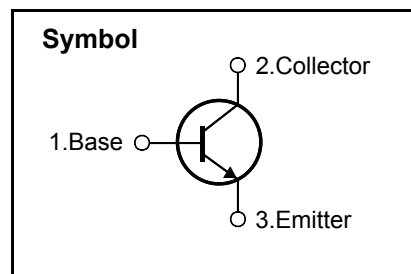


**High Voltage Fast-Switching NPN Power Transistor**

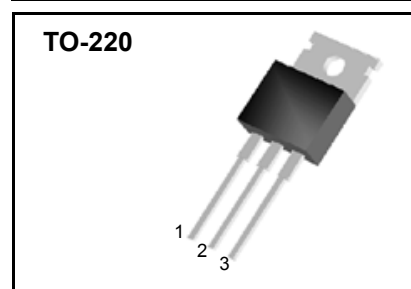
**Features**

- Very High Switching Speed (Typical 40ns@8.0A)
- Minimum Lot-to-Lot hFE Variation
- Low VCE(sat) (Typical 320mV@8.0A/1.6A)
- Wide Reverse Bias S.O.A



**General Description**

This device is designed for high voltage, high speed switching characteristic required such as switching mode power supply.



**Absolute Maximum Ratings**

Symbol	Parameter	Value	Units
V <sub>CES</sub>	Collector-Emitter Voltage ( V <sub>BE</sub> = 0 )	700	V
V <sub>CEO</sub>	Collector-Emitter Voltage ( I <sub>B</sub> = 0 )	400	V
V <sub>EBO</sub>	Emitter-Base Voltage ( I <sub>C</sub> = 0 )	9.0	V
I <sub>C</sub>	Collector Current	12	A
I <sub>CM</sub>	Collector Peak Current ( t <sub>p</sub> < 10 ms )	25	A
I <sub>B</sub>	Base Current	6.0	A
I <sub>BM</sub>	Base Peak Current ( t <sub>p</sub> < 10 ms )	12	A
P <sub>C</sub>	Total Dissipation at T <sub>C</sub> = 25 °C	100	W
T <sub>STG</sub>	Storage Temperature	- 65 ~ 150	°C
T <sub>J</sub>	Max. Operating Junction Temperature	150	°C

**Thermal Characteristics**

Symbol	Parameter	Value	Units
R <sub>θJC</sub>	Thermal Resistance, Junction-to-Case	1.25	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient	40	°C/W

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## Electrical Characteristics ( $T_C = 25\text{ }^\circ\text{C}$ unless otherwise noted )

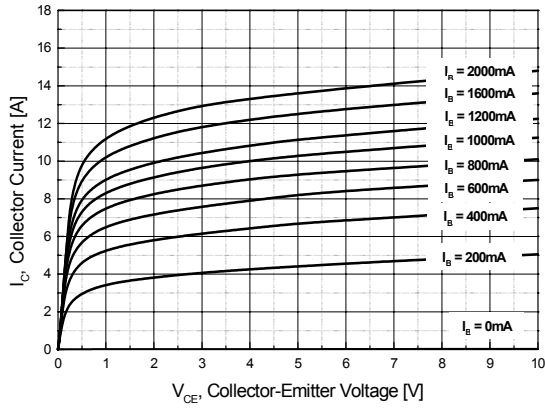
Symbol	Parameter	Condition	Min	Typ	Max	Units
$I_{CEV}$	Collector Cut-off Current ( $V_{BE} = -1.5V$ )	$V_{CE} = 700V$ $V_{CE} = 700V$ $T_C = 100\text{ }^\circ\text{C}$	-	-	1.0 5.0	mA
$V_{CEO(sus)}$	Collector-Emitter Sustaining Voltage ( $I_B = 0$ )	$I_C = 10\text{ mA}$	400	-	-	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 5.0A$ $I_C = 8.0A$ $I_C = 12A$ $I_C = 8.0A$ $I_B = 1.0A$ $I_B = 1.6A$ $I_B = 3.0A$ $I_B = 1.6A$ $T_C = 100\text{ }^\circ\text{C}$	-	-	0.5 1.0 1.5 2.0	V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	$I_C = 5.0A$ $I_C = 8.0A$ $I_C = 8.0A$ $I_B = 1.0A$ $I_B = 1.6A$ $I_B = 1.6A$ $T_C = 100\text{ }^\circ\text{C}$	-	-	1.2 1.6 1.5	V
$h_{FE}$	DC Current Gain	$I_C = 5.0A$ $I_C = 8.0A$ $V_{CE} = 5V$ $V_{CE} = 5V$	10 6	-	30 30	
$t_s$ $t_f$	<b>Resistive Load</b> Storage Time Fall Time	$I_C = 8.0A$ $I_{B1} = 1.6A$ $T_P = 25\mu s$ $V_{CC} = 125V$ $I_{B2} = -1.6A$	-	1.5 0.16	3.0 0.4	$\mu s$
$t_s$ $t_f$	<b>Inductive Load</b> Storage Time Fall Time	$V_{CC} = 15V$ $I_{B1} = 1.6A$ $L_C = 0.2mH$ $I_C = 8.0A$ $V_{BE(off)} = 5V$ $V_{clamp} = 300V$	-	0.6 0.04	2.0 0.1	$\mu s$
$t_s$ $t_f$	<b>Inductive Load</b> Storage Time Fall Time	$V_{CC} = 15V$ $I_{B1} = 1.6A$ $L_C = 0.2mH$ $I_C = 8.0A$ $V_{BE(off)} = 5V$ $V_{clamp} = 300V$ $T_C = 100\text{ }^\circ\text{C}$	-	0.8 0.05	2.5 0.15	$\mu s$

