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MJE8502
MJE8503

8.0 AMPERE

NPN SILICON POWER TRANSISTORS

700 and 800 VOLTS
80 WATTS

SWITCHMODE SERIES
NPN SILICON POWER TRANSISTORS

The MJE8502 and MJE8503 transistors are designed for high-voltage, high-speed, power switching in inductive circuits where fall time is critical. They are particularly suited for line operated switch-mode applications such as:

- Switching Regulators
- Inverters
- Solenoid and Relay Drivers
- Motor Controls
- Deflection Circuits

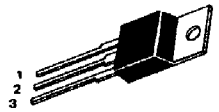
Fast Turn-Off Times
- 150 ns Inductive Fall Time—25°C (Typ)
- 400 ns Inductive Crossover Time—25°C (Typ)
- 1200 ns Inductive Storage Time—25°C (Typ)

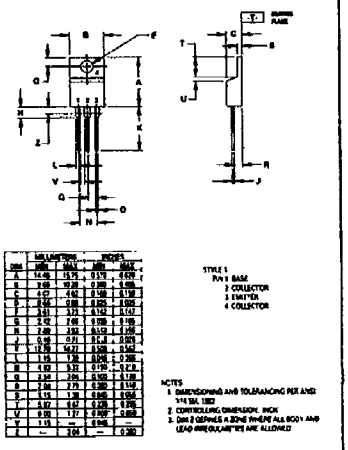
Operating Temperature Range −65 to +125°C

100°C Performance Specified for:
- Reverse-Biased SOA with Inductive Loads
- Switching Times with Inductive Loads
- Saturation Voltages
- Leakage Currents

Designer's Data for "Worst Case" Conditions

The Designers Data Sheet permits the design of most circuits entirely from the information presented. Limit data – representing device characteristics boundaries – are given to facilitate "worst case" design.





TO-220AB

MAXIMUM RATINGS

Rating	Symbol	MJE8502	MJE8503	Unit
Collector-Emitter Voltage	$V_{CEO(sus)}$	700	800	Vdc
Collector-Emitter Voltage	V_{CEV}	1200	1400	Vdc
Emitter Base Voltage	V_{EB}	8.0	8.0	Vdc
Collector Current – Continuous Peak (1)	I_C I_{CM}	5.0 10	5.0 10	Adc
Base Current – Continuous Peak (1)	I_B I_{BM}	4.0 8.0	4.0 8.0	Adc
Total Power Dissipation @ T_C = 25°C @ T_C = 100°C Derate above 25°C	P_D	80 21 0.80	80 21 0.80	Watts W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−65 to +125		°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.25	°C/W
Maximum Lead Temperature for Soldering Purposes: 1/8" from Case for 5 Seconds	T_L	275	°C

(1) Pulse Test: Pulse Width = 5 ms, Duty Cycle ≤ 10%.

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector-Emitter Sustaining Voltage (Table 1) (I_C = 100 mA, I_B = 0)	MJE8502 MJE8503	$V_{CEO(sus)}$	700 800	– –	– –	Vdc
Collector Cutoff Current (V_{CEV} = Rated Value, $V_{BE(off)}$ = 1.5 Vdc) (V_{CEV} = Rated Value, $V_{BE(off)}$ = 1.5 Vdc, T_C = 100°C)		I_{CEV}	– –	– –	0.25 5.0	mAdc
Collector Cutoff Current (V_{CE} = Rated V_{CEV}, R_{BE} = 50 Ω, T_C = 100°C)		I_{CER}	–	–	5.0	mAdc
Emitter Cutoff Current (V_{EB} = 7.0 Vdc, I_C = 0)		I_{EBO}	–	–	1.0	mAdc
SECOND BREAKDOWN						
Second Breakdown Collector Current with base forward biased		$I_{S/b}$	See Figure 12			
Clamped Inductive SOA with Base Reverse Biased		RBSOA	See Figure 13			
ON CHARACTERISTICS (1)						
DC Current Gain (I_C = 1.0 Adc, V_{CE} = 5.0 Vdc)		h_{FE}	7.5	–	–	–
Collector-Emitter Saturation Voltage (I_C = 2.5 Adc, I_B = 1.0 Adc) (I_C = 5.0 Adc, I_B = 2.0 Adc) (I_C = 2.5 Adc, I_B = 1.0 Adc, T_C = 100°C)		$V_{CE(sat)}$	– – –	– – –	2.0 5.0 3.0	Vdc
Base-Emitter Saturation Voltage (I_C = 2.5 Adc, I_B = 1.0 Adc) (I_C = 2.5 Adc, I_B = 1.0 Adc, T_C = 100°C)		$V_{BE(sat)}$	– –	– –	1.5 1.5	Vdc
DYNAMIC CHARACTERISTICS						
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f_{test} = 1.0 kHz)		C_{ob}	60	–	300	pF
SWITCHING CHARACTERISTICS						
Resistive Load (Table 1)						
Delay Time	(V_{CC} = 500 Vdc, I_C = 2.5 A, I_{B1} = 1.0 A, $V_{BE(off)}$ = 5.0 Vdc, t_p = 50 μs, Duty Cycle ≤ 2.0%)	t_d	–	0.040	0.20	μs
Rise Time		t_r	–	0.125	2.0	μs
Storage Time		t_s	–	1.2	4.0	μs
Fall Time		t_f	–	0.65	2.0	μs
Inductive Load, Clamped (Table 1)						
Storage Time	(I_C = 2.5 A(pk), V_{clamp} = 500 Vdc, I_{B1} = 1.0 A, $V_{BE(off)}$ = 5 Vdc, TC = 100°C)	t_{sv}	–	1.6	5.0	μs
Crossover Time		t_c	–	0.60	2.0	μs
Storage Time	(I_C = 2.5 A(pk), V_{clamp} = 500 Vdc, I_{B1} = 1.0 A, $V_{BE(off)}$ = 5 Vdc, T_C = 25°C)	t_{sv}	–	1.2	–	μs
Crossover Time		t_c	–	0.4	–	μs
Fall Time		t_{fi}	–	0.15	–	μs

(1) Pulse Test: PW = 300 μs, Duty Cycle ≤ 2%.