



## MJE13003

## NPN SILICON TRANSISTOR

### NPN SILICON POWER TRANSISTOR

#### DESCRIPTION

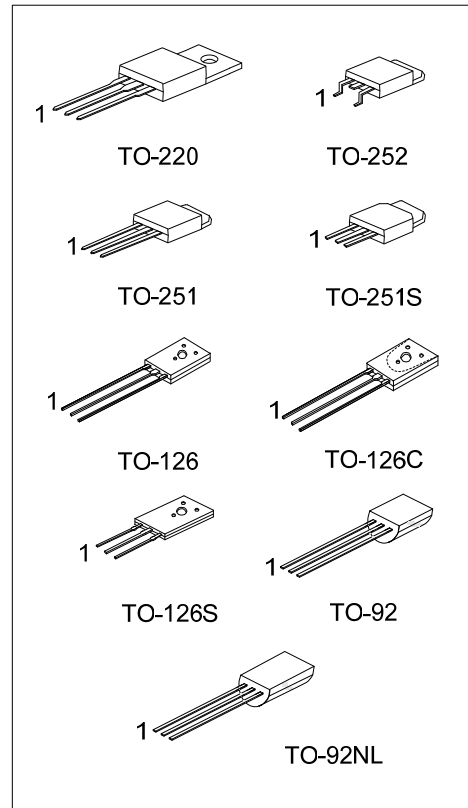
These devices are designed for high-voltage, high-speed power switching inductive circuits where fall time is critical. They are particularly suited for 115 and 220V applications in switch mode.

#### FEATURES

- \* Reverse biased SOA with inductive load @  $T_c=100^\circ\text{C}$
- \* Inductive switching matrix 0.5 ~ 1.5 Amp, 25 and  $100^\circ\text{C}$   
Typical  $t_c = 290\text{ns}$  @ 1A,  $100^\circ\text{C}$ .
- \* 700V blocking capability

#### APPLICATIONS

- \* Switching regulator's, inverters
- \* Motor controls
- \* Solenoid/relay drivers
- \* Deflection circuits



#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen-Free		1	2	3	
MJE13003L-TA3-T	MJE13003G-TA3-T	TO-220	B	C	E	Tube
MJE13003L-TM3-T	MJE13003G-TM3-T	TO-251	B	C	E	Tube
MJE13003L-TMS-T	MJE13003G-TMS-T	TO-251S	B	C	E	Tube
MJE13003L-TN3-R	MJE13003G-TN3-R	TO-252	B	C	E	Tape Reel
MJE13003L-T60-K	MJE13003G-T60-K	TO-126	B	C	E	Bulk
MJE13003L-T6C-A-K	MJE13003G-T6C-A-K	TO-126C	E	C	B	Bulk
MJE13003L-T6C-K	MJE13003G-T6C-K	TO-126C	B	C	E	Bulk
MJE13003L-T6S-K	MJE13003G-T6S-K	TO-126S	B	C	E	Bulk
MJE13003L-T92-B	MJE13003G-T92-B	TO-92	E	C	B	Tape Box
MJE13003L-T92-K	MJE13003G-T92-K	TO-92	E	C	B	Bulk
MJE13003L-T92-F-B	MJE13003G-T92-F-B	TO-92	B	C	E	Tape Box
MJE13003L-T92-F-K	MJE13003G-T92-F-K	TO-92	B	C	E	Bulk
MJE13003L-T9N-B	MJE13003G-T9N-B	TO-92NL	E	C	B	Tape Box
MJE13003L-T9N-K	MJE13003G-T9N-K	TO-92NL	E	C	B	Bulk

Note: Pin Assignment: B: Base C: Collector E: Emitter

<p>MJE13003G-T6C-A-K</p> <p>(1)Packing Type (2)Pin Assignment (3)Package Type (4)Green Package</p>	<p>(1) B: Tape Box, K: Bulk, R: Tape Reel, T: Tube (2) refer to Pin Assignment (3) TA3: TO-220, TM3: TO-251, TMS: TO-251S, TN3: TO-252, T60: TO-126, T6C: TO-126C, T6S: TO-126S, T92: TO-92, T9N: TO-92NL (4) G: Halogen Free and Lead Free, L: Lead Free</p>
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### MARKING

