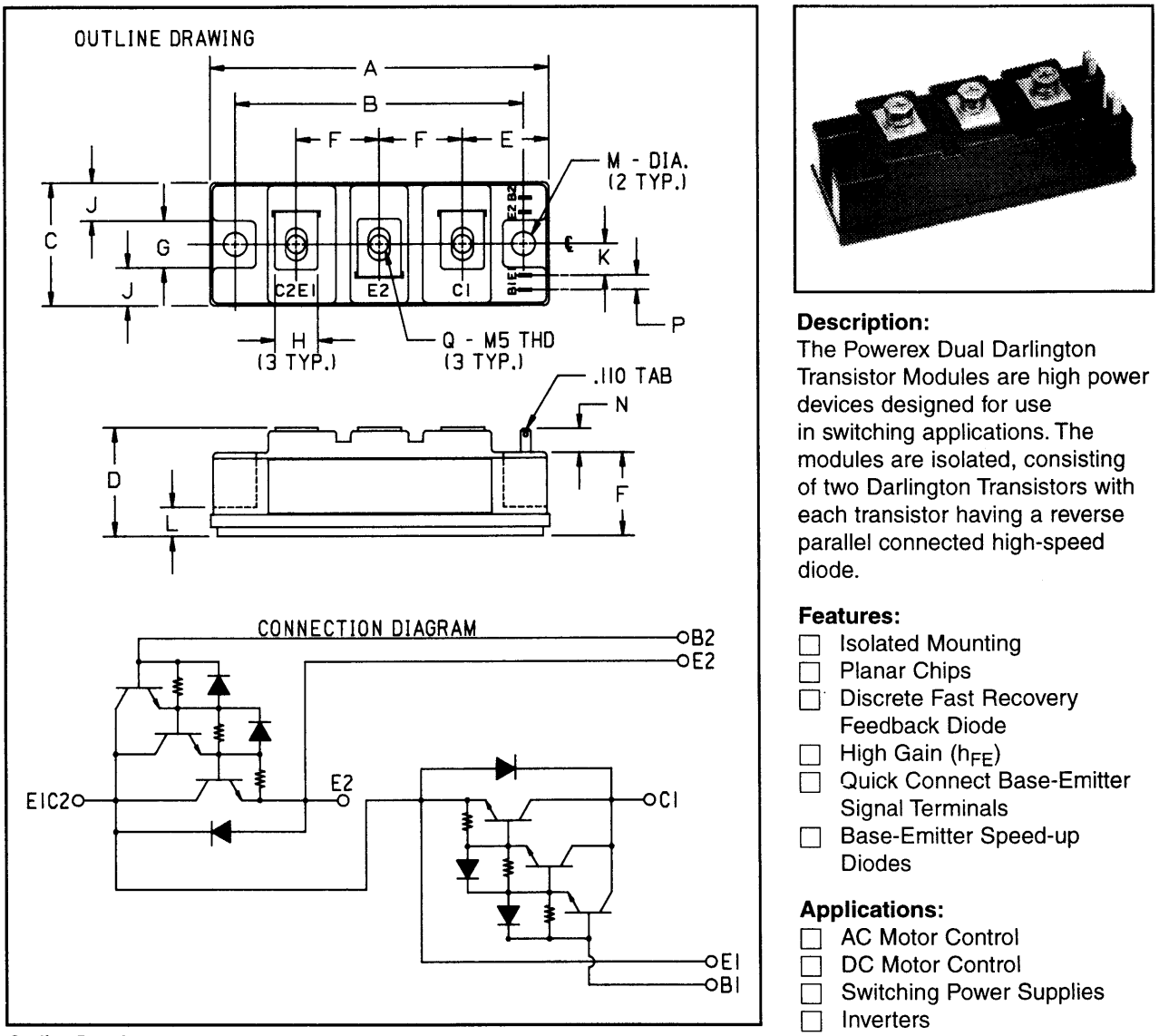
Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800 (412) 925-7272

Dual Darlington Transistor Module
50 Amperes/1000 Volts



Description:
The Powerex Dual Darlington Transistor Modules are high power devices designed for use in switching applications. The modules are isolated, consisting of two Darlington Transistors with each transistor having a reverse parallel connected high-speed diode.

Features:
- ☐ Isolated Mounting
- ☐ Planar Chips
- ☐ Discrete Fast Recovery Feedback Diode
- ☐ High Gain (h_{FE})
- ☐ Quick Connect Base-Emitter Signal Terminals
- ☐ Base-Emitter Speed-up Diodes

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

Ordering Information:
Example: Select the complete eight digit module part number you desire from the table - i.e. KD221K05 is a 1000 Volt, 50 Ampere Dual Darlington Module.

