

# 2N3019SJAN, JTX, JTXV, JANS 2N3700JAN, JTX, JTXV, JANS

Processed per MIL-S-19500/391

## NPN Silicon Small-Signal Transistors

...designed for general-purpose switching and amplifier applications.



MAXIMUM RATINGS				
Rating	Symbol	2N3019S	2N3700	Unit
Collector-Base Voltage	$V_{CBO}$	140		Vdc
Collector-Emitter Voltage	$V_{CEO}$	80		Vdc
Emitter-Base Voltage	$V_{EBO}$	7.0		Vdc
Collector Current	$I_C$	1.0		Adc
Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$ @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	0.8 4.6 5.0 28.6	0.5 2.85 1.8 10.3	Watts mW/ $^\circ\text{C}$ Watts mW/ $^\circ\text{C}$
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 65 to 200		$^\circ\text{C}$

ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise noted.)				
Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage <sup>(1)</sup> ( $I_C = 30 \text{ mAdc}$ )	$V_{(BR)CEO}$	80	—	Vdc
Emitter-Base Breakdown Voltage ( $I_E = 100 \mu\text{Adc}$ )	$V_{(BR)EBO}$	7.0	—	Vdc
Collector-Base Breakdown Voltage ( $I_C = 100 \mu\text{Adc}$ )	$V_{(BR)CBO}$	140	—	Vdc
Collector Cutoff Current ( $V_{CE} = 90 \text{ Vdc}$ ) ( $V_{CE} = 90 \text{ Vdc}, T_A = 150^\circ\text{C}$ )	$I_{CES}$	—	10 10	nAdc $\mu\text{Adc}$
Emitter Cutoff Current ( $V_{BE} = 5.0 \text{ Vdc}$ )	$I_{EBO}$	—	10	nAdc

(1) Pulsed. Pulse Width 250 to 350  $\mu\text{s}$ , Duty Cycle 1.0 to 2.0%.

(continued)



2N3019S  
CASE 79-04, STYLE 1  
TO-205AD (TO-39)



2N3700  
CASE 22-03, STYLE 1  
TO-206AA (TO-18)



# 2N3019S and 2N3700 SERIES

ELECTRICAL CHARACTERISTICS — continued ( $T_C = 25^\circ\text{C}$ unless otherwise noted.)				
Characteristic	Symbol	Min	Max	Unit
<b>ON CHARACTERISTICS</b>				
DC Current Gain ( $V_{CE} = 10\text{ Vdc}$ , $I_C = 150\text{ mAdc}$ )(1) ( $V_{CE} = 10\text{ Vdc}$ , $I_C = 0.1\text{ mAdc}$ ) ( $V_{CE} = 10\text{ Vdc}$ , $I_C = 10\text{ mAdc}$ )(1) ( $V_{CE} = 10\text{ Vdc}$ , $I_C = 500\text{ mAdc}$ )(1) ( $V_{CE} = 10\text{ Vdc}$ , $I_C = 1.0\text{ mAdc}$ ) ( $V_{CE} = 10\text{ Vdc}$ , $I_C = 150\text{ mAdc}$ , $T_A = -65^\circ\text{C}$ )(1)	$h_{FE}$	100 50 90 50 15 40	300 200 — 200 — —	—
Collector-Emitter Saturation Voltage(1) ( $I_C = 150\text{ mAdc}$ , $I_B = 15\text{ mAdc}$ ) ( $I_C = 500\text{ mAdc}$ , $I_B = 50\text{ mAdc}$ )	$V_{CE(sat)}$	— —	0.2 0.5	Vdc
Base-Emitter Saturation Voltage(1) ( $I_C = 150\text{ mAdc}$ , $I_B = 15\text{ mAdc}$ )	$V_{BE(sat)}$	—	1.1	Vdc
<b>SMALL-SIGNAL CHARACTERISTICS</b>				
Small-Signal Current Gain ( $V_{CE} = 5.0\text{ Vdc}$ , $I_C = 1.0\text{ mAdc}$ , $f = 1.0\text{ kHz}$ ) ( $V_{CE} = 10\text{ Vdc}$ , $I_C = 50\text{ mAdc}$ , $f = 20\text{ MHz}$ )	$h_{fe}$	80 5.0	400 20	—
Input Capacitance ( $V_{EB} = 0.5\text{ Vdc}$ , $I_C = 0$ , $f = 0.1\text{ to }1.0\text{ MHz}$ )	$C_{ibo}$	—	60	pF
Output Capacitance ( $V_{CB} = 10\text{ Vdc}$ , $I_E = 0$ , $f = 0.1\text{ to }1.0\text{ MHz}$ )	$C_{obo}$	—	12	pF
Noise Figure ( $V_{CE} = 10\text{ Vdc}$ , $I_C = 100\text{ }\mu\text{Adc}$ , $f = 1.0\text{ kHz}$ $R_G = 1.0\text{ kohm}$ , Pwr. B.W. = 200 Hz)	NF	—	4.0	dB
Collector Base Time Constant ( $V_{CB} = 10\text{ Vdc}$ , $I_C = 10\text{ mAdc}$ , $f = 79.8\text{ MHz}$ )	$\tau_b C_c$	—	400	ps
<b>SWITCHING CHARACTERISTICS</b> (See Section 4, Figure 9)				
Turn-On + Turn-Off Time	$t_{on} + t_{off}$	—	30	ns

