

## 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	
		<b>2N720A</b>	<b>2N1893, S</b>		
Total Power Dissipation	@ $T_A = +25^\circ\text{C}$ <sup>(1)</sup>	$P_T$	0.5	0.8	W
	@ $T_C = +25^\circ\text{C}$ <sup>(2)</sup>		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 $I_C = 0.1 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$ $I_C = 10 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$ $I_C = 150 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$	$h_{FE}$	20 35 40	120	
Collector-Emitter Saturation Voltage $I_C = 150 \text{ mAdc}, I_B = 15 \text{ mAdc}$	$V_{CE(sat)}$		5.0	Vdc
Base-Emitter Voltage $I_C = 150 \text{ mAdc}, I_B = 15 \text{ mAdc}$	$V_{BE(sat)}$		1.3	Vdc

**DYNAMIC CHARACTERISTICS**

Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = 50 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}, f = 20 \text{ MHz}$	$ h_{fe} $	3.0	10	
Small-Signal Short-Circuit Forward Current Transfer Ratio $V_{CE} = 5.0 \text{ Vdc}, I_C = 1.0 \text{ mAdc}$ $V_{CE} = 10 \text{ Vdc}, I_C = 5.0 \text{ mAdc}, f = 1.0 \text{ kHz}$	$h_{fe}$	35 45	100	
Small-Signal Short-Circuit Input Impedance $V_{CB} = 10 \text{ Vdc}, I_C = 5.0 \text{ mAdc}$	$h_{ib}$	4.0	8.0	$\Omega$
Small-Signal Short-Circuit Output Admittance $V_{CB} = 10 \text{ Vdc}, I_C = 5.0 \text{ mAdc}$	$h_{ob}$		0.5	$\mu\Omega$
Output Capacitance $V_{CB} = 10 \text{ Vdc}, I_E = 0, 100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$	$C_{obo}$	2	15	$pF$

**SWITCHING CHARACTERISTICS**

Turn-On Time + Turn-Off Time (See Figure 3 of MIL-PRF-19500/182)	$t_{on} + t_{off}$		30	$\eta s$
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(3) Pulse Test: Pulse Width = 300 $\mu s$ , Duty Cycle  $\leq 2.0\%$ .