

## NPN LOW POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/182

### Devices

2N720A

2N1893  
2N1893S

### Qualified Level

JAN  
JANTX  
JANTXV

### MAXIMUM RATINGS

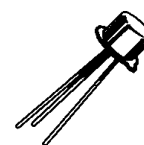
Ratings	Symbol	All Devices		Units
Collector-Emitter Voltage	$V_{CEO}$	80		Vdc
Collector-Base Voltage	$V_{CBO}$	120		Vdc
Emitter-Base Voltage	$V_{EBO}$	7.0		Vdc
Collector-Emitter Voltage ( $R_{BE} = 10 \Omega$ )	$V_{CER}$	100		Vdc
Collector Current	$I_C$	500		mAdc
		2N720A	2N1893, S	
Total Power Dissipation @ $T_A = +25^\circ\text{C}$ <sup>(1)</sup> @ $T_C = +25^\circ\text{C}$ <sup>(2)</sup>	$P_T$	0.5	0.8	W
		1.8	3.0	
Operating & Storage Junction Temperature Range	$T_J, T_{srg}$	-65 to +200		$^\circ\text{C}$

### THERMAL CHARACTERISTICS

Characteristics	Symbol	2N720A	2N1893, S	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	97	58	$^\circ\text{C/W}$

1) Derate linearly 2.86 mW/ $^\circ\text{C}$  for 2N720A, 4.57 mW/ $^\circ\text{C}$  for 2N1893, S  $T_A > 25^\circ\text{C}$

2) Derate linearly 10.3 mW/ $^\circ\text{C}$  for 2N720A, 17.2 mW/ $^\circ\text{C}$  for 2N1893, S  $T_C > 25^\circ\text{C}$



TO-18 (TO-206AA)\*  
2N720A



TO-5\*  
2N1893, 2N1893S

\*See appendix A for package outline

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

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

Collector-Emitter Breakdown Voltage $I_C = 30 \text{ mAdc}$	$V_{(BR)CEO}$	80		Vdc
Collector-Emitter Breakdown Voltage $I_C = 10 \text{ mAdc}, R_{BE} = 10 \Omega$	$V_{(BR)CER}$	100		Vdc
Collector-Base Cutoff Current $V_{CB} = 120 \text{ Vdc}$ $V_{CB} = 90 \text{ Vdc}$	$I_{CBO}$		10 10	$\mu\text{Adc}$ $\eta\text{Adc}$
Emitter-Base Cutoff Current $V_{EB} = 7.0 \text{ Vdc}$ $V_{EB} = 5.0 \text{ Vdc}$	$I_{EBO}$		10 10	$\mu\text{Adc}$ $\eta\text{Adc}$

**ELECTRICAL CHARACTERISTICS (con't)**

Characteristics	Symbol	Min.	Max.	Unit
<b>ON CHARACTERISTICS</b> <sup>(3)</sup>				
Forward-Current Transfer Ratio I <sub>C</sub> = 0.1 mA <sub>dc</sub> , V <sub>CE</sub> = 10 V <sub>dc</sub> I <sub>C</sub> = 10 mA <sub>dc</sub> , V <sub>CE</sub> = 10 V <sub>dc</sub> I <sub>C</sub> = 150 mA <sub>dc</sub> , V <sub>CE</sub> = 10 V <sub>dc</sub>	h <sub>FE</sub>	20 35 40	120	
Collector-Emitter Saturation Voltage I <sub>C</sub> = 150 mA <sub>dc</sub> , I <sub>B</sub> = 15 mA <sub>dc</sub>	V <sub>CE(sat)</sub>		5.0	V <sub>dc</sub>
Base-Emitter Voltage I <sub>C</sub> = 150 mA <sub>dc</sub> , I <sub>B</sub> = 15 mA <sub>dc</sub>	V <sub>BE(sat)</sub>		1.3	V <sub>dc</sub>

**DYNAMIC CHARACTERISTICS**

Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio I <sub>C</sub> = 50 mA <sub>dc</sub> , V <sub>CE</sub> = 10 V <sub>dc</sub> , f = 20 MHz	h <sub>fe</sub>	3.0	10	
Small-Signal Short-Circuit Forward Current Transfer Ratio V <sub>CE</sub> = 5.0 V <sub>dc</sub> , I <sub>C</sub> = 1.0 mA <sub>dc</sub> V <sub>CE</sub> = 10 V <sub>dc</sub> , I <sub>C</sub> = 5.0 mA <sub>dc</sub> , f = 1.0 kHz	h <sub>fe</sub>	35 45	100	
Small-Signal Short-Circuit Input Impedance V <sub>CB</sub> = 10 V <sub>dc</sub> , I <sub>C</sub> = 5.0 mA <sub>dc</sub>	h <sub>ib</sub>	4.0	8.0	Ω
Small-Signal Short-Circuit Output Admittance V <sub>CB</sub> = 10 V <sub>dc</sub> , I <sub>C</sub> = 5.0 mA <sub>dc</sub>	h <sub>ob</sub>		0.5	μΩ
Output Capacitance V <sub>CB</sub> = 10 V <sub>dc</sub> , I <sub>E</sub> = 0, 100 kHz ≤ f ≤ 1.0 MHz	C <sub>obo</sub>	2	15	pF

**SWITCHING CHARACTERISTICS**

Turn-On Time + Turn-Off Time (See Figure 3 of MIL-PRF-19500/182)	t <sub>on</sub> + t <sub>off</sub>		30	ns
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(3) Pulse Test: Pulse Width = 300μs, Duty Cycle ≤ 2.0%.