

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

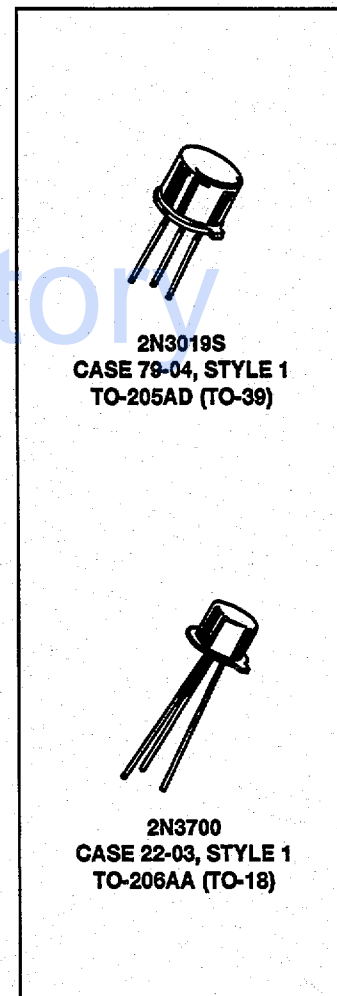
Processed per MIL-S-19500/391

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		V _{dc}
Collector-Emitter Voltage	V _{CEO}	80		V _{dc}
Emitter-Base Voltage	V _{EBO}	7.0		V _{dc}
Collector Current	I _C	1.0		A _{dc}
Device Dissipation @ T _A = 25°C Derate above 25°C @ T _C = 25°C Derate above 25°C	P _D	0.8 4.6 5.0 28.6	0.5 2.85 1.8 10.3	Watts mW/°C Watts mW/°C
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 65 to 200		°C



ELECTRICAL CHARACTERISTICS (T _C = 25°C unless otherwise noted.)				
Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage ⁽¹⁾ (I _C = 30 mA _{dc})	V _{(BR)CEO}	80	—	V _{dc}
Emitter-Base Breakdown Voltage (I _E = 100 μA _{dc})	V _{(BR)EBO}	7.0	—	V _{dc}
Collector-Base Breakdown Voltage (I _C = 100 μA _{dc})	V _{(BR)CBO}	140	—	V _{dc}
Collector Cutoff Current (V _{CE} = 90 V _{dc}) (V _{CE} = 90 V _{dc} , T _A = 150°C)	I _{CES}	—	10 10	nA _{dc} μA _{dc}
Emitter Cutoff Current (V _{BE} = 5.0 V _{dc})	I _{EBO}	—	10	nA _{dc}

(1) Pulsed. Pulse Width 250 to 350 μs, Duty Cycle 1.0 to 2.0%. (continued)

2N3019S and 2N3700 SERIES

ELECTRICAL CHARACTERISTICS — continued ($T_C = 25^\circ\text{C}$ unless otherwise noted.)				
Characteristic	Symbol	Min	Max	Unit
ON CHARACTERISTICS				
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
SMALL-SIGNAL CHARACTERISTICS				
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 ($V_{CE} = 10\text{ Vdc}, I_C = 100\text{ }\mu\text{Adc}, f = 1.0\text{ kHz}$ $R_G = 1.0\text{ kohm}, P_{wr. B.W.} = 200\text{ Hz}$)	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
SWITCHING CHARACTERISTICS (See Section 4, Figure 9)				
Turn-On + Turn-Off Time	$t_{on} + t_{off}$	—	30	ns

(1) Pulsed. Pulse Width 250 to 350 μs , Duty Cycle 1.0 to 2.0%.

ASSURANCE TESTING (Pre/Post Burn-In) 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	—

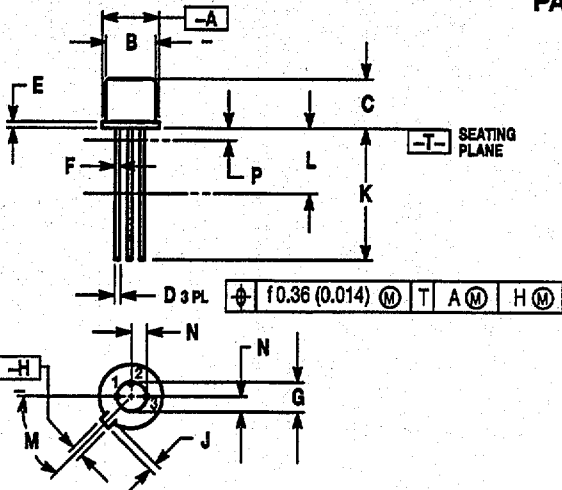
Delta from Pre-Burn-In Measured Values		Min	Max	
Delta Collector Cutoff Current	ΔI_{CES}	—	± 100 or ± 5.0 whichever is greater	% of Initial Value nAdc
Delta DC Current Gain ⁽¹⁾	Δh_{FE}	—	± 15	% of Initial Value

(1) Pulsed. Pulse Width 250 to 350 μs , Duty Cycle 1.0 to 2.0%.

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2N3019S and 2N3700 SERIES

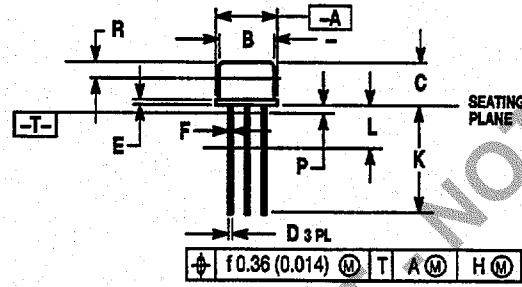
PACKAGE DIMENSIONS



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. DRAIN
3. BASE
- STYLE 11:
PIN 1. ANODE
2. OPEN
3. CATHODE

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