

NPN SILICON TRANSISTOR

Qualified per MIL-PRF-19500/366

Devices

2N3498	2N3499	2N3500	2N3501
2N3498L	2N3499L	2N3500L	2N3501L

Qualified Level

JAN
JANTX
JANTXV
JANS

MAXIMUM RATINGS

Ratings	Symbol	2N3498* 2N3499*	2N3500* 2N3501*	Unit
Collector-Emitter Voltage	V_{CEO}	100	150	Vdc
Collector-Base Voltage	V_{CBO}	100	150	Vdc
Emitter-Base Voltage	V_{EBO}	6.0	6.0	Vdc
Collector Current	I_C	500	300	mAdc
Total Power Dissipation	P_T	@ $T_A = 25^{\circ}\text{C}$ (1)	1.0	W
		@ $T_C = 25^{\circ}\text{C}$ (2)	5.0	W
Operating & Storage Junction Temp. Range	T_J, T_{stg}	-55 to +200		$^{\circ}\text{C}$

THERMAL CHARACTERISTICS

Characteristics	Symbol	Max.	Unit
Thermal Resistance: Junction-to-Case	$R_{\theta JC}$	35	$^{\circ}\text{C}/\text{W}$
Junction-to-Ambient	$R_{\theta JA}$	175	

*Electrical characteristics for "L" suffix devices are identical to the "non L" corresponding devices

1) Derate linearly 5.71 W/ $^{\circ}\text{C}$ for $T_A > 25^{\circ}\text{C}$

2) Derate linearly 28.6 W/ $^{\circ}\text{C}$ for $T_C > 25^{\circ}\text{C}$



TO-5*
2N3498L, 2N3499L
2N3500L, 2N3501L



TO-39* (TO-205AD)
2N3498, 2N3499
2N3500, 2N3501

*See appendix A for package outline

ELECTRICAL CHARACTERISTICS ($T_A = 25^{\circ}\text{C}$ unless otherwise noted)

Characteristics	Symbol	Min.	Max.	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage $I_C = 10 \text{ mAdc}$	2N3498, 2N3499 2N3500, 2N3501	$V_{(BR)CEO}$	100 150	Vdc
Collector-Base Cutoff Current $V_{CB} = 50 \text{ Vdc}$ $V_{CB} = 75 \text{ Vdc}$ $V_{CB} = 100 \text{ Vdc}$ $V_{CB} = 150 \text{ Vdc}$	2N3498, 2N3499 2N3500, 2N3501 2N3498, 2N3499 2N3500, 2N3501	I_{CBO}	50 50 10 10	ηAdc ηAdc μAdc μAdc
Emitter-Base Cutoff Current $V_{EB} = 4.0 \text{ Vdc}$ $V_{EB} = 6.0 \text{ Vdc}$		I_{EBO}	25 10	ηAdc μAdc

ELECTRICAL CHARACTERISTICS (con't)

Characteristics		Symbol	Min.	Max.	Unit
ON CHARACTERISTICS ⁽³⁾					
Forward-Current Transfer Ratio $I_C = 0.1 \text{ mA dc}, V_{CE} = 10 \text{ V dc}$	2N3498, 2N3500 2N3499, 2N3501	h_{FE}	20 35		
$I_C = 1.0 \text{ mA dc}, V_{CE} = 10 \text{ V dc}$	2N3498, 2N3500 2N3499, 2N3501		25 50		
$I_C = 10 \text{ mA dc}, V_{CE} = 10 \text{ V dc}$	2N3498, 2N3500 2N3499, 2N3501		35 75		
$I_C = 150 \text{ mA dc}, V_{CE} = 10 \text{ V dc}$	2N3498, 2N3500 2N3499, 2N3501		40 100	120 300	
$I_C = 300 \text{ mA dc}, V_{CE} = 10 \text{ V dc}$	2N3500 2N3501		15 20		
$I_C = 500 \text{ mA dc}, V_{CE} = 10 \text{ V dc}$	2N3498 2N3499		15 20		
Collector-Emitter Saturation Voltage $I_C = 10 \text{ mA dc}, I_B = 1.0 \text{ mA dc}$	All Types		$V_{CE(sat)}$		0.2
$I_C = 300 \text{ mA dc}, I_B = 30 \text{ mA dc}$	2N3498, 2N349	0.6			
$I_C = 150 \text{ mA dc}, I_B = 15 \text{ mA dc}$	2N3500, 2N3501	0.4			
Base-Emitter Saturation Voltage $I_C = 10 \text{ mA dc}, I_B = 1.0 \text{ mA dc}$	All Types	$V_{BE(sat)}$		0.8	Vdc
$I_C = 300 \text{ mA dc}, I_B = 30 \text{ mA dc}$	2N3498, 2N3499		1.4		
$I_C = 150 \text{ mA dc}, I_B = 15 \text{ mA dc}$	2N3500, 2N3501		1.2		

DYNAMIC CHARACTERISTICS

Forward Current Transfer Ratio, Magnitude $I_C = 20 \text{ mA dc}, V_{CE} = 20 \text{ V dc}, f = 100 \text{ MHz}$		$ h_{fe} $	1.5	8.0	
Output Capacitance $V_{CB} = 10 \text{ V dc}, I_E = 0, 100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$	2N3498, 2N3499 2N3500, 2N3501	C_{obo}		10 8.0	pF
Input Capacitance $V_{EB} = 0.5 \text{ V dc}, I_C = 0, 100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$		C_{ibo}		80	pF

SWITCHING CHARACTERISTICS

Turn-On Time $V_{EB} = 5 \text{ V dc}; I_C = 150 \text{ mA dc}; I_{B1} = 15 \text{ mA dc}$		t_{on}		115	ns
Turn-Off Time $I_C = 150 \text{ mA dc}; I_{B1} = I_{B2} = -15 \text{ mA dc}$		t_{off}		1150	ns

SAFE OPERATING AREA

DC Tests					
$T_C = +25^\circ\text{C}, t_r \geq 10 \text{ ns}; 1 \text{ Cycle}, t = 1.0 \text{ s}$					
Test 1					
$V_{CE} = 10 \text{ V dc}, I_C = 500 \text{ mA dc}$	2N3498, 2N3499				
$V_{CE} = 16.67 \text{ V dc}, I_C = 300 \text{ mA dc}$	2N3500, 2N3501				
Test 2					
$V_{CE} = 50 \text{ V dc}, I_C = 100 \text{ mA dc}$	All Types				
Test 3					
$V_{CE} = 80 \text{ V dc}, I_C = 40 \text{ mA dc}$	All Types				
Clamped Switching					
$T_A = +25^\circ\text{C}$					
Test 1					
$I_B = 85 \text{ mA dc}, I_C = 500 \text{ mA dc}$	2N3498, 2N3499				
$I_B = 50 \text{ mA dc}, I_C = 300 \text{ mA dc}$	2N3500, 2N3501				

(3) Pulse Test: Pulse Width = 300 μs , Duty Cycle \leq 2.0%.

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