TO-220 / TO-251 / TO-251S / TO-252	TO-126 / TO-126C / TO-126S
<p>UTC MJE13003 Lot Code → → → → → Date Code L: Lead Free G: Halogen Free 1</p>	<p>UTC → → → → → Pin Code MJE13003 → → → → → Date Code L: Lead Free G: Halogen Free 1</p>
TO-92	TO-92NL
<p>UTC MJE 13003 Pin Code → → → → → Date Code L: Lead Free G: Halogen Free 1</p>	<p>UTC MJE13003 Date Code → → → → → L: Lead Free G: Halogen Free 1</p>

■ ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ , unless otherwise specified.)

PARAMETER		SYMBOL	RATINGS	UNIT	
Collector-Emitter Voltage		$V_{CEO(SUS)}$	400	V	
Collector-Base Voltage		$V_{CBO}$	700	V	
Collector-Emitter Voltage ( $V_{BE}=0$ )		$V_{CES}$	700	V	
Emitter Base Voltage		$V_{EBO}$	9	V	
Collector Current	Continuous	$I_C$	1.6	A	
	Peak (1)	$I_{CM}$	3		
Base Current	Continuous	$I_B$	0.75	A	
	Peak (1)	$I_{BM}$	1.5		
Emitter Current	Continuous	$I_E$	2.25	A	
	Peak (1)	$I_{EM}$	4.5		
Power Dissipation	$T_A=25^\circ\text{C}$	TO-126/TO-126C TO-126S	$P_D$	1.4	W
		TO-92/TO-92NL		1.1	W
		TO-220		2	W
		TO-251/TO-251S TO-252		1.56	W
	$T_C=25^\circ\text{C}$	TO-126/TO-126C TO-126S		20	W
		TO-92/TO-92NL		1.5	W
		TO-220		40	W
		TO-251/TO-251S TO-252		25	W
Junction Temperature		$T_J$	+150	$^\circ\text{C}$	
Storage Temperature		$T_{STG}$	-55 ~ +150	$^\circ\text{C}$	

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ , unless otherwise specified.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS (Note)</b>						
Collector-Emitter Sustaining Voltage	$V_{CEO(SUS)}$	$I_C=10\text{mA}$ , $I_B=0$	400			V
Collector Cut-Off Current	$I_{CBO}$	$V_{CB}=700\text{V}$ , $I_E=0$			1	mA
Collector Cutoff Current	$I_{CEO}$	$V_{CEO}=\text{Rated Value}$ , $V_{BE(OFF)}=1.5\text{V}$			1	mA
					5	
Emitter Cutoff Current	$I_{EBO}$	$V_{EB}=9\text{V}$ , $I_C=0$			1	mA
<b>ON CHARACTERISTICS (Note)</b>						
DC Current Gain	$h_{FE}$	$I_C=200\text{mA}$ , $V_{CE}=5\text{V}$	20		40	
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	$I_C=1\text{A}$ , $I_B=200\text{mA}$			0.5	V

Note: Pulse Test:  $P_W = 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

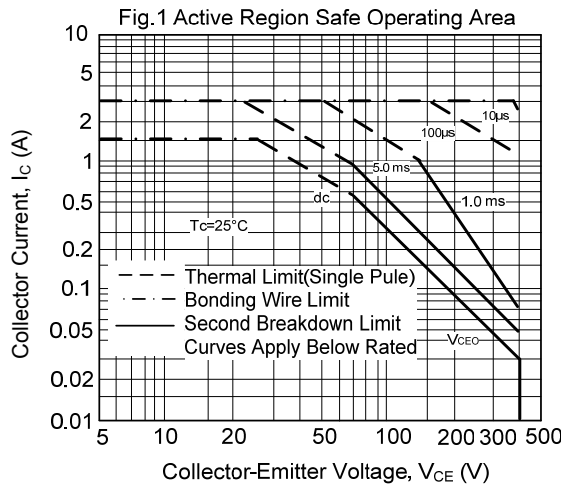
■ SAFE OPERATING AREA INFORMATION

**FORWARD BIAS**

There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate  $I_C$ - $V_{CE}$  limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

