

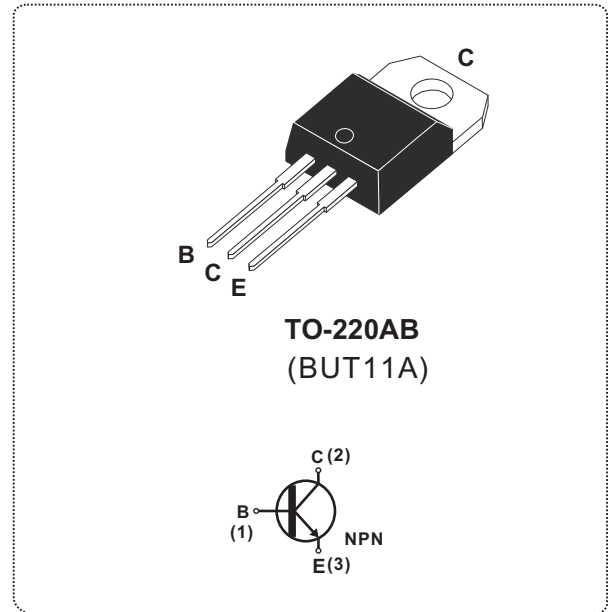
High Voltage Fast-switching NPN Power Transistor 5A/450V

FEATURES

- High voltage capability
- Fast switching speed
- TO-220AB package which can be installed to the heat sink with one screw

APPLICATIONS

- Flyback and forward single transistor low power converters
- Inverters
- Converters
- Switching regulators
- Motor control systems



ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ unless otherwise specified)				
SYMBOL	PARAMETER	TEST CONDITIONS	VALUE	UNIT
V_{CES}	Collector to emitter voltage	$V_{BE}=0$	1000	V
V_{CEO}	Collector to emitter voltage	$I_B=0$	450	
V_{EBO}	Emitter to base voltage	$I_C=0$	9	
I_C	Collector current-continuous		5	A
I_{CM}	Peak collector current	$t_p < 5 \text{ ms}$	10	
I_B	Base Current		2	
I_{BM}	Peak base current	$t_p < 5 \text{ ms}$	4	
P_D	Collector power dissipation	$T_a = 25^\circ\text{C}$	100	W
T_J	Junction temperature		150	$^\circ\text{C}$
T_{STG}	Storage temperature		-65 to 150	

THERMAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$)			
SYMBOL	PARAMETER	VALUE	UNIT
$R_{th(j-c)}$	Thermal resistance, junction to case	1.5	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS (T _C = 25°C unless otherwise specified)							
SYMBOL	PARAMETER	TEST CONDITIONS	Min.	Typ.	Max.	UNIT	
I _{CES}	Collector to emitter cutoff current	V _{CE} =1000V, V _{BE} =0	T _C =25°C			1.0	mA
			T _C =125°C			2.0	
I _{EBO}	Emitter to base cutoff current	V _{EBO} =9V, I _C =0			10		
V _{CEO}	Collector to emitter voltage	I _B =0	450			V	
V _{CEO(SUS)} *	Collector to emitter sustaining voltage	I _C =100mA, I _B =0, L=25mH	450				
h _{FE} *	Forward current transfer ratio (DC current gain)	I _C =5mA, V _{CE} =5V		10	18	35	
			I _C =0.5A, V _{CE} =5V	10	20	35	
V _{CE(sat)} *	Collector to emitter saturation voltage	I _C =2.5A, I _B =0.5A			1.5	V	
V _{BE(sat)} *	Base to emitter saturation voltage	I _C =2.5A, I _B =0.5A			1.3		
© SWITCHING TIMES RESISTIVE LOAD							
t _{on}	Turn-on time	I _C =2.5A, I _{B(on)} = -I _{B(off)} =0.5A, V _{CC} =250V			1	μS	
t _{stg}	Storage time				4		
t _f	Fall time				0.8		
© SWITCHING TIMES INDUCTIVE LOAD							
t _{stg}	Storage time	I _C =2.5A, I _{B(on)} =0.5A, V _{CC} =300V, V _{EB} =5V, L _B =1μH	T _C =25°C		1.1	1.4	μS
			T _C =100°C		1.2	1.5	
t _f	Fall time		T _C =25°C		80	150	nS
			T _C =100°C		140	300	

*Pulsed: Pulse duration= 300μs, duty cycle= 1.5%.

