

High Voltage Fast-Switching NPN Power Transistor

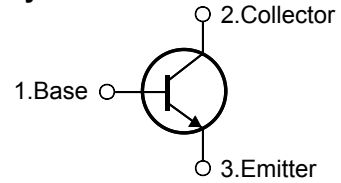
Features

- 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

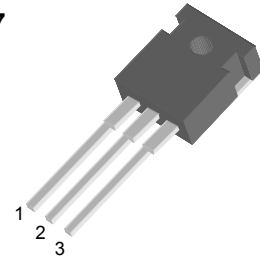
General Description

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

Symbol



TO-247



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	$I_C = 5.0A$ $I_B = 1.0A$ $I_C = 8.0A$ $I_B = 1.6A$ $I_C = 12A$ $I_B = 3.0A$ $I_C = 8.0A$ $I_B = 1.6A$ $T_C = 100\text{ }^{\circ}\text{C}$	-	-	0.5 1.0 1.5 2.0	V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	$I_C = 5.0A$ $I_B = 1.0A$ $I_C = 8.0A$ $I_B = 1.6A$ $I_C = 8.0A$ $I_B = 1.6A$ $T_C = 100\text{ }^{\circ}\text{C}$	-	-	1.2 1.6 1.5	V
h_{FE}	DC Current Gain	$I_C = 5.0A$ $V_{CE} = 5V$ $I_C = 8.0A$ $V_{CE} = 5V$	10 6	-	30 30	
t_s t_f	Resistive Load Storage Time Fall Time	$I_C = 8.0A$ $V_{CC} = 125V$ $I_{B1} = 1.6A$ $I_{B2} = -1.6A$ $T_P = 25\mu s$	-	1.5 0.16	3.0 0.4	μs
t_s t_f	Inductive Load Storage Time Fall Time	$V_{CC} = 15V$ $I_C = 8.0A$ $I_{B1} = 1.6A$ $V_{BE(off)} = 5V$ $L_C = 0.2mH$ $V_{clamp} = 300V$	-	0.6 0.04	2.0 0.1	μs
t_s t_f	Inductive Load Storage Time Fall Time	$V_{CC} = 15V$ $I_C = 8.0A$ $I_{B1} = 1.6A$ $V_{BE(off)} = 5V$ $L_C = 0.2mH$ $V_{clamp} = 300V$ $T_C = 100\text{ }^{\circ}\text{C}$	-	0.8 0.05	2.5 0.15	μs

※ Notes :

