

## NPN MEDIUM POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/393

### Devices

<b>2N3418</b>	<b>2N3419</b>	<b>2N3420</b>	<b>2N3421</b>
<b>2N3814S</b>	<b>2N3419S</b>	<b>2N3420S</b>	<b>2N3421S</b>

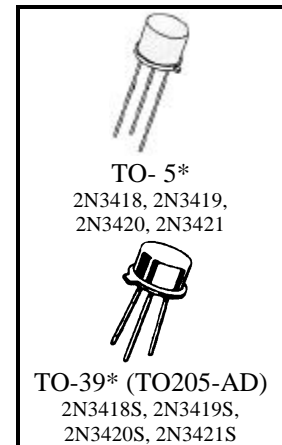
### Qualified Level

**JAN**  
**JANTX**  
**JANTXV**

### MAXIMUM RATINGS

Ratings	Symbol	2N3418, S 2N3420, S	2N3419, S 2N3421, S	Unit
Collector-Emitter Voltage	$V_{CEO}$	60	80	Vdc
Collector-Base Voltage	$V_{CBO}$	85	125	Vdc
Emitter-Base Voltage	$V_{EBO}$	8.0		Vdc
Collector Current $t_p \leq 1.0$ ms, duty cycle $\leq 50\%$	$I_C$	3.0 5.0		Adc
Total Power Dissipation @ $T_A = +25^\circ\text{C}^{(1)}$ @ $T_C = +100^\circ\text{C}^{(2)}$	$P_T$	1.0 15		W W/ $^\circ\text{C}$
Operating & Storage Temperature Range	$T_{op}, T_{stg}$	-65 to +200		$^\circ\text{C}$

- 1) Derate linearly 5.72 mW/ $^\circ\text{C}$  for  $T_A > 25^\circ\text{C}$   
2) Derate linearly 150 mW/ $^\circ\text{C}$  for  $T_C > 100^\circ\text{C}$



\*See Appendix A for  
Package Outline

### ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Min.	Max.	Unit
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#### OFF CHARACTERISTICS

Collector-Emitter Breakdown Current $I_C = 50$ mAdc, $I_B = 0$	2N3418, S; 2N3420, S 2N3419, S; 2N3421, S	$V_{(BR)CEO}$	60 80	Vdc
Collector-Emitter Cutoff Current $V_{BE} = -0.5$ Vdc, $V_{CE} = 80$ Vdc $V_{BE} = -0.5$ Vdc, $V_{CE} = 120$ Vdc	2N3418, S; 2N3420, S 2N3419, S; 2N3421, S	$I_{CEX}$	0.3 0.3	$\mu\text{Adc}$
Collector-Emitter Cutoff Current $V_{CE} = 45$ Vdc, $I_B = 0$ $V_{CE} = 60$ Vdc, $I_B = 0$	2N3418, S; 2N3420, S 2N3419, S; 2N3421, S	$I_{CEO}$	5.0 5.0	$\mu\text{Adc}$
Emitter-Base Cutoff Current $V_{EB} = 6.0$ Vdc, $I_C = 0$ $V_{EB} = 8.0$ Vdc, $I_C = 0$		$I_{EBO}$	0.5 10	$\mu\text{Adc}$

**ELECTRICAL CHARACTERISTICS**

Characteristics	Symbol	Min.	Max.	Unit
<b>DC CHARACTERISTICS</b>				
Forward-Current Transfer Ratio I <sub>C</sub> = 100 mA <sub>dc</sub> , V <sub>CE</sub> = 2.0 V <sub>dc</sub> 2N3418, S; 2N3419, S 2N3420, S; 2N3421, S	h <sub>FE</sub>	20	60	
I <sub>C</sub> = 1.0 A <sub>dc</sub> , V <sub>CE</sub> = 2.0 V <sub>dc</sub> 2N3418, S; 2N3419, S 2N3420, S; 2N3421, S		40		
I <sub>C</sub> = 2.0 A <sub>dc</sub> , V <sub>CE</sub> = 2.0 V <sub>dc</sub> 2N3418, S; 2N3419, S 2N3420, S; 2N3421, S		15		
I <sub>C</sub> = 5.0 A <sub>dc</sub> , V <sub>CE</sub> = 5.0 V <sub>dc</sub> 2N3418, S; 2N3419, S 2N3420, S; 2N3421, S		10		
Base-Emitter Saturation Voltage I <sub>C</sub> = 1.0 A <sub>dc</sub> , I <sub>B</sub> = 0.1 A <sub>dc</sub> I <sub>C</sub> = 2.0 A <sub>dc</sub> , I <sub>B</sub> = 0.2 A <sub>dc</sub>	V <sub>BE(sat)</sub>	0.6	1.2	V <sub>dc</sub>
Collector-Emitter Saturation Voltage I <sub>C</sub> = 1.0 A <sub>dc</sub> , I <sub>B</sub> = 0.1 A <sub>dc</sub> I <sub>C</sub> = 2.0 A <sub>dc</sub> , I <sub>B</sub> = 0.2 A <sub>dc</sub>	V <sub>CE(sat)</sub>		0.25	V <sub>dc</sub>
			0.5	

**DYNAMIC CHARACTERISTICS**

Magnitude of Common Emitter Small-Signal Short Circuit Forward Current Transfer Ratio I <sub>C</sub> = 0.1 A <sub>dc</sub> , V <sub>CE</sub> = 10 V <sub>dc</sub> , f = 20 MHz	h <sub>fe</sub>	1.3	8.0	
Output Capacitance V <sub>CB</sub> = 10 V <sub>dc</sub> , I <sub>E</sub> = 0, 100 kHz ≤ f ≤ 1.0 MHz	C <sub>obo</sub>		150	pF

**SWITCHING CHARACTERISTICS**

Delay Time V <sub>BE(off)</sub> = -3.7 V <sub>dc</sub>	t <sub>d</sub>		0.08	μs
Rise Time I <sub>C</sub> = 1.0 A <sub>dc</sub> , I <sub>B1</sub> = 100 mA <sub>dc</sub>	t <sub>r</sub>		0.22	μs
Storage Time V <sub>BE(off)</sub> = -3.7 V <sub>dc</sub>	t <sub>s</sub>		1.10	μs
Fall Time I <sub>C</sub> = 1.0 A <sub>dc</sub> , I <sub>B2</sub> = -100 mA <sub>dc</sub>	t <sub>f</sub>		0.20	μs

**SAFE OPERATING AREA**

<b>DC Tests</b>				
T <sub>C</sub> = 100°C, 1 Cycle, t = 1.0 s				
<b>Test 1</b>				
V <sub>CE</sub> = 5.0 V <sub>dc</sub> , I <sub>C</sub> = 3.0 A <sub>dc</sub>				
<b>Test 2</b>				
V <sub>CE</sub> = 37 V <sub>dc</sub> , I <sub>C</sub> = 0.4 A <sub>dc</sub>				
<b>TEST 3</b>				
V <sub>CE</sub> = 60 V <sub>dc</sub> , I <sub>C</sub> = 0.185 A <sub>dc</sub>	2N3418, S; 2N3420, S			
V <sub>CE</sub> = 80 V <sub>dc</sub> , I <sub>C</sub> = 0.12 A <sub>dc</sub>	2N3419, S; 2N3421, S			
<b>Clamped Switching</b>				
T <sub>A</sub> = 25°C, I <sub>B</sub> = 0.5 A <sub>dc</sub> , I <sub>C</sub> = 3.0 A <sub>dc</sub>				

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