

## 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

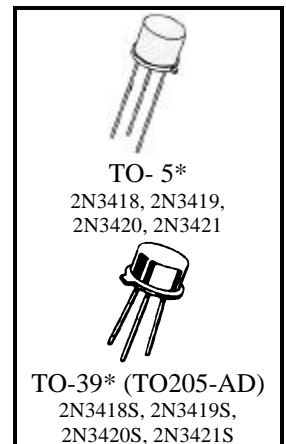
**JAN**  
**JANTX**  
**JANTXV**

### 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		A <sub>dc</sub>
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
<b>OFF CHARACTERISTICS</b>				
Collector-Emitter Breakdown Current $I_C = 50$ mA <sub>dc</sub> , $I_B = 0$	$V_{(BR)CEO}$	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	$I_{CEX}$		0.3 0.3	$\mu\text{A}_{dc}$
Collector-Emitter Cutoff Current $V_{CE} = 45$ Vdc, $I_B = 0$ $V_{CE} = 60$ Vdc, $I_B = 0$	$I_{CEO}$		5.0 5.0	$\mu\text{A}_{dc}$
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	$\mu\text{A}_{dc}$

2N3418, S, 2N3419, S, 2N3420, S, 2N3421, S, JAN SERIES

**ELECTRICAL CHARACTERISTICS**

Characteristics	Symbol	Min.	Max.	Unit
<b>ON CHARACTERISTICS</b>				
Forward-Current Transfer Ratio $I_C = 100 \text{ mAdc}, V_{CE} = 2.0 \text{ Vdc}$ 2N3418, S; 2N3419, S 2N3420, S; 2N3421, S	$h_{FE}$	20		
$I_C = 1.0 \text{ Adc}, V_{CE} = 2.0 \text{ Vdc}$ 2N3418, S; 2N3419, S 2N3420, S; 2N3421, S		40	60	
$I_C = 2.0 \text{ Adc}, V_{CE} = 2.0 \text{ Vdc}$ 2N3418, S; 2N3419, S 2N3420, S; 2N3421, S		20	120	
$I_C = 5.0 \text{ Adc}, V_{CE} = 5.0 \text{ Vdc}$ 2N3418, S; 2N3419, S 2N3420, S; 2N3421, S		40		
Base-Emitter Saturation Voltage $I_C = 1.0 \text{ Adc}, I_B = 0.1 \text{ Adc}$ $I_C = 2.0 \text{ Adc}, I_B = 0.2 \text{ Adc}$	$V_{BE(sat)}$	0.6	1.2	Vdc
Collector-Emitter Saturation Voltage $I_C = 1.0 \text{ Adc}, I_B = 0.1 \text{ Adc}$ $I_C = 2.0 \text{ Adc}, I_B = 0.2 \text{ Adc}$	$V_{CE(sat)}$		0.25	Vdc
			0.5	

**DYNAMIC CHARACTERISTICS**

Magnitude of Common Emitter Small-Signal Short Circuit Forward Current Transfer Ratio $I_C = 0.1 \text{ Adc}, V_{CE} = 10 \text{ Vdc}, f = 20 \text{ MHz}$	$ h_{fe} $	1.3	8.0	
Output Capacitance $V_{CB} = 10 \text{ Vdc}, I_E = 0, 100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$	$C_{obo}$		150	pF

**SWITCHING CHARACTERISTICS**

Delay Time	$V_{BE(off)} = -3.7 \text{ Vdc}$	$t_d$		0.08	$\mu\text{s}$
Rise Time	$I_C = 1.0 \text{ Adc}, I_{B1} = 100 \text{ mAdc}$	$t_r$		0.22	$\mu\text{s}$
Storage Time	$V_{BE(off)} = -3.7 \text{ Vdc}$	$t_s$		1.10	$\mu\text{s}$
Fall Time	$I_C = 1.0 \text{ Adc}, I_{B2} = -100 \text{ mAdc}$	$t_f$		0.20	$\mu\text{s}$

**SAFE OPERATING AREA**

<b>DC Tests</b>				
$T_C = 100^\circ\text{C}, 1 \text{ Cycle}, t = 1.0 \text{ s}$				
<b>Test 1</b>				
$V_{CE} = 5.0 \text{ Vdc}, I_C = 3.0 \text{ Adc}$				
<b>Test 2</b>				
$V_{CE} = 37 \text{ Vdc}, I_C = 0.4 \text{ Adc}$				
<b>TEST 3</b>				
$V_{CE} = 60 \text{ Vdc}, I_C = 0.185 \text{ Adc}$	2N3418, S; 2N3420, S			
$V_{CE} = 80 \text{ Vdc}, I_C = 0.12 \text{ Adc}$	2N3419, S; 2N3421, S			
<b>Clamped Switching</b>				
$T_A = 25^\circ\text{C}, I_B = 0.5 \text{ Adc}, I_C = 3.0 \text{ Adc}$				