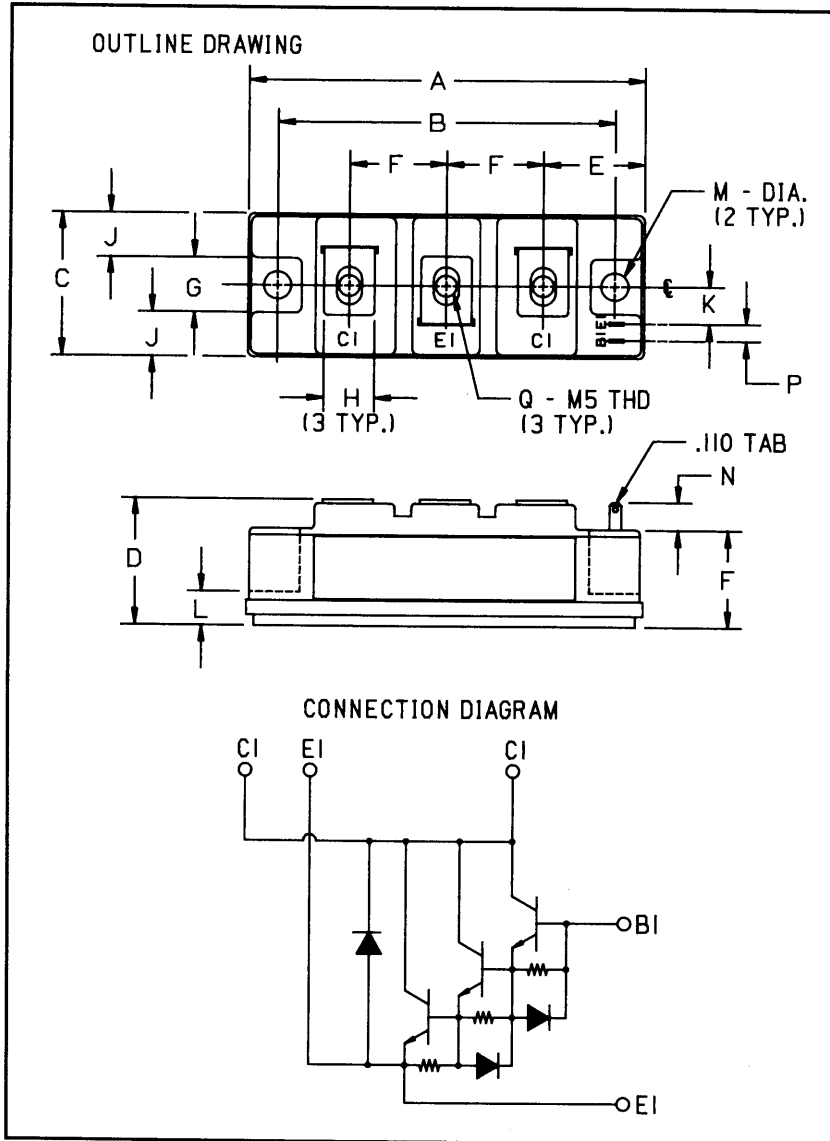


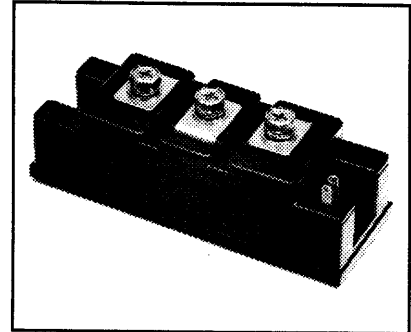
Single Darlington Transistor Module 100 Amperes/1000 Volts



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



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.

