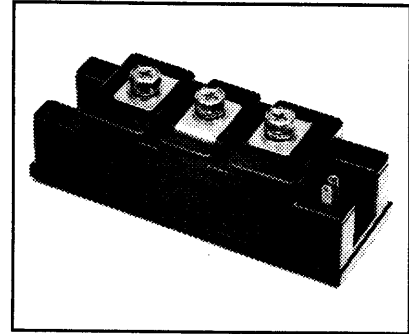
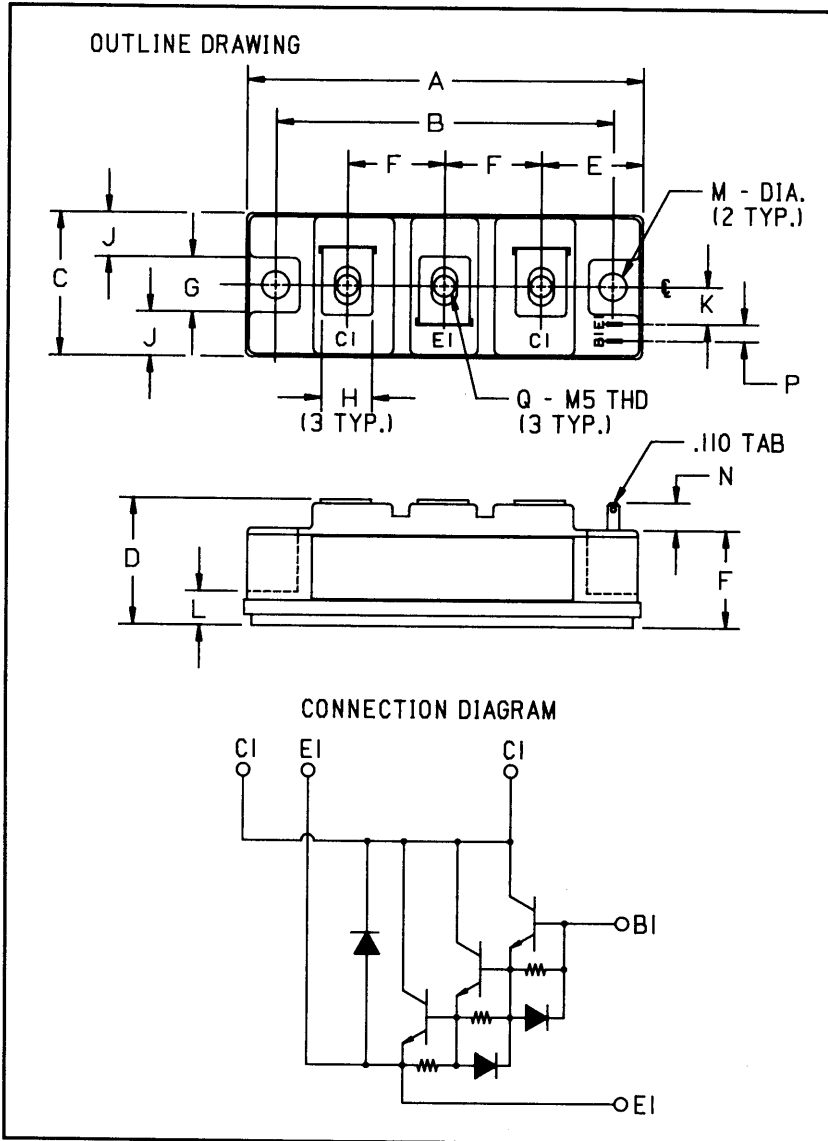


### Single Darlington Transistor Module 100 Amperes/1000 Volts



**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. KS221K10 is a 1000 Volt, 100 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> Volts (1000)	Current Rating Amperes (X 10)
KS22	1K	10



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

**KS221K10**  
**Single Darlington Transistor Module**  
 100 Amperes/1000 Volts

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

Ratings	Symbol	KS221K10	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	$I_C$	100	Amperes
Diode Forward Current	$I_{FM}$	100	Amperes
Continuous Base Current	$I_B$	5	Amperes
Diode Surge Current	$I_{FSM}$	1000	Amperes
Power Dissipation	$P_t$	800	Watts
Max. Mounting Torque M5 Terminal Screws	-	17	in.-lb.
Max. Mounting Torque M5 Mounting Screws	-	17	in.-lb.
Module Weight (Typical)	-	250	Grams
V Isolation	$V_{RMS}$	2500	Volts

