



# LOW POWER NPN SILICON TRANSISTOR

Qualified per MIL-PRF-19500/391

## DESCRIPTION

This 2N3019S 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 D2N3019S](#).)
- RoHS compliant by design.

## APPLICATIONS / BENEFITS

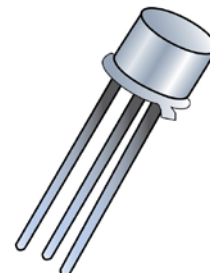
- Short leaded TO-39 package.
- Lightweight.
- Low power.
- Military and other high-reliability applications.

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

Parameters/Test Conditions	Symbol	Value	Unit
Junction and Storage Temperature	$T_J$ and $T_{STG}$	-65 to +200	$^\circ\text{C}$
Thermal Resistance Junction-to-Ambient	$R_{\theta JA}$	195	$^\circ\text{C/W}$
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	30	$^\circ\text{C/W}$
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:			
@ $T_A = +25^\circ\text{C}$ <sup>(1)</sup>	$P_D$	0.8	W
@ $T_C = +25^\circ\text{C}$ <sup>(2)</sup>		5.0	


- Notes:**
1. Derate linearly 4.6 mW/ $^\circ\text{C}$  for  $T_A \geq +25^\circ\text{C}$ .
  2. Derate linearly 28.6 mW/ $^\circ\text{C}$  for  $T_C \geq +25^\circ\text{C}$ .

Qualified Levels:  
JAN, JANTX,  
JANTXV, and JANS




## TO-39 (TO-205AD) Package

Also available in:

**TO-5 package**  
(long-leaded)  
 [2N3019](#)

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

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

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

### MSC – Lawrence

6 Lake Street,  
Lawrence, MA 01841  
Tel: 1-800-446-1158 or  
(978) 620-2600  
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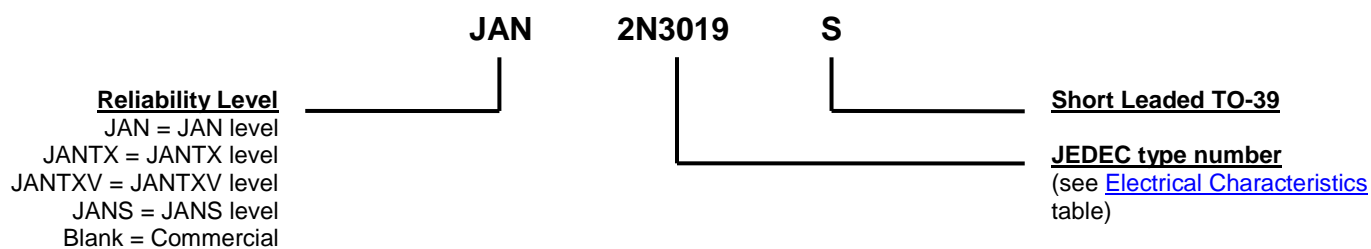
### Website:

[www.microsemi.com](http://www.microsemi.com)

### 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



### SYMBOLS & DEFINITIONS

Symbol	Definition
f	Frequency
I <sub>B</sub>	Base current (dc)
I <sub>E</sub>	Emitter current (dc)
T <sub>A</sub>	Ambient temperature
T <sub>C</sub>	Case temperature
V <sub>CB</sub>	Collector to base voltage (dc)
V <sub>CE</sub>	Collector to emitter voltage (dc)
V <sub>EB</sub>	Emitter to base voltage (dc)