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

Fig 1. Static Characteristics

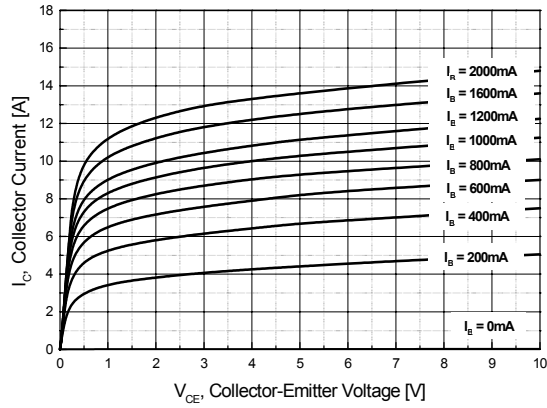


Fig 2. DC Current Gain

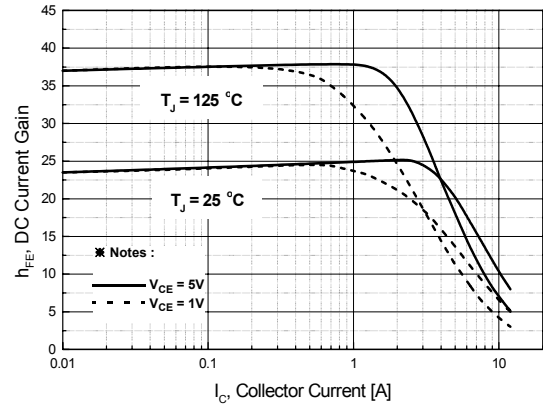


Fig 3. Collector-Emitter Saturation Voltage

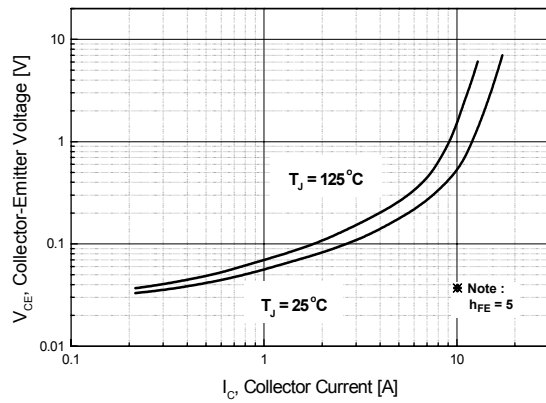


Fig 4. Base-Emitter Saturation Voltage

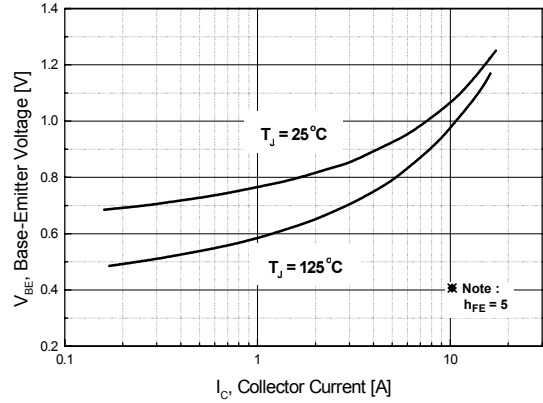


Fig 5. Resistive Load Fall Time

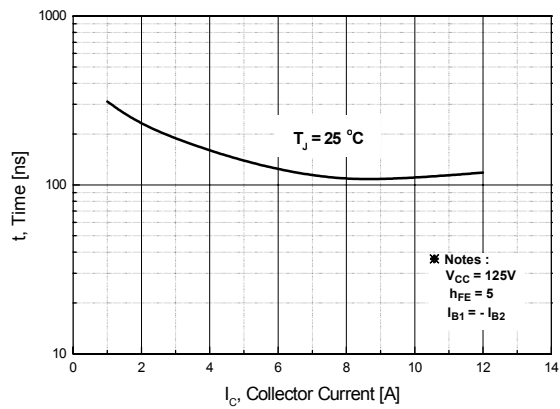
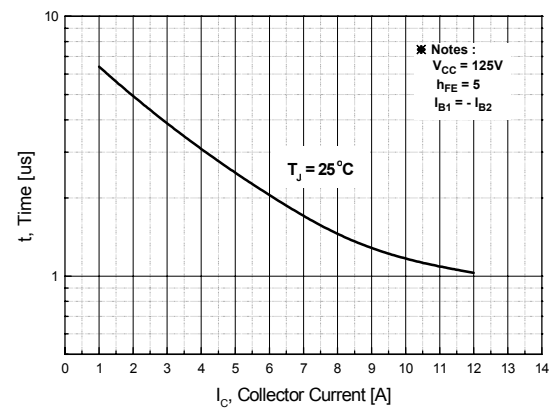


