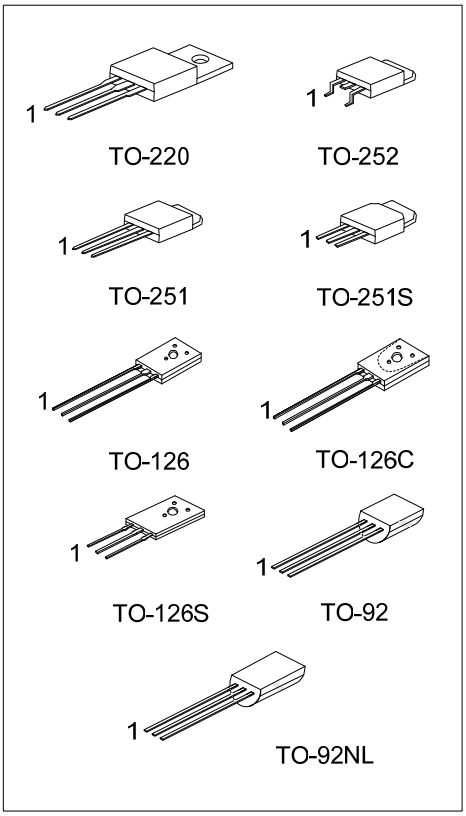
MJE13003

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°C
* Inductive switching matrix 0.5 ~ 1.5 Amp, 25 and 100°C
  Typical t_C = 290ns @ 1A, 100°C.
* 700V blocking capability

■ APPLICATIONS

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

■ ORDERING INFORMATION

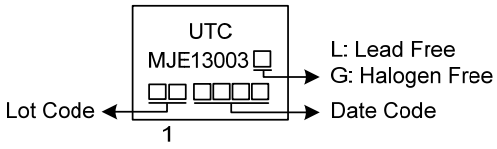
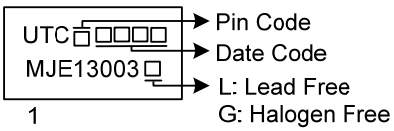
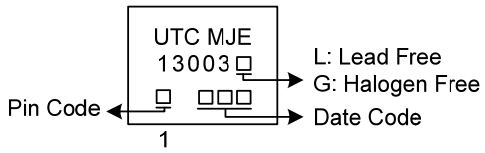
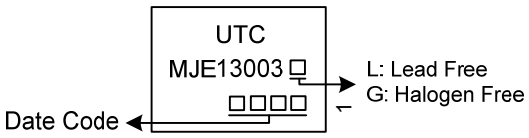
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen-Free		1	2	3	
MJE13003L-TA3-T	MJE13003G-TA3-T	TO-220	B	C	E	Tube
MJE13003L-TM3-T	MJE13003G-TM3-T	TO-251	B	C	E	Tube
MJE13003L-TMS-T	MJE13003G-TMS-T	TO-251S	B	C	E	Tube
MJE13003L-TN3-R	MJE13003G-TN3-R	TO-252	B	C	E	Tape Reel
MJE13003L-T60-K	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

MJE13003G-T6C-A-K
(1)Packing Type
(2)Pin Assignment
(3)Package Type
(4)Green Package

(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

■ MARKING

TO-220 / TO-251 / TO-251S / TO-252	TO-126 / TO-126C / TO-126S
	
TO-92	**TO-92NL**
	

■ ABSOLUTE MAXIMUM RATINGS (T_A=25°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°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°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	°C
Storage Temperature			T_{STG}	-55 ~ +150	°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°C, unless otherwise specified.)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS (Note)							
Collector-Emitter Sustaining Voltage		$V_{CEO(SUS)}$	I_C=10mA , I_B=0	400			V
Collector Cut-Off Current		I_{CBO}	V_{CB}= 700V, I_E=0			1	mA
Collector Cutoff Current	T_C=25°C	I_{CEO}	V_{CEO}=Rated Value, $V_{BE(OFF)}$=1.5 V			1	mA
	T_C=100°C					5	
Emitter Cutoff Current		I_{EBO}	V_{EB}=9V, I_C=0			1	mA
ON CHARACTERISTICS (Note)							
DC Current Gain		h_{FE}	I_C=200mA, V_{CE}=5V	20		40	
Collector-Emitter Saturation Voltage		$V_{CE(SAT)}$	I_C=1A, I_B=200mA			0.5	V

Note: Pulse Test: P_W = 300μs, Duty Cycle ≤ 2%.

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-126/TO-126C TO-126S	θ_{JA}	89	°C/W
	TO-92/TO-92NL		113	°C/W
	TO-220		62.5	°C/W
	TO-251/TO-251S TO-252		80	°C/W

Note: Device mounted on FR-4 substrate P_C board, 2oz copper, with 1inch square copper plate.

■ SAFE OPERATING AREA INFORMATION

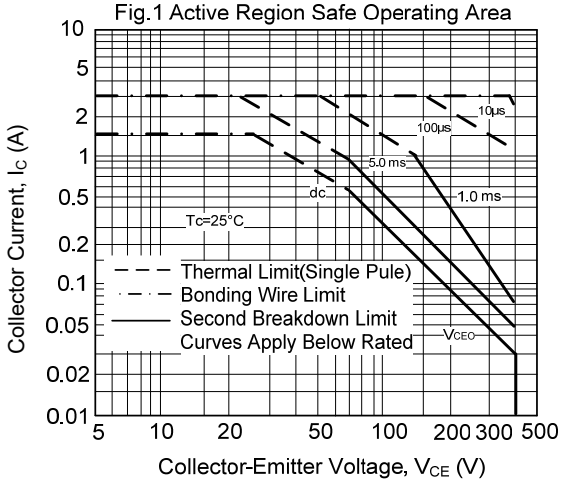
FORWARD BIAS

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°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≥25°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.

Fig.1 Active Region Safe Operating Area



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

■ TYPICAL CHARACTERISTICS