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

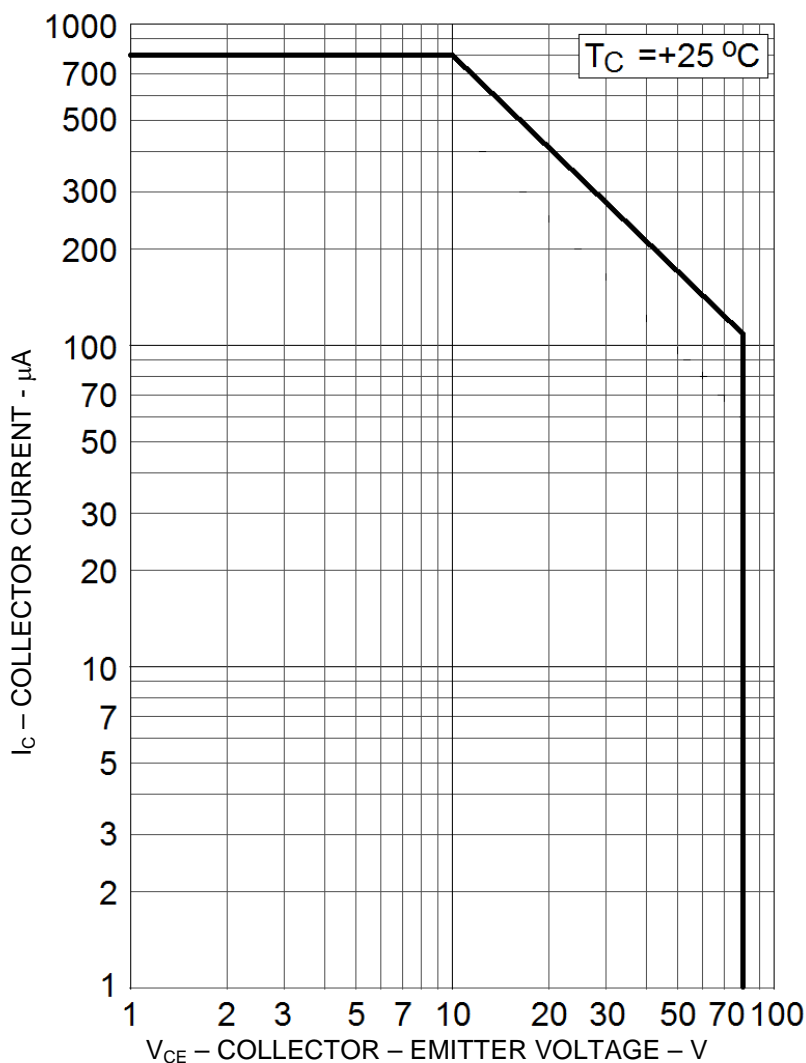
Parameters / Test Conditions	Symbol	Min.	Max.	Unit
<b>OFF CHARACTERISTICS</b>				
Collector-Emitter Breakdown Current $I_C = 30\text{ mA}$	$V_{(BR)CEO}$	80		V
Collector-Base Cutoff Current $V_{CB} = 140\text{ V}$	$I_{CBO}$		10	$\mu\text{A}$
Emitter-Base Cutoff Current $V_{EB} = 7\text{ V}$	$I_{EBO1}$		10	$\mu\text{A}$
Collector-Emitter Cutoff Current $V_{CE} = 90\text{ V}$	$I_{CES}$		10	$\eta\text{A}$
Emitter-Base Cutoff Current $V_{EB} = 5.0\text{ V}$	$I_{EBO2}$		10	$\eta\text{A}$
<b>ON CHARACTERISTICS</b>				
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