Fig 6. Resistive Load Storage Time



SBW13009

Fig 7. Safe Operation Areas

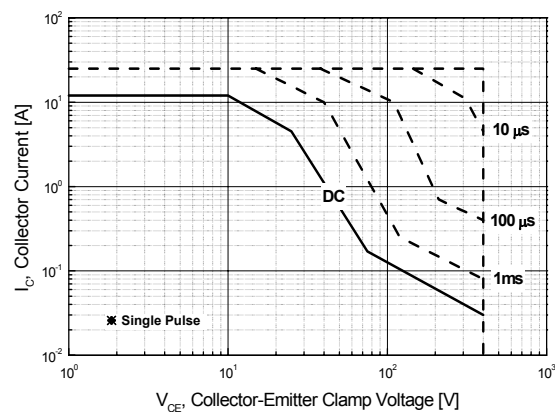


Fig 8. Reverse Biased Safe Operation Areas

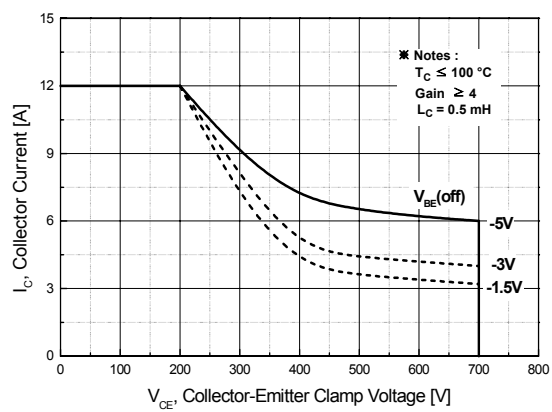
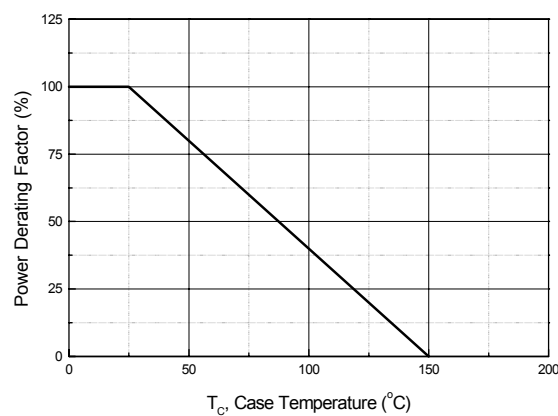
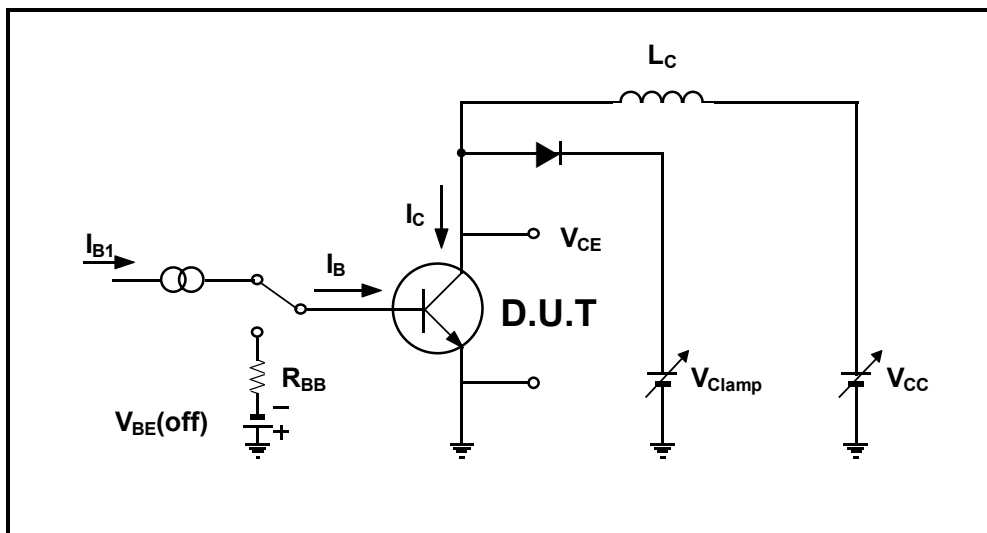


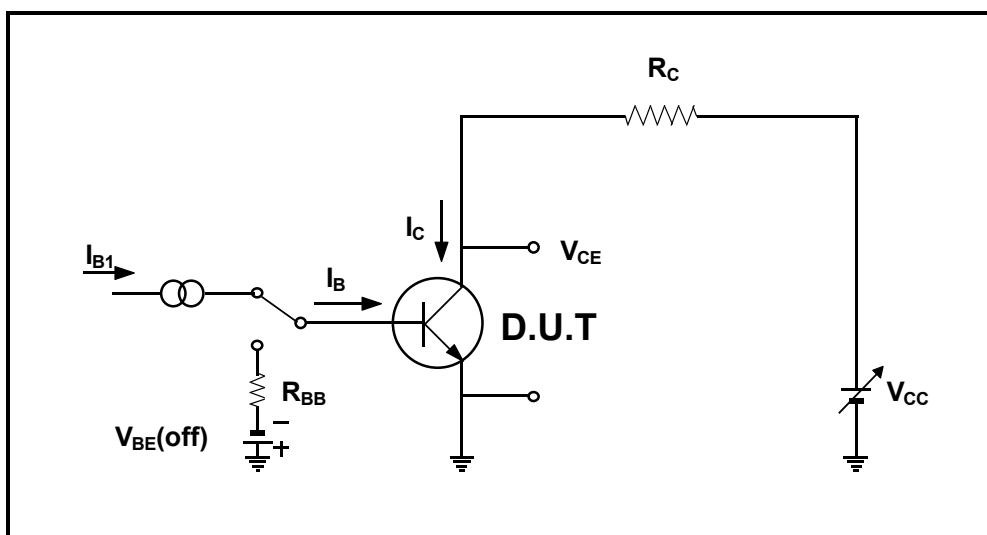
Fig 9. Power Derating Curve



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
ϕ	3.56		3.66	0.140		0.144

