

2N3418(S) - 2N3421(S) Series

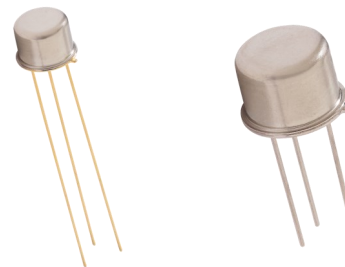


NPN Medium Power Silicon Transistor

Rev. V4

Features

- Available in JAN, JANTX, JANTXV, JANS and JANSR 100K rads(Si) per MIL-PRF-19500/393
- TO-5 & TO-39 (TO-205AD) Packages
- Ideal for Medium Power Applications Requiring High Frequency Switching



Electrical Characteristics ($T_A = +25^\circ\text{C}$ unless otherwise noted)

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Off Characteristics					
Collector - Emitter Breakdown Voltage	$I_C = 50 \text{ mA dc}$ 2N3418, S, 2N3420, S 2N3419, S, 2N3421, S	$V_{(BR)CEO}$	V dc	60 80	—
Collector - Emitter Cutoff Current	$V_{CE} = 80 \text{ Vdc}$, $V_{BE} = -0.5 \text{ Vdc}$ 2N3418, S, 2N3420, S $V_{CE} = 120 \text{ Vdc}$, $V_{BE} = -0.5 \text{ Vdc}$ 2N3419, S, 2N3421, S	I_{CEX1}	$\mu\text{A dc}$	—	0.3 0.3
Collector - Emitter Cutoff Current	$V_{CE} = 45$ 2N3418, S, 2N3420, S $V_{CE} = 60$ 2N3419, S, 2N3421, S	I_{CEO}	$\mu\text{A dc}$	—	5.0 5.0
Emitter - Base Cutoff Current	$V_{EB} = 6 \text{ Vdc}$, $I_C = 0$ $V_{EB} = 8 \text{ Vdc}$, $I_C = 0$	I_{EBO}	$\mu\text{A dc}$	—	0.5 10.0
On Characteristics¹					
Forward Current Transfer Ratio	$I_C = 100 \text{ mA dc}$, $V_{CE} = 2 \text{ V dc}$ 2N3418, S, 2N3419, S 2N3420, S, 2N3421, S $I_C = 1 \text{ A dc}$, $V_{CE} = 2 \text{ V dc}$ 2N3418, S, 2N3419, S 2N3420, S, 2N3421, S $I_C = 2 \text{ A dc}$, $V_{CE} = 2 \text{ V dc}$ 2N3418, S, 2N3419, S 2N3420, S, 2N3421, S $I_C = 5 \text{ A dc}$, $V_{CE} = 5 \text{ V dc}$ 2N3418, S, 2N3419, S 2N3420, S, 2N3421, S	H_{FE}	-	20 40 20 40 15 30 10 15	— — 60 120 — — — —
Base - Emitter Voltage	$I_C = 1 \text{ A dc}$, $I_B = 0.1 \text{ A dc}$ $I_C = 2 \text{ A dc}$, $I_B = 0.2 \text{ A dc}$	$V_{BE(SAT)}$	Vdc	0.6 0.7	1.2 1.4
Collector - Emitter Saturation Voltage	$I_C = 1 \text{ A dc}$, $I_B = 0.1 \text{ A dc}$ $I_C = 2 \text{ A dc}$, $I_B = 0.2 \text{ A dc}$	$V_{CE(SAT)}$	Vdc	—	0.25 0.50

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Parameter	Test Conditions	Symbol	Units	Min.	Max.
Collector - Emitter Cutoff Current	$T_A = +150^{\circ}\text{C}$ $V_{CE} = 80\text{ Vdc}, V_{BE} = -0.5\text{ Vdc}$ 2N3418, S, 2N3420, S $V_{CE} = 120\text{ Vdc}, V_{BE} = -0.5\text{ Vdc}$ 2N3419, S, 2N3421, S	I_{CEX2}	$\mu\text{A dc}$	—	16 16
Forward Current Transfer Ratio	$T_A = -55^{\circ}\text{C}$	h_{fe5}		10	

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Parameter	Test Conditions	Symbol	Units	Min.	Max.
Dynamic Characteristics					
Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio	$I_C = 0.1 \text{ A dc}$, $V_{CE} = 10 \text{ Vdc}$, $f = 20 \text{ MHz}$	$ h_{fe} $	-	1.3	8.0
Output Capacitance	$V_{CB} = 10 \text{ Vdc}$, $I_E = 0$, $100 \text{ kHz} \leq f \leq 1 \text{ MHz}$	C_{obo}	pF	—	150
Switching Characteristics					
Delay Time	$V_{BE(off)} = -3.7 \text{ Vdc}$; $I_C = 1 \text{ A dc}$; $I_{B2} = 100 \text{ mA dc}$	t_d	μs	—	0.08
Rise Time		t_r	μs	—	0.22
Storage Time	$V_{BE(off)} = -3.7 \text{ Vdc}$; $I_C = 1 \text{ A dc}$; $I_{B2} = 100 \text{ mA dc}$	t_s	μs	—	1.10
Fall Time		t_f	μs	—	0.20
Safe Operating Area					
DC Tests:	$T_C = +100^\circ\text{C}$, 1 Cycle, $t = 1.0 \text{ s}$				
Test 1:	$V_{CE} = 5 \text{ Vdc}$, $I_C = 3.0 \text{ A dc}$				
Test 2:	$V_{CE} = 37 \text{ Vdc}$, $I_C = 0.4 \text{ A dc}$				
Test 3:	$V_{CE} = 60 \text{ Vdc}$, $I_C = 0.185 \text{ mA dc}$ 2N3418, S; 2N3420, S				
	$V_{CE} = 80 \text{ Vdc}$, $I_C = 0.120 \text{ mA dc}$ 2N3419, S; 2N3421, S				

