

NPN MEDIUM POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/393

Devices

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

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 $T_C > 100^{\circ}\text{C}$



TO- 5*
 2N3418, 2N3419,
 2N3420, 2N3421



TO-39* (TO205-AD)
 2N3418S, 2N3419S,
 2N3420S, 2N3421S

*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 $I_C = 100 \text{ mAdc}, V_{CE} = 2.0 \text{ Vdc}$ $I_C = 1.0 \text{ Adc}, V_{CE} = 2.0 \text{ Vdc}$ $I_C = 2.0 \text{ Adc}, V_{CE} = 2.0 \text{ Vdc}$ $I_C = 5.0 \text{ Adc}, V_{CE} = 5.0 \text{ Vdc}$	h_{FE}	20 40 20 40 15 30 10 15	60 120	
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 0.7	1.2 1.4	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 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

$T_A = 25^\circ\text{C}, I_B = 0.5 \text{ Adc}, I_C = 3.0 \text{ Adc}$