

**Silicon NPN Power Transistors**

**MJE13009**

**DESCRIPTION**

- With TO-220C package
- High voltage ,high speed

**APPLICATIONS**

- Particularly suited for 115V and 220V switchmode applications such as switching regulators,inverters ,motor controls,solenoid/ relay drivers and deflection circuits

**PINNING**

PIN	DESCRIPTION
1	Base
2	Collector;connected to mounting base
3	Emitter

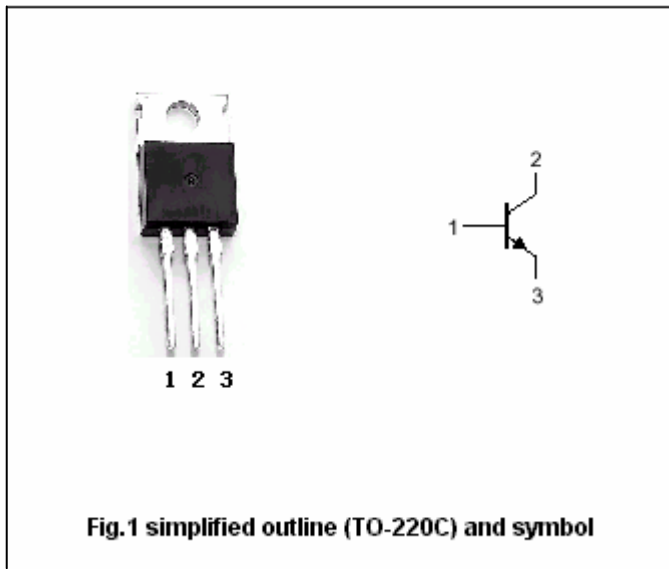


Fig.1 simplified outline (TO-220C) and symbol

**Absolute maximum ratings(Tc=25 )**

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
V <sub>CBO</sub>	Collector-base voltage	Open emitter	700	V
V <sub>CEO</sub>	Collector-emitter voltage	Open base	400	V
V <sub>EBO</sub>	Emitter-base voltage	Open collector	9	V
I <sub>C</sub>	Collector current (DC)		12	A
I <sub>CM</sub>	Collector current-Peak		24	A
I <sub>E</sub>	Emitter current		18	A
I <sub>EM</sub>	Emitter current-Peak		36	A
I <sub>B</sub>	Base current		6	A
I <sub>BM</sub>	Base current-Peak		12	A
P <sub>D</sub>	Total power dissipation	T <sub>a</sub> =25	2	W
		T <sub>C</sub> =25	100	
T <sub>j</sub>	Junction temperature		150	
T <sub>stg</sub>	Storage temperature		-65~150	

**THERMAL CHARACTERISTICS**

SYMBOL	PARAMETER	VALUE	UNIT
R <sub>th j-c</sub>	Thermal resistance from junction to case	1.25	/W

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## CHARACTERISTICS

T<sub>j</sub>=25 unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP.	MAX	UNIT
V <sub>CEQ(SUS)</sub>	Collector-emitter sustaining voltage	I <sub>C</sub> =10mA; I <sub>B</sub> =0	400			V
V <sub>CEsat-1</sub>	Collector-emitter saturation voltage	I <sub>C</sub> =5A; I <sub>B</sub> =1A			1.0	V
V <sub>CEsat-2</sub>	Collector-emitter saturation voltage	I <sub>C</sub> =8A; I <sub>B</sub> =1.6A T <sub>C</sub> =100			1.5 2.0	V
V <sub>CEsat-3</sub>	Collector-emitter saturation voltage	I <sub>C</sub> =12A; I <sub>B</sub> =3A			3.0	V
V <sub>BEsat-1</sub>	Base-emitter saturation voltage	I <sub>C</sub> =5A; I <sub>B</sub> =1A			1.2	V
V <sub>BEsat-2</sub>	Base-emitter saturation voltage	I <sub>C</sub> =8A; I <sub>B</sub> =1.6A T <sub>C</sub> =100			1.6 1.5	V
I <sub>CEV</sub>	Collector cut-off current	V <sub>CEV</sub> =Rated value, V <sub>BE(off)</sub> =1.5V dc; T <sub>C</sub> =100			1.0 5.0	mA
I <sub>EBO</sub>	Emitter cut-off current	V <sub>EB</sub> =9V; I <sub>C</sub> =0			1.0	mA
h <sub>FE-1</sub>	DC current gain	I <sub>C</sub> =5A; V <sub>CE</sub> =5V	8		40	
h <sub>FE-2</sub>	DC current gain	I <sub>C</sub> =8A; V <sub>CE</sub> =5V	6		30	
f <sub>T</sub>	Transition frequency	I <sub>C</sub> =0.5A; V <sub>CE</sub> =10V; f=1MHz	4			MHz
C <sub>OB</sub>	Collector outoput capacitance	I <sub>E</sub> =0; f=0.1MHz; V <sub>CB</sub> =10V		180		pF

