

## LOW POWER NPN SILICON TRANSISTOR

Qualified per MIL-PRF-19500/391

### Devices

2N3019	2N3057A	2N3700
2N3019S		2N3700S

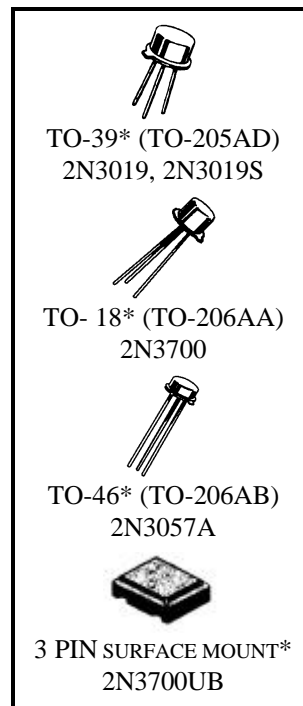
### Qualified Level

JAN  
JANTX  
JANTXV  
JANS

### MAXIMUM RATINGS

Ratings	Symbol	Value	Units
Collector-Emitter Voltage	$V_{CEO}$	80	Vdc
Collector-Base Voltage	$V_{CBO}$	140	Vdc
Emitter-Base Voltage	$V_{EBO}$	7.0	Vdc
Collector Current	$I_C$	1.0	Adc
Total Power Dissipation @ $T_A = +25^{\circ}\text{C}^{(1)}$	$P_T$		W
2N3019; 2N3019S		0.8	
2N3057A		0.4	
2N3700		0.5	
2N3700UB		0.4	
@ $T_C = +25^{\circ}\text{C}^{(2)}$			W
2N3019; 2N3019S		5.0	
2N3057A		1.8	
2N3700		1.8	
2N3700UB		1.16	
Operating & Storage Jct Temp Range	$T_J, T_{stg}$	-55 to +175	$^{\circ}\text{C}$

- 1) Derate linearly 4.6 mW/ $^{\circ}\text{C}$  for type 2N3019 and 2N3019S; 2.3 mW/ $^{\circ}\text{C}$  for type 2N3057A; 2.85 mW/ $^{\circ}\text{C}$  for type 2N3700; 6.6 mW/ $^{\circ}\text{C}$  for type 2N3700UB for  $T_A \geq +25^{\circ}\text{C}$ .
- 2) Derate linearly 28.6 mW/ $^{\circ}\text{C}$  for type 2N3019 and 2N3019S; 10.3 mW/ $^{\circ}\text{C}$  for types 2N3057A, 2N3700, & 2N3700UB for  $T_C \geq +25^{\circ}\text{C}$ .



\*See appendix A for package outline

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

Characteristics	Symbol	Min.	Max.	Unit
Collector-Base Breakdown Voltage $I_C = 100 \mu\text{Adc}$	$V_{(BR)CBO}$	140		Vdc
Emitter-Base Breakdown Voltage $I_E = 100 \mu\text{Adc}$	$V_{(BR)EBO}$	7.0		Vdc
Collector-Emitter Breakdown Current $I_C = 30 \text{ mAdc}$	$V_{(BR)CEO}$	80		Vdc

**ELECTRICAL CHARACTERISTICS (con't)**

Characteristics	Symbol	Min.	Max.	Unit
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**OFF CHARACTERISTICS (con't)**

Collector-Emitter Cutoff Current $V_{CE} = 90 \text{ Vdc}$	$I_{CES}$		10	$\eta\text{Adc}$
Emitter-Base Cutoff Current $V_{EB} = 5.0 \text{ Vdc}$	$I_{EBO}$		10	$\eta\text{Adc}$

**ON CHARACTERISTICS (1)**

Forward-Current Transfer Ratio $I_C = 150 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$ $I_C = 0.1 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$ $I_C = 10 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$ $I_C = 500 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$ $I_C = 1.0 \text{ Adc}, V_{CE} = 10 \text{ Vdc}$	$h_{FE}$	100 50 90 50 15	300 200 200	
Collector-Emitter Saturation Voltage $I_C = 150 \text{ mAdc}, I_B = 15 \text{ mAdc}$ $I_C = 500 \text{ mAdc}, I_B = 50 \text{ mAdc}$	$V_{CE(sat)}$		0.2 0.5	Vdc
Base-Emitter Saturation Voltage $I_C = 150 \text{ mAdc}, I_B = 15 \text{ mAdc}$	$V_{BE(sat)}$		1.1	Vdc

**DYNAMIC CHARACTERISTICS**

Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = 1.0 \text{ mAdc}, V_{CE} = 5.0 \text{ Vdc}, f = 1.0 \text{ kHz}$	$h_{fe}$	80	400	
Magnitude of Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = 50 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}, f = 20 \text{ MHz}$	$ h_{fe} $	5.0	20	
Output Capacitance $V_{CB} = 10 \text{ Vdc}, I_E = 0, 100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$	$C_{obo}$		12	$p^f$
Input Capacitance $V_{EB} = 0.5 \text{ Vdc}, I_C = 0, 100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$	$C_{ibo}$		60	pF

**SAFE OPERATING AREA****DC Tests** $T_C = 25^{\circ}\text{C}$ , 1 Cycle,  $t = 10 \text{ ms}$ **Test 1**

2N3019, 2N3019S

2N3057A, 2N3700, 2N3700UB

 $V_{CE} = 10 \text{ Vdc}$  $I_C = 500 \text{ mAdc}$  $I_C = 180 \text{ mAdc}$ **Test 2**

2N3019, 2N3019S

2N3057A, 2N3700, 2N3700UB

 $V_{CE} = 40 \text{ Vdc}$  $I_C = 125 \text{ mAdc}$  $I_C = 45 \text{ mAdc}$ **Test 3**

2N3019, 2N3019S

2N3057A, 2N3700, 2N3700UB

 $V_{CE} = 80 \text{ Vdc}$  $I_C = 60 \text{ mAdc}$  $I_C = 22.5 \text{ mAdc}$ (1) Pulse Test: Pulse Width = 300 $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .