

## PNP POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/535

### Devices

2N5003

2N5005

### Qualified Level

JAN  
JANTX  
JANTXV

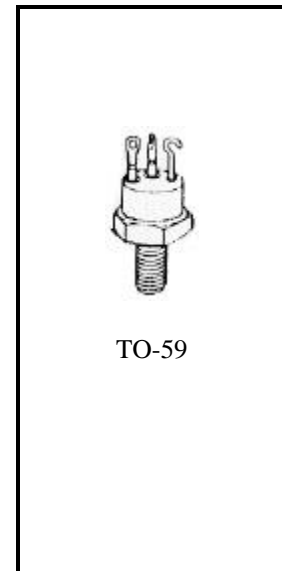
### MAXIMUM RATINGS

Ratings	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	80	Vdc
Collector-Base Voltage	$V_{CBO}$	100	Vdc
Emitter-Base Voltage	$V_{EBO}$	5.5	Vdc
Collector Current	$I_C$ $I_C^{(3)}$	5.0 10	Adc
Total Power Dissipation @ $T_A = +25^{\circ}\text{C}$ <sup>(1)</sup> @ $T_C = +25^{\circ}\text{C}$ <sup>(2)</sup>	$P_T$	2.0 58	W
Operating & Storage Junction Temperature Range	$T_J, T_{stg}$	-65 to +200	$^{\circ}\text{C}$

### THERMAL CHARACTERISTICS

Characteristics	Symbol	Max.	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.0	$^{\circ}\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	88	$^{\circ}\text{C}/\text{W}$

- 1) Derate linearly 11.4 mW/ $^{\circ}\text{C}$  for  $T_A > +25^{\circ}\text{C}$
- 2) Derate linearly 331 mW/ $^{\circ}\text{C}$  for  $T_C > +25^{\circ}\text{C}$
- 3) This value applies for  $P_W \leq 8.3$  ms, duty cycle  $\leq 1\%$



\*See appendix A for package outline

### ELECTRICAL CHARACTERISTICS ( $T_C = 25^{\circ}\text{C}$ unless otherwise noted)

Characteristics	Symbol	Min.	Max.	Unit
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### OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage $I_C = 100$ mAdc,	$V_{(BR)CEO}$	80		Vdc
Collector-Emitter Cutoff Current $V_{CE} = 40$ Vdc, $I_B = 0$	$I_{CEO}$		50	$\mu\text{Adc}$
Collector-Emitter Cutoff Current $V_{CE} = 60$ Vdc, $V_{BE} = 0$ $V_{CE} = 100$ Vdc, $V_{BE} = 0$	$I_{CES}$		1.0 1.0	$\mu\text{Adc}$ mAdc
Emitter-Base Cutoff Current $V_{BE} = 4.0$ Vdc, $I_C = 0$ $V_{BE} = 5.5$ Vdc, $I_C = 0$	$I_{EBO}$		1.0 1.0	MAdc MAdc

**2N5003, 2N5005 JAN SERIES**

**ELECTRICAL CHARACTERISTICS (Con't)**

Characteristics	Symbol	Min.	Max.	Unit
<b>ON CHARACTERISTICS</b>				
Forward-Current Transfer Ratio $I_C = 50 \text{ mA dc}, V_{CE} = 5.0 \text{ V dc}$ $I_C = 2.5 \text{ A dc}, V_{CE} = 5.0 \text{ V dc}$ $I_C = 5.0 \text{ A dc}, V_{CE} = 5.0 \text{ V dc}$  $I_C = 50 \text{ mA dc}, V_{CE} = 5.0 \text{ V dc}$ $I_C = 2.5 \text{ A dc}, V_{CE} = 5.0 \text{ V dc}$ $I_C = 5.0 \text{ A dc}, V_{CE} = 5.0 \text{ V dc}$	2N5003    2N5005	20 30 20  50 70 40	90   200	
Base-Emitter Voltage Non-saturated $V_{CE} = 5.0 \text{ A dc}, I_C = 2.5 \text{ A dc}$	$V_{BE}$		1.45	Vdc
Collector-Emitter Saturation Voltage $I_C = 2.5 \text{ A dc}, I_B = 250 \text{ mA dc}$ $I_C = 5.0 \text{ A dc}, I_B = 500 \text{ mA dc}$	$V_{CE(sat)}$		0.75 1.5	Vdc
Base-Emitter Saturation Voltage $I_C = 2.5 \text{ A dc}, I_B = 250 \text{ mA dc}$ $I_C = 5.0 \text{ A dc}, I_B = 500 \text{ mA dc}$	$V_{BE(sat)}$		1.45 2.2	Vdc

**DYNAMIC CHARACTERISTICS**

Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio 2N5003 $I_C = 100 \text{ mA dc}, V_{CE} = 5.0 \text{ V dc}, f = 10 \text{ MHz}$ 2N5005	$h_{fe}$	2.0 50		
Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio 2N5003 $I_C = 500 \text{ mA dc}, V_{CE} = 5.0 \text{ V dc}, f = 10 \text{ MHz}$ 2N5005	$h_{fe}$	6.0 7.0		
Output Capacitance $V_{CB} = 10 \text{ V dc}, I_E = 0, f = 1 \text{ MHz}$	$C_{obo}$		250	PF

**SWITCHING CHARACTERISTICS**

Turn-On Time $I_C = 5 \text{ A dc}; I_{B1} = 500 \text{ mA dc}$	$t_{on}$		0.5	$\mu\text{s}$
Storage Time $I_{B2} = -500 \text{ mA dc}$	$t_s$		1.4	$\mu\text{s}$
Fall Time $V_{BE(OFF)} = 3.7 \text{ V dc}$	$t_f$		0.5	$\mu\text{s}$
Turn-Off Time $R_L = 6 \Omega$	$t_{off}$		1.5	$\mu\text{s}$

**SAFE OPERATING AREA**

<b>DC Tests</b> $T_C = +25^\circ\text{C}, V_{CE} = 0, t_p = 1 \text{ second 1 Cycle}$ <b>Test 1</b> $V_{CE} = 12 \text{ V dc}, I_C = 5 \text{ A dc}$ <b>Test 2</b> $V_{CE} = 32 \text{ V dc}, I_C = 1.7 \text{ A dc}$ <b>Test 3</b> $V_{CE} = 80 \text{ V dc}, I_C = 100 \text{ mA dc}$
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