

NPN MEDIUM POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/393

Devices

2N3418	2N3419	2N3420	2N3421
2N3814S	2N3419S	2N3420S	2N3421S

Qualified Level

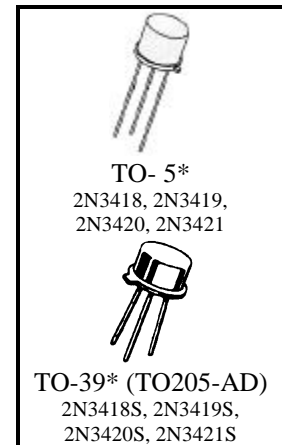
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MAXIMUM RATINGS

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	μAdc
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	μAdc
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	μAdc

ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Min.	Max.	Unit
DC CHARACTERISTICS				
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	60	
$I_C = 1.0 \text{ Adc}, V_{CE} = 2.0 \text{ Vdc}$ 2N3418, S; 2N3419, S 2N3420, S; 2N3421, S		40		
$I_C = 2.0 \text{ Adc}, V_{CE} = 2.0 \text{ Vdc}$ 2N3418, S; 2N3419, S 2N3420, S; 2N3421, S		15		
$I_C = 5.0 \text{ Adc}, V_{CE} = 5.0 \text{ Vdc}$ 2N3418, S; 2N3419, S 2N3420, S; 2N3421, S		10		
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 $I_C = 1.0 \text{ Adc}, I_B = 0.1 \text{ Adc}$ $I_C = 2.0 \text{ Adc}, I_B = 0.2 \text{ Adc}$	$V_{CE(sat)}$	0.7	1.4	Vdc
			0.25	Vdc
			0.5	Vdc

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

SAFE OPERATING AREA

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