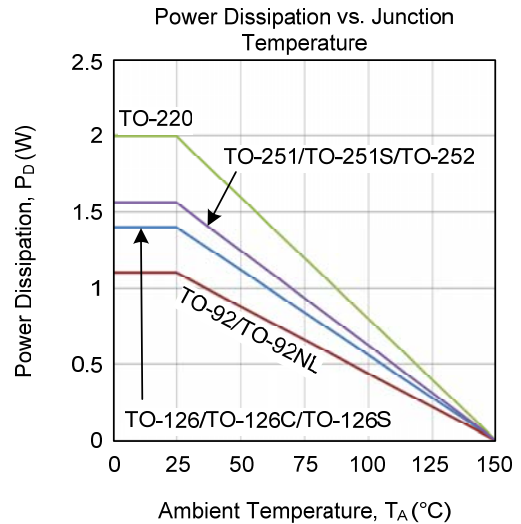
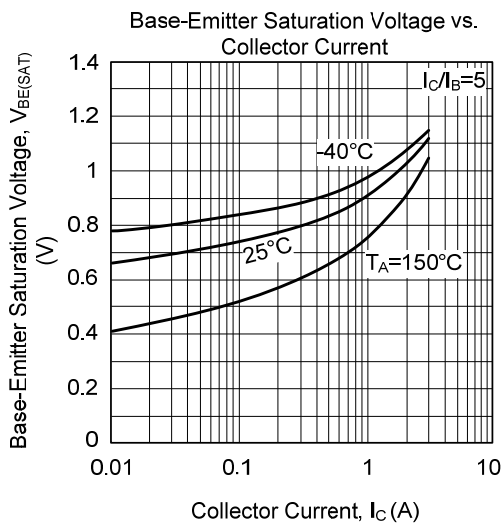
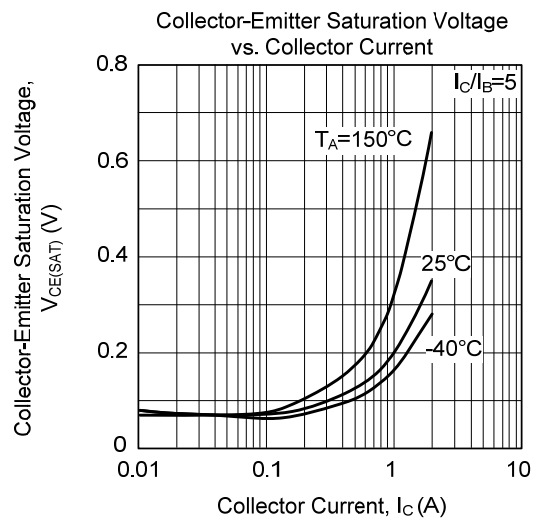
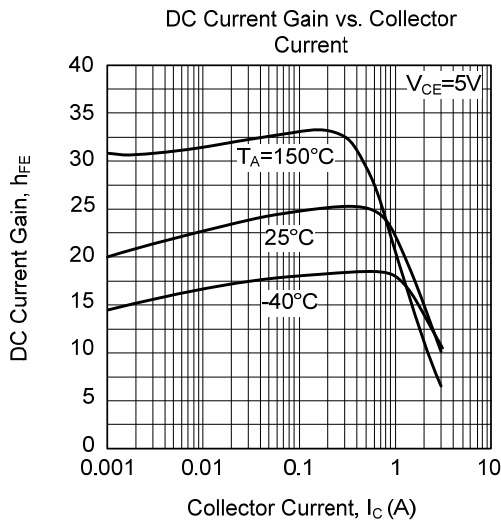
The data of Fig.1 is based on  $T_C = 25^\circ\text{C}$ ;  $T_{J(PK)}$  is variable depending on power level. Second breakdown pulse limits are valid for duty cycles to 10% but must be derated when  $T_C \geq 25^\circ\text{C}$ . Second breakdown limitations do not derate the same as thermal limitations. Allowable current at the voltages shown on Fig.1.

At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.



The Safe Operating Area of Fig.1 are specified ratings (for these devices under the test conditions shown.)

■ TYPICAL CHARACTERISTICS



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