Fig.1 Reverse bias SOA

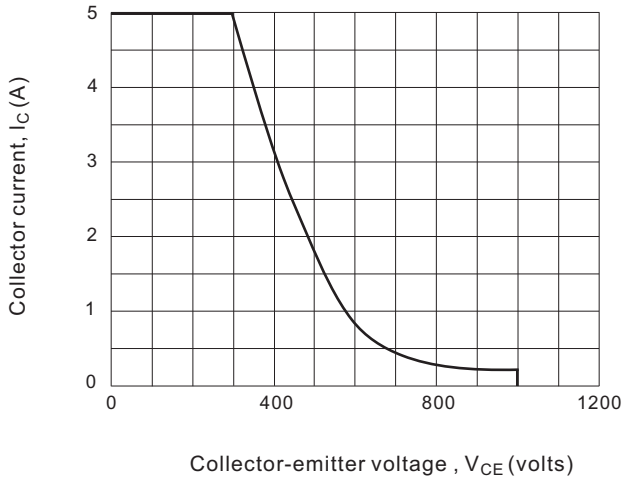


Fig.2 Power derating curve

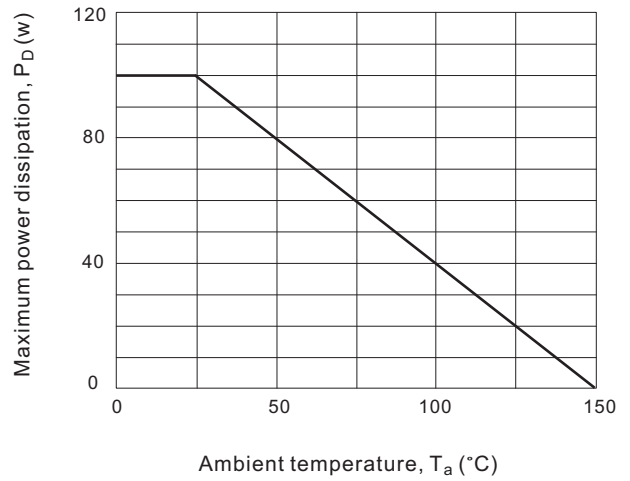
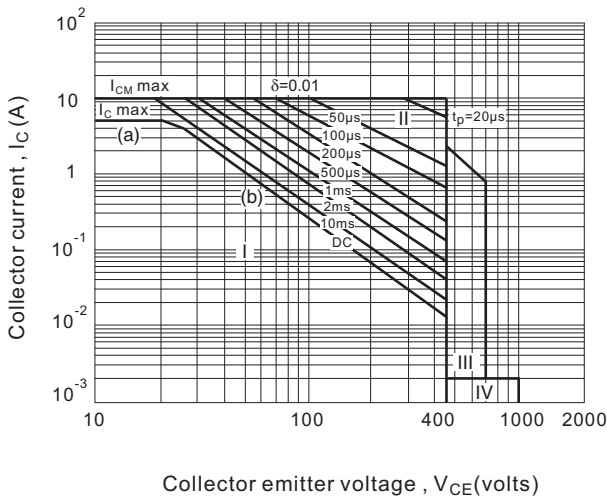


Fig.3 Forward bias SOA



$T_a \leq 25^\circ\text{C}$

- I - Region permissible DC operation
 - II - Permissible extension for repetitive pulse operation
 - III - Area of permissible operation during turn-on in single transistor converters, provided $R_{BE} \leq 100\Omega$ and $t_p \leq 0.6\mu\text{s}$
 - IV - Repetitive pulse operation in this region is permissible provided $V_{BE} \leq 0$ and $t_p \leq 5\text{ms}$.
- (a) P_D max and P_D peak max lines.
 (b) Second breakdown limits.