Absolute Maximum Ratings ($T_A = +25^\circ\text{C}$ unless otherwise noted)

Ratings	Symbol	Value 2N3418, S 2N3420, S	Value 2N3419, S 2N3421, S
Collector - Emitter Voltage	V_{CEO}	60 Vdc	80 Vdc
Collector - Base Voltage	V_{CBO}	85 Vdc	125 Vdc
Emitter - Base Voltage	V_{EBO}	8 Vdc	
Collector Current $T_P \leq 1 \text{ ms}$, duty cycle $\leq 50\%$	I_C	3 Adc 5 Adc	
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ ¹ @ $T_C = 100^\circ\text{C}$ ¹	P_T	1 W 5 W	
Operating & Storage Temperature Range	T_J , T_{STG}	-65°C to $+200^\circ\text{C}$	
Thermal Resistance Junction to Ambient	$R_{\theta JA}$ ³	175 $^\circ\text{C/W}$	
Thermal Resistance Junction to Case	$R_{\theta JC}$ ³	18 $^\circ\text{C/W}$	

- (1) For derating, see figures 4, 5 and 6 of MIL-PRF-19500/393
 (2) This value applies for $t_p \leq 1 \text{ ms}$, duty cycle ≤ 50 percent
 (3) For thermal impedance curves see figures 7, 8 and 9 of MIL-PRF-19500/393

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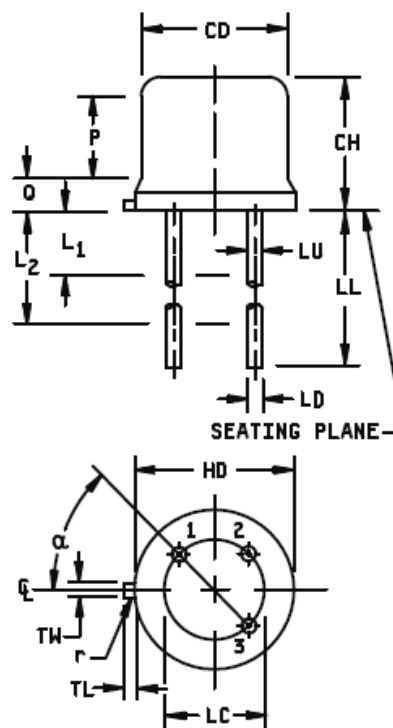


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Outline Drawing (TO-5 & TO-39)

Symbol	Dimensions				Note
	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	
LL	.500	.750	12.7	19.05	7
LU	See notes 7, 13, 14				
L ₁		.050		1.27	7
L ₂	.250		6.35		7
P	.100		2.54		5
Q		.040		1.02	4
TL	.029	.045	0.74	1.14	3,10
TW	.028	.034	0.71	.86	9,10
r		.010		0.25	11
α	45° TP		45° TP		6



NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Symbol TL is measured from HD maximum.
4. Details of outline in this zone are optional.
5. Symbol CD shall not vary more than .010 inch (0.25 mm) in zone P. This zone is controlled for automatic handling.
6. Leads at gauge plane .054 inch (1.37 mm) +.001 inch (0.03 mm) -.000 inch (0.00 mm) below seating plane shall be within .007 inch (0.18 mm) radius of TP relative to tab. Device may be measured by direct methods or by gauge.
7. Symbol LU applies between L₁ and L₂. Dimension LD applies between L₂ and LL minimum. Diameter is uncontrolled in L₁ and beyond LL minimum.
8. Lead number 3 is electrically connected to case.
9. Beyond r maximum, TW shall be held for a minimum length of .021 inch (0.53 mm).
10. Lead number 4 omitted on this variation.
11. Symbol r applied to both inside corners of tab.
12. For transistor types 2N3418S, 2N3419S, 2N3420S, 2N3421S, LL is .500 (12.70 mm) minimum and .750 (19.05 mm) maximum (short leads).
13. For transistor types 2N3418, 2N3419, 2N3420, 2N3421, LL is 1.500 (38.10 mm) minimum, and 1.750 (44.45 mm) maximum (long leads).
14. In accordance with ASME Y14.5M, diameters are equivalent to ϕ x symbology.
15. Lead 1 is emitter, lead 2 is base, and lead 3 is collector.

FIGURE 1. Physical dimensions.

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