

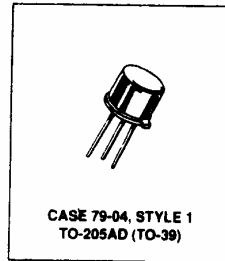
**SEMICONDUCTOR
TECHNICAL DATA**

**2N3498
2N3499
2N3500
2N3501**

**NPN Silicon
Small-Signal Transistors**

... designed for general-purpose switching and amplifier applications in high-voltage circuits.

CRYSTALONCS
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MAXIMUM RATINGS				
Rating	Symbol	2N3498 2N3499	2N3500 2N3501	Unit
Collector-Emitter Voltage	V _{CEO}	100	150	V _{dc}
Collector-Base Voltage	V _{CBO}	100	150	V _{dc}
Emitter-Base Voltage	V _{EBO}	6.0	6.0	V _{dc}
Collector Current — Continuous	I _C	500	300	mA _{dc}
Device Dissipation @ T _A = 25 C Derate above 25 C @ T _C = 25 C Derate above 25 C	P _T		1.0 5.71 5.0 28.6	Watts mW/ C Watts mW. C
Thermal Resistance — Junction to Ambient — Junction to Case	R _{θJA} R _{θJC}		175 35	C/W
Operating Junction and Storage Temperature Range	T _J , T _{stg}		-65 to 200	C

2N3498JAN THRU 2N3501JAN SERIES

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted.)					
Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage ⁽¹⁾ ($I_C = 10 \text{ mAdc}$, $I_B = 0$)	2N3498, 2N3499 2N3500, 2N3501	$V_{(BR)CEO}$	100 150	— —	Vdc
Collector-Base Breakdown Voltage ($I_C = 10 \mu\text{Adc}$, $I_E = 0$)	2N3498, 2N3499 2N3500, 2N3501	$V_{(BR)CBO}$	100 150	— —	Vdc
Emitter-Base Breakdown Voltage ($I_E = 10 \mu\text{Adc}$, $I_C = 0$)		$V_{(BR)EBO}$	6.0	—	μAdc
Collector Cutoff Current ($V_{CB} = 50 \text{ Vdc}$) ($V_{CB} = 75 \text{ Vdc}$) @ $T_A = 150 \text{ C}$ ($V_{CB} = 50 \text{ Vdc}$) ($V_{CB} = 75 \text{ Vdc}$)	2N3498, 2N3499 2N3500, 2N3501 2N3498, 2N3499 2N3500, 2N3501	I_{CBO}	— —	0.05 0.05 50 50	μAdc
Emitter Cutoff Current ($V_{EB} = 4.0 \text{ Vdc}$, $I_C = 0$)		I_{EBO}	—	0.025	μAdc
ON CHARACTERISTICS⁽¹⁾					
DC Current Gain ($I_C = 0.1 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$)	2N3498, 2N3500 2N3499, 2N3501	h_{FE}	20 35	— —	—
($I_C = 1.0 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$)	2N3498, 2N3500 2N3499, 2N3501		25 50	— —	
($I_C = 10 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$)	2N3498, 2N3500 2N3499, 2N3501		35 75	— —	
($I_C = 150 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$)	2N3498, 2N3500 2N3499, 2N3501		40 100	120 300	
($I_C = 300 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$)	2N3500 2N3501		15 20	— —	
($I_C = 500 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$)	2N3498 2N3499		15 20	— —	
($I_C = 150 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$, $T_A = -55^\circ\text{C}$)	2N3498, 2N3500 2N3499, 2N3501		22 45	— —	
Collector-Emitter Saturation Voltage ($I_C = 10 \text{ mAdc}$, $I_B = 1.0 \text{ mAdc}$) ($I_C = 150 \text{ mAdc}$, $I_B = 15 \text{ mAdc}$) ($I_C = 300 \text{ mAdc}$, $I_B = 30 \text{ mAdc}$)	2N3500, 2N3501 2N3498, 2N3499	$V_{CE(sat)}$	— — —	0.2 0.4 0.6	Vdc
Base-Emitter Saturation Voltage ($I_C = 10 \text{ mAdc}$, $I_B = 1.0 \text{ mAdc}$) ($I_C = 150 \text{ mAdc}$, $I_B = 15 \text{ mAdc}$) ($I_C = 300 \text{ mAdc}$, $I_B = 30 \text{ mAdc}$)	2N3500, 2