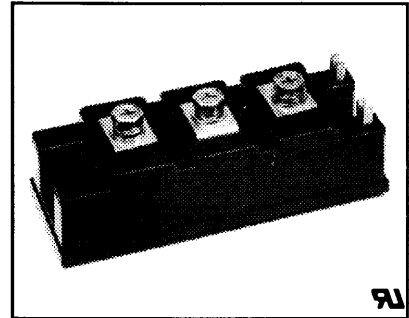
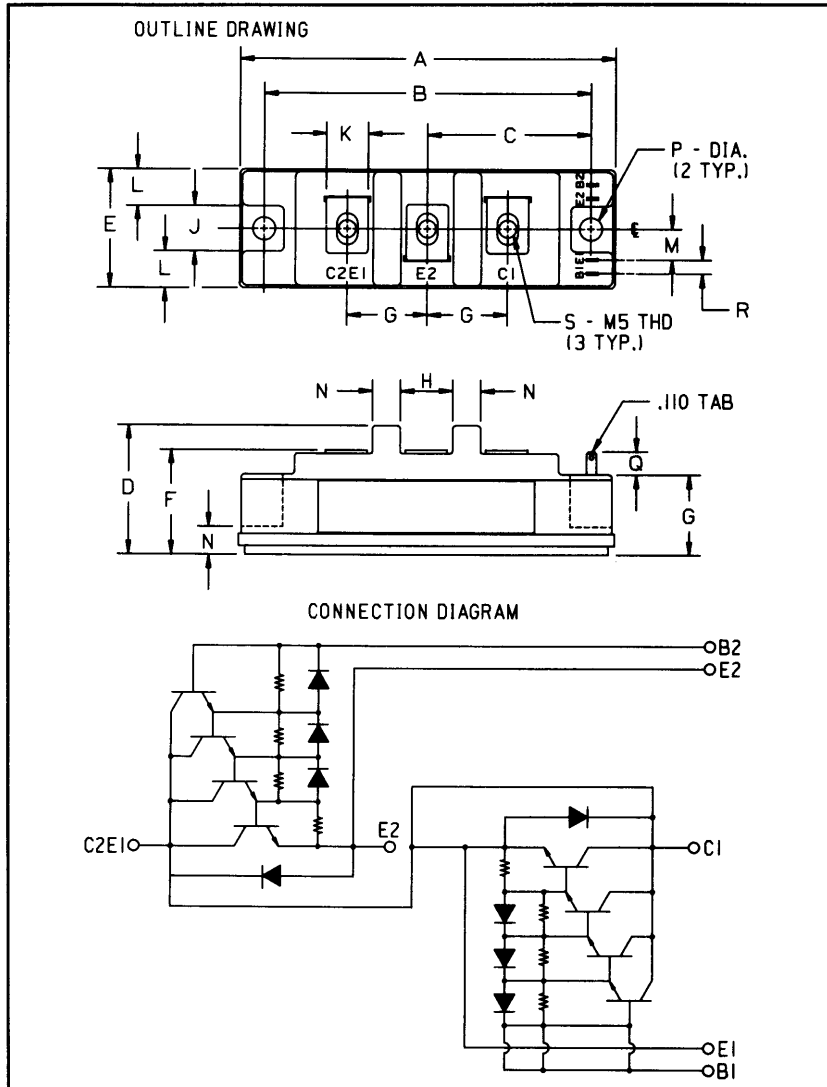


### High-Beta Dual Darlington Transistor Module 50 Amperes/1000 Volts



#### Description:

The Powerex High-Beta 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
- Very High Gain ( $h_{FE}$ )
- Quick Connect Signal Terminals
- Base-Emitter Speed-up Diodes
- UL Recognized

#### Applications:

- AC Motor Control
- DC Motor Control
- Switching Power Supplies
- Inverters

#### Ordering Information:

Example: Select the complete ten digit module part number you desire from the table - i.e. KD221K05HB is an 850  $V_{CE0(sus)}$  (1000  $V_{CEV}$ ), 50 Ampere High-Beta Dual Darlington Module with a gain of 750 at rated current (50 Amperes).

#### Outline Drawing

Dimensions	Inches	Millimeters
A	4.25 Max.	108 Max.
B	3.661 ± 0.012	93 ± 0.3
C	1.83	46.5
D	1.46	37
E	1.34 Max.	34 Max.
F	1.18 Max.	30 Max.
G	0.90	23
H	0.59	15
J	0.51	13

Dimensions	Inches	Millimeters
K	0.47	12
L	0.41	10.5
M	0.344	8.75
N	0.31	8
P	0.256 Dia.	6.5 Dia.
Q	0.256 Min.	6.5 Min.
R	0.16	4
S	M5 Metric	M5

Type	$V_{CE0(sus)}$ Volts (1000)	Current Rating Amperes (X 10)	High Beta
KD22	1K	05	HB



