



LOW POWER NPN SILICON TRANSISTOR

Qualified per MIL-PRF-19500/391

Qualified Levels:
JAN, JANTX,
JANTXV, and JANS

DESCRIPTION

This 2N3019 NPN leaded silicon transistor device is military qualified for high-reliability applications. Microsemi also offers numerous other transistor products to meet higher and lower power ratings with various switching speed requirements in both through-hole and surface-mount packages.

Important: For the latest information, visit our website <http://www.microsemi.com>.

FEATURES

- JEDEC registered 2N3019 number.
- JAN, JANTX, JANTXV and JANS qualifications are available per MIL-PRF-19500/391.
- Rad hard levels are also available per MIL-PRF-19500/391.
(For RHA datasheet see [JANS D2N3019](#).)
- RoHS compliant by design.

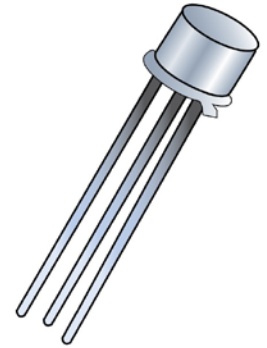
APPLICATIONS / BENEFITS

- Long leaded TO-5 package.
- Lightweight.
- Low power.
- Military and other high-reliability applications.

MAXIMUM RATINGS @ T_A = +25 °C unless otherwise noted

| Parameters/Test Conditions | Symbol | Value | Unit |
|--|-------------------------------------|-------------|------|
| Junction and Storage Temperature | T _J and T _{STG} | -65 to +200 | °C |
| Thermal Resistance Junction-to-Ambient | R _{θJA} | 195 | °C/W |
| Thermal Resistance Junction-to-Case | R _{θJC} | 30 | °C/W |
| Collector-Emitter Voltage | V _{CEO} | 80 | V |
| Collector-Base Voltage | V _{CBO} | 140 | V |
| Emitter-Base Voltage | V _{EBO} | 7.0 | V |
| Collector Current | I _C | 1.0 | A |
| Total Power Dissipation: | | | |
| @ T _A = +25 °C ⁽¹⁾ | P _D | 0.8 | W |
| @ T _C = +25 °C ⁽²⁾ | | 5.0 | |


- Notes:**
1. Derate linearly 4.6 mW/°C for T_A ≥ +25 °C.
 2. Derate linearly 28.6 mW/°C for T_C ≥ +25 °C.





TO-5 Package

Also available in:

TO-39 (TO-205AD)
(short-leaded)
 [2N3019S](#)

TO-46 (TO-206AB)
(leaded)
 [2N3057A](#)

TO-18 (TO-206AA)
(leaded)
 [2N3700](#)

UB package
(leaded)
 [2N3700UB](#)

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MECHANICAL and PACKAGING

- CASE: Hermetically sealed, kovar base, nickel cap.
- TERMINALS: Gold plate, solder dip (Sn63/Pb37) available upon request. NOTE: Solder dip will eliminate RoHS compliance.
- MARKING: Part number, date code, manufacturer's ID and serial number.
- POLARITY: NPN.
- WEIGHT: Approximately 1.064 grams.
- See [Package Dimensions](#) on last page.

PART NOMENCLATURE

JAN 2N3019

Reliability Level

JAN = JAN level
 JANTX = JANTX level
 JANTXV = JANTXV level
 JANS = JANS level
 Blank = Commercial

JEDEC type number

(see [Electrical Characteristics](#) table)

SYMBOLS & DEFINITIONS

| Symbol | Definition |
|----------|-----------------------------------|
| f | Frequency |
| I_B | Base current (dc) |
| I_E | Emitter current (dc) |
| T_A | Ambient temperature |
| T_C | Case temperature |
| V_{CB} | Collector to base voltage (dc) |
| V_{CE} | Collector to emitter voltage (dc) |
| V_{EB} | Emitter to base voltage (dc) |

ELECTRICAL CHARACTERISTICS @ $T_A = +25\text{ }^\circ\text{C}$, unless otherwise noted

