9 |
| P | 0.256 | 6.5 |
| Q | 0.256 Dia. | 6.5 Dia. |
| R | 0.157 | 4 |
| S | 0.118 | 3 |
| T | M4 Metric | M4 |
| U | M6 Metric | M6 |



**Description:**
The Powerex Single Darlington Transistor Modules are high power devices designed for use in switching applications. The modules are isolated, consisting of one Darlington Transistor with a reverse parallel connected high-speed diode and base-to-emitter speed-up diode.

**Features:**
- ☐ Isolated Mounting
- ☐ Planar Chips
- ☐ Discrete Fast Recovery Feedback Diode
- ☐ High Gain ($h_{FE}$)
- ☐ Base-Emitter Speed-up Diode

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

**Ordering Information:**
Example: Select the complete eight digit module part number you desire from the table - i.e. KS624430 is a 450 $V_{CEO(sus)}$ (600 $V_{CEV}$), 300 Ampere Single Darlington Module.

| Type | $V_{CEO(sus)}$ Volts (X 10) | Current Rating Amperes (X 10) |
|---|---|---|
| KS62 | 45 | 30 |

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***KS624530***
***Single Darlington Transistor Module***
*300 Amperes/600 Volts*

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

| Ratings | Symbol | KS624530 | 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 | $V_{CEV}$ | 600 | Volts |
| Continuous Collector Current | $I_C$ | 300 | Amperes |
| Diode Forward Current | $I_{FM}$ | 300 | Amperes |
| Continuous Base Current | $I_B$ | 18 | Amperes |
| Diode Surge Current | $I_{FSM}$ | 3000 | Amperes |
| Power Dissipation | $P_t$ | 1380 | Watts |
| Max. Mounting Torque M6 Terminal Screws (E, C) | – | 26 | in.-lb. |
| Max. Mounting Torque M4 Terminal Screws (B, Bx) | – | 12 | in.-lb. |
| Max. Mounting Torque M6 Mounting Screws | – | 26 | in.-lb. |
| Modular Weight (Typical) | – | 460 | Grams |
| V Isolation | $V_{RMS}$ | 2000 | 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 |
| | | | $V_{CE}$ = 600V, $V_{BE}$ = -2V, $T_C$ = 125°C | – | – | 30 | mA |
| Emitter Cutoff Current | | $I_{EBO}$ | $V_{EB}$ = 7V | – | – | 700 | mA |
| DC Current Gain | | $h_{FE}$ | $I_C$ = 300A, $V_{CE}$ = 2.8V | 75 | – | – | – |
| | | | $I_C$ = 300A, $V_{CE}$ = 5.0V | 100 | – | – | – |
| Diode Forward Voltage | | $V_{FM}$ | $I_{FM}$ = 300A | – | – | 1.85 | Volts |
| Collector-Emitter Saturation Voltage | | $V_{CE(sat)}$ | $I_C$ = 300A, $I_B$ = 4.0A | – | – | 2.0 | Volts |
| Base-Emitter Saturation Voltage | | $V_{BE(sat)}$ | $I_C$ = 300A, $I_B$ = 4.0A | – | – | 2.5 | Volts |
| Resistive | Turn-on | $t_{on}$ | $V_{CC}$ = 300V | – | – | 2.5 | µs |
| Load | Storage Time | $t_s$ | $I_C$ = 300A | – | – | 12 | µs |
| Switch Times | Fall Time | $t_f$ | $I_{B1}$ = 6A, $I_{B2}$ = -6A | – | – | 3.0 | µs |

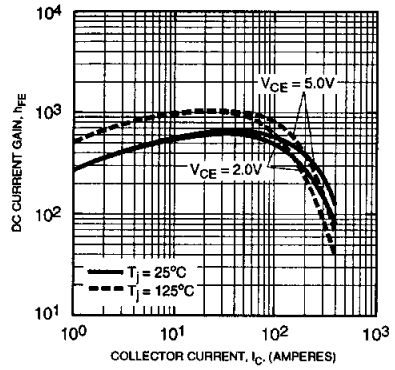
## Thermal and Mechanical Characteristics, $T_j$ = 25 °C unless otherwise specified

| Characteristics | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| Thermal Resistance, Case-to-Sink | $R_{\theta(c-s)}$ | – | – | – | 0.04 | °C/W |
| Thermal Resistance, Junction-to-Case | $R_{\theta(j-c)}$ | Transistor Part | – | – | 0.09 | °C/W |
| Thermal Resistance, Junction-to-Case | $R_{\theta(j-c)}$ | Diode Part | – | – | 0.3 | °C/W |

