

NPN-SWITCHING SILICON TRANSISTOR

Qualified per MIL-PRF-19500/251

DEVICES

2N2218	2N2219
2N2218A	2N2219A
2N2218AL	2N2219AL

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		$^\circ\text{C}$

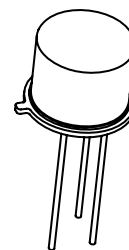
THERMAL CHARACTERISTICS

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

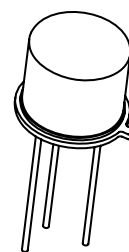
Note: (1) Derate linearly 4.6mW/ $^\circ\text{C}$ above $T_A > +25^\circ\text{C}$
(2) Derate linearly 17.0mW/ $^\circ\text{C}$ above $T_C > +25^\circ\text{C}$

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

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage $I_E = 10\text{mA}$	$V_{(BR)CEO}$	30 50		Vdc
Emitter-Base Cutoff Current $V_{EB} = 5.0\text{Vdc}$ $V_{EB} = 6.0\text{Vdc}$ $V_{EB} = 4.0\text{Vdc}$	I_{EBO}		10 10 10	μAdc ηAdc
Collector-Base Cutoff Current $V_{CE} = 30\text{Vdc}$ $V_{CE} = 50\text{Vdc}$	I_{CES}		10 10	ηAdc



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} = 50Vdc V _{CB} = 60Vdc V _{CB} = 60Vdc V _{CB} = 75Vdc	I _{CBO}		10 10 10 10	ηAdc μAdc ηAdc μAdc	
ON CHARACTERTICS (3)					
Forward-Current Transfer Ratio I _C = 0.1mAdc, V _{CE} = 10Vdc I _C = 1.0mAdc, V _{CE} = 10Vdc I _C = 10mAdc, V _{CE} = 10Vdc I _C = 150mAdc, V _{CE} = 10Vdc I _C = 500mAdc, V _{CE} = 10Vdc		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 = 150mAdc, I _B = 15mAdc I _C = 500mAdc, I _B = 50mAdc			V _{CE(sat)}		0.4 0.3 1.6 1.0
Base-Emitter Saturation Voltage I _C = 150mAdc, I _B = 15mAdc I _C = 500mAdc, I _B = 50mAdc	V _{BE(sat)}			0.6 0.6 2.6 2.0	Vdc

DYNAMIC CHARACTERISTICS

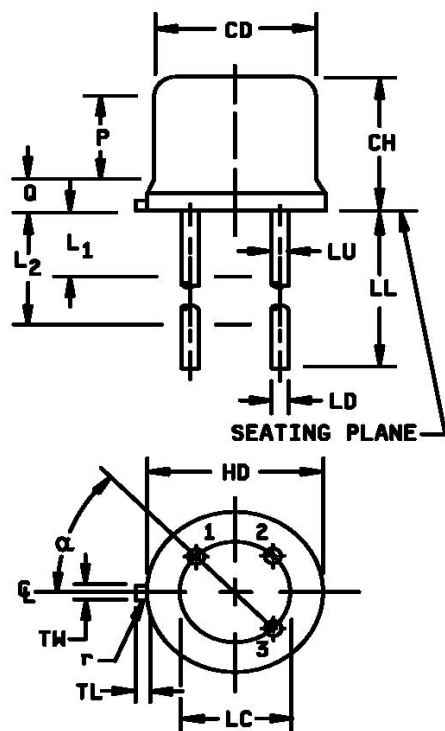
Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Magnitude of Small-Signal Forward Current Transfer Ratio $I_C = 20\text{mA}$, $V_{CE} = 20\text{V}$, $f = 100\text{MHz}$	$ h_{fe} $	2.5	12	
Small-Signal Forward Current Transfer Ratio $I_C = 1.0\text{mA}$, $V_{CE} = 10\text{V}$, $f = 1.0\text{kHz}$ 2N2218 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	μs
Turn-Off Time (See Figure 4 of MIL-PRF-19500/251) 2N2218, 2N2219 2N2218A, 2N2219A / AL	t_{off}		250 300	μs

(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 ₁		.050		1.27	8, 9
L ₂	.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 L₁ and L₂. Dimension LD applies between L₂ and LL 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 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).