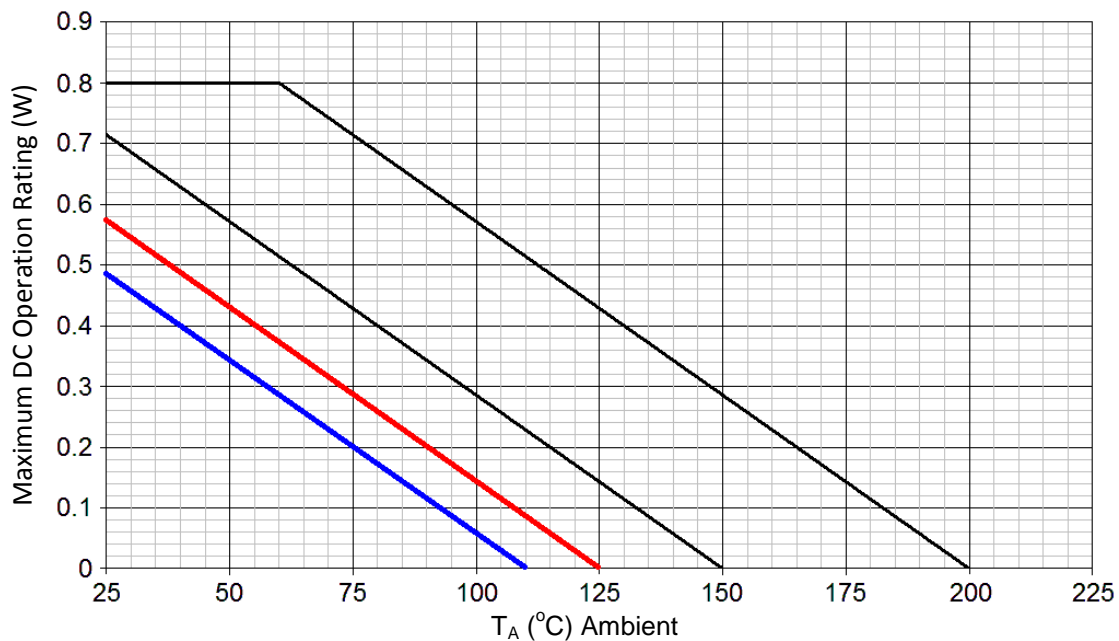
**DYNAMIC CHARACTERISTICS**

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

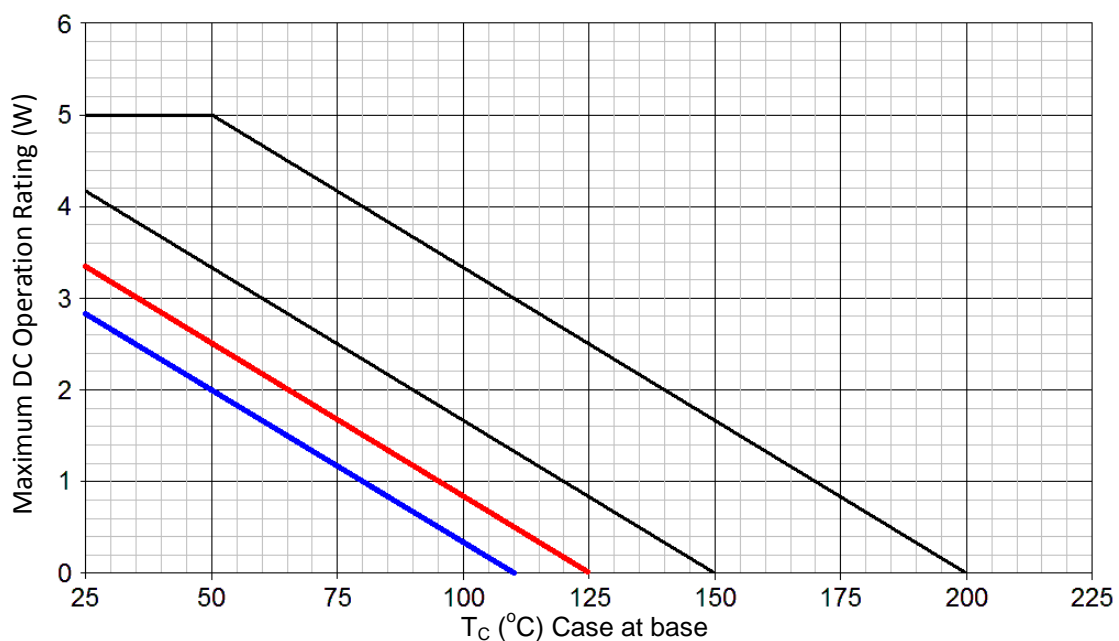
**ELECTRICAL CHARACTERISTICS @  $T_A = +25\text{ }^{\circ}\text{C}$ , unless otherwise noted (continued)**
**SAFE OPERATION AREA** (See SOA graph below and [MIL-STD-750, method 3053](#))

**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**  $V_{CE} = 80\text{ V}$   
 $I_C = 60\text{ mA}$ 

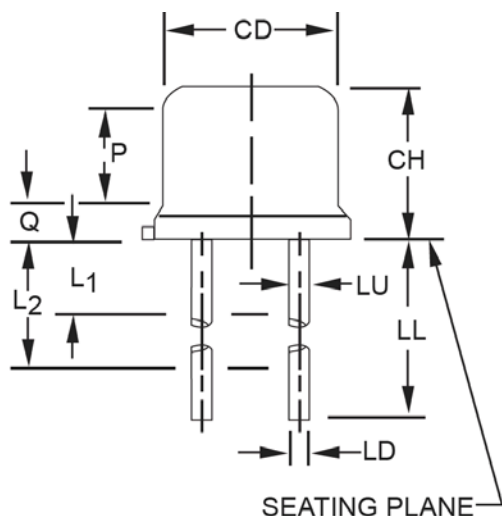
(1) Pulse Test: Pulse Width =  $300\text{ }\mu\text{s}$ , duty cycle  $\leq 2.0\%$ .

Maximum Safe Operating Area

**GRAPHS**


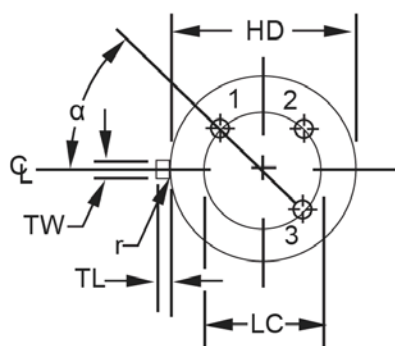
**FIGURE 1**  
Temperature – Power Derating ( $R_{\Theta JA}$ )



**FIGURE 2**  
Temperature – Power Derating ( $R_{\Theta JC}$ )

**PACKAGE DIMENSIONS**


Symbol	Dimensions				Notes
	Inch		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	.500	.750	12.70	19.05	7, 8
LU	.016	.019	0.41	0.48	7, 8
L <sub>1</sub>		.050		1.27	7, 8
L <sub>2</sub>	.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:**

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Beyond r (radius) maximum, TW shall be held for a minimum length of .011 (0.28 mm).
4. Dimension TL measured from maximum HD.
5. Body contour optional within zone defined by HD, CD, and Q.
6. 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.
7. Dimension LU applies between L1 and L2. Dimension LD applies between L2 and minimum. Diameter is uncontrolled in L1 and beyond LL minimum.
8. All three leads.
9. The collector shall be internally connected to the case.
10. Dimension r (radius) applies to both inside corners of tab.
11. In accordance with ASME Y14.5M, diameters are equivalent to  $\Phi$ x symbology.
12. Lead 1 = emitter, lead 2 = base, lead 3 = collector.