Type	$V_{CE(sus)}$ 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, $T_J = 25^\circ\text{C}$ 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, $T_J = 25^\circ\text{C}$ 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	mA
		$V_{CE} = 1000\text{V}, V_{BE} = -2\text{V}, T_C = 125^\circ\text{C}$	—	—	20	mA
Emitter Cutoff Current	I_{EBO}	$V_{EB} = 7\text{V}$	—	—	400	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	μs
Load Storage Time	t_s	$I_C = 100\text{A}$	—	—	15	μs
Switch Times Fall Time	t_f	$I_{B1} = 2\text{A}, I_{B2} = -2\text{A}$	—	—	3.0	μs

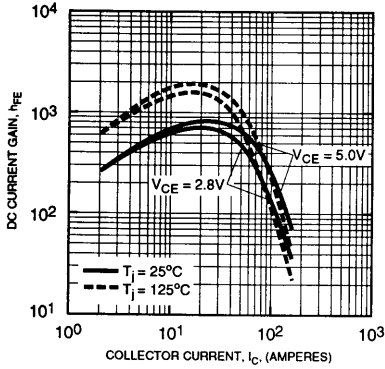
Thermal and Mechanical Characteristics, $T_J = 25^\circ\text{C}$ unless otherwise specified

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	$^\circ\text{C/W}$

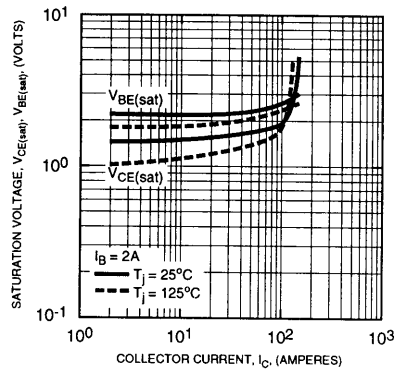
KS221K10

Single Darlington Transistor Module
100 Amperes/1000 Volts

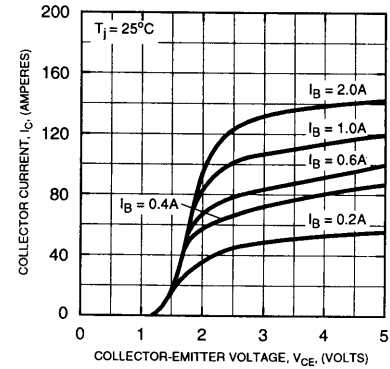
DC CURRENT GAIN
(TYPICAL)



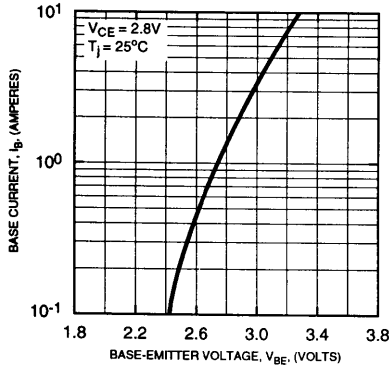
SATURATION VOLTAGE
(TYPICAL)



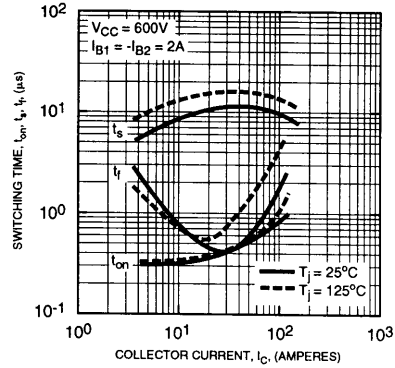
COMMON EMITTER OUTPUT
CHARACTERISTICS (TYPICAL)



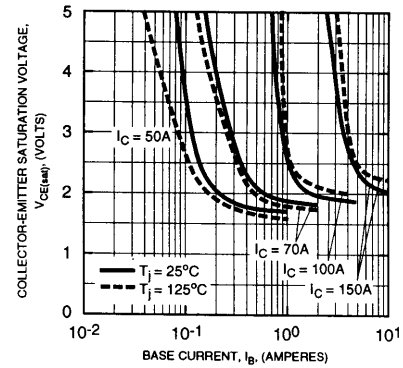
COMMON EMITTER INPUT
CHARACTERISTICS (TYPICAL)



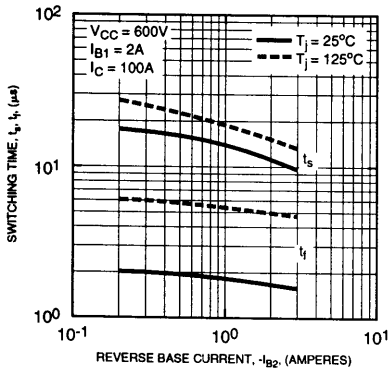
SWITCHING CHARACTERISTICS
(TYPICAL)