(1) Pulsed. Pulse Width 250 to 350  $\mu\text{s}$ , Duty Cycle 1.0 to 2.0%.

<b>ASSURANCE TESTING (Pre/Post Burn-In)</b>				
Burn-In Conditions: $T_A = 25 \pm 5^\circ\text{C}$ , $V_{CB} = 60\text{ Vdc}$ (10 Vdc JANS), $P_D = 600\text{ mW}$ 2N3019S, 500 mW 2N3700				
Characteristics Tested	Symbol	Initial and End Point Limits		Unit
		Min	Max	
Collector Cutoff Current ( $V_{CE} = 90\text{ Vdc}$ )	$I_{CES}$	—	10	nAdc
DC Current Gain(1) ( $V_{CE} = 10\text{ Vdc}$ , $I_C = 150\text{ mAdc}$ )	$h_{FE}$	100	300	—

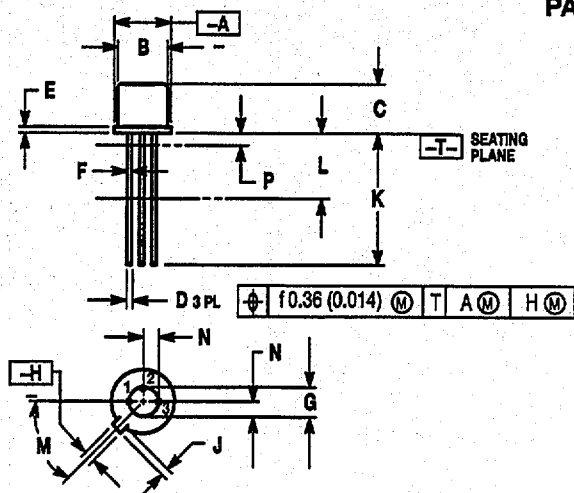
Delta from Pre-Burn-In Measured Values		Min	Max	
Delta Collector Cutoff Current	$\Delta I_{CES}$	—	$\pm 100$ or $\pm 5.0$ whichever is greater	% of Initial Value nAdc
Delta DC Current Gain(1)	$\Delta h_{FE}$	—	$\pm 15$	% of Initial Value

(1) Pulsed. Pulse Width 250 to 350  $\mu\text{s}$ , Duty Cycle 1.0 to 2.0%.

