

# 2N3019, 2N3019S, 2N3700

## Low Power Transistors

### NPN Silicon

#### Features

- MIL-PRF-19500/391 Qualified
- Available as JAN, JANTX, and JANTXV

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

| Characteristic   | Symbol         | Value       | Unit             |
|--|----------------|-------------|------------------|
| Collector - Emitter Voltage  | $V_{CE0}$      | 80          | Vdc              |
| Collector - Base Voltage   | $V_{CB0}$      | 140         | Vdc              |
| Emitter - Base Voltage   | $V_{EB0}$      | 7.0         | Vdc              |
| Collector Current - Continuous   | $I_C$          | 1.0         | Adc              |
| Total Device Dissipation @ $T_A = 25^\circ\text{C}$<br>2N3019, 2N3019S<br>2N3700 | $P_T$          | 800<br>500  | mW               |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$<br>2N3019, 2N3019S<br>2N3700 | $P_T$          | 5.0<br>1.0  | W                |
| Operating and Storage Junction Temperature Range                                 | $T_J, T_{stg}$ | -65 to +200 | $^\circ\text{C}$ |

#### THERMAL CHARACTERISTICS

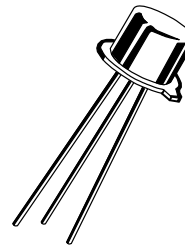
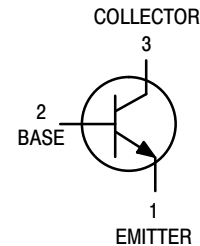
| Characteristic   | Symbol          | Max        | Unit               |
|--|-----------------|------------|--------------------|
| Thermal Resistance, Junction to Ambient<br>2N3019, 2N3019S<br>2N3700 | $R_{\theta JA}$ | 195<br>325 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Case<br>2N3019, 2N3019S<br>2N3700    | $R_{\theta JC}$ | 30<br>150  | $^\circ\text{C/W}$ |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

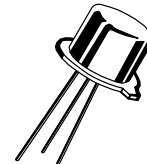


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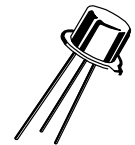
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TO-5  
CASE 205AA  
STYLE 1  
2N3019



TO-39  
CASE 205AB  
STYLE 1  
2N3019S



TO-18  
CASE 206AA  
STYLE 1  
2N3700

#### ORDERING INFORMATION

| Device        | Package | Shipping |
|---------------|---------|----------|
| JAN2N3019     | TO-5    | Bulk     |
| JANTX2N3019   |         |          |
| JANTXV2N3019  |         |          |
| JAN2N3019S    | TO-39   | Bulk     |
| JANTX2N3019S  |         |          |
| JANTXV2N3019S |         |          |
| JAN2N3700     | TO-18   | Bulk     |
| JANTX2N3700   |         |          |
| JANTXV2N3700  |         |          |

