



## LOW POWER NPN SILICON TRANSISTOR

*Qualified per MIL-PRF-19500/391*

Qualified Levels:  
JAN, JANTX,  
JANTXV, and JANS

### 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 [JANS2N3019S](#).)
- RoHS compliant by design.

### APPLICATIONS / BENEFITS

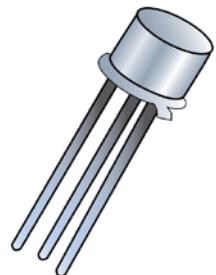
- Short leaded TO-39 package.
- Lightweight.
- Low power.
- Military and other high-reliability applications.

### 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	$^\circ\text{C}/\text{W}$
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	30	$^\circ\text{C}/\text{W}$
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> @ $T_C = +25^\circ\text{C}$ <sup>(2)</sup>	$P_D$	0.8 5.0	W

**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  $T_C \geq +25^\circ\text{C}$ .



**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  
Fax: (978) 689-0803

#### **MSC – Ireland**

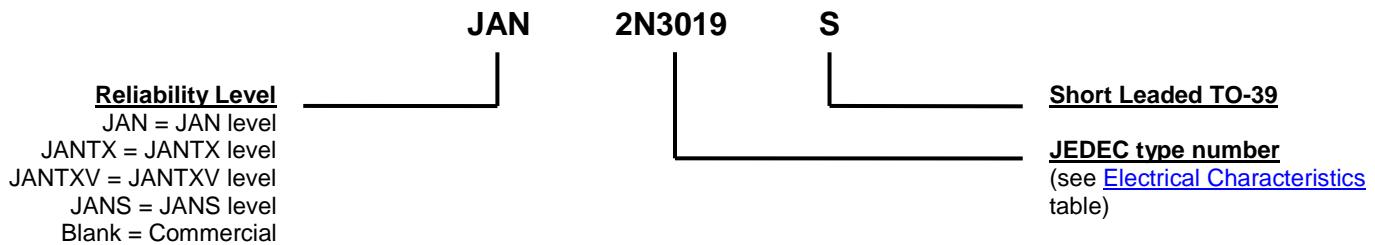
Gort Road Business Park,  
Ennis, Co. Clare, Ireland  
Tel: +353 (0) 65 6840044  
Fax: +353 (0) 65 6822298

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

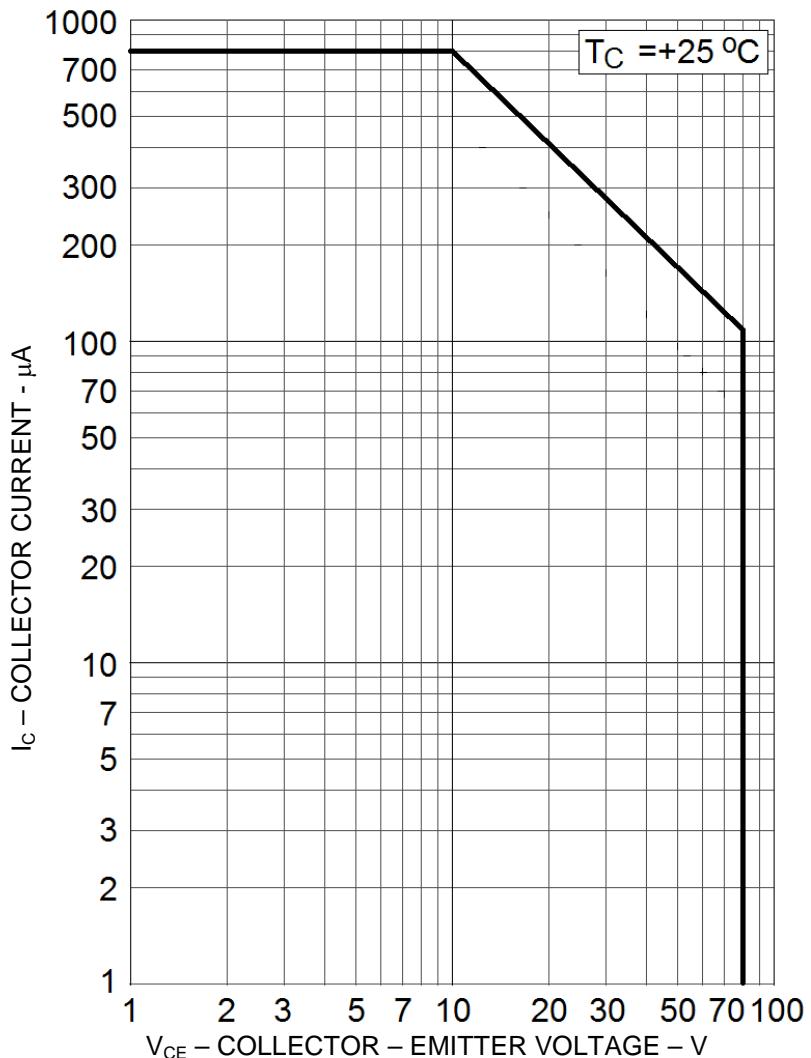
Parameters / Test Conditions	Symbol	Min.	Max.	Unit
<b>OFF CHARACTERISTICS</b>				
Collector-Emitter Breakdown Current $I_C = 30 \text{ mA}$	$V_{(\text{BR})\text{CEO}}$	80		V
Collector-Base Cutoff Current $V_{\text{CB}} = 140 \text{ V}$	$I_{\text{CBO}}$		10	$\mu\text{A}$
Emitter-Base Cutoff Current $V_{\text{EB}}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

