

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

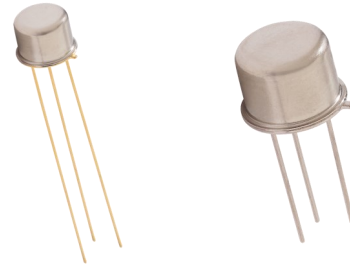


NPN Medium Power Silicon Transistor

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	$V_{BE(off)} = -3.7 \text{ Vdc};$	t_d	μs	—	0.08
Rise Time	$I_C = 1 \text{ A dc}; I_{B2} = 100 \text{ mA dc}$	t_r	μs	—	0.22
Storage Time	$V_{BE(off)} = -3.7 \text{ Vdc};$	t_s	μs	—	1.10
Fall Time	$I_C = 1 \text{ A dc}; I_{B2} = 100 \text{ mA dc}$	t_f	μs	—	0.20
Safe Operating Area					
DC Tests:	$T_C = +100^\circ\text{C}, 1 \text{ Cycle}, t = 1.0 \text{ s}$				
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 $T_P \leq 1 \text{ ms}, \text{ duty cycle} \leq 50\%$	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°C	
Thermal Resistance Junction to Ambient	$R_{\theta JA}$ ³	175 °C/W	
Thermal Resistance Junction to Case	$R_{\theta JC}$ ³	18 °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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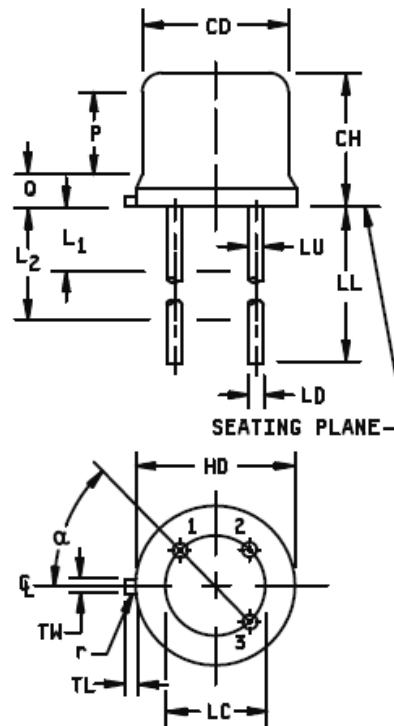


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Outline Drawing (TO-5 & TO-39)

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:

- Dimensions are in inches.
- Millimeters are given for general information only.
- Symbol TL is measured from HD maximum.
- Details of outline in this zone are optional.
- Symbol 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 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.
- Symbol LU applies between L₁ and L₂. Dimension LD applies between L₂ and LL minimum. Diameter is uncontrolled in L₁ and beyond LL minimum.
- Lead number 3 is electrically connected to case.
- Beyond r maximum, TW shall be held for a minimum length of .021 inch (0.53 mm).
- Lead number 4 omitted on this variation.
- Symbol r applied to both inside corners of tab.
- For transistor types 2N3418S, 2N3419S, 2N3420S, 2N3421S, LL is .500 (12.70 mm) minimum and .750 (19.05 mm) maximum (short leads).
- For transistor types 2N3418, 2N3419, 2N3420, 2N3421, LL is 1.500 (38.10 mm) minimum, and 1.750 (44.45 mm) maximum (long leads).
- In accordance with ASME Y14.5M, diameters are equivalent to ϕ x symbology.
- Lead 1 is emitter, lead 2 is base, and lead 3 is collector.

FIGURE 1. Physical dimensions.

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