## 2N3019, 2N3019S, 2N3700

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

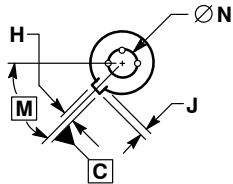
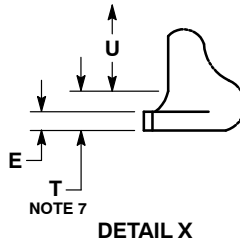
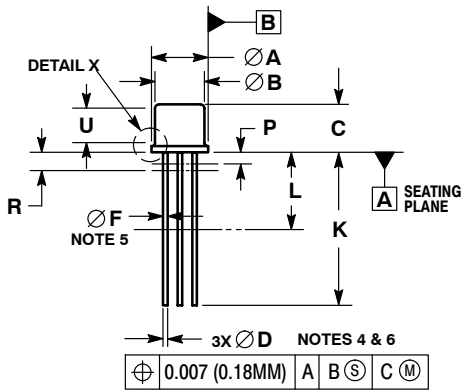
| Characteristic  | Symbol             | Min                         | Max                         | Unit                    |
|---|--------------------|-----------------------------|-----------------------------|-------------------------|
| <b>OFF CHARACTERISTICS</b>  |                    |                             |                             |                         |
| Collector–Emitter Breakdown Voltage<br>( $I_C = 30\text{ mA}$ )   | $V_{(BR)CEO}$      | 80                          | –                           | Vdc                     |
| Emitter–Base Cutoff Current<br>( $V_{EB} = 5.0\text{ Vdc}$ )<br>( $V_{EB} = 7.0\text{ Vdc}$ )   | $I_{EBO}$          | –<br>–                      | 10<br>10                    | nAdc<br>$\mu\text{Adc}$ |
| Collector–Emitter Cutoff Current<br>( $V_{CE} = 90\text{ Vdc}$ )  | $I_{CEO}$          | –                           | 10                          | nAdc                    |
| Collector–Base Cutoff Current<br>( $V_{CB} = 140\text{ Vdc}$ )  | $I_{CBO}$          | –                           | 10                          | $\mu\text{Adc}$         |
| <b>ON CHARACTERISTICS (Note 1)</b>  |                    |                             |                             |                         |
| DC Current Gain<br>( $I_C = 0.1\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ )<br>( $I_C = 10\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ )<br>( $I_C = 150\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ )<br>( $I_C = 500\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ )<br>( $I_C = 1.0\text{ A}$ , $V_{CE} = 10\text{ Vdc}$ ) | $h_{FE}$           | 50<br>90<br>100<br>50<br>15 | 300<br>–<br>300<br>300<br>– | –                       |
| Collector–Emitter Saturation Voltage<br>( $I_C = 150\text{ mA}$ , $I_B = 15\text{ mA}$ )<br>( $I_C = 500\text{ mA}$ , $I_B = 50\text{ mA}$ )  | $V_{CE(sat)}$      | –<br>–                      | 0.2<br>0.5                  | Vdc                     |
| Base–Emitter Saturation Voltage<br>( $I_C = 150\text{ mA}$ , $I_B = 15\text{ mA}$ )   | $V_{BE(sat)}$      | –                           | 1.1                         | Vdc                     |
| <b>SMALL-SIGNAL CHARACTERISTICS</b>   |                    |                             |                             |                         |
| Magnitude of Small–Signal Current Gain<br>( $I_C = 50\text{ mA}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 20\text{ MHz}$ )   | $ h_{fe} $         | 5.0                         | 20                          | –                       |
| Small–Signal Current Gain<br>( $I_C = 1.0\text{ mA}$ , $V_{CE} = 5\text{ Vdc}$ , $f = 1\text{ kHz}$ )   | $h_{fe}$           | 80                          | 400                         | –                       |
| Output Capacitance<br>( $V_{CB} = 10\text{ Vdc}$ , $I_E = 0$ , $100\text{ kHz} \leq f \leq 1.0\text{ MHz}$ )  | $C_{obo}$          | –                           | 12                          | pF                      |
| Input Capacitance<br>( $V_{EB} = 0.5\text{ Vdc}$ , $I_C = 0$ , $100\text{ kHz} \leq f \leq 1.0\text{ MHz}$ )  | $C_{ibo}$          | –                           | 60                          | pF                      |
| Noise Figure<br>( $V_{CE} = 10\text{ Vdc}$ , $I_C = 100\text{ }\mu\text{Adc}$ , $R_g = 1\text{ k}\Omega$ , $\text{PBW} = 200\text{ Hz}$ )   | NF                 | –                           | 4.0                         | dB                      |
| Collector–Base Time Constant<br>( $V_{CB} = 10\text{ Vdc}$ , $I_C = 10\text{ mA}$ , $f = 79.8\text{ MHz}$ )   | $r'_{b,C_C}$       | –                           | 400                         | ps                      |
| <b>SWITCHING CHARACTERISTICS</b>  |                    |                             |                             |                         |
| Pulse Response<br>(Reference Figure in MIL-PRF-19500/391)   | $t_{on} + t_{off}$ | –                           | 30                          | ns                      |