| Parameters / Test Conditions | Symbol | Min. | Max. | Unit |
|---|---------------|-----------------------------|--------------------------|----------------|
| OFF CHARACTERISTICS | | | | |
| Collector-Emitter Breakdown Current $I_C = 30\text{ mA}$ | $V_{(BR)CEO}$ | 80 | | V |
| Collector-Base Cutoff Current $V_{CB} = 140\text{ V}$ | I_{CBO} | | 10 | μA |
| Emitter-Base Cutoff Current $V_{EB} = 7\text{ V}$ | I_{EBO1} | | 10 | μA |
| Collector-Emitter Cutoff Current $V_{CE} = 90\text{ V}$ | I_{CES} | | 10 | ηA |
| Emitter-Base Cutoff Current $V_{EB} = 5.0\text{ V}$ | I_{EBO2} | | 10 | ηA |
| ON CHARACTERISTICS | | | | |
| Forward-Current Transfer Ratio $I_C = 150\text{ mA}, V_{CE} = 10\text{ V}$ $I_C = 0.1\text{ mA}, V_{CE} = 10\text{ V}$ $I_C = 10\text{ mA}, V_{CE} = 10\text{ V}$ $I_C = 500\text{ mA}, V_{CE} = 10\text{ V}$ $I_C = 1.0\text{ A}, V_{CE} = 10\text{ V}$ | h_{FE} | 100 50 90 50 15 | 300 300 300 300 | |
| Collector-Emitter Saturation Voltage $I_C = 150\text{ mA}, I_B = 15\text{ mA}$ $I_C = 500\text{ mA}, I_B = 50\text{ mA}$ | $V_{CE(sat)}$ | | 0.2 0.5 | V |
| Base-Emitter Saturation Voltage $I_C = 150\text{ mA}, I_B = 15\text{ mA}$ | $V_{BE(sat)}$ | | 1.1 | V |

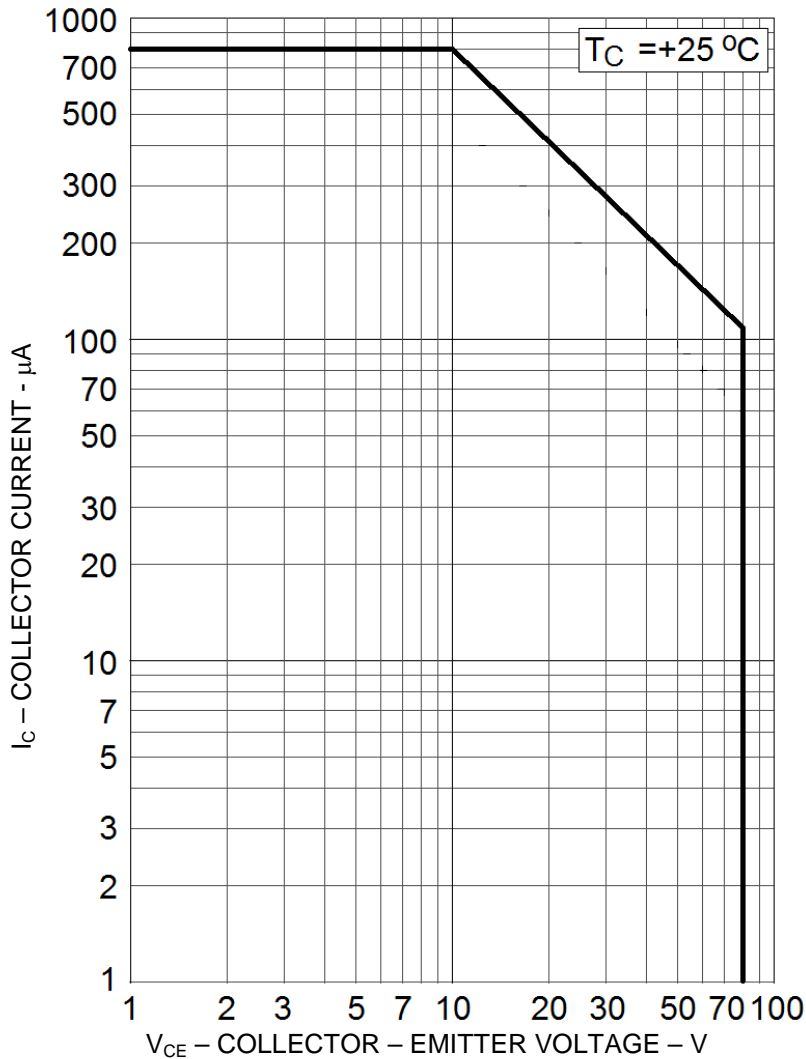
DYNAMIC CHARACTERISTICS

| Parameters / Test Conditions | Symbol | Min. | Max. | Unit |
|---|------------|------|------|------|
| Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = 1.0\text{ mA}, V_{CE} = 5.0\text{ V}, f = 1.0\text{ kHz}$ | h_{fe} | 80 | 400 | |
| Magnitude of Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = 50\text{ mA}, V_{CE} = 10\text{ V}, f = 20\text{ MHz}$ | $ h_{fe} $ | 5.0 | 20 | |
| Output Capacitance $V_{CB} = 10\text{ V}, I_E = 0, 100\text{ kHz} \leq f \leq 1.0\text{ MHz}$ | C_{obo} | | 12 | pF |
| Input Capacitance $V_{EB} = 0.5\text{ V}, I_C = 0, 100\text{ kHz} \leq f \leq 1.0\text{ MHz}$ | C_{ibo} | | 60 | pF |

