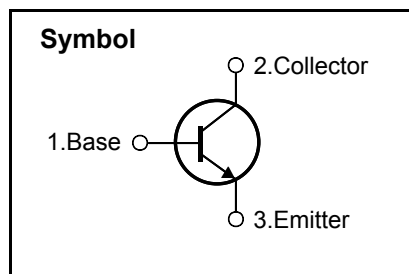


**High Voltage Fast-Switching NPN Power Transistor**

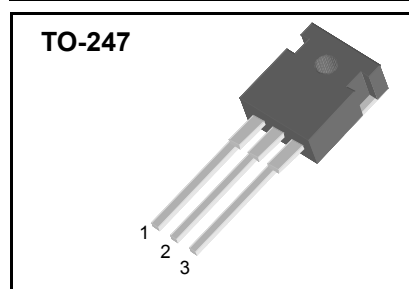
**Features**

- 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
$V_{CES}$	Collector-Emitter Voltage ( $V_{BE} = 0$ )	700	V
$V_{CEO}$	Collector-Emitter Voltage ( $I_B = 0$ )	400	V
$V_{EBO}$	Emitter-Base Voltage ( $I_C = 0$ )	9.0	V
$I_C$	Collector Current	12	A
$I_{CM}$	Collector Peak Current ( $t_p < 10$ ms )	25	A
$I_B$	Base Current	6.0	A
$I_{BM}$	Base Peak Current ( $t_p < 10$ ms )	12	A
$P_C$	Total Dissipation at $T_C = 25$ °C	130	W
$T_{STG}$	Storage Temperature	- 65 ~ 150	°C
$T_J$	Max. Operating Junction Temperature	150	°C

**Thermal Characteristics**

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.96	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	40	°C/W

# SBW13009

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

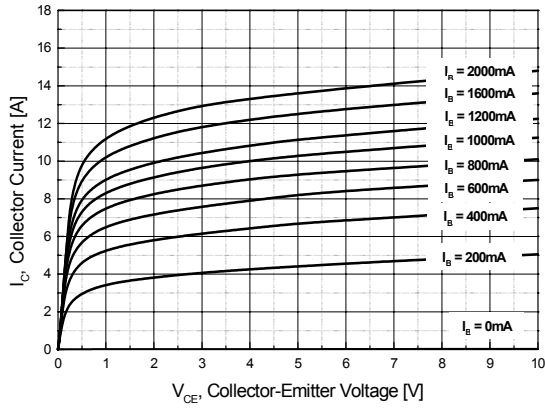
Symbol	Parameter	Condition	Min	Typ	Max	Units
$I_{CEV}$	Collector Cut-off Current ( $V_{BE} = -1.5V$ )	$V_{CE} = 700V$ $V_{CE} = 700V$ $T_C = 100\text{ }^\circ\text{C}$	-	-	1.0 5.0	mA
$V_{CEO(sus)}$	Collector-Emitter Sustaining Voltage ( $I_B = 0$ )	$I_C = 10\text{ mA}$	400	-	-	V
$V_{CE(sat)}$	Collector-Emitter 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 :

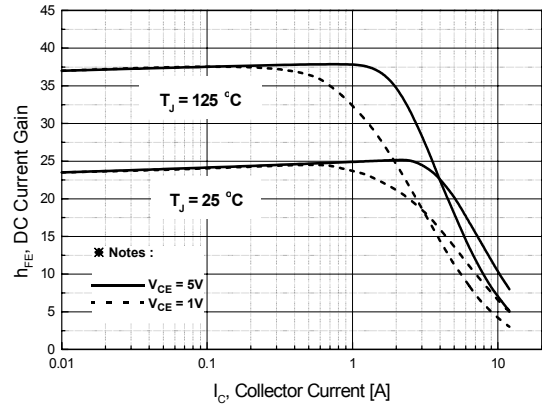
Pulse Test : Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$