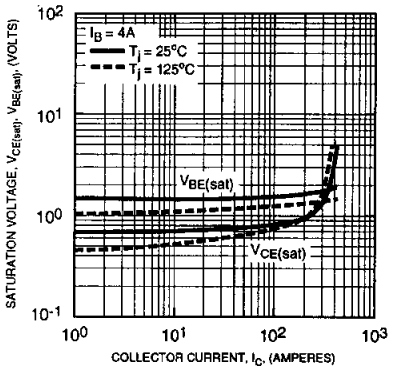
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***KS624530***
***Single Darlington Transistor Module***
*300 Amperes/600 Volts*

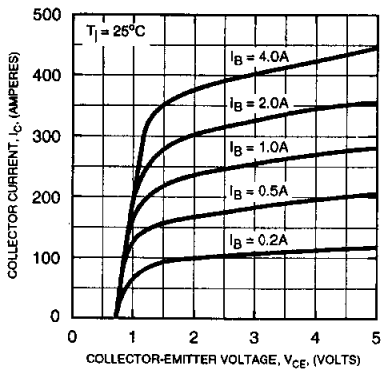
**DC CURRENT GAIN (TYPICAL)**



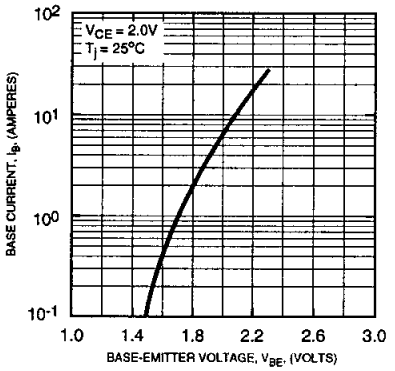

**SATURATION VOLTAGE (TYPICAL)**



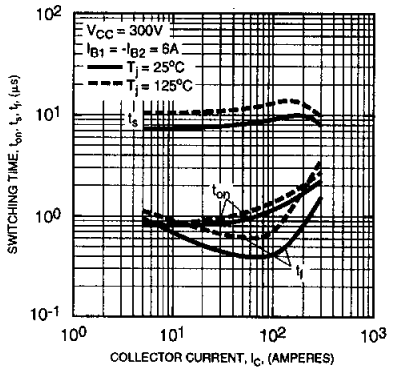

**COMMON EMITTER OUTPUT CHARACTERISTICS (TYPICAL)**



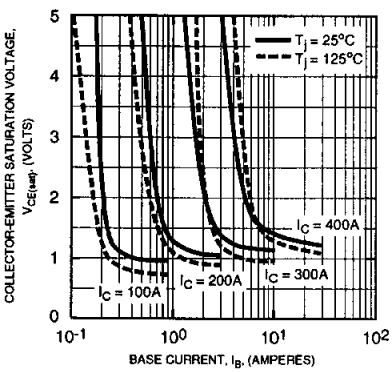

**COMMON EMITTER INPUT CHARACTERISTICS (TYPICAL)**



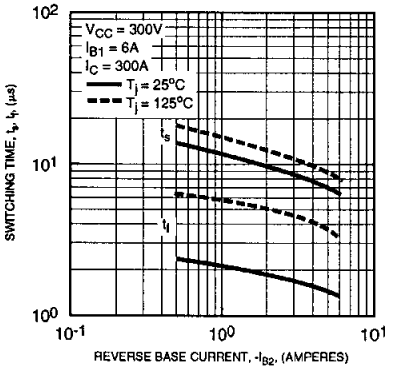

**SWITCHING CHARACTERISTICS (TYPICAL)**



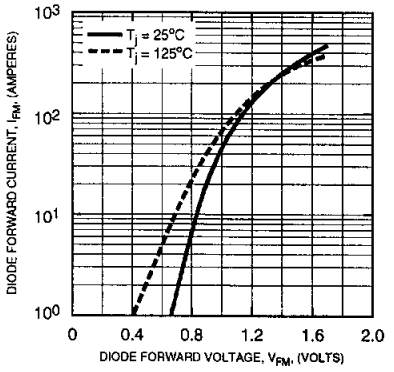

**COLLECTOR-EMITTER SATURATION VOLTAGE (TYPICAL)**



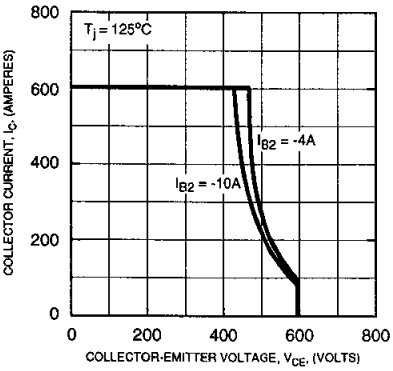