※ Notes :

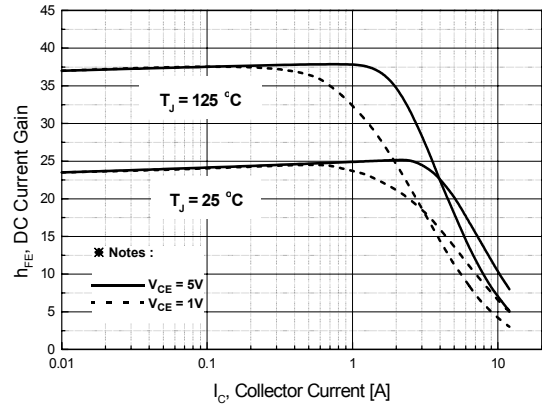
Pulse Test : Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$



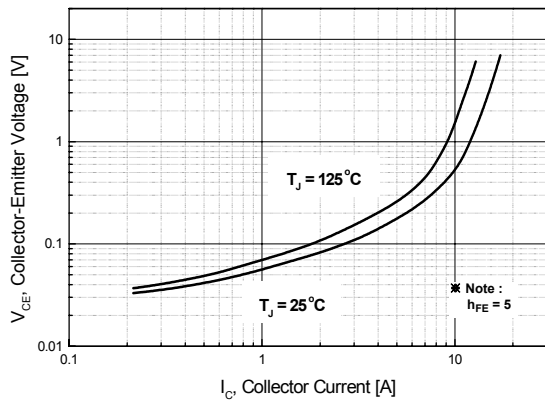
**Fig 1. Static Characteristics**



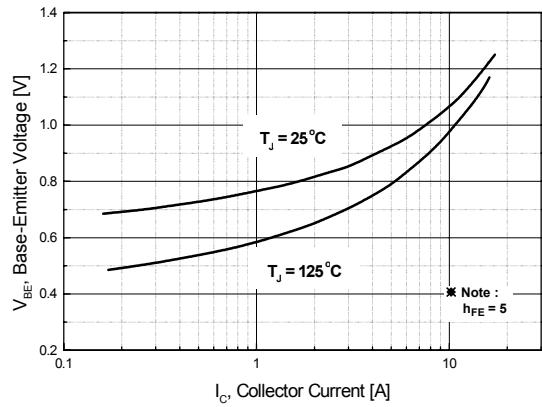
**Fig 2. DC Current Gain**



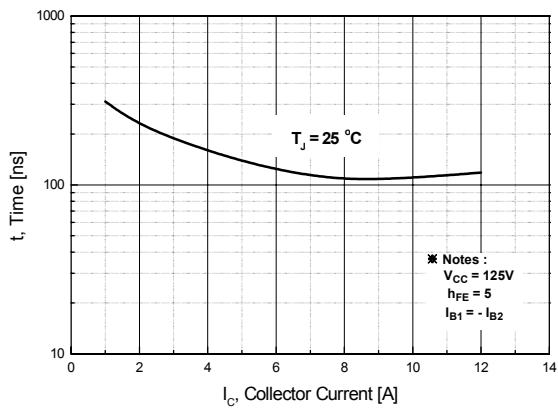
**Fig 3. Collector-Emitter Saturation Voltage**