ELECTRICAL CHARACTERISTICS @ $T_A = +25\text{ }^\circ\text{C}$, unless otherwise noted (continued)
SAFE OPERATION AREA (See SOA graph below and [MIL-STD-750, method 3053](#))

DC Tests
 $T_C = 25\text{ }^\circ\text{C}$, 1 cycle, $t = 10\text{ ms}$

| | |
|---------------|---|
| Test 1 | $V_{CE} = 10\text{ V}$ $I_C = 500\text{ mA}$ |
| Test 2 | $V_{CE} = 40\text{ V}$ $I_C = 125\text{ mA}$ |
| Test 3 | $V_{CE} = 80\text{ V}$ $I_C = 60\text{ mA}$ |

 (1) Pulse Test: Pulse Width = $300\text{ }\mu\text{s}$, duty cycle $\leq 2.0\%$.

Maximum Safe Operating Area

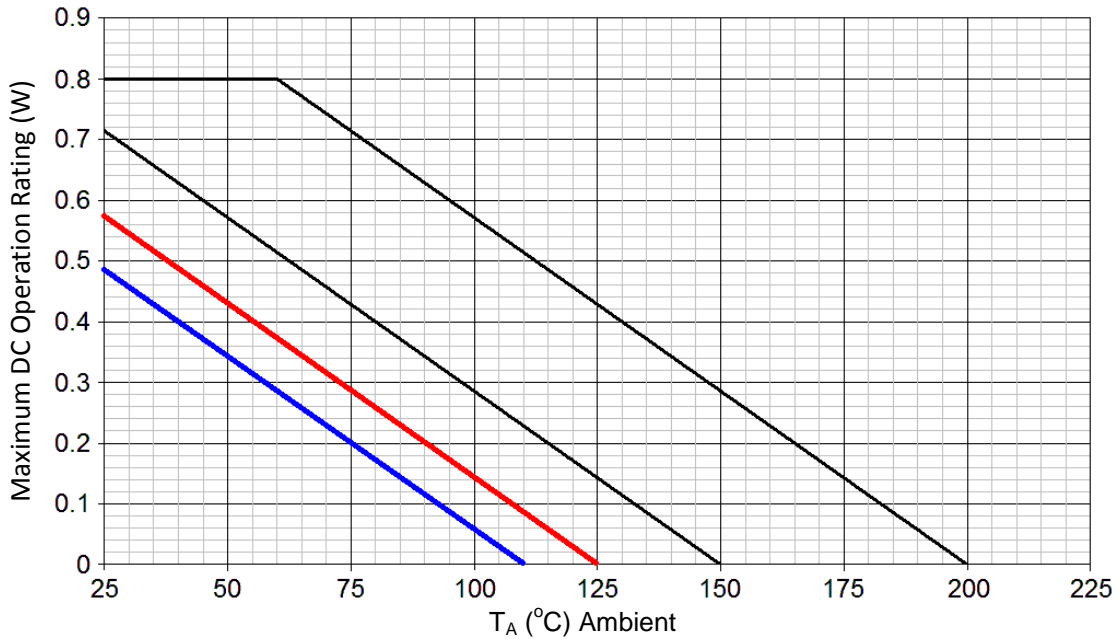
GRAPHS


FIGURE 1
Temperature - Power Derating ($R_{\theta JA}$)