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

**KD221K05HB**  
**High-Beta Dual Darlington Transistor Module**  
 50 Amperes/1000 Volts

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

Ratings	Symbol	KD221K05HB	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	$V_{CEO(sus)}$	850	Volts
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 M4 Terminal Screws	-	17	in.-lb.
Max. Mounting Torque M5 Mounting Screws	-	26	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	$I_{CEV}$	$V_{CE} = 1000V, V_{BE} = -2V$	-	-	5	mA	
Emitter Cutoff Current	$I_{EBO}$	$V_{EB} = 7V$	-	-	50	mA	
DC Current Gain	$h_{FE}$	$I_C = 50A, V_{CE} = 4.0V$	750	-	-	-	
Diode Forward Voltage	$V_{FM}$	$I_{FM} = 50A$	-	-	1.8	Volts	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 50A, I_B = 67mA$	-	-	4.0	Volts	
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	$I_C = 50A, I_B = 67mA$	-	-	4.0	Volts	
Resistive	Turn-on	$t_{on}$	$V_{CC} = 600V$	-	-	2.5	$\mu s$
Load	Storage Time	$t_s$	$I_C = 50A$	-	-	15	$\mu s$
Switch Times	Fall Time	$t_f$	$I_{B1} = 0.1A, I_{B2} = -1.0A$	-	-	3.0	$\mu s$

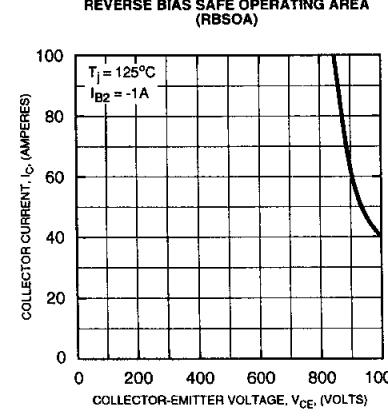
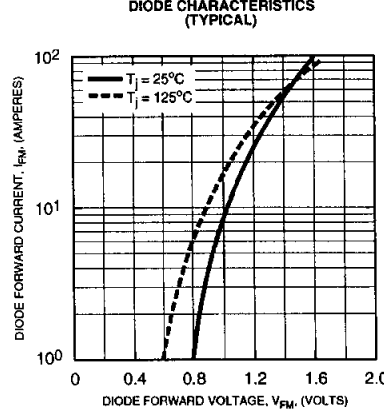
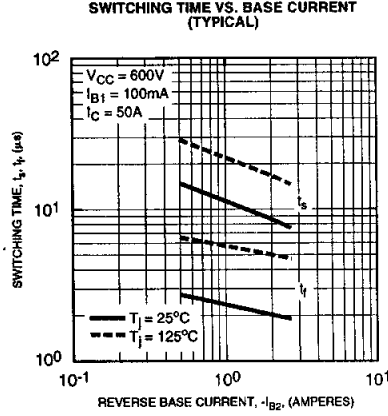
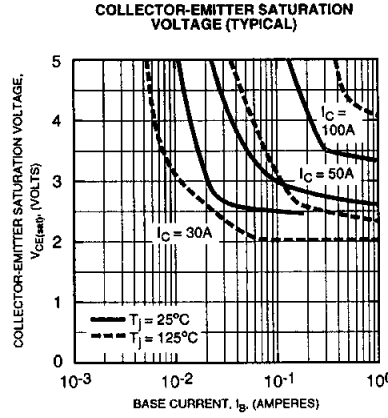
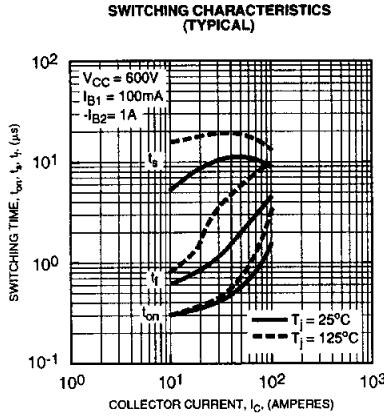
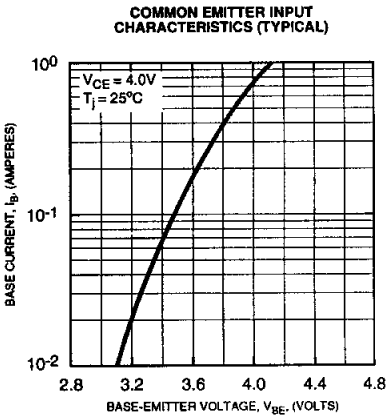
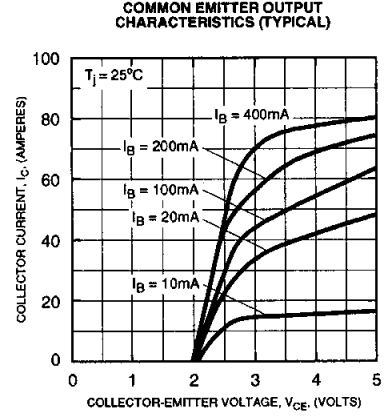
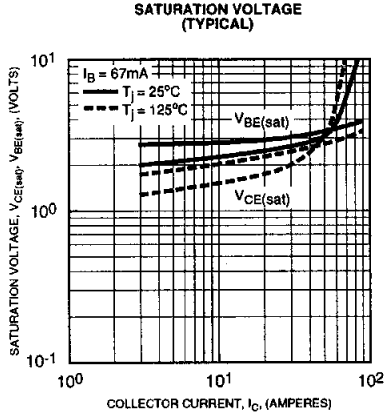
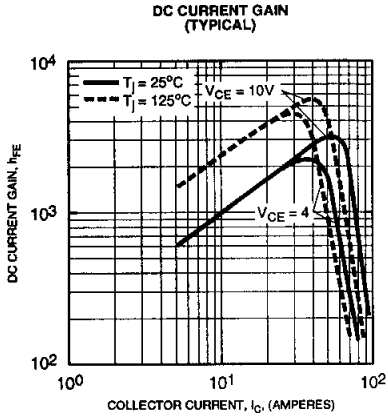
**Thermal and Mechanical Characteristics,  $T_J = 25\text{ }^\circ\text{C}$  unless otherwise specified**