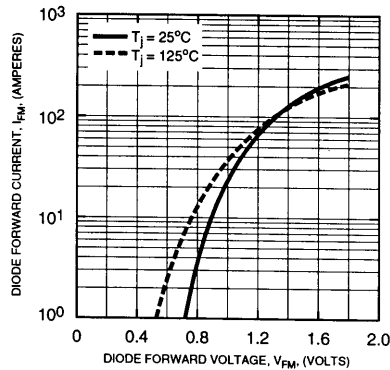
COLLECTOR-EMITTER SATURATION
VOLTAGE (TYPICAL)



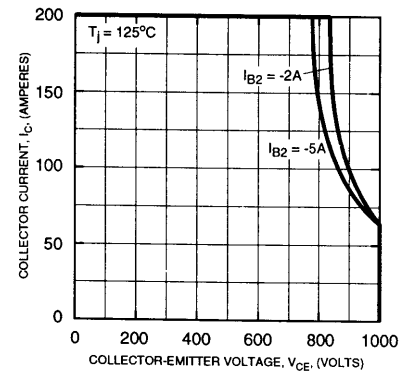
SWITCHING TIME VS. BASE CURRENT
(TYPICAL)



DIODE CHARACTERISTICS
(TYPICAL)

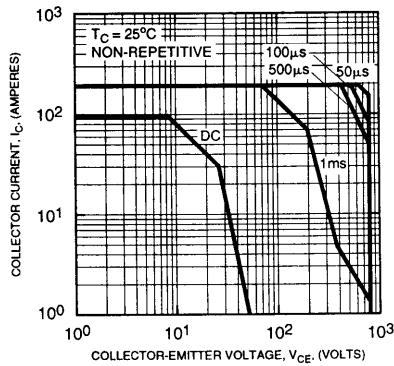


REVERSE BIAS SAFE OPERATING AREA
(RBSOA)

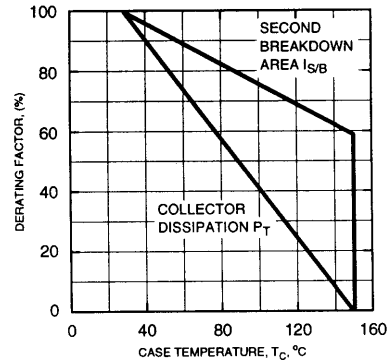


KS221K10
Single Darlington Transistor Module
 100 Amperes/1000 Volts

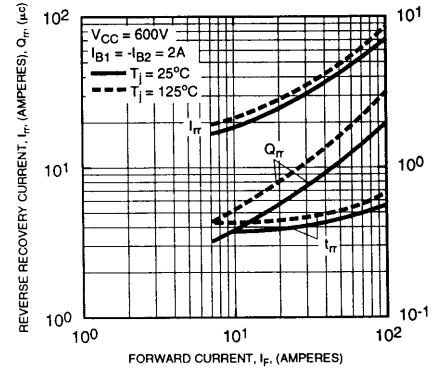
FORWARD BIAS SAFE OPERATING AREA (SOA)



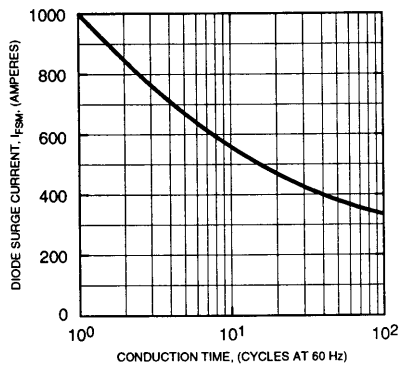
DERATING FACTOR OF SAFE OPERATING AREA (SOA)



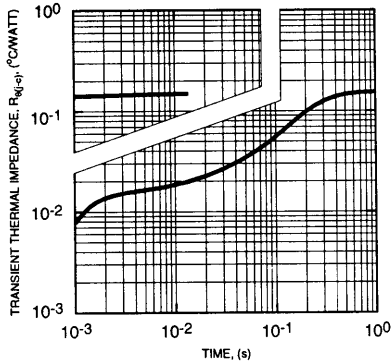
REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



DIODE FORWARD SURGE CURRENT



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (TRANSISTOR)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (DIODE)