## Switching times resistive load

t <sub>d</sub>	Delay time	V <sub>CC</sub> =125V, I <sub>C</sub> =8A I <sub>B1</sub> =-I <sub>B2</sub> =1.6A t <sub>p</sub> =25 μs duty cycle 1%		0.06	0.1	μs
t <sub>r</sub>	Rise time			0.45	1.0	μs
t <sub>s</sub>	Storage time			1.30	3.0	μs
t <sub>f</sub>	Fall time			0.20	0.7	μs

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PACKAGE OUTLINE

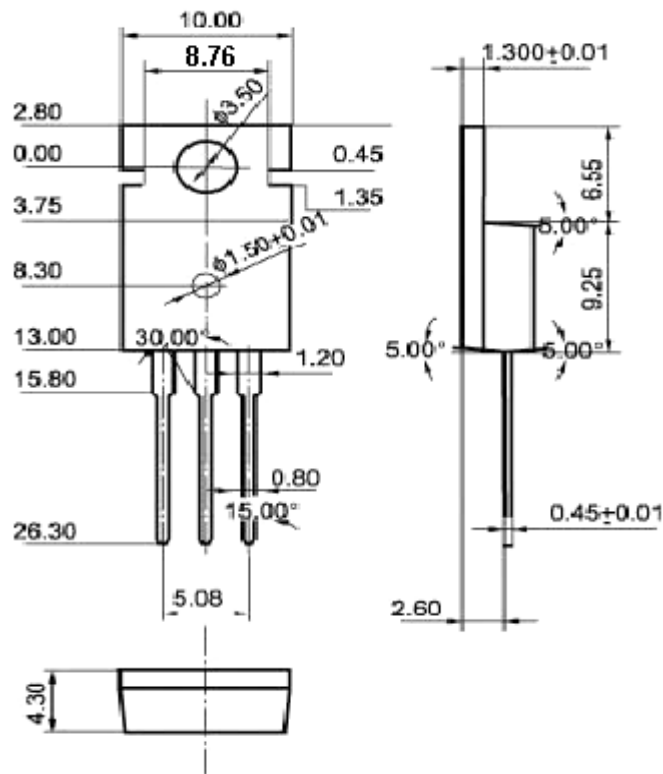


Fig.2 Outline dimensions (unindicated tolerance: 0.10mm)

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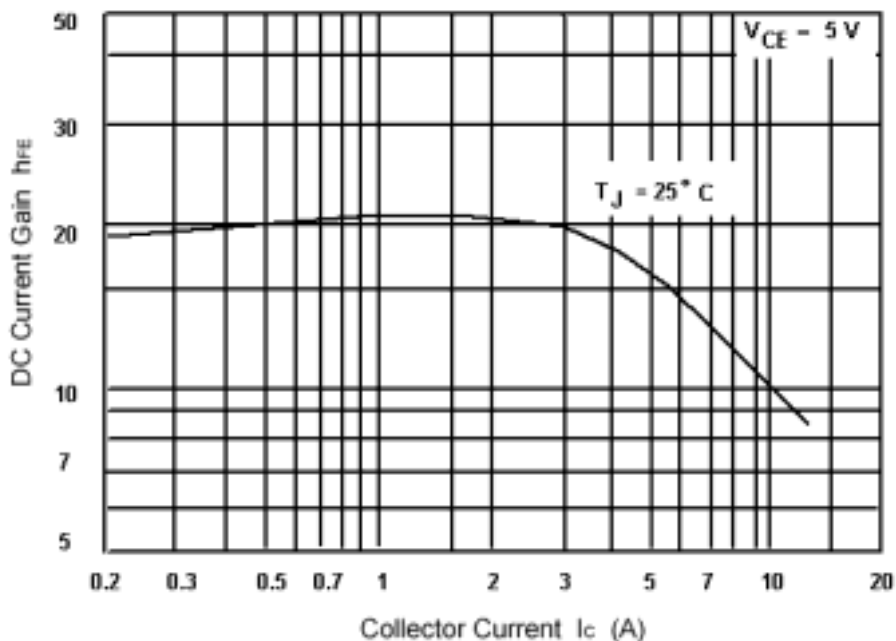


