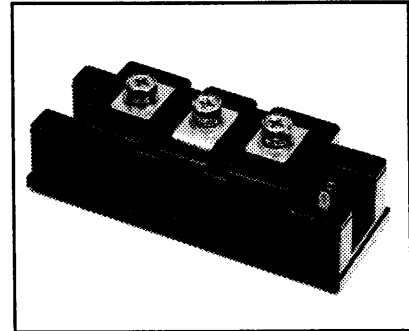
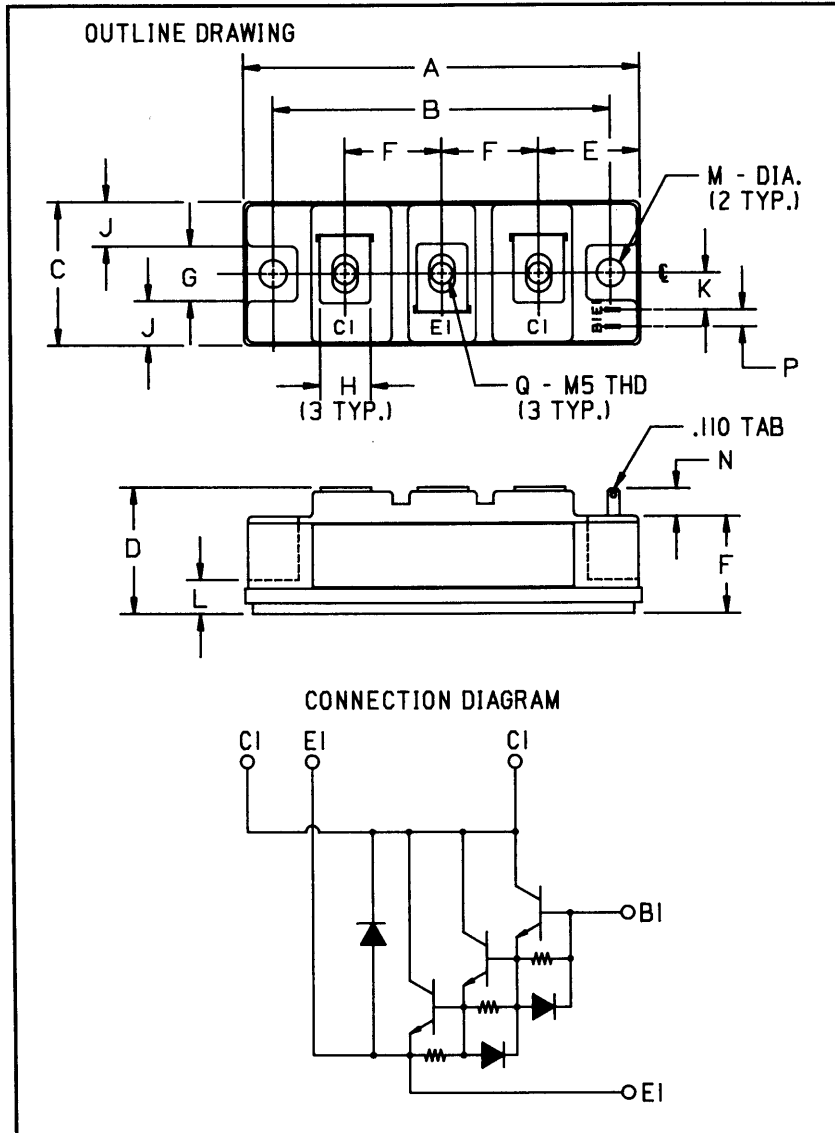


### Single Darlington Transistor Module 50 Amperes/1000 Volts



**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 ( $h_{FE}$ )
- TAB Quick-Connect Terminals
- 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. KS221K05 is a 1000 Volt, 50 Ampere Single Darlington Module.

