

## SWITCHMODE SERIES NPN SILICON TRANSISTORS

...designed for high-voltage, high-speed, power switching in inductive circuits where fall time is critical, They are particularly suited for line operated switchmode applications such as:

- \* Switching Regulators
  - \* Inverters
  - \* Solenoid and relay drivers
  - \* Motor Controls
  - \* Deflection Circuits
- Fast Turn-off Times

400ns Inductive Fall Time  $-25^{\circ}\text{C}$  (Typ)

2.5  $\mu\text{s}$  Inductive Storage Time  $-25^{\circ}\text{C}$  (Typ)

Operating Temperature Range  $-65^{\circ}\text{C}$  to  $+200^{\circ}\text{C}$

100 $^{\circ}\text{C}$  performance Specified for:

- Reversed Biased SOA with Inductive Loads
- Switching Times with Inductive Loads
- Leakage Currents

**NPN**  
**MJ13332**  
**MJ13333**  
**MJ13334**  
**MJ13335**

**20 AMPERES**  
**POWER TRANSISTOR**  
**NPN SILICON**  
**350-500 VOLTS**  
**175 WATTS**



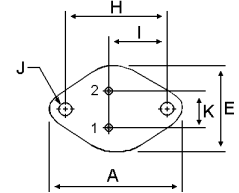
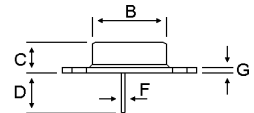
**TO-3**

### MAXIMUM RATINGS

Rating	Symbol	MJ13332	MJ13333	MJ13334	MJ13335	Unit
Collector-Emitter Voltage	$V_{CEV}$	650	700	750	800	V
Collector-Emitter Voltage	$V_{CEO}$	350	400	450	500	V
Emitter-Base Voltage	$V_{EB}$	6.0				V
Collector Current-Continuous	$I_C$	20				A
Peak	$I_{CM}$	30				A
Base Current	$I_B$	10				A
Total Device Dissipation @ $T_C=25^{\circ}\text{C}$ Derate above $25^{\circ}\text{C}$	$P_D$	275				Watts
		1.0				$\text{W}/^{\circ}\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{STG}$	$-65$ to $+200$				$^{\circ}\text{C}$

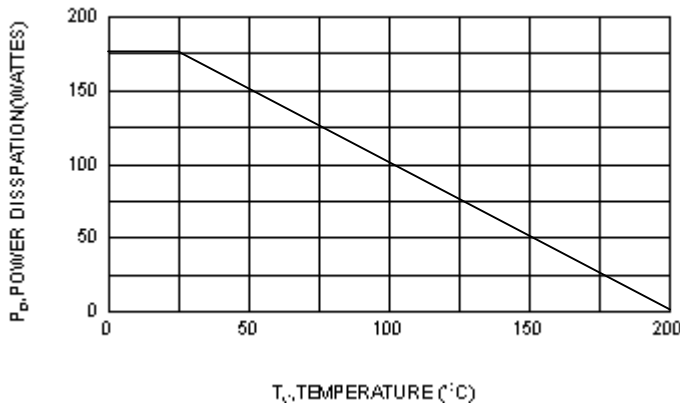
### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance to Case	$R_{\theta JC}$	1.0	$^{\circ}\text{C}/\text{W}$



PIN 1 BASE  
2 EMITTER  
COLLECTOR(CASE)

FIGURE -1 POWER DERATING



DIM	MILLIMETERS	
	MIN	MAX
A	38.75	39.96
B	19.28	22.23
C	7.96	9.28
D	11.18	12.19
E	25.20	26.67
F	0.92	1.09
G	1.38	1.62
H	29.90	30.40
I	16.64	17.30
J	3.88	4.36
K	10.67	11.18

**ELECTRICAL CHARACTERISTICS (T<sub>c</sub>=25°C unless otherwise noted)**

Characteristic	Symbol	Min.	Typ.	Max	Unit
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**OFF CHARACTERISTICS**

Collector-Emitter Sustaining Voltage ( I <sub>C</sub> = 100 mAdc, I <sub>B</sub> = 0 )	MJ13332 MJ13333 MJ13334 MJ13335	V <sub>CEO(sus)</sub>	350 400 450 500	-- -- -- --	-- -- -- --	V
Collector Current ( V <sub>CE</sub> = Rated V <sub>CEV</sub> , V <sub>BE(off)</sub> = 1.5V )		I <sub>CEV</sub>	--	--	5.0	mAdc
Emitter Cutoff Current ( V <sub>BE</sub> = 6.0 Vdc, I <sub>C</sub> = 0 )		I <sub>EBO</sub>	--	--	1.0	mAdc

**ON CHARACTERISTICS(1)**

DC current gain ( I <sub>C</sub> = 5.0 Adc, V <sub>CE</sub> = 5.0 Vdc )		h <sub>FE</sub>	10	--	60	
Collector-Emitter Saturation Voltage ( I <sub>C</sub> = 10 Adc, I <sub>B</sub> = 2.0 Adc ) ( I <sub>C</sub> = 20 Adc, I <sub>B</sub> = 6.7 Adc )		V <sub>CE(sat)</sub>	-- --	-- --	1.8 5.0	Vdc
Base-Emitter Saturation Voltage ( I <sub>C</sub> = 10 Adc, I <sub>B</sub> = 2.0 Adc )		V <sub>BE(sat)</sub>	--	--	1.8	Vdc

**DYNAMIC CHARACTERISTICS**

Output Capacitance ( V <sub>CB</sub> = 10 Vdc, I <sub>E</sub> = 0 , f=1.0 KHz )		C <sub>ob</sub>	125	--	500	pF
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**SWITCHING CHARACTERISTICS**

Delay time	V <sub>cc</sub> =250V, I <sub>C</sub> =10A I <sub>B1</sub> =2.0A, V <sub>BE</sub> =5.0V, t <sub>p</sub> =10us Duty Cycle 2.0%	t <sub>d</sub>	--	--	0.1	μs
Rise Time		t <sub>r</sub>	--	--	0.7	μs
Storage Time		t <sub>s</sub>	--	--	4.0	μs
Fall Time		t <sub>f</sub>	--	--	0.7	μs

(1) Pulse test: Pulse Width=300 s, Duty Cycle 2.0%