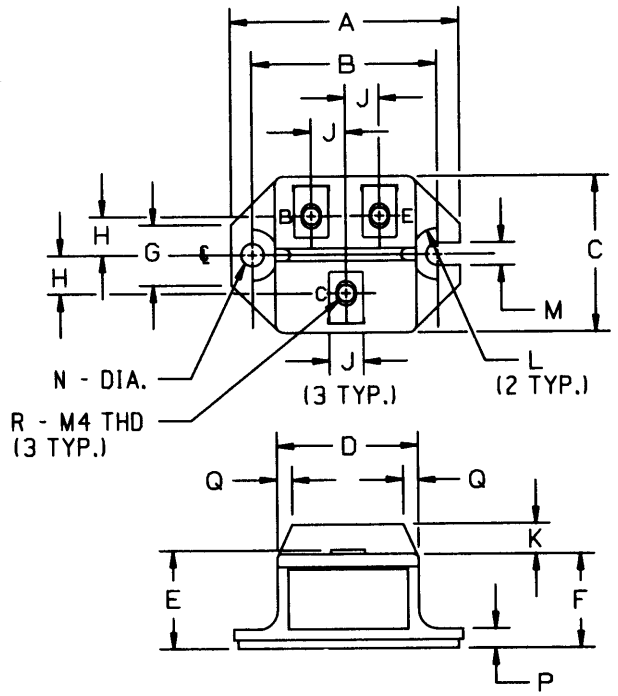
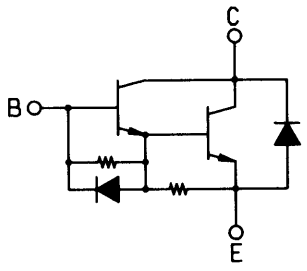
Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (412) 925-7272

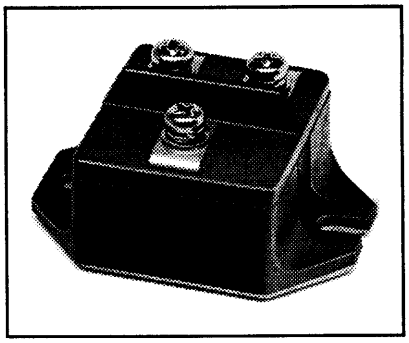
Single Darlington Transistor Module
50 Amperes/600 Volts

OUTLINE DRAWING



CONNECTION DIAGRAM





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. KS524505 is a 450 $V_{CEO(sus)}$ (600 V_{CEV}), 50 Ampere Single Darlington Module.

Type	$V_{CEO(sus)}$ Volts (X 10)	Current Rating Amperes (x 10)
KS52	45	05

Outline Drawing

Dimensions	Inches	Millimeters
A	2.106	53.5
B	1.705 ± 0.008	43.3 ± 0.02
C	1.437	36.5
D	1.299	33
E	0.925	23.5
F	0.866	22
G	0.551	14
H	0.354	9

Dimensions	Inches	Millimeters
J	0.315	8
K	0.276	7
L	0.236 Rad.	6 Rad.
M	0.209	5.3
N	0.209 Dia.	5.3 Dia.
P	0.177	4.5
Q	0.138	3.5
R	M4 Metric	M4

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

KS524505
Single Darlington Transistor Module
50 Amperes/600 Volts

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

Ratings	Symbol	KS524505	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	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	310	Watts
Max. Mounting Torque M5 Terminal Screws	–	17	in.-lb.
Max. Mounting Torque M6 Mounting Screws	–	26	in.-lb.
Module Weight (Typical)	–	90	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	–	–	1	mA
			V_{CE} = 600V, V_{BE} = -2V, T_C = 125°C	–	–	5	mA
Emitter Cutoff Current		I_{EBO}	V_{EB} = 7V	–	–	200	mA
DC Current Gain		h_{FE}	I_C = 50A, V_{CE} = 2V	75	–	–	–
			I_C = 50A, V_{CE} = 5V	100	–	–	–
Diode Forward Voltage		V_{FM}	I_{FM} = 50A	–	–	1.75	Volts
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	I_C = 50A, I_B = 0.65A	–	–	2.0	Volts
Base-Emitter Saturation Voltage		$V_{BE(sat)}$	I_C = 50A, I_B = 0.65A	–	–	2.5	Volts
Resistive	Turn-on	t_{on}	V_{CC} = 300V	–	–	1.5	µs
Load	Storage Time	t_s	I_C = 50A	–	–	12	µs
Switch Times	Fall Time	t_f	I_{B1} = I_{B2} = -1A	–	–	3.0	µs