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

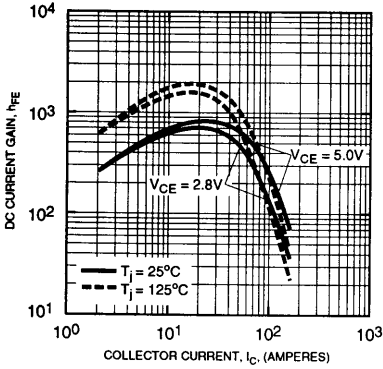
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units	
Collector Cutoff Current	$I_{CEV}$	$V_{CE} = 1000\text{V}, V_{BE} = -2\text{V}$	-	-	2	$\text{mA}$	
		$V_{CE} = 1000\text{V}, V_{BE} = -2\text{V}, T_C = 125^\circ\text{C}$	-	-	20	$\text{mA}$	
Emitter Cutoff Current	$I_{EBO}$	$V_{EB} = 7\text{V}$	-	-	400	$\text{mA}$	
DC Current Gain	$h_{FE}$	$I_C = 100\text{A}, V_{CE} = 5\text{V}$	100	-	-	-	
Diode Forward Voltage	$V_{FM}$	$I_{FM} = 100\text{A}$	-	-	1.8	Volts	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 100\text{A}, I_B = 2\text{A}$	-	-	2.5	Volts	
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 100\text{A}, I_B = 2\text{A}$	-	-	3.5	Volts	
Resistive	Turn-on	$t_{on}$	$V_{CC} = 600\text{V}$	-	-	3.0	$\mu\text{s}$
Switch Times	Fall Time	$t_f$	$I_{B1} = 2\text{A}, I_{B2} = -2\text{A}$	-	-	3.0	$\mu\text{s}$

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

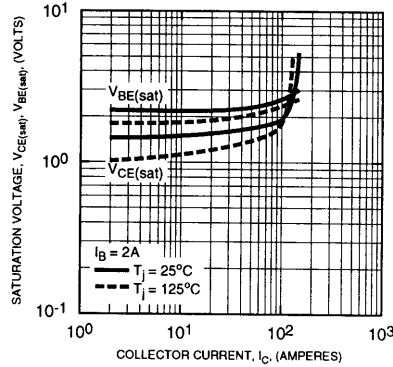
Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Case-to-Sink	$R_{\theta(c-s)}$	-	-	-	0.15	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Case	$R_{\theta(j-c)}$	Transistor Part	-	-	0.155	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Case	$R_{\theta(j-c)}$	Diode Part	-	-	0.65	$^\circ\text{C/W}$

**KS221K10**  
**Single Darlington Transistor Module**  
 100 Amperes/1000 Volts

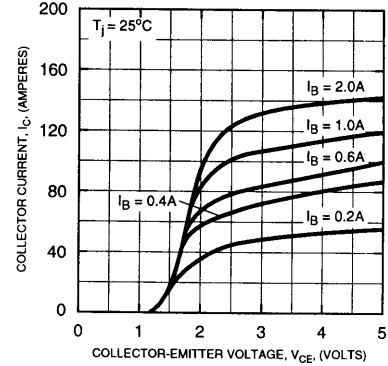
**DC CURRENT GAIN (TYPICAL)**



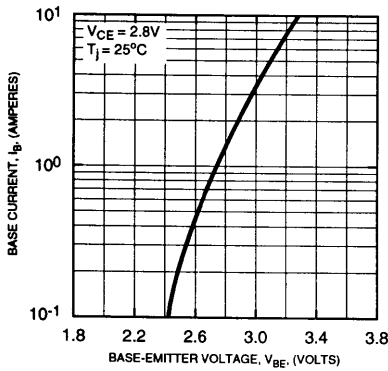
**SATURATION VOLTAGE (TYPICAL)**



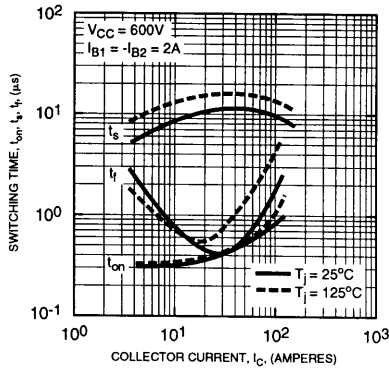
**COMMON EMITTER OUTPUT CHARACTERISTICS (TYPICAL)**



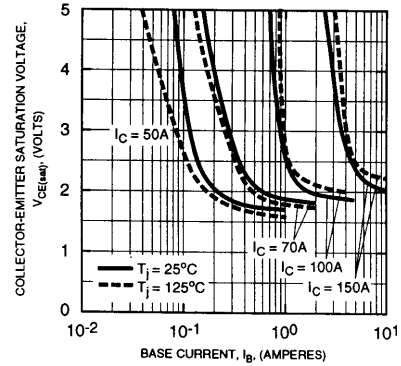
**COMMON EMITTER INPUT CHARACTERISTICS (TYPICAL)**



