New Jersey Semi-Conductor Products, Inc.

20 STERN AVE.
SPRINGFIELD, NEW JERSEY 07081
U.S.A.

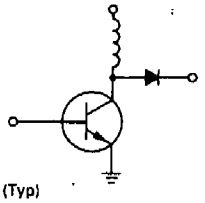
TELEPHONE: (973) 376-2922
(212) 227-6005
FAX: (973) 376-8960

MJ13080
MJ13081

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

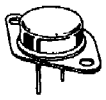
8 AMPERE

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.



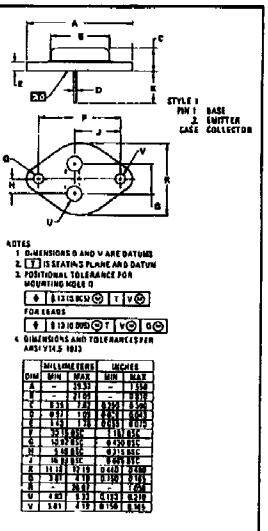
MAXIMUM RATINGS

Rating	Symbol	MJ13080	MJ13081	Unit
Collector-Emitter Voltage	V_{CEO}	400	450	Vdc
Collector-Emitter Voltage	V_{CEV}	650	750	Vdc
Emitter Base Voltage	V_{EB}	6.0		Vdc
Collector Current — Continuous — Peak (1)	I_C I_{CM}	8.0 12		Adc
Base Current — Continuous — Peak (1)	I_B I_{BM}	3.0 6.0		Adc
Total Power Dissipation @ T_C = 25°C @ T_C = 100°C Derate above 25°C	P_D	150 85.5 0.86		Watts 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	$R_{\theta JC}$	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%.



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	$V_{CEO(sus)}$	400	—	—	Vdc
	MJ13081		450	—	—	
Collector Cutoff Current (V_{CEV} = Rated Value, $V_{BE(off)}$ = 1.5 Vdc)		I_{CEV}	—	—	0.5	mAdc
(V_{CEV} = Rated Value, $V_{BE(off)}$ = 1.5 Vdc, T_C = 100°C)			—	—	2.5	
Collector Cutoff Current (V_{CE} = Rated V_{CEV}, R_{BE} = 50 Ω, T_C = 100°C)		I_{CER}	—	—	3.0	mAdc
Emitter Cutoff Current (V_{EB} = 6.0 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 = 5.0 Adc, V_{CE} = 3.0 Vdc		h_{FE}	8.0	—	—	—
Collector-Emitter Saturation Voltage (I_C = 5.0 Adc, I_B = 1.0 Adc)		$V_{CE(sat)}$	—	—	1.0	Vdc
(I_C = 8.0 Adc, I_B = 1.6 Adc)			—	—	3.0	
(I_C = 5.0 Adc, I_B = 1.0 Adc, T_C = 100°C)			—	—	2.0	
Base-Emitter Saturation Voltage (I_C = 5.0 Adc, I_B = 1.0 Adc)		$V_{BE(sat)}$	—	—	1.5	Vdc
(I_C = 5.0 Adc, I_B = 1.0 Adc, T_C = 100°C)			—	—	1.5	
DYNAMIC CHARACTERISTICS						
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f_{test} = 1.0 kHz)		C_{ob}	—	—	300	pF
SWITCHING CHARACTERISTICS						
Resistive Load (Table 1)						
Delay Time	(V_{CC} = 250 Vdc, I_C = 5.0 Adc, I_{B1} = 0.7 Adc, t_p = 30 μs, Duty Cycle ≤2%, $V_{BE(off)}$ = 5.0 Vdc)	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 Adc, $V_{BE(off)}$ = 5.0 Vdc, $V_{CE(pk)}$ = 250 V) (T_J = 100°C)	t_{sv}	—	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_{sv}	—	0.40	—	
Crossover Time		t_c	—	0.15	—	
Fall Time		t_{fi}	—	0.10	—	

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

$\beta_f = \frac{I_C}{I_B}$