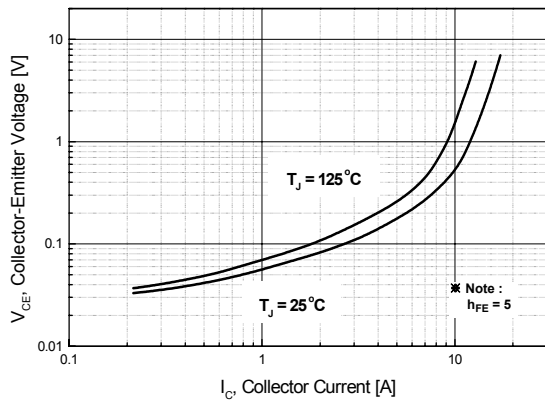
**Fig 1. Static Characteristics**



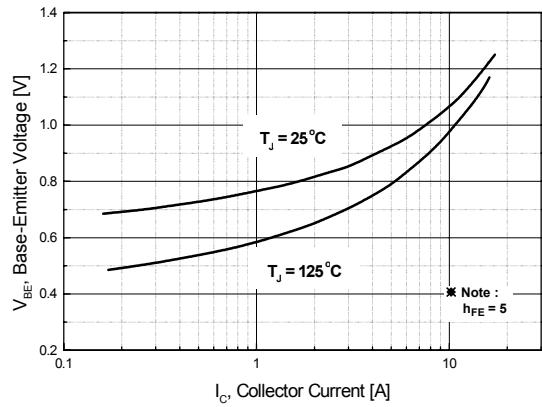
**Fig 2. DC Current Gain**



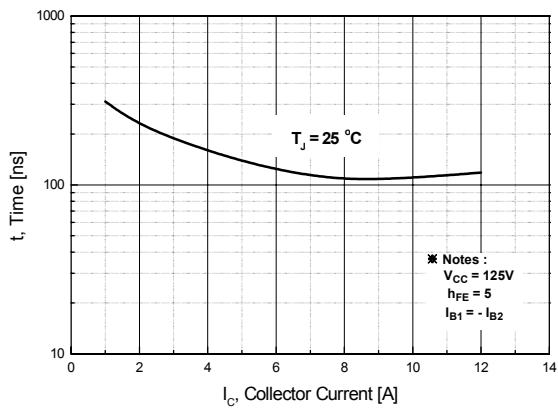
**Fig 3. Collector-Emitter Saturation Voltage**



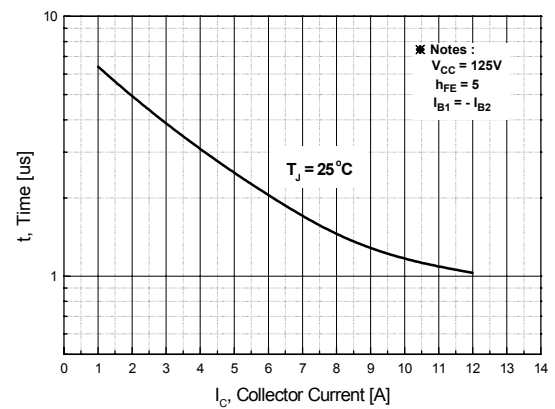
**Fig 4. Base-Emitter Saturation Voltage**