**SWITCHING TIME VS. BASE CURRENT (TYPICAL)**




**DIODE CHARACTERISTICS (TYPICAL)**



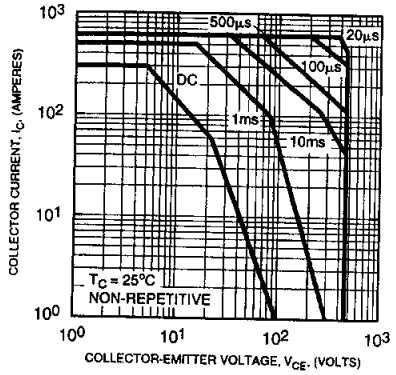

**REVERSE BIAS SAFE OPERATING AREA (RBSOA)**



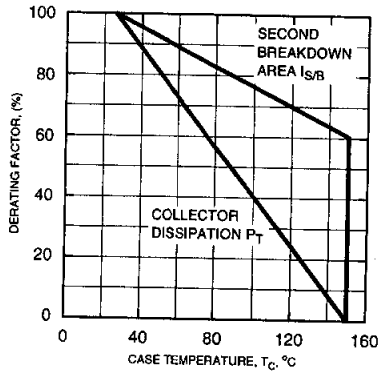
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***KS624530***
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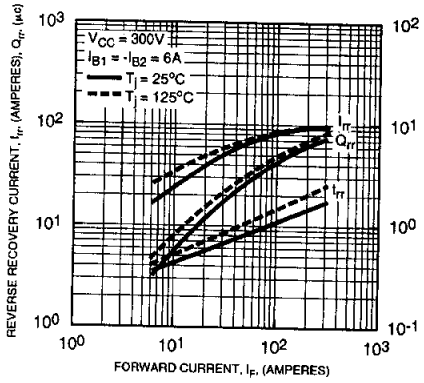
FORWARD BIAS SAFE OPERATING AREA (SOA)



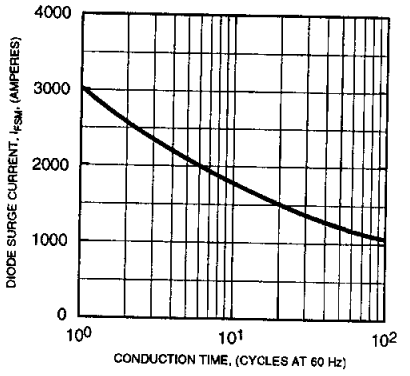

DERATING FACTOR OF SAFE OPERATING AREA (SOA)



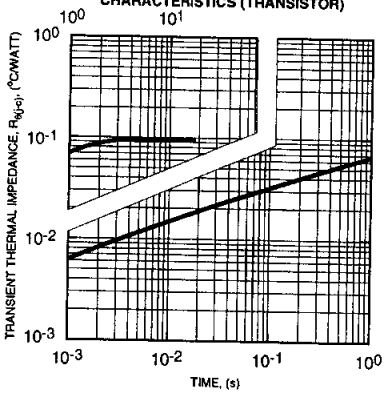

REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)




DIODE FORWARD SURGE CURRENT




TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (TRANSISTOR)




TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (DIODE)