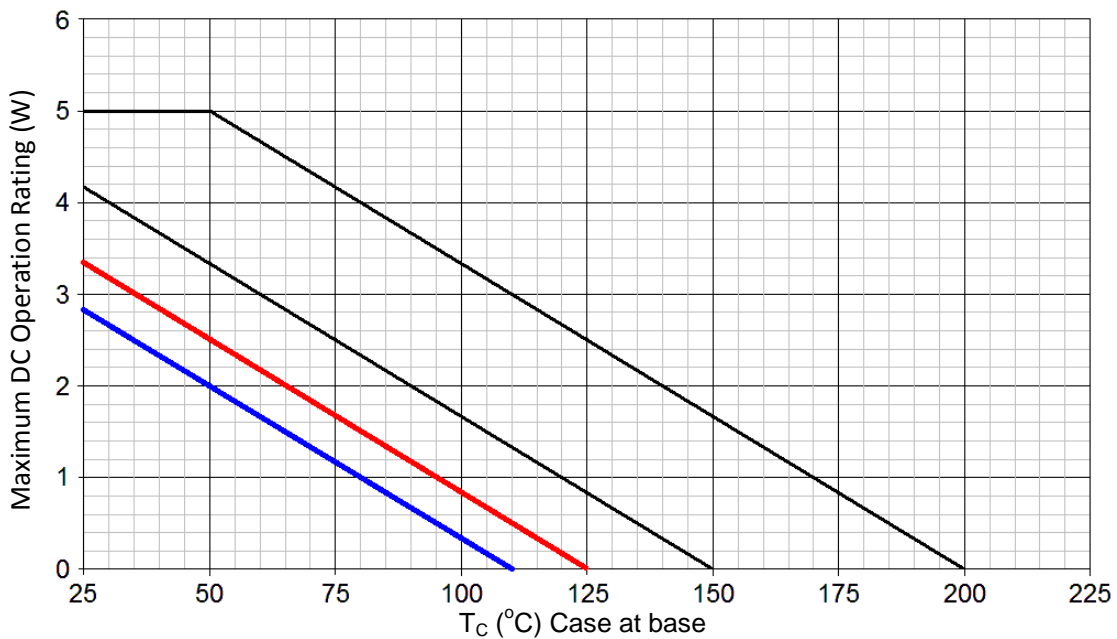
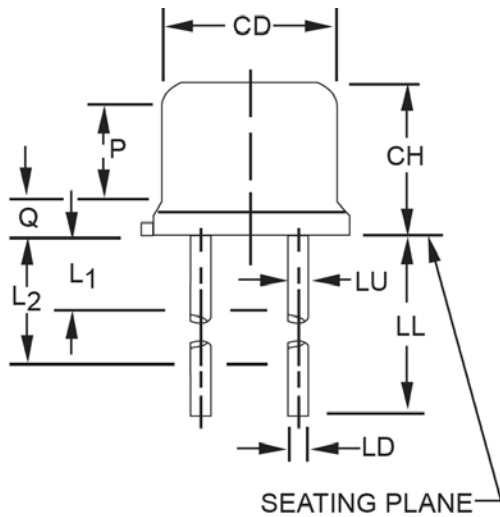
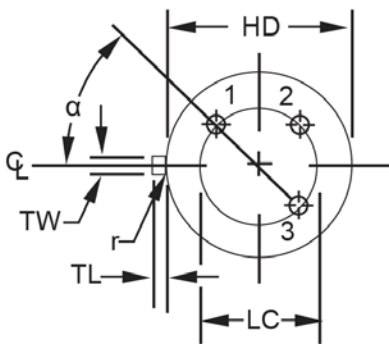


FIGURE 2
Temperature - Power Derating ($R_{\theta JC}$)

PACKAGE DIMENSIONS


| Symbol | Dimensions | | | | Notes |
|----------------|------------|-------|-------------|-------|-------|
| | Inches | | Millimeters | | |
| | Min | Max | Min | Max | |
| CD | .305 | .335 | 7.75 | 8.51 | |
| CH | .240 | .260 | 6.10 | 6.60 | |
| HD | .335 | .370 | 8.51 | 9.40 | |
| LC | .200 TP | | 5.08 TP | | 6 |
| LD | .016 | .021 | 0.41 | 0.53 | 7, 8 |
| LL | 1.500 | 1.750 | 38.10 | 44.45 | 7, 8 |
| LU | .016 | .019 | 0.41 | 0.48 | 7, 8 |
| L ₁ | | .050 | | 1.27 | 7, 8 |
| L ₂ | .250 | | 6.35 | | 7, 8 |
| Q | | .050 | | 1.27 | 5 |
| TL | .029 | .045 | 0.74 | 1.14 | 4 |
| TW | .028 | .034 | 0.71 | 0.86 | 3 |
| r | | .010 | | 0.25 | 10 |
| α | 45° TP | | 45° TP | | 6 |
| P | .100 | - | 2.54 | - | |


NOTES:

- Dimensions are in inches.
- Millimeters are given for general information only.
- Beyond r (radius) maximum, TW shall be held for a minimum length of .011 (0.28 mm).
- Dimension TL measured from maximum HD.
- Body contour optional within zone defined by HD, CD, and Q.
- Leads at gauge plane .054 +.001 -.000 inch (1.37 +0.03 -0.00 mm) below seating plane shall be within .007 inch (0.18 mm) radius of true position (TP) at maximum material condition (MMC) relative to tab at MMC. This device may be measured by direct methods.
- Dimension LU applies between L₁ and L₂. Dimension LD applies between L₂ and minimum. Diameter is uncontrolled in L₁ and beyond LL minimum.
- All three leads.
- The collector shall be internally connected to the case.
- Dimension r (radius) applies to both inside corners of tab.
- In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.
- Lead 1 = emitter, lead 2 = base, lead 3 = collector.