

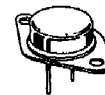
**MJ13080
MJ13081**

**8 AMPERE
NPN SILICON
POWER TRANSISTORS**

**400 AND 450 VOLTS
150 WATTS**

**Designer's Data for
"Worst Case" Conditions**

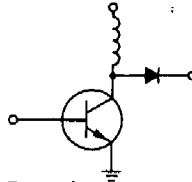
The Designer's Data Sheet permits the design of most circuits entirely from the information presented. Limit data — representing device characteristics boundaries — are given to facilitate "worst case" design.



**SWITCHMODE II SERIES
NPN SILICON POWER TRANSISTORS**

The MJ13080 and MJ13081 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

- 100 ns Inductive Fall Time @ 25°C (Typ)
- 150 ns Inductive Crossover Time @ 25°C (Typ)
- 400 ns Inductive Storage Time @ 25°C (Typ)

Operating Temperature Range -65 to +200°C

100°C Performance Specified for:

- Reverse-Biased SOA with Inductive Loads
- Switching Times with Inductive Loads
- Saturation Voltages
- Leakage Currents

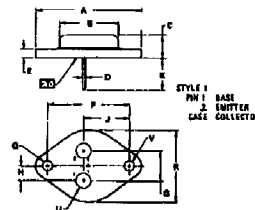
MAXIMUM RATINGS

Rating	Symbol	MJ13080	MJ13081	Unit
Collector-Emitter Voltage	V _{CEO}	400	450	V _{dc}
Collector-Emitter Voltage	V _{CEV}	650	750	V _{dc}
Emitter Base Voltage	V _{EB}	6.0		V _{dc}
Collector Current — Continuous	I _C	8.0		A _{dc}
— Peak (1)	I _{CM}	12		
Base Current — Continuous	I _B	3.0		A _{dc}
— Peak (1)	I _{BM}	6.0		
Total Power Dissipation @ T _C = 25°C	P _D	150		Watts
@ T _C = 100°C		85.5		
Derate above 25°C		0.86		W/°C
Operating and Storage Junction Temperature Range	T _J , T _{stg}	-65 to +200		°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	R _{θJC}	1.17	°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%.



NOTES
1. DIMENSIONS A AND V ARE DATUM
2. [] IS SEATING PLANE AND DATUM
3. POSITIONAL TOLERANCE FOR MOUNTING HOLES

FOR LEADS

4. DIMENSIONS AND TOLERANCES REFER TO ANSI Y14.5-1983

	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.27	1.27	0.050	0.050
B	1.27	1.27	0.050	0.050
C	1.27	1.27	0.050	0.050
D	1.27	1.27	0.050	0.050
E	1.27	1.27	0.050	0.050
F	1.27	1.27	0.050	0.050
G	1.27	1.27	0.050	0.050
H	1.27	1.27	0.050	0.050
I	1.27	1.27	0.050	0.050
J	1.27	1.27	0.050	0.050
K	1.27	1.27	0.050	0.050
L	1.27	1.27	0.050	0.050
M	1.27	1.27	0.050	0.050
N	1.27	1.27	0.050	0.050
O	1.27	1.27	0.050	0.050
P	1.27	1.27	0.050	0.050
Q	1.27	1.27	0.050	0.050
R	1.27	1.27	0.050	0.050
S	1.27	1.27	0.050	0.050
T	1.27	1.27	0.050	0.050
U	1.27	1.27	0.050	0.050
V	1.27	1.27	0.050	0.050
W	1.27	1.27	0.050	0.050
X	1.27	1.27	0.050	0.050
Y	1.27	1.27	0.050	0.050
Z	1.27	1.27	0.050	0.050



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MJ13080, MJ13081

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

Characteristic	Symbol	Min	Typ	Max	Unit	
OFF CHARACTERISTICS (1)						
Collector-Emitter Sustaining Voltage (Table 1) (I _C = 100 mA, I _B = 0)	MJ13080 MJ13081	V _{CEO(sus)}	400 450	— —	— —	V _{dc}
Collector Cutoff Current (V _{CEV} = Rated Value, V _{BE(off)} = 1.5 V _{dc}) (V _{CEV} = Rated Value, V _{BE(off)} = 1.5 V _{dc} , T _C = 100°C)		I _{CEV}	— —	— —	0.5 2.5	mA _{dc}
Collector Cutoff Current (V _{CE} = Rated V _{CEV} , R _{BE} = 50 Ω, T _C = 100°C)		I _{CER}	—	—	3.0	mA _{dc}
Emitter Cutoff Current (V _{EB} = 6.0 V _{dc} , I _C = 0)		I _{EBO}	—	—	1.0	mA _{dc}

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 = 5.0 A _{dc} , V _{CE} = 3.0 V _{dc})	h _{FE}	8.0	—	—	—
Collector-Emitter Saturation Voltage (I _C = 5.0 A _{dc} , I _B = 1.0 A _{dc}) (I _C = 8.0 A _{dc} , I _B = 1.6 A _{dc}) (I _C = 5.0 A _{dc} , I _B = 1.0 A _{dc} , T _C = 100°C)	V _{CE(sat)}	— — —	— — —	1.0 3.0 2.0	V _{dc}
Base-Emitter Saturation Voltage (I _C = 5.0 A _{dc} , I _B = 1.0 A _{dc}) (I _C = 5.0 A _{dc} , I _B = 1.0 A _{dc} , T _C = 100°C)	V _{BE(sat)}	— —	— —	1.5 1.5	V _{dc}

DYNAMIC CHARACTERISTICS

Output Capacitance (V _{CB} = 10 V _{dc} , I _E = 0, f _{test} = 1.0 kHz)	C _{ob}	—	—	300	pF
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SWITCHING CHARACTERISTICS

Resistive Load (Table 1)						
Delay Time	(V _{CC} = 250 V _{dc} , I _C = 5.0 A _{dc} , I _{B1} = 0.7 A _{dc} , t _p = 30 μs, Duty Cycle ≤ 2%, V _{BE(off)} = 5.0 V _{dc})	t _d	—	0.025	0.05	μs
Rise Time		t _r	—	0.10	0.50	
Storage Time		t _s	—	0.50	1.50	
Fall Time		t _f	—	0.15	0.50	

Inductive Load, Clamped (Table 1)							
Storage Time	(I _{C(pk)} = 5.0 A, I _{B1} = 0.7 A _{dc} , V _{BE(off)} = 5.0 V _{dc} , V _{CE(pk)} = 250 V)	(T _J = 100°C)	t _{gv}	—	0.75	2.20	μs
Crossover Time			t _c	—	0.22	0.40	
Fall Time		t _{fi}	—	0.175	0.35		
Storage Time		(T _J = 25°C)	t _{gv}	—	0.40	—	
Crossover Time			t _c	—	0.15	—	
Fall Time			t _{fi}	—	0.10	—	

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

$$\beta_{r1} = \frac{I_C}{I_B}$$