**Fig 5. Resistive Load Fall Time**

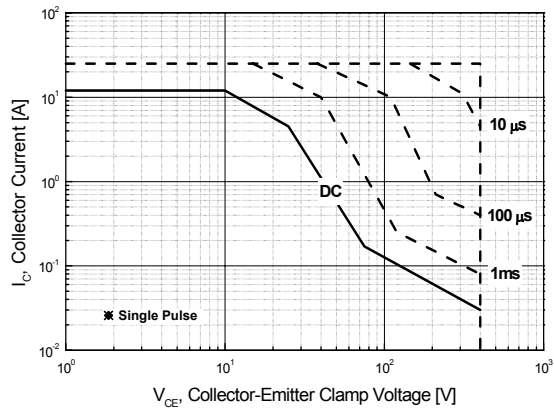


**Fig 6. Resistive Load Storage Time**

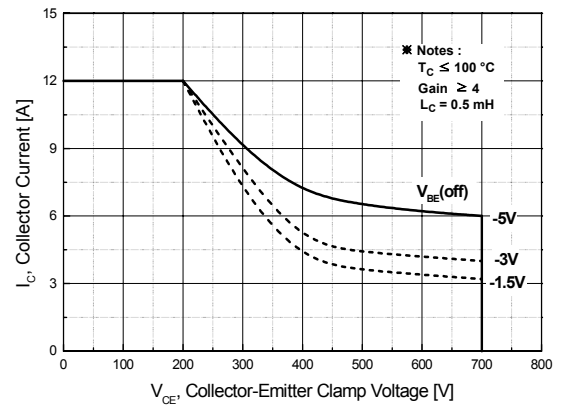


# SBW13009

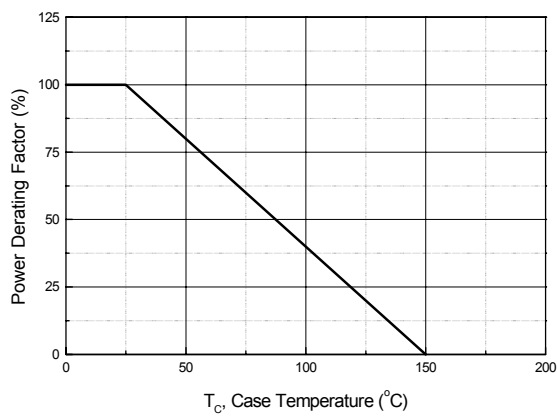
**Fig 7. Safe Operation Areas**



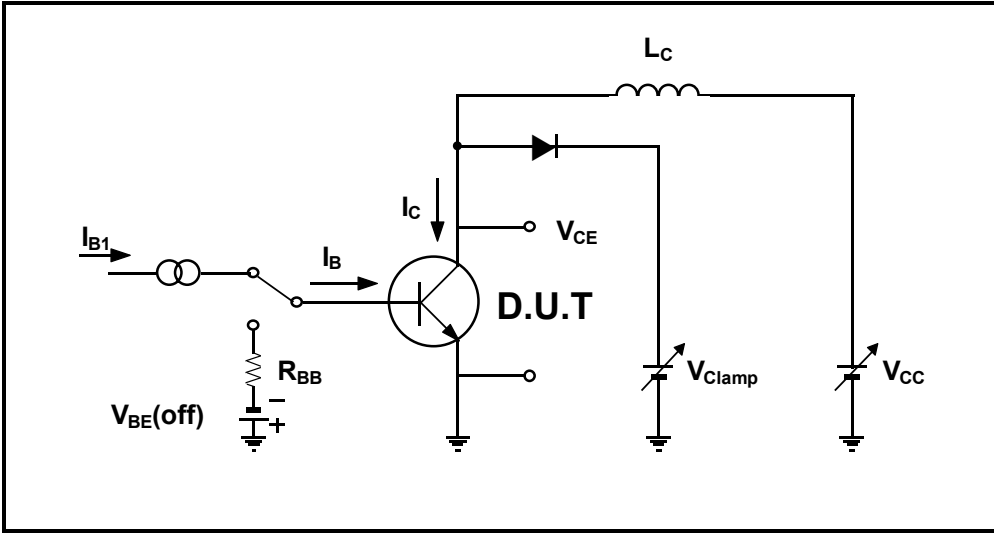
**Fig 8. Reverse Biased Safe Operation Areas**



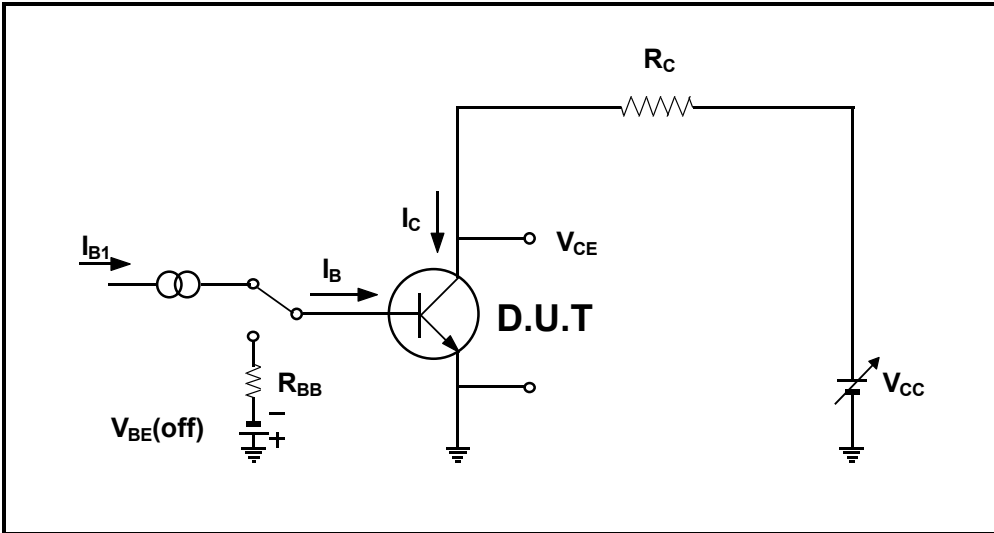
**Fig 9. Power Derating Curve**



**Inductive Load Switching & RBSOA Test Circuit**



**Resistive Load Switching Test Circuit**



# SBW13009

## TO-247 Package Dimension

Dim.	mm			Inch		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.77		16.03	0.621		0.631
B	20.80		21.10	0.819		0.831
C	20.05		20.31	0.789		0.800
D	4.48		4.58	0.176		0.180
E	4.27		4.37	0.168		0.172
F	5.32		5.58	0.209		0.220
G	4.90		5.16	0.193		0.203
H	1.90		2.06	0.075		0.081
I	2.35		2.45	0.093		0.096
J		0.6			0.024	
K	1.2		1.33	0.047		0.052
L	1.07		1.33	0.042		0.052
M	2.99		3.25	0.118		0.128
$\phi$	3.56		3.66	0.140		0.144