1. Pulse Test: Pulse Width = 300  $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

# 2N3019, 2N3019S, 2N3700

## PACKAGE DIMENSIONS

### TO-5 3-Lead CASE 205AA ISSUE B



NOTES:

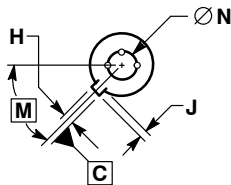
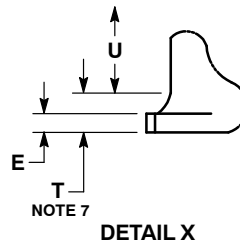
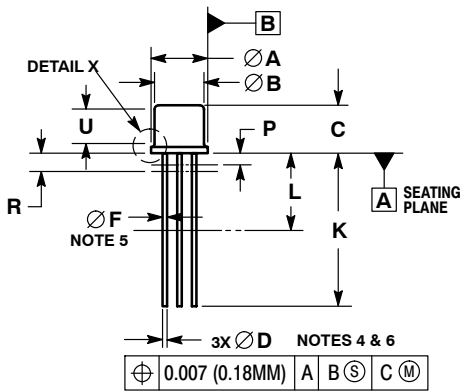
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. DIMENSION J MEASURED FROM DIAMETER A TO EDGE.
4. LEAD TRUE POSITION TO BE DETERMINED AT THE GAUGE PLANE DEFINED BY DIMENSION R.
5. DIMENSION F APPLIES BETWEEN DIMENSION P AND L.
6. DIMENSION D APPLIES BETWEEN DIMENSION L AND K.
7. BODY CONTOUR OPTIONAL WITHIN ZONE DEFINED BY DIMENSIONS A, B, AND T.
8. DIMENSION B SHALL NOT VARY MORE THAN 0.010 IN ZONE P.

| DIM | MILLIMETERS |       | INCHES    |       |
|-----|-------------|-------|-----------|-------|
|     | MIN         | MAX   | MIN       | MAX   |
| A   | 8.89        | 9.40  | 0.350     | 0.370 |
| B   | 8.00        | 8.51  | 0.315     | 0.335 |
| C   | 6.10        | 6.60  | 0.240     | 0.260 |
| D   | 0.41        | 0.53  | 0.016     | 0.021 |
| E   | 0.23        | 3.18  | 0.009     | 0.125 |
| F   | 0.41        | 0.48  | 0.016     | 0.019 |
| H   | 0.71        | 0.86  | 0.028     | 0.034 |
| J   | 0.73        | 1.02  | 0.029     | 0.040 |
| K   | 38.10       | 44.45 | 1.500     | 1.750 |
| L   | 6.35        | ---   | 0.250     | ---   |
| M   | 45° BSC     |       | 45° BSC   |       |
| N   | 5.08 BSC    |       | 0.200 BSC |       |
| P   | ---         | 1.27  | ---       | 0.050 |
| R   | 1.37 BSC    |       | 0.054 BSC |       |
| T   | ---         | 0.76  | ---       | 0.030 |
| U   | 2.54        | ---   | 0.100     | ---   |

STYLE 1:

- PIN 1. EMITTER
- BASE
- COLLECTOR

### TO-39 3-Lead CASE 205AB ISSUE A



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. DIMENSION J MEASURED FROM DIAMETER A TO EDGE.
4. LEAD TRUE POSITION TO BE DETERMINED AT THE GAUGE PLANE DEFINED BY DIMENSION R.
5. DIMENSION F APPLIES BETWEEN DIMENSION P AND L.
6. DIMENSION D APPLIES BETWEEN DIMENSION L AND K.
7. BODY CONTOUR OPTIONAL WITHIN ZONE DEFINED BY DIMENSIONS A, B, AND T.
8. DIMENSION B SHALL NOT VARY MORE THAN 0.010 IN ZONE P.