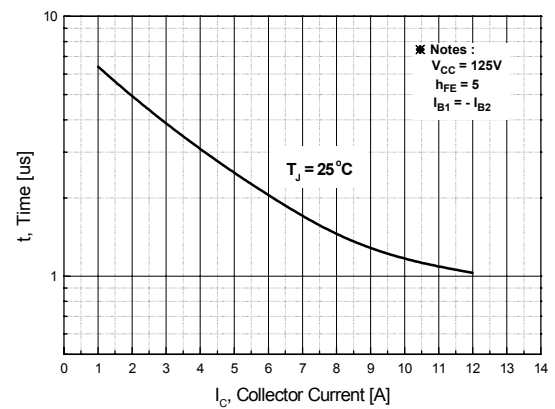
**Fig 4. Base-Emitter Saturation Voltage**



**Fig 5. Resistive Load Fall Time**

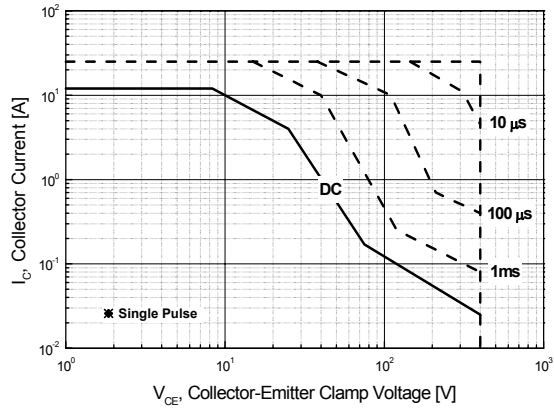


**Fig 6. Resistive Load Storage Time**

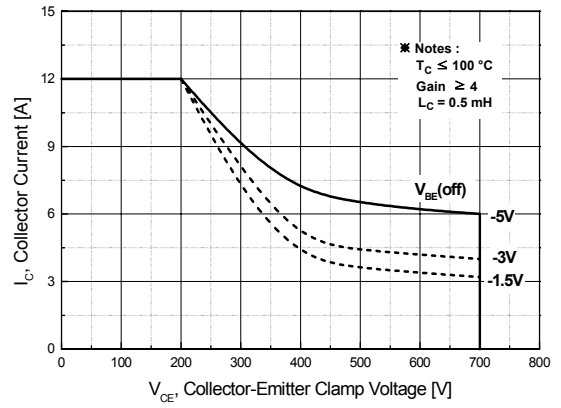


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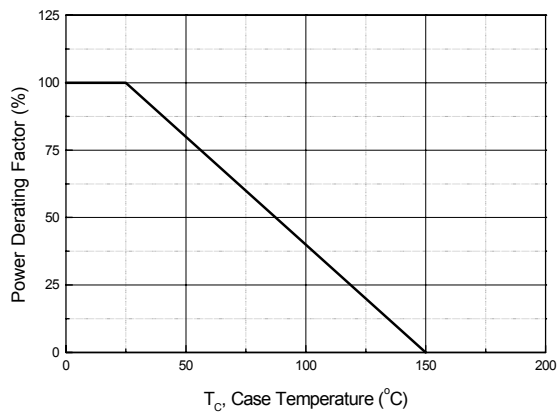
**Fig 7. Safe Operation Areas**