Characteristics	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Thermal Resistance, Case-to-Sink	$R_{\theta(c-s)}$	Per 1/2 Module	-	-	0.13	$^\circ\text{C/W}$
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	$^\circ\text{C/W}$



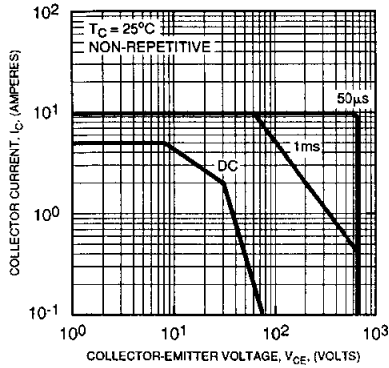
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**KD221K05HB**  
**High-Beta Dual Darlington Transistor Module**  
**50 Amperes/1000 Volts**

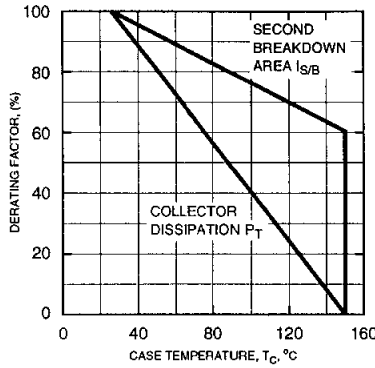


**KD221K05HB**  
**High-Beta Dual Darlington Transistor Module**  
 50 Amperes/1000 Volts

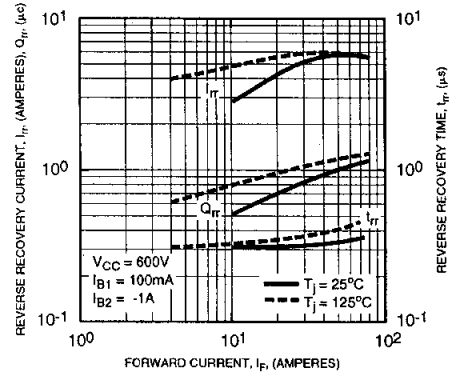
**FORWARD BIAS SAFE OPERATING AREA (SOA)**



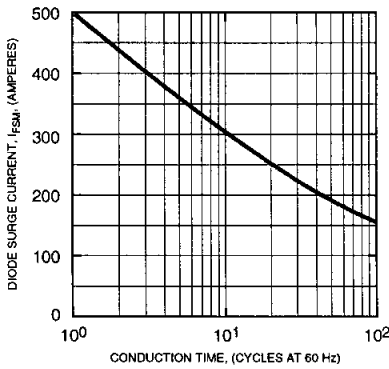
**DERATING FACTOR OF SAFE OPERATING AREA (SOA)**



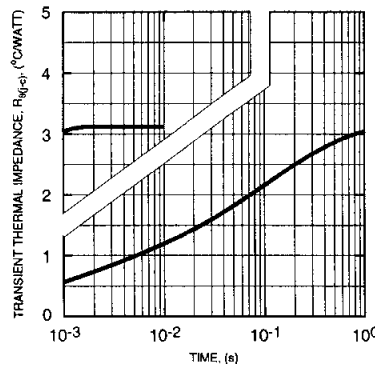
**REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)**



**DIODE FORWARD SURGE CURRENT**



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (TRANSISTOR)**



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (DIODE)**