Outline Drawing

| Dimensions | Inches        | Millimeters |
|------------|---------------|-------------|
| A          | 3.701 Max.    | 94 Max.     |
| B          | 3.150 ± 0.010 | 80 ± 0.25   |
| C          | 1.339 Max.    | 34 Max.     |
| D          | 1.181 Max.    | 30 Max.     |
| E          | 0.945         | 24          |
| F          | 0.906         | 23          |
| G          | 0.512         | 13          |
| H          | 0.472         | 12          |

| Dimensions | Inches     | Millimeters |
|------------|------------|-------------|
| J          | 0.413      | 10.5        |
| K          | 0.344      | 8.75        |
| L          | 0.315      | 8           |
| M          | 0.256 Dia. | 6.5 Dia.    |
| N          | 0.256 Min. | 6.5 Min.    |
| P          | 0.157      | 4           |
| Q          | M5 Metric  | M5          |

| Type | V <sub>CEO(sus)</sub><br>Volts 1000 | Current Rating<br>Amperes (X 10) |
|------|-------------------------------------|----------------------------------|
| KS22 | 1K                                  | 05                               |



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

**KS221K05**  
**Single Darlington Transistor Module**  
 50 Amperes/1000 Volts

**Absolute Maximum Ratings,  $T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified**

| Ratings   | Symbol         | KS221K05   | Units            |
|---|----------------|------------|------------------|
| Junction Temperature  | $T_j$          | -40 to 150 | $^\circ\text{C}$ |
| Storage Temperature   | $T_{stg}$      | -40 to 125 | $^\circ\text{C}$ |
| Collector-Emitter Sustaining Voltage, $V_{BE} = -2\text{V}$ | $V_{CEV(sus)}$ | 1000       | Volts            |
| Collector-Base Voltage                                      | $V_{CBO}$      | 1000       | Volts            |
| Emitter-Base Voltage  | $V_{EBO}$      | 7          | Volts            |
| Collector-Emitter Voltage                                   | $V_{CEV}$      | 1000       | Volts            |
| Continuous Collector Current                                | $I_C$          | 50         | Amperes          |
| Diode Forward Current                                       | $I_{FM}$       | 50         | Amperes          |
| Continuous Base Current                                     | $I_B$          | 3          | Amperes          |
| Diode Surge Current   | $I_{FSM}$      | 500        | Amperes          |
| Power Dissipation   | $P_t$          | 400        | Watts            |
| Max. Mounting Torque M5 Terminal Screws                     | —              | 17         | in.-lb.          |
| Max. Mounting Torque M6 Mounting Screws                     | —              | 26         | in.-lb.          |
| Module Weight (Typical)                                     | —              | 200        | Grams            |
| V Isolation   | $V_{RMS}$      | 2500       | Volts            |

**Electrical Characteristics,  $T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified**

| Characteristics                      | Symbol        | Test Conditions   | Min. | Typ. | Max. | Units         |
|--------------------------------------|---------------|---|------|------|------|---------------|
| Collector Cutoff Current             | $I_{CEV}$     | $V_{CE} = 1000\text{V}, V_{BE} = -2\text{V}$                                  | —    | —    | 1    | mA            |
|                                      |               | $V_{CE} = 1000\text{V}, V_{BE} = -2\text{V}, T_C = 125\text{ }^\circ\text{C}$ | —    | —    | 10   | mA            |
| Emitter Cutoff Current               | $I_{EBO}$     | $V_{EB} = 7\text{V}$  | —    | —    | 200  | mA            |
| DC Current Gain                      | $h_{FE}$      | $I_C = 50\text{A}, V_{CE} = 5\text{V}$  | 100  | —    | —    | —             |
| Diode Forward Voltage                | $V_{FM}$      | $I_{FM} = 50\text{A}$   | —    | —    | 1.8  | Volts         |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = 50\text{A}, I_B = 1\text{A}$   | —    | —    | 2.5  | Volts         |
| Base-Emitter Saturation Voltage      | $V_{BE(sat)}$ | $I_C = 50\text{A}, I_B = 1\text{A}$   | —    | —    | 3.5  | Volts         |
| Resistive                            | Turn-on       | $V_{CC} = 600\text{V}$  | —    | —    | 2.5  | $\mu\text{s}$ |
|                                      | Storage Time  |   |      |      |      |               |
| Switch Times                         | Fall Time     | $I_{B1} = 1\text{A}, I_{B2} = -1\text{A}$                                     | —    | —    | 3.0  | $\mu\text{s}$ |