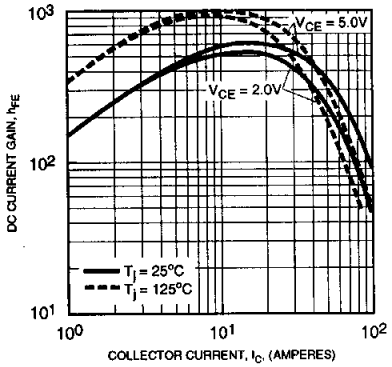
Thermal and Mechanical Characteristics, T_j = 25 °C unless otherwise specified

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Case-to-Sink	$R_{\theta(c-s)}$	–	–	–	0.15	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta(j-c)}$	Transistor Part	–	–	0.4	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta(j-c)}$	Diode Part	–	–	1.3	°C/W

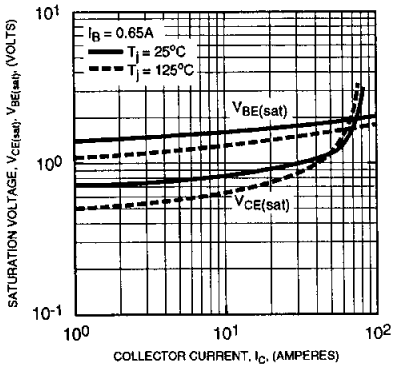
Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (412) 925-7272

KS524505
Single Darlington Transistor Module
50 Amperes/600 Volts

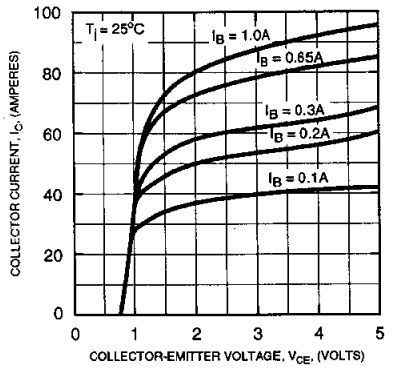
DC CURRENT GAIN (TYPICAL)



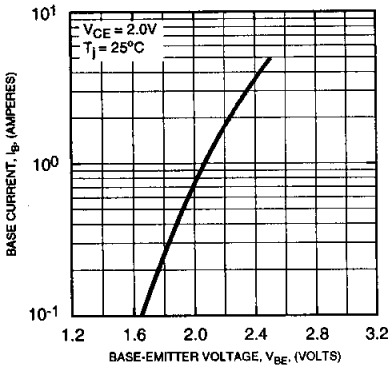
SATURATION VOLTAGE (TYPICAL)



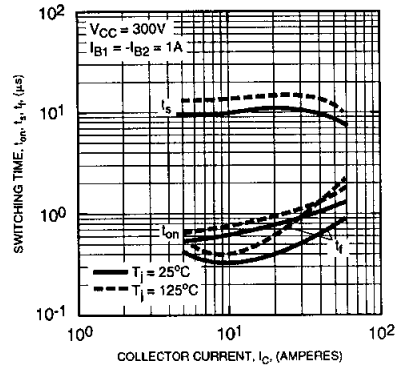
COMMON EMITTER OUTPUT CHARACTERISTICS (TYPICAL)



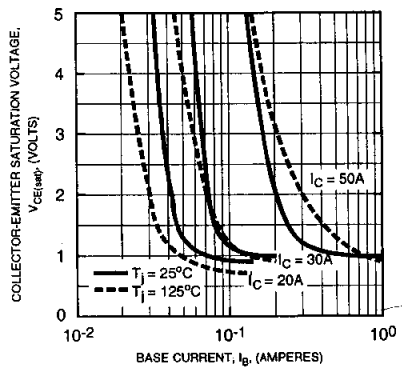
COMMON EMITTER INPUT CHARACTERISTICS (TYPICAL)



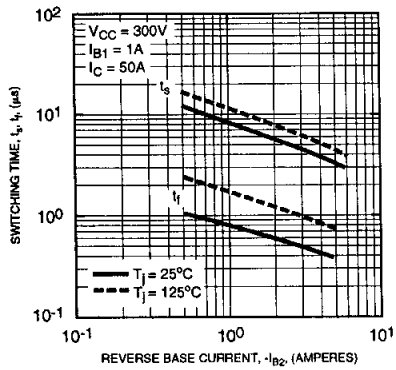
SWITCHING CHARACTERISTICS (TYPICAL)