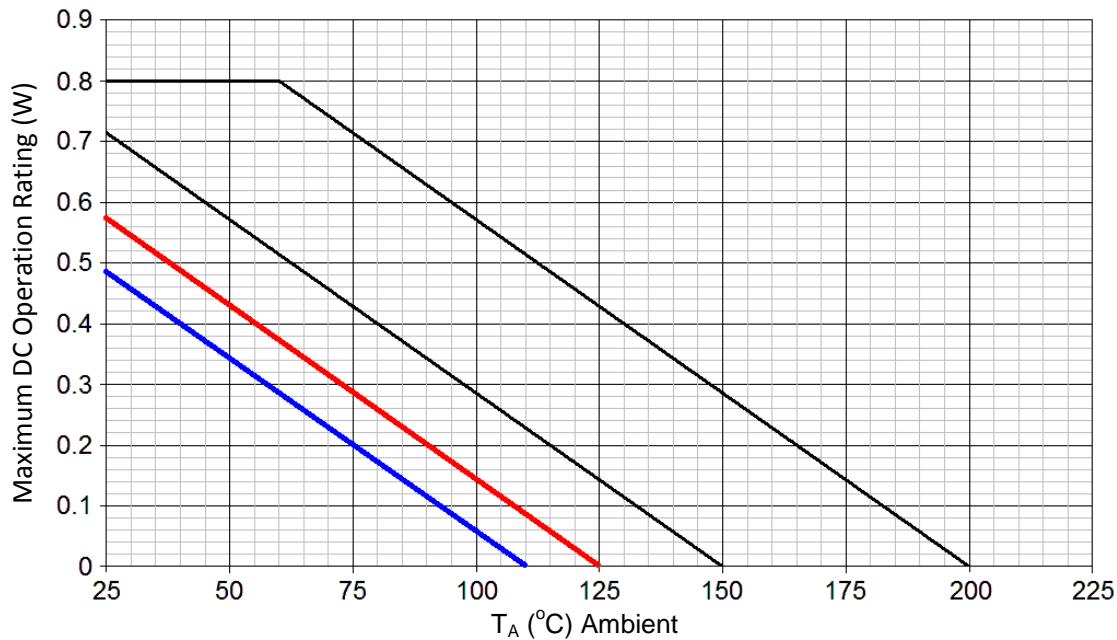
**DYNAMIC CHARACTERISTICS**

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

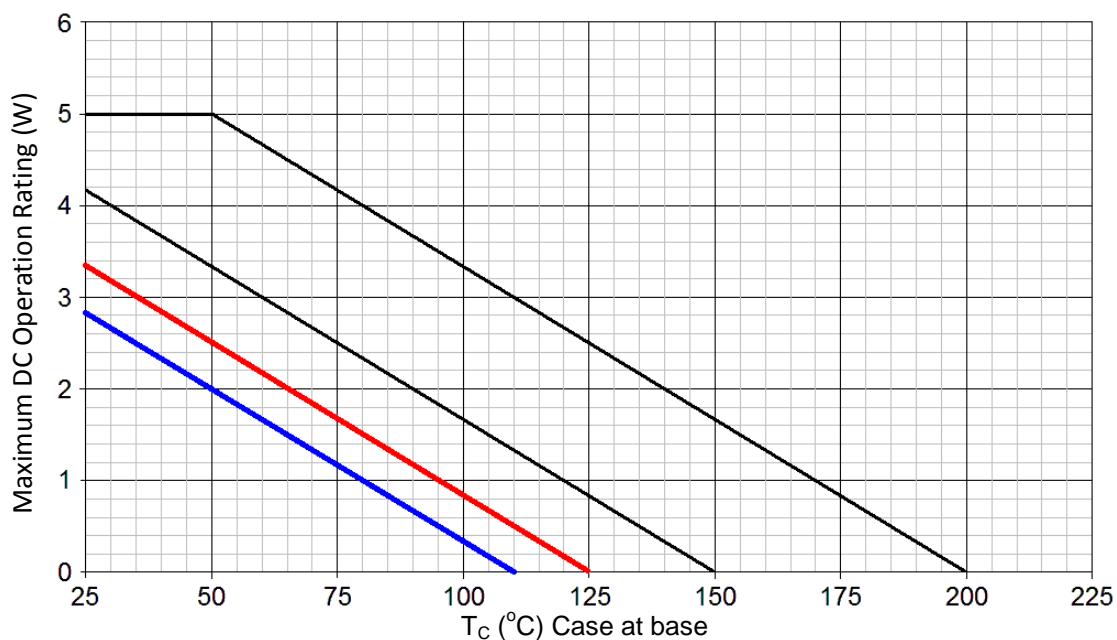
**ELECTRICAL CHARACTERISTICS @  $T_A = +25^\circ\text{C}$ , unless otherwise noted (continued)**
**SAFE OPERATION AREA (See SOA graph below and [MIL-STD-750, method 3053](#))**
**DC Tests**
 $T_C = 25^\circ\text{C}$ , 1 cycle,  $t = 10\text{ ms}$ 
**Test 1**
 $V_{CE} = 10\text{ V}$   
 $I_C = 500\text{ mA}$ 
**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  $\mu\text{s}$ , duty cycle  $\leq 2.0\%$ .

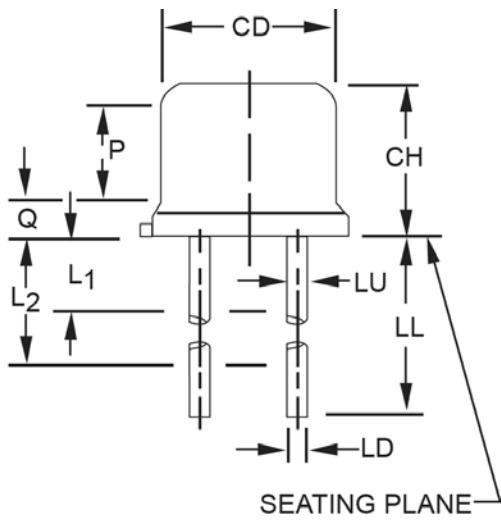

Maximum Safe Operating Area

**GRAPHS**


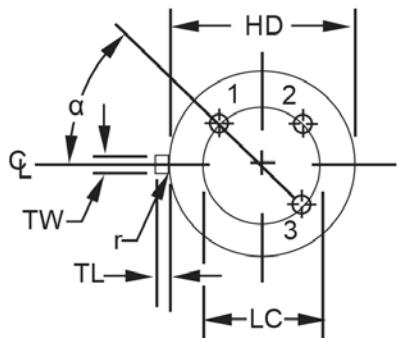
**FIGURE 1**  
Temperature – Power Derating (R<sub>θJA</sub>)



**FIGURE 2**  
Temperature – Power Derating (R<sub>θJC</sub>)

**PACKAGE DIMENSIONS**


Symbol	Dimensions				Notes	
	Inch		Millimeters			
	Min	Max	Min	Max		
<b>CD</b>	.305	.335	7.75	8.51		
<b>CH</b>	.240	.260	6.10	6.60		
<b>HD</b>	.335	.370	8.51	9.40		
<b>LC</b>	.200	TP	5.08	TP	6	
<b>LD</b>	.016	.021	0.41	0.53	7, 8	
<b>LL</b>	.500	.750	12.70	19.05	7, 8	
<b>LU</b>	.016	.019	0.41	0.48	7, 8	
<b>L<sub>1</sub></b>		.050		1.27	7, 8	
<b>L<sub>2</sub></b>	.250		6.35		7, 8	
<b>Q</b>		.050		1.27	5	
<b>TL</b>	.029	.045	0.74	1.14	4	
<b>TW</b>	.028	.034	0.71	0.86	3	
<b>r</b>		.010		0.25	10	
<b>α</b>	45° TP		45° TP		6	
<b>P</b>	.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 L<sub>1</sub> and L<sub>2</sub>. Dimension LD applies between L<sub>2</sub> and minimum. Diameter is uncontrolled in L<sub>1</sub> 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.