Fig.3 DC Current Gain

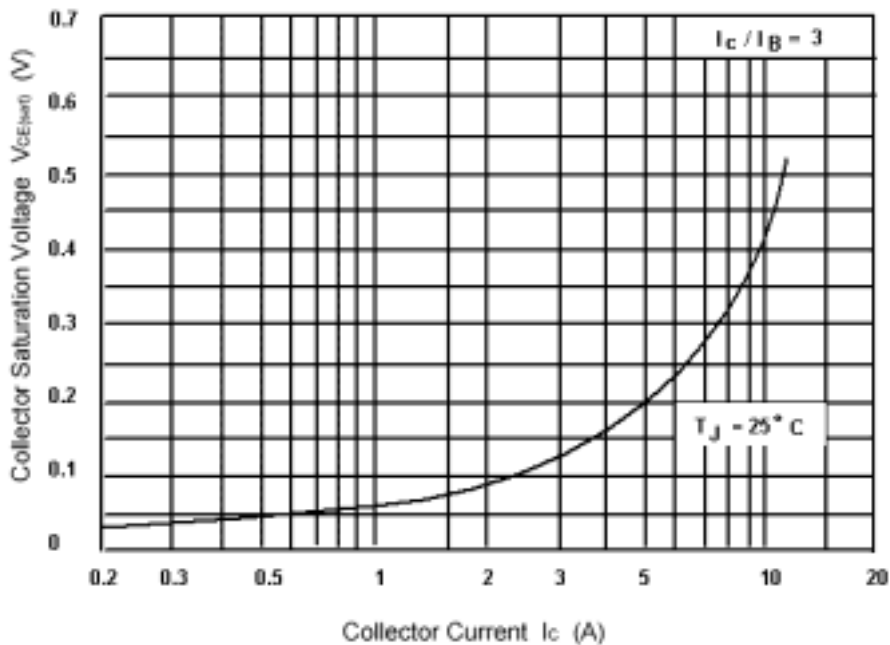


Fig.4 Collector–Emitter Saturation Voltage

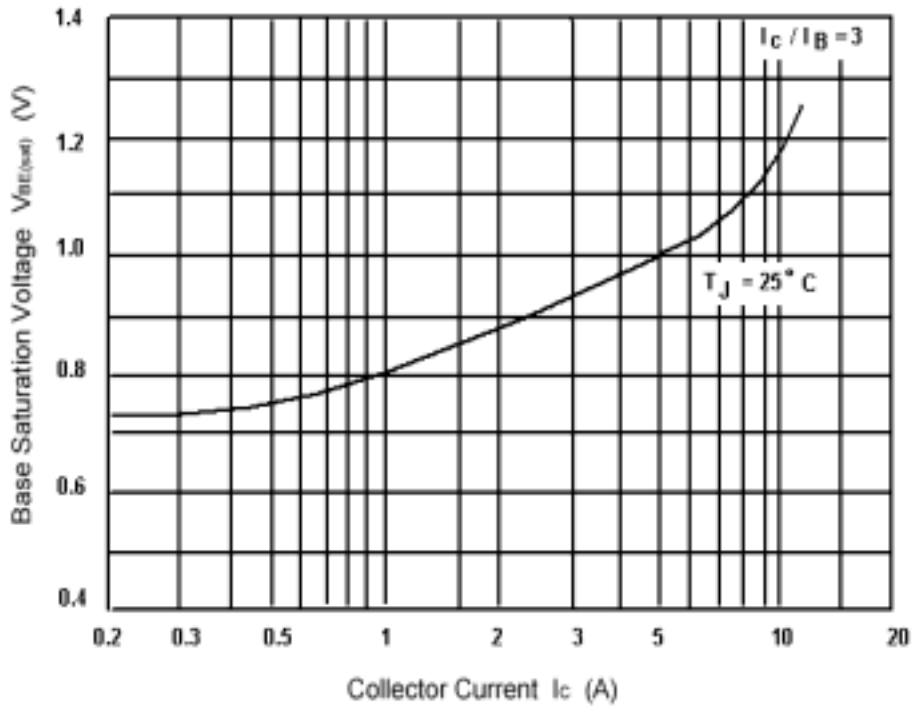


Fig.5 Base-Emitter Saturation Voltage

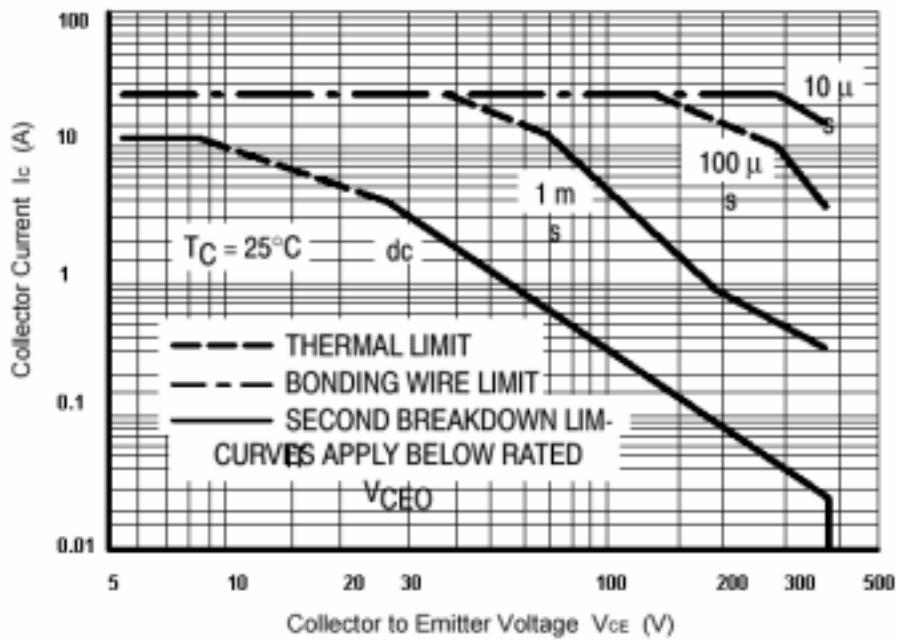


Fig.6 Safe Operating Area