

## NPN-SWITCHING SILICON TRANSISTOR

Qualified per MIL-PRF-19500/251

### DEVICES

<b>2N2218</b>	<b>2N2219</b>
<b>2N2218A</b>	<b>2N2219A</b>
<b>2N2218AL</b>	<b>2N2219AL</b>

### LEVELS

**JAN**  
**JANTX**  
**JANTXV**  
**JANS \***

\* Also available in Radiation Hardened versions. See datasheet for JANSR2N2218 & JANSR2N2219

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

Parameters / Test Conditions	Symbol	2N2218 2N2219	2N221A; L 2N2219A; L	Unit
Collector-Emitter Voltage	$V_{CEO}$	30	50	Vdc
Collector-Base Voltage	$V_{CBO}$	60	75	Vdc
Emitter-Base Voltage	$V_{EBO}$	5.0	6.0	Vdc
Collector Current	$I_C$	800		mA
Total Power Dissipation @ $T_A = +25^\circ\text{C}$ @ $T_C = +25^\circ\text{C}$	$P_T$	0.8 3.0		W W
Operating & Storage Junction Temp. Range	$T_{op}, T_{stg}$	-55 to +200		$^\circ\text{C}$

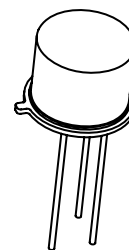
### THERMAL CHARACTERISTICS

Parameters / Test Conditions	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	59	$^\circ\text{C/W}$

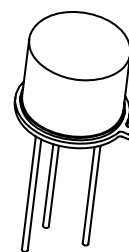
**Note:** (1) Derate linearly 4.6mW/ $^\circ\text{C}$  above  $T_A > +25^\circ\text{C}$   
(2) Derate linearly 17.0mW/ $^\circ\text{C}$  above  $T_C > +25^\circ\text{C}$

### 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 Voltage $I_E = 10\text{mA}$ 2N2218; 2N2219 2N2218A; 2N2219A / AL	$V_{(BR)CEO}$	30 50		Vdc
Emitter-Base Cutoff Current $V_{EB} = 5.0\text{Vdc}$ $V_{EB} = 6.0\text{Vdc}$ $V_{EB} = 4.0\text{Vdc}$ 2N2218; 2N2219 2N2218A; 2N2219A / AL All Types	$I_{EBO}$		10 10 10	$\mu\text{Adc}$ $\eta\text{Adc}$
Collector-Base Cutoff Current $V_{CE} = 30\text{Vdc}$ $V_{CE} = 50\text{Vdc}$ 2N2218; 2N2219 2N2218A; 2N2219A / AL	$I_{CES}$		10 10	$\eta\text{Adc}$



**TO-39 (TO-205AD)**  
**2N2218, 2N2218A**  
**2N2219, 2N2219A**



**TO-5**  
**2N2218AL**  
**2N2219AL**

## ELECTRICAL CHARACTERISTICS ( $T_A = +25^\circ\text{C}$ , unless otherwise noted) (Con't)

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Collector-Base Cutoff Current $V_{CB} = 50\text{Vdc}$ 2N2218; 2N2219 $V_{CB} = 60\text{Vdc}$ 2N2218; 2N2219 $V_{CB} = 60\text{Vdc}$ 2N2218A; 2N2219A / AL $V_{CB} = 75\text{Vdc}$ 2N2218A; 2N2219A / AL	$I_{CBO}$		10 10 10 10	$\eta\text{Adc}$ $\mu\text{Adc}$ $\eta\text{Adc}$ $\mu\text{Adc}$
<b>ON CHARACTERISTICS (3)</b>				
Forward-Current Transfer Ratio $I_C = 0.1\text{mA}$ , $V_{CE} = 10\text{Vdc}$ 2N2218 2N2219 2N2218A; 2N2218AL 2N2219A; 2N2219AL $I_C = 1.0\text{mA}$ , $V_{CE} = 10\text{Vdc}$ 2N2218 2N2219 2N2218A; 2N2218AL 2N2219A; 2N2219AL $I_C = 10\text{mA}$ , $V_{CE} = 10\text{Vdc}$ 2N2218 2N2219 2N2218A; 2N2218AL 2N2219A; 2N2219AL $I_C = 150\text{mA}$ , $V_{CE} = 10\text{Vdc}$ 2N2218; A; AL 2N2219; A; AL $I_C = 500\text{mA}$ , $V_{CE} = 10\text{Vdc}$ 2N2218; A; AL 2N2219; A; AL	$h_{FE}$	20 35 30 50 25 50 35 75 35 75 40 100 40 100 20 30	150 325 150 325 120 300	
Collector-Emitter Saturation Voltage $I_C = 150\text{mA}$ , $I_B = 15\text{mA}$ 2N2218; 2N2219 2N2218A; 2N2219A / AL $I_C = 500\text{mA}$ , $I_B = 50\text{mA}$ 2N2218; 2N2219 2N2218A; 2N2219A / AL	$V_{CE(sat)}$		0.4 0.3 1.6 1.0	Vdc
Base-Emitter Saturation Voltage $I_C = 150\text{mA}$ , $I_B = 15\text{mA}$ 2N2218; 2N2219 2N2218A; 2N2219A / AL $I_C = 500\text{mA}$ , $I_B = 50\text{mA}$ 2N2218; 2N2219 2N2218A; 2N2219A / AL	$V_{BE(sat)}$	0.6 0.6	1.3 1.2 2.6 2.0	Vdc