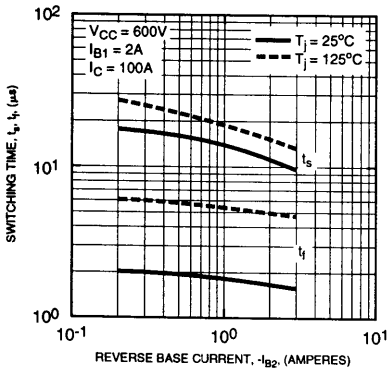
**SWITCHING CHARACTERISTICS (TYPICAL)**



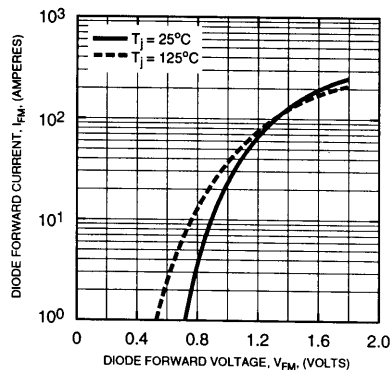
**COLLECTOR-EMITTER SATURATION VOLTAGE (TYPICAL)**



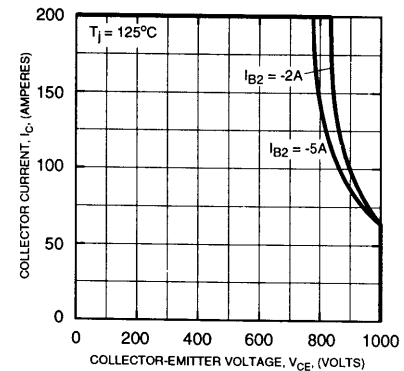
**SWITCHING TIME VS. BASE CURRENT (TYPICAL)**



**DIODE CHARACTERISTICS (TYPICAL)**

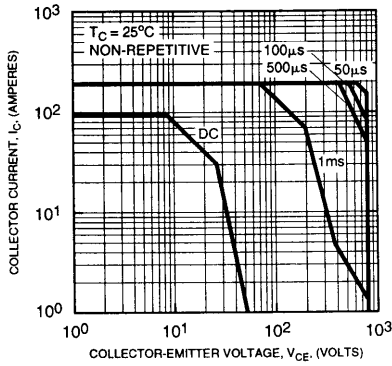


**REVERSE BIAS SAFE OPERATING AREA (RBSOA)**

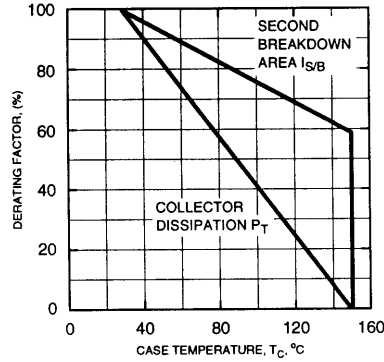


**KS221K10**  
**Single Darlington Transistor Module**  
 100 Amperes/1000 Volts

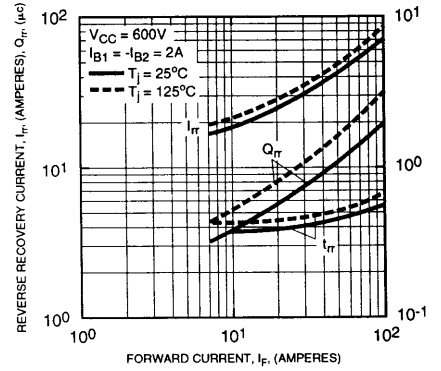
**FORWARD BIAS SAFE OPERATING AREA (SOA)**



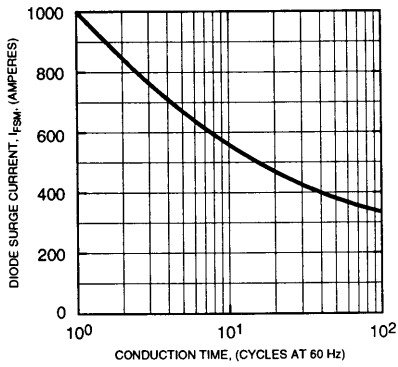
**DERATING FACTOR OF SAFE OPERATING AREA (SOA)**



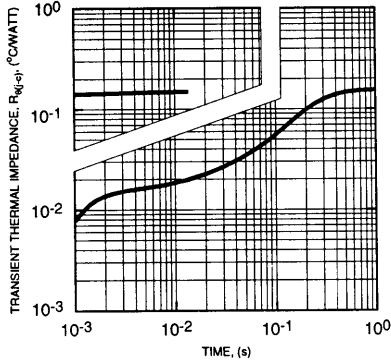
**REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)**



**DIODE FORWARD SURGE CURRENT**



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (TRANSISTOR)**



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (DIODE)**