Type	$V_{CEO(sus)}$ Volts (X 1000)	Current Rating Amperes (X 10)
KD22	1K	05

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

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

Ratings	Symbol	KD221K05	Units
Junction Temperature	T_j	-40 to 150	°C
Storage Temperature	T_{stg}	-40 to 125	°C
Collector-Emitter Sustaining Voltage, V_{BE} = -2V	$V_{CEV(sus)}$	1000	Volts
Collector-Base Voltage	V_{CBO}	1000	Volts
Emitter-Base Voltage	V_{EBO}	7	Volts
Collector-Emitter Voltage, V_{BE} = -2V	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 (Each Transistor)	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)	–	210	Grams
V Isolation	V_{RMS}	2500	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} = 1000V, V_{BE} = -2V	–	–	1	mA
			V_{CE} = 1000V, V_{BE} = -2V, T_C = 125°C	–	–	10	mA
Emitter Cutoff Current		I_{EBO}	V_{EB} = 7V	–	–	200	mA
DC Current Gain		h_{FE}	I_C = 50A, V_{CE} = 5V	100	–	–	–
Diode Forward Voltage		V_{FM}	I_{FM} = 50A	–	–	1.8	Volts
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	I_C = 50A, I_B = 1A	–	–	2.5	Volts
Base-Emitter Saturation Voltage		$V_{BE(sat)}$	I_C = 50A, I_B = 1A	–	–	3.5	Volts
Resistive	Turn-on	t_{on}	V_{CC} = 600V	–	–	2.5	µs
Load	Storage Time	t_s	I_C = 50A	–	–	15	µs
Switch Times	Fall Time	t_f	I_{B1} = 1A, 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	$R_{\theta(c-s)}$	Per 1/2 Module	–	–	0.15	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta(j-c)}$	Transistor Part	–	–	0.31	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta(j-c)}$	Diode Part	–	–	1.2	°C/W

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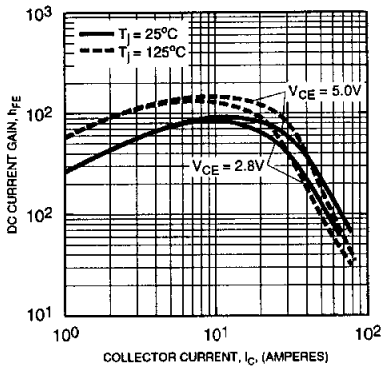
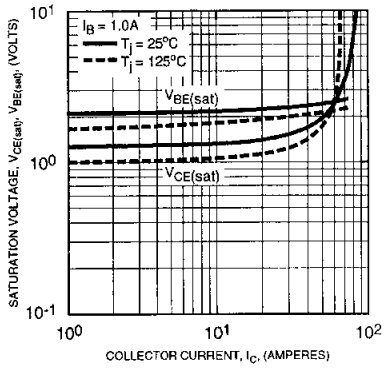
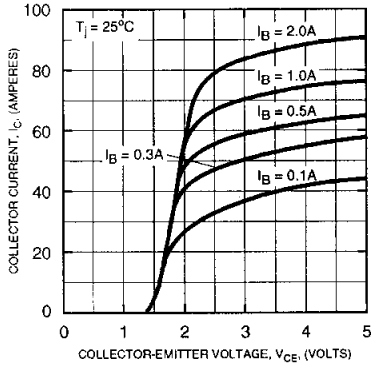
DC CURRENT GAIN (TYPICAL)



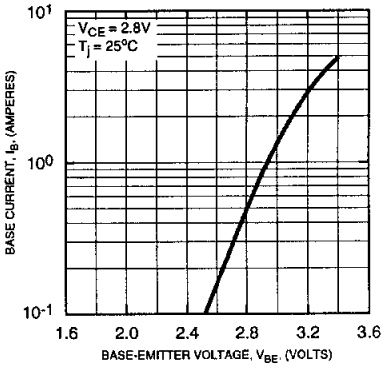
SATURATION VOLTAGE (TYPICAL)



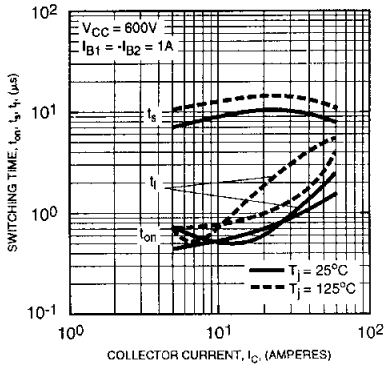
COMMON EMITTER OUTPUT CHARACTERISTICS (TYPICAL)



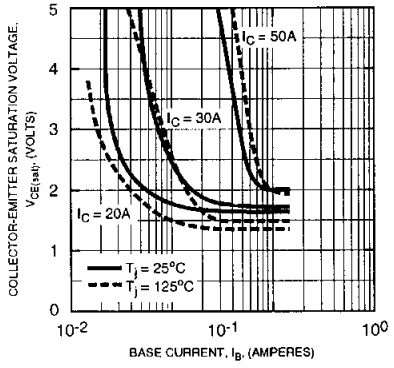
COMMON EMITTER INPUT CHARACTERISTICS (TYPICAL)