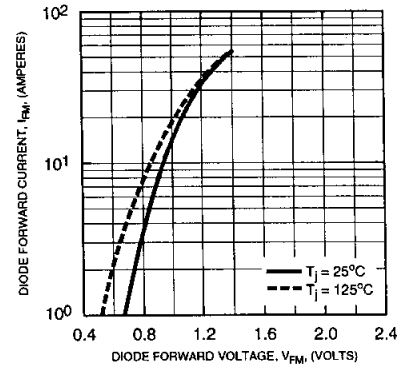
COLLECTOR-EMITTER SATURATION VOLTAGE (TYPICAL)



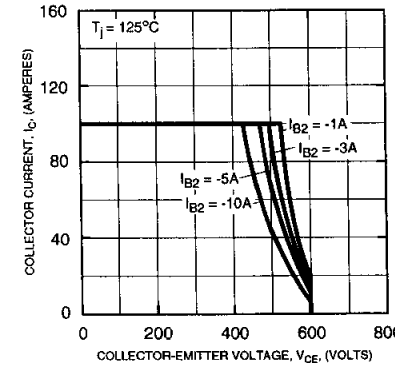
SWITCHING TIME VS. BASE CURRENT (TYPICAL)



DIODE CHARACTERISTICS (TYPICAL)



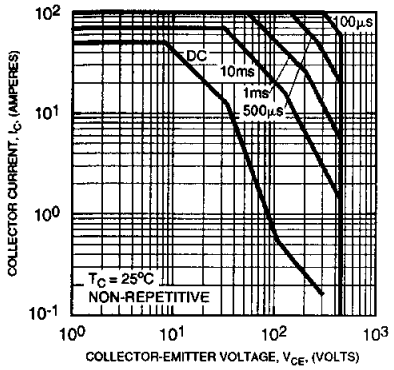
REVERSE BIAS SAFE OPERATING AREA (RBSOA)



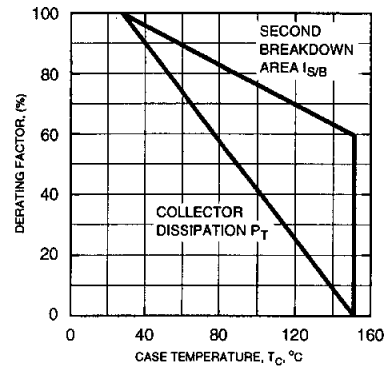
Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (412) 925-7272

KS524505
Single Darlington Transistor Module
50 Amperes/600 Volts

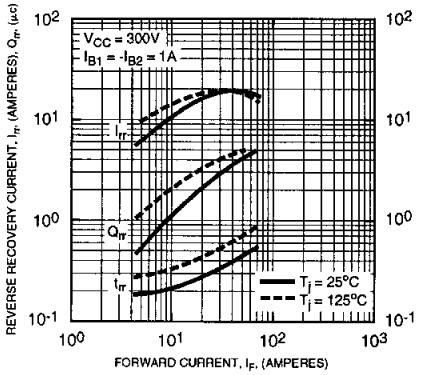
FORWARD BIAS SAFE OPERATING AREA (SOA)



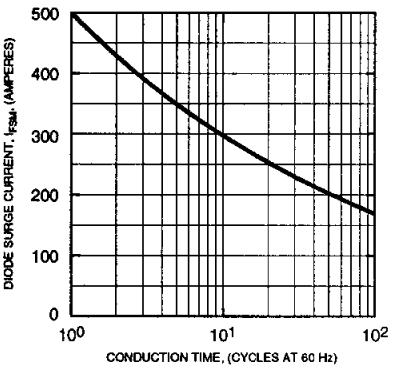
DERATING FACTOR OF SAFE OPERATING AREA (SOA)



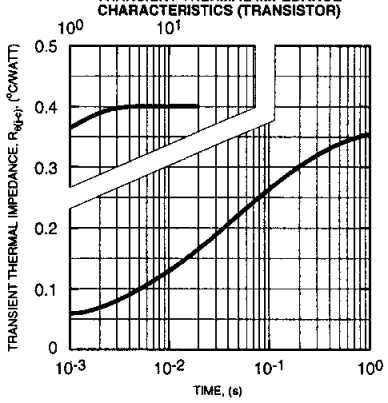
REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



DIODE FORWARD SURGE CURRENT



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (TRANSISTOR)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (DIODE)