Fig.4 Test circuit for $V_{CE(sus)}$

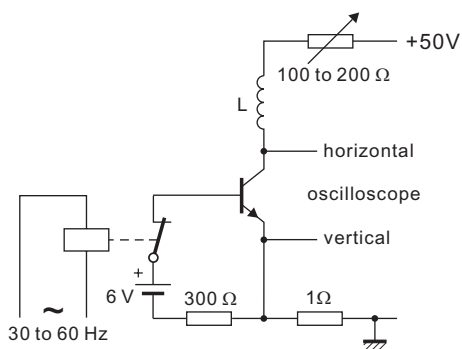


Fig.5 Oscilloscope display for $V_{CE(sus)}$

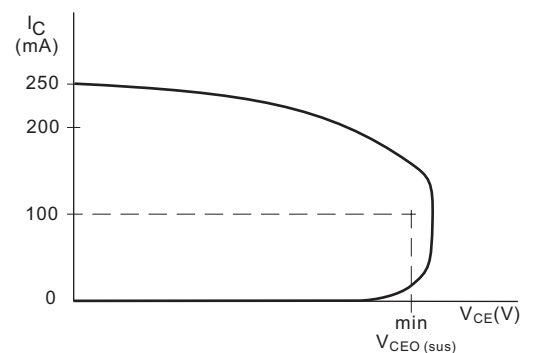


Fig.6 $V_{BE(sat)}$ - $V_{CE(sat)}$ - I_C Temperature characteristics (Typical)

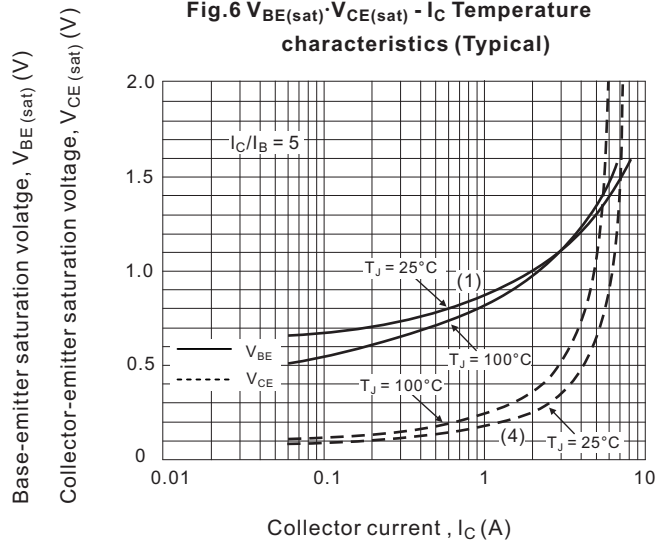


Fig.7 V_{BE} - I_B Characteristics

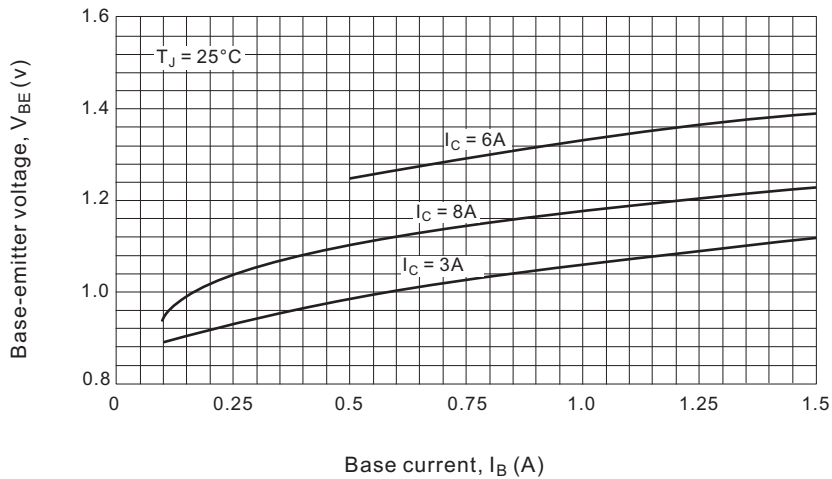


Fig.8 $V_{CE(sat)}$ - I_B Characteristics (Typical)