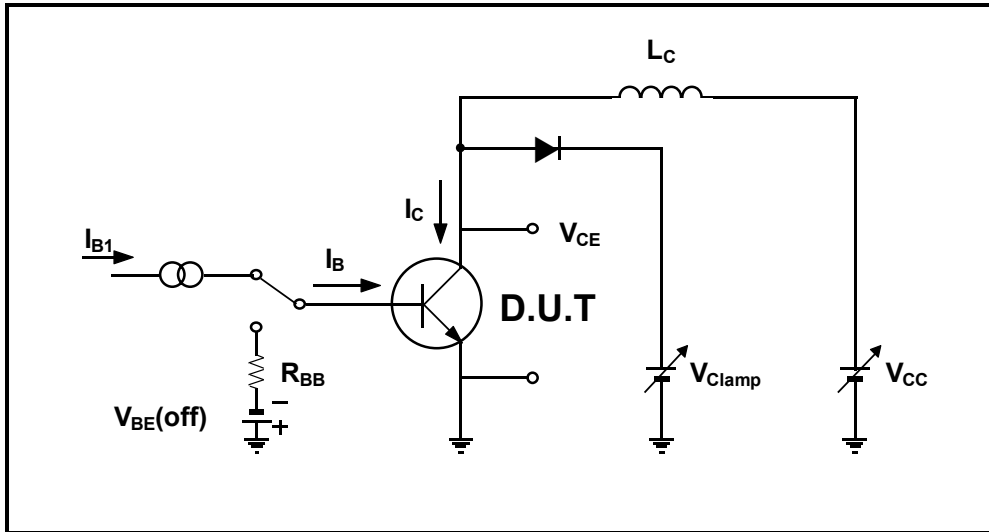
**Fig 8. Reverse Biased Safe Operation Areas**



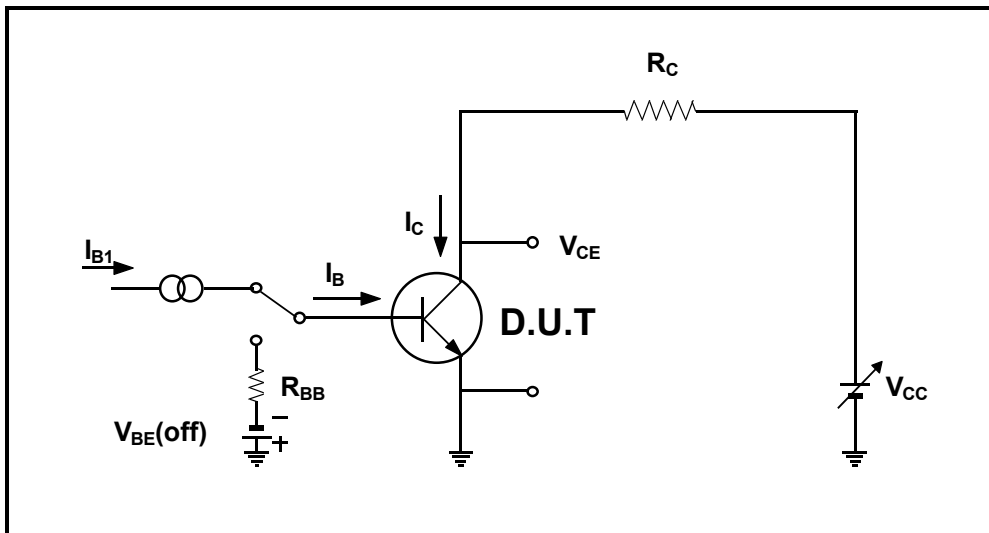
**Fig 9. Power Derating Curve**



## Inductive Load Switching & RBSOA Test Circuit



## Resistive Load Switching Test Circuit



# SBP13009

## TO-220 Package Dimension

Dim.	mm			Inch		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	9.7		10.1	0.382		0.398
B	6.3		6.7	0.248		0.264
C	9.0		9.47	0.354		0.373
D	12.8		13.3	0.504		0.524
E	1.2		1.4	0.047		0.055
F		1.7			0.067	
G		2.5			0.098	
H	3.0		3.4	0.118		0.134
I	1.25		1.4	0.049		0.055
J	2.4		2.7	0.094		0.106
K	5.0		5.15	0.197		0.203
L	2.2		2.6	0.087		0.102
M	1.42		1.62	0.056		0.064
N	0.45		0.6	0.018		0.024
O	0.7		0.9	0.027		0.035
$\phi$		3.6			0.142	