## DYNAMIC CHARACTERISTICS

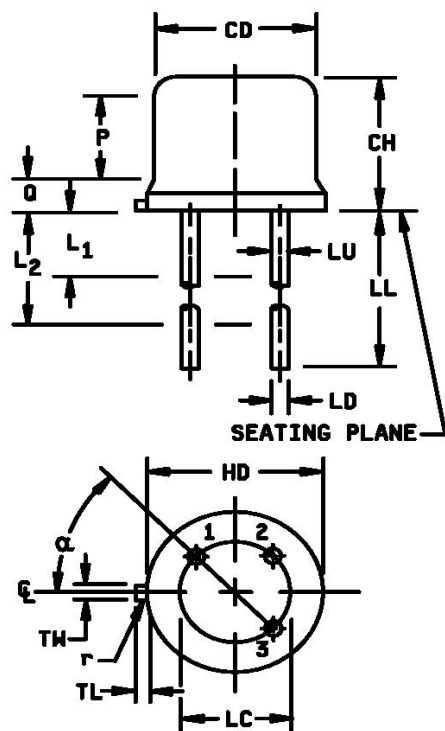
Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Magnitude of Small-Signal Forward Current Transfer Ratio $I_C = 20\text{mA}$ , $V_{CE} = 20\text{V}$ , $f = 100\text{MHz}$	$ h_{fe} $	2.5	12	
Small-Signal Forward Current Transfer Ratio $I_C = 1.0\text{mA}$ , $V_{CE} = 10\text{V}$ , $f = 1.0\text{kHz}$ 2N2218 2N2219 2N2218A, AL 2N2219A, AL	$h_{fe}$	25 50 35 75		
Output Capacitance $V_{CB} = 10\text{V}$ , $I_E = 0$ , $100\text{kHz} \leq f \leq 1.0\text{MHz}$	$C_{obo}$		8.0	pF
Input Capacitance $V_{EB} = 0.5\text{V}$ , $I_C = 0$ , $100\text{kHz} \leq f \leq 1.0\text{MHz}$	$C_{ibo}$		25	pF

## SWITCHING CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
$V_{CC} = 30\text{V}$ ; $I_C = 150\text{mA}$ ; $I_{B1} = 15\text{mA}$				
Turn-On Time (See Figure 3 of MIL-PRF-19500/251) 2N2218, 2N2219 2N2218A, 2N2219A / AL	$t_{on}$		40 35	$\mu\text{s}$
Turn-Off Time (See Figure 4 of MIL-PRF-19500/251) 2N2218, 2N2219 2N2218A, 2N2219A / AL	$t_{off}$		250 300	$\mu\text{s}$

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

## PACKAGE DIMENSIONS



	Dimensions				
Symbol	Inches		Millimeters		Notes
	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		7
LD	.016	.019	0.41	0.48	8, 9
LL	See note 14				
LU	.016	.019	0.41	0.48	8, 9
L <sub>1</sub>		.050		1.27	8, 9
L <sub>2</sub>	.250		6.35		8, 9
P	.100		2.54		7
Q		.030		0.76	5
TL	.029	.045	0.74	1.14	3, 4
TW	.028	.034	0.71	0.86	3
r		.010		0.25	10
α	45° TP		45° TP		7

### 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.
- CD shall not vary more than .010 inch (0.25 mm) in zone P. This zone is controlled for automatic handling.
- 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.
- Dimension LU applies between L<sub>1</sub> and L<sub>2</sub>. Dimension LD applies between L<sub>2</sub> and LL minimum. Diameter is uncontrolled in L<sub>1</sub> 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 øx symbology.
- Lead 1 = emitter, lead 2 = base, lead 3 = collector.
- For L suffix devices (TO-5), dimension LL = 1.5 inches (38.10 mm) min. and 1.75 inches (44.45 mm) max. For non-L suffix types (TO-39), dimension LL = .5 inch (12.70 mm) min. and .750 inch (19.05 mm) max.

**FIGURE 1.** Physical dimensions (similar to TO-39, TO-5).