| DIM | MILLIMETERS |       | INCHES    |       |
|-----|-------------|-------|-----------|-------|
|     | MIN         | MAX   | MIN       | MAX   |
| A   | 8.89        | 9.40  | 0.350     | 0.370 |
| B   | 8.00        | 8.51  | 0.315     | 0.335 |
| C   | 6.10        | 6.60  | 0.240     | 0.260 |
| D   | 0.41        | 0.48  | 0.016     | 0.019 |
| E   | 0.23        | 3.18  | 0.009     | 0.125 |
| F   | 0.41        | 0.48  | 0.016     | 0.019 |
| H   | 0.71        | 0.86  | 0.028     | 0.034 |
| J   | 0.73        | 1.02  | 0.029     | 0.040 |
| K   | 12.70       | 14.73 | 0.500     | 0.580 |
| L   | 6.35        | ---   | 0.250     | ---   |
| M   | 45° BSC     |       | 45° BSC   |       |
| N   | 5.08 BSC    |       | 0.200 BSC |       |
| P   | ---         | 1.27  | ---       | 0.050 |
| R   | 1.37 BSC    |       | 0.054 BSC |       |
| T   | ---         | 0.76  | ---       | 0.030 |
| U   | 2.54        | ---   | 0.100     | ---   |

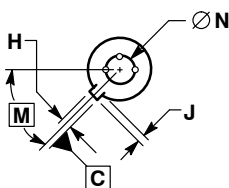
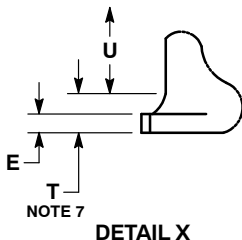
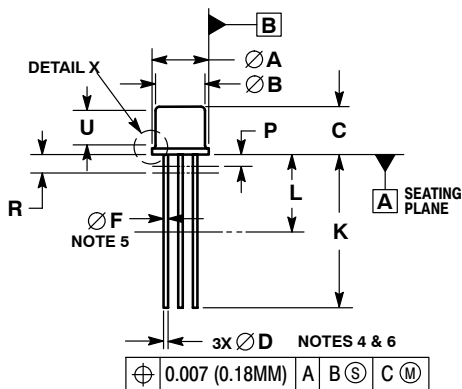
STYLE 1:

- PIN 1. EMITTER
- BASE
- COLLECTOR

# 2N3019, 2N3019S, 2N3700

## PACKAGE DIMENSIONS

### TO-18 3-Lead CASE 206AA ISSUE A



**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. DIMENSION J MEASURED FROM DIAMETER A TO EDGE.
4. LEAD TRUE POSITION TO BE DETERMINED AT THE GAUGE PLANE DEFINED BY DIMENSION R.
5. DIMENSION F APPLIES BETWEEN DIMENSION P AND L.
6. DIMENSION D APPLIES BETWEEN DIMENSION L AND K.
7. BODY CONTOUR OPTIONAL WITHIN ZONE DEFINED BY DIMENSIONS A, B, AND T.

| 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   | 0.41        | 0.53  | 0.016     | 0.021 |
| E   | ---         | 0.76  | ---       | 0.030 |
| F   | 0.41        | 0.48  | 0.016     | 0.019 |
| H   | 0.91        | 1.17  | 0.036     | 0.046 |
| J   | 0.71        | 1.22  | 0.028     | 0.048 |
| K   | 12.70       | 19.05 | 0.500     | 0.750 |
| L   | 6.35        | ---   | 0.250     | ---   |
| M   | 45° BSC     |       | 45° BSC   |       |
| N   | 2.54 BSC    |       | 0.100 BSC |       |
| P   | ---         | 1.27  | ---       | 0.050 |
| R   | 1.37 BSC    |       | 0.054 BSC |       |
| T   | ---         | 0.76  | ---       | 0.030 |
| U   | 2.54        | ---   | 0.100     | ---   |

**STYLE 1:**

- PIN 1. EMITTER
2. BASE
3. COLLECTOR

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