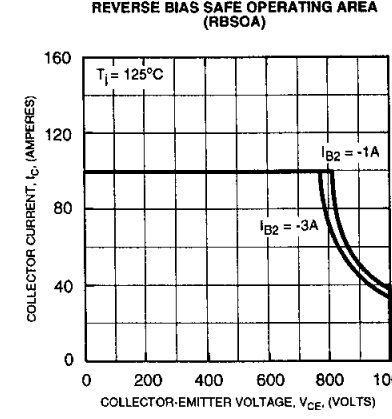
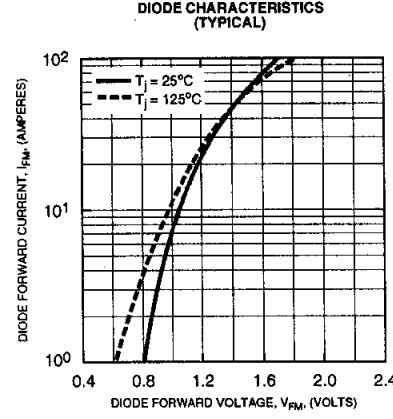
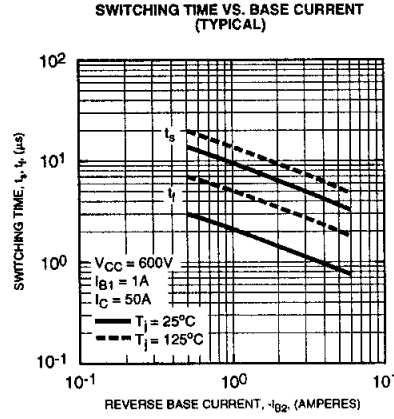
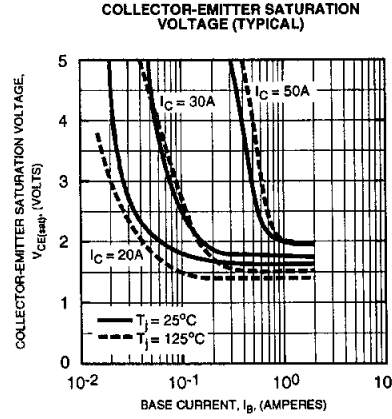
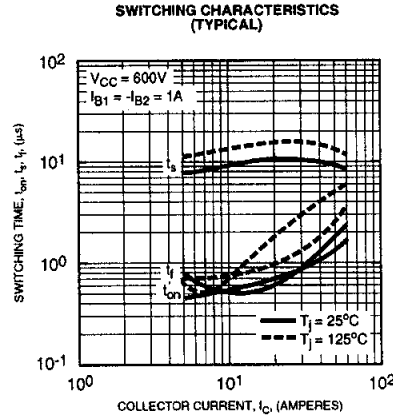
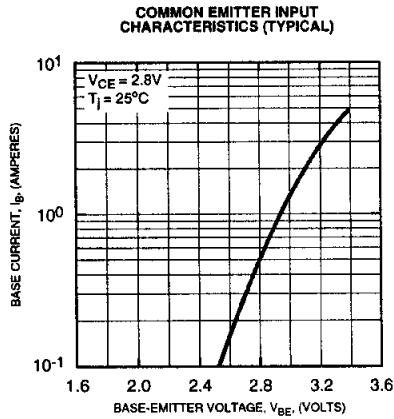
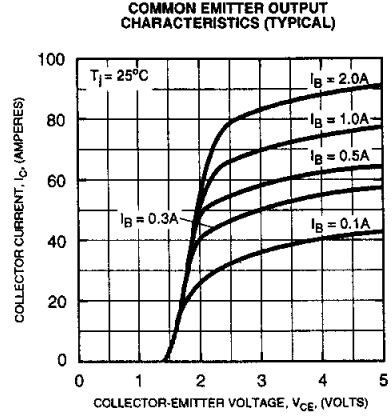
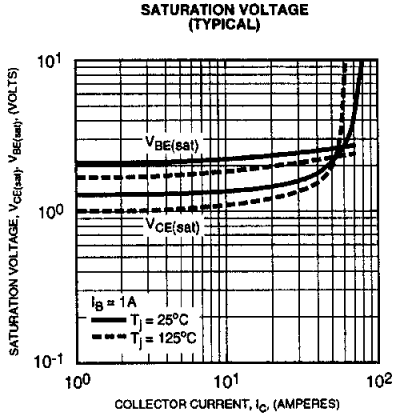
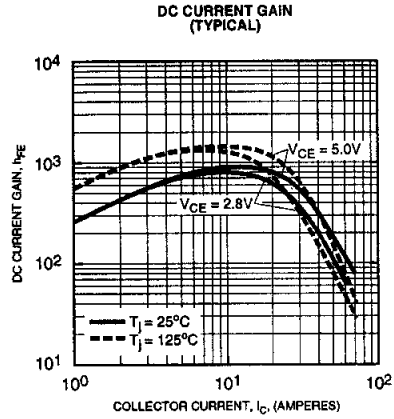
**Thermal and Mechanical Characteristics,  $T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified**