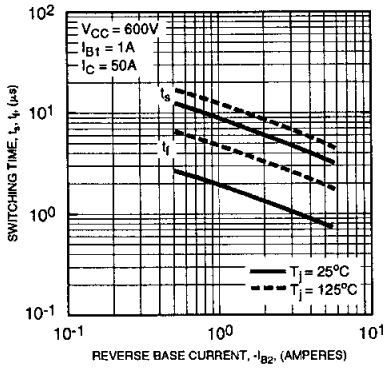
SWITCHING CHARACTERISTICS (TYPICAL)



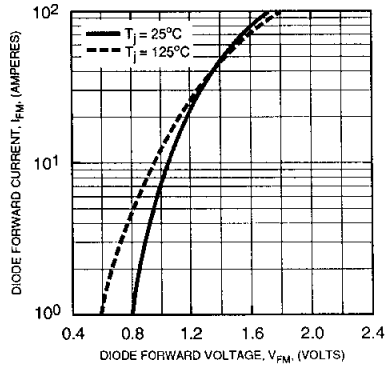
COLLECTOR-EMITTER SATURATION VOLTAGE (TYPICAL)



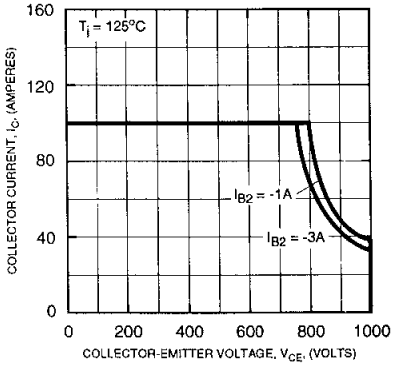
SWITCHING TIME VS. BASE CURRENT (TYPICAL)



DIODE CHARACTERISTICS (TYPICAL)



REVERSE BIAS SAFE OPERATING AREA (RBSOA)



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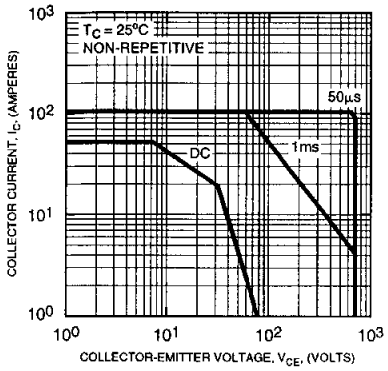
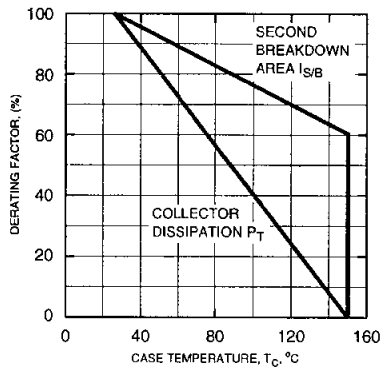
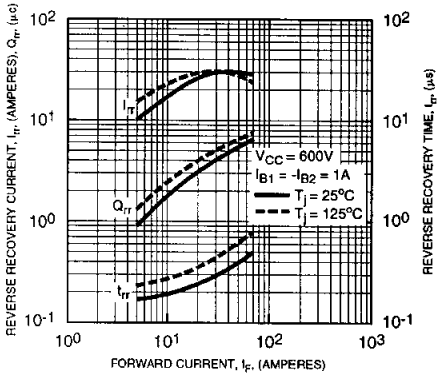
FORWARD BIAS SAFE OPERATING AREA (SOA)



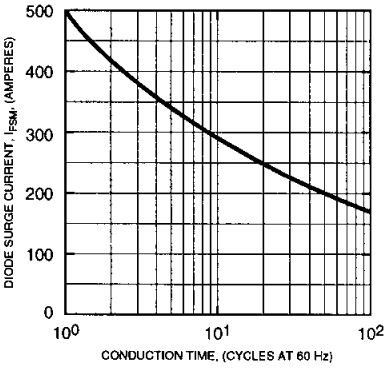
DERATING FACTOR OF SAFE OPERATING AREA (SOA)



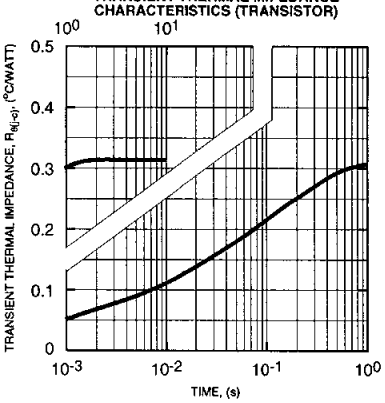
REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



DIODE FORWARD SURGE CURRENT



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (TRANSISTOR)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (DIODE)