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.

CPTO
Commercial Plus Technologies Operation

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°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 mAdc)	$V_{(BR)CEO}$	80	—	Vdc
Emitter–Base Breakdown Voltage (I_E = 100 μAdc)	$V_{(BR)EBO}$	7.0	—	Vdc
Collector–Base Breakdown Voltage (I_C = 100 μAdc)	$V_{(BR)CBO}$	140	—	Vdc
Collector Cutoff Current (V_{CE} = 90 Vdc) (V_{CE} = 90 Vdc, T_A = 150°C)	I_{CES}	 — —	 10 10	 nAdc μAdc
Emitter Cutoff Current (V_{BE} = 5.0 Vdc)	I_{EBO}	—	10	nAdc

(1) Pulsed. Pulse Width 250 to 350 μs, 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)

MOTOROLA

ELECTRICAL CHARACTERISTICS — continued (T_C = 25°C unless otherwise noted.)				
Characteristic	**Symbol**	**Min**	**Max**	**Unit**
ON CHARACTERISTICS				
DC Current Gain	h_{FE}			—
(V_{CE} = 10 Vdc, I_C = 150 mAdc)(1)		100	300	
(V_{CE} = 10 Vdc, I_C = 0.1 mAdc)		50	200	
(V_{CE} = 10 Vdc, I_C = 10 mAdc)(1)		90	—	
(V_{CE} = 10 Vdc, I_C = 500 mAdc)(1)		50	200	
(V_{CE} = 10 Vdc, I_C = 1.0 mAdc)		15	—	
(V_{CE} = 10 Vdc, I_C = 150 mAdc, T_A = −65°C)(1)		40	—	
Collector–Emitter Saturation Voltage(1)	$V_{CE(sat)}$			Vdc
(I_C = 150 mAdc, I_B = 15 mAdc)		—	0.2	
(I_C = 500 mAdc, I_B = 50 mAdc)		—	0.5	
Base–Emitter Saturation Voltage(1) (I_C = 150 mAdc, I_B = 15 mAdc)	$V_{BE(sat)}$	—	1.1	Vdc
SMALL–SIGNAL CHARACTERISTICS				
Small–Signal Current Gain	h_{fe}			—
(V_{CE} = 5.0 Vdc, I_C = 1.0 mAdc, f = 1.0 kHz)		80	400	
(V_{CE} = 10 Vdc, I_C = 50 mAdc, f = 20 MHz)		5.0	20	
Input Capacitance (V_{EB} = 0.5 Vdc, I_C = 0, f = 0.1 to 1.0 MHz)	C_{ibo}	—	60	pF
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 0.1 to 1.0 MHz)	C_{obo}	—	12	pF
Noise Figure (V_{CE} = 10 Vdc, I_C = 100 µAdc, f = 1.0 kHz R_G = 1.0 kohm, Pwr. B.W. = 200 Hz)	NF	—	4.0	dB
Collector Base Time Constant (V_{CB} = 10 Vdc, I_C = 10 mAdc, f = 79.8 MHz)	$r_b'C_c$	—	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 ±5°C, V_{CB} = 60 Vdc (10 Vdc JANS), P_D = 600 mW 2N3019S, 500 mW 2N3700

Characteristics Tested	**Symbol**	**Initial and End Point Limits**		**Unit**
		Min	**Max**	
Collector Cutoff Current (V_{CE} = 90 Vdc)	I_{CES}	—	10	nAdc
DC Current Gain(1) (V_{CE} = 10 Vdc, I_C = 150 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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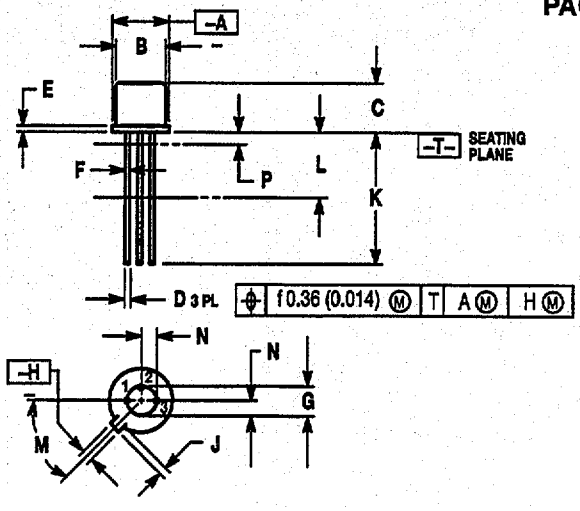
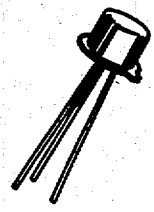
PACKAGE DIMENSIONS

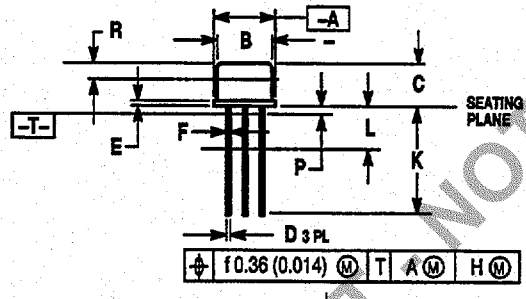


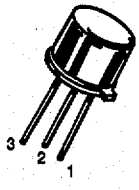


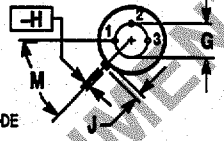
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIM J MEASURED FROM DIM A MAXIMUM.
4. DIM F APPLIES BETWEEN DIM P AND L. DIM D APPLIES BETWEEN DIM L AND K MINIMUM. LEAD DIAMETER IS UNCONTROLLED IN DIM P AND BEYOND DIM K MINIMUM.

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES 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 22–03
TO–206AA
(TO–18)







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 MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	8.51	9.39	0.335	0.370
B	7.75	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

CASE 79–04
TO–205AD
(TO–39)

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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