| Characteristics                      | Symbol            | Test Conditions | Min. | Typ. | Max. | Units              |
|--------------------------------------|-------------------|-----------------|------|------|------|--------------------|
| Thermal Resistance, Case-to-Sink     | $R_{\theta(c-s)}$ | —               | —    | —    | 0.15 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Case | $R_{\theta(j-c)}$ | Transistor Part | —    | —    | 0.31 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Case | $R_{\theta(j-c)}$ | Diode Part      | —    | —    | 1.2  | $^\circ\text{C/W}$ |



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**KS221K05**  
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 50 Amperes/1000 Volts

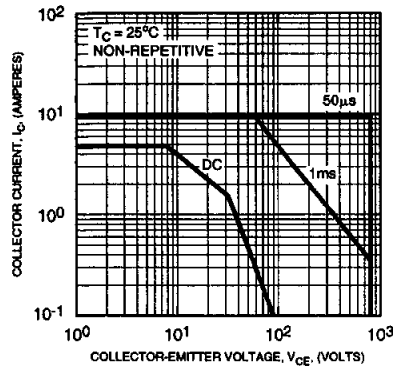




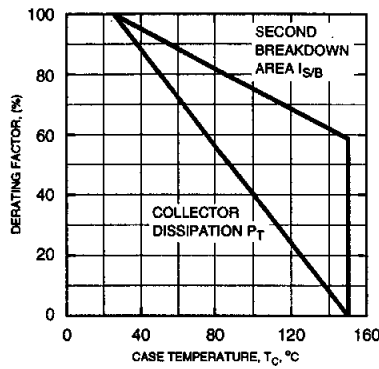
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**Single Darlington Transistor Module**  
**50 Amperes/1000 Volts**

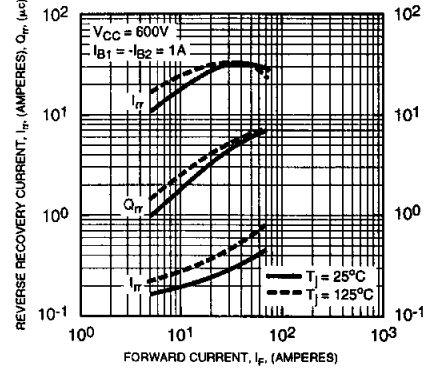
**FORWARD BIAS SAFE OPERATING AREA (SOA)**



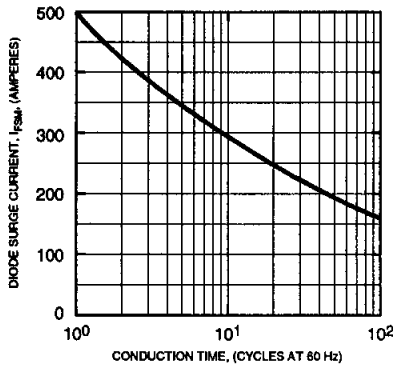
**DERATING FACTOR OF SAFE OPERATING AREA (SOA)**



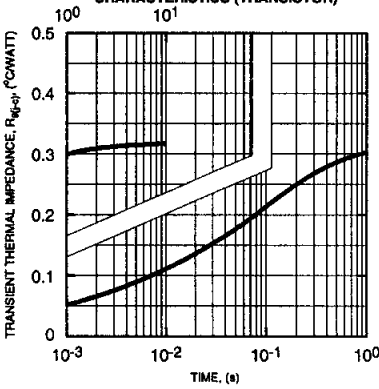
**REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)**



**DIODE FORWARD SURGE CURRENT**



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (TRANSISTOR)**



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (DIODE)**