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# 2N3019S and 2N3700 SERIES

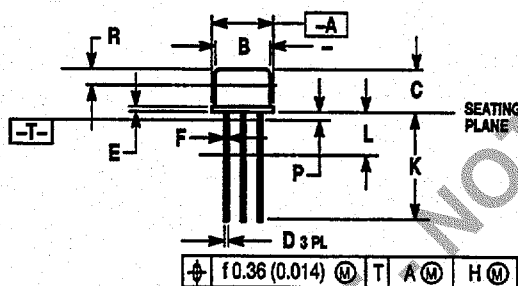
## PACKAGE DIMENSIONS



CASE 22-03  
TO-206AA  
(TO-18)

- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIM J MEASURED FROM DIM A MAXIMUM.
  4. DIM F APPLIES BETWEEN DIM P AND L. DIM D APPLIES BETWEEN DIM L AND K MINIMUM. LEAD DIAMETER IS UNCONTROLLED IN DIM P AND BEYOND DIM K MINIMUM.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	5.31	5.84	0.209	0.230
B	4.52	4.95	0.178	0.195
C	4.32	5.33	0.170	0.210
D	0.406	0.533	0.016	0.021
E	—	0.762	—	0.030
F	0.406	0.483	0.016	0.019
G	2.54 BSC	—	0.100 BSC	—
H	0.914	1.17	0.036	0.046
J	0.711	1.22	0.028	0.048
K	12.70	—	0.500	—
L	6.35	—	0.250	—
M	45° BSC	—	45° BSC	—
N	1.27 BSC	—	0.050 BSC	—
P	—	1.27	—	0.050



CASE 79-04  
TO-205AD  
(TO-39)

- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION J MEASURED FROM DIMENSION A MAXIMUM.
  4. DIMENSION B SHALL NOT VARY MORE THAN 0.25 (0.010) IN ZONE R. THIS ZONE CONTROLLED FOR AUTOMATIC HANDLING.
  5. DIMENSION F APPLIES BETWEEN DIMENSION P AND L. DIMENSION D APPLIES BETWEEN DIMENSION L AND K MINIMUM. LEAD DIAMETER IS UNCONTROLLED IN DIMENSION P AND BEYOND DIMENSION K MINIMUM.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	8.51	9.39	0.335	0.370
B	7.76	8.50	0.305	0.335
C	6.10	6.60	0.240	0.260
D	0.41	0.53	0.016	0.021
E	0.23	1.04	0.009	0.041
F	0.41	0.48	0.016	0.019
G	5.08 BSC	—	0.200 BSC	—
H	0.72	0.86	0.028	0.034
J	0.74	1.14	0.029	0.045
K	12.70	19.05	0.500	0.750
L	6.35	—	0.250	—
M	45° BSC	—	45° BSC	—
P	—	1.27	—	0.050
R	2.54	—	0.100	—

STYLE 1:  
PIN 1. EMITTER  
2. BASE  
3. COLLECTOR

STYLE 2:  
PIN 1. DRAIN  
2. SOURCE  
3. GATE

STYLE 3:  
PIN 1. CATHODE  
2. GATE  
3. ANODE

STYLE 4:  
PIN 1. MAIN TERM. 1  
2. GATE  
3. MAIN TERM. 2

STYLE 5:  
PIN 1. COLLECTOR  
2. BASE  
3. EMITTER

STYLE 6:  
PIN 1. SOURCE  
2. GATE  
3. DRAIN (CASE)

STYLE 7:  
PIN 1. DRAIN  
2. GATE  
3. SOURCE

STYLE 8:  
PIN 1. ANODE  
2. ANODE  
3. CATHODE

STYLE 9:  
PIN 1. SOURCE  
2. DRAIN  
3. GATE

STYLE 10:  
PIN 1. COLLECTOR  
2. EMITTER  
3. BASE

STYLE 11:  
PIN 1. ANODE  
2. OPEN  
3. CATHODE

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