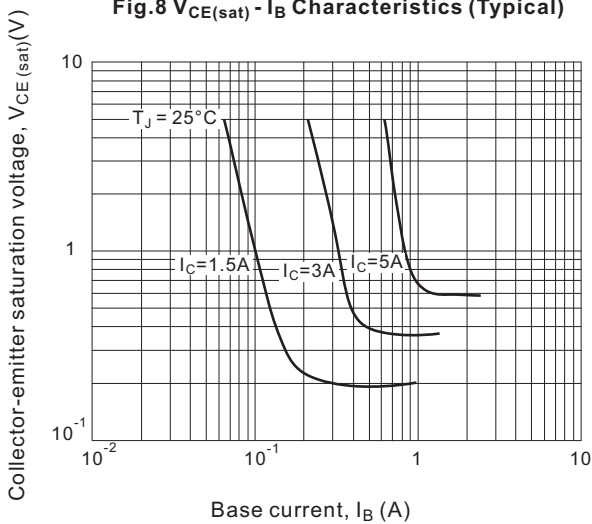


Fig.9 DC current gain

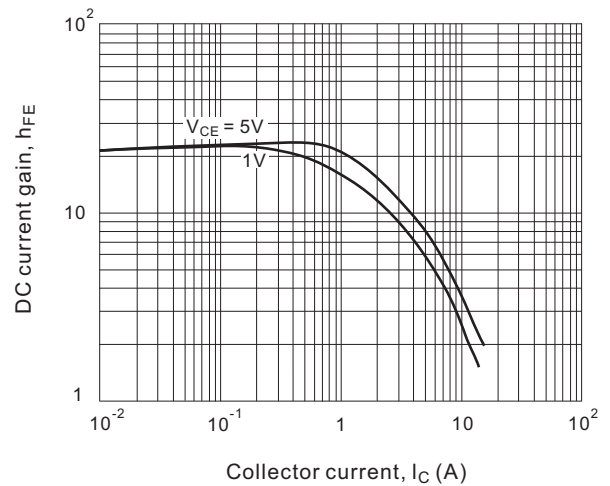
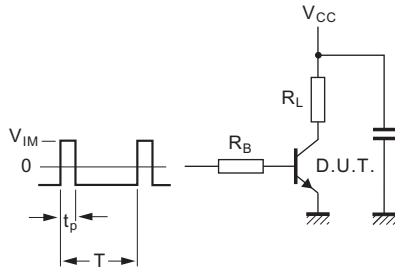


Fig.10 Test circuit resistive load



$V_{CC} = 250V$; $t_p = 20\mu s$; $V_{IM} = -6$ to $+8V$; $t_p/T = 0.01$.
The values of R_B and R_L are selected in accordance with $I_{C(ON)}$ and $I_{B(ON)}$ requirements

Fig.11 Switching time waveforms with resistive load

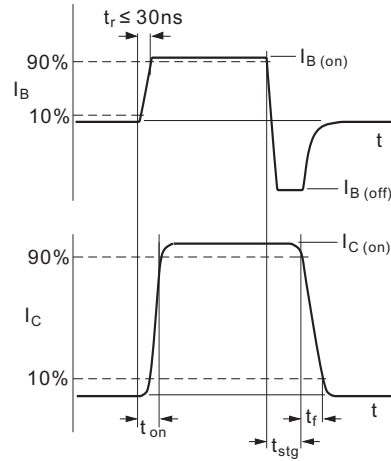
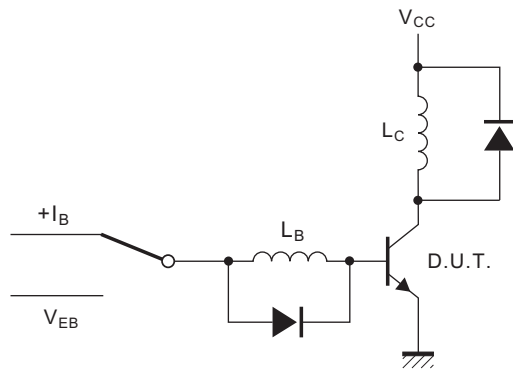
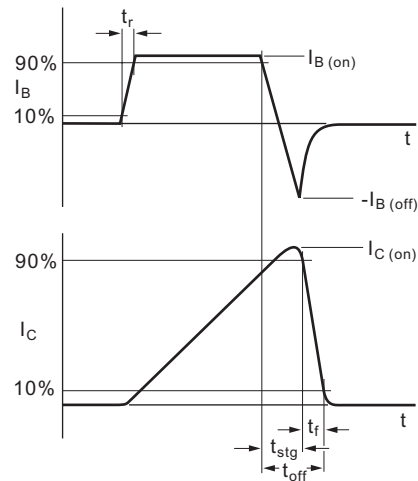


Fig.12 Test circuit inductive load



$V_{CC} = 300V$; $V_{EB} = 5V$; $L_B = 1\mu H$

Fig.13 Switching time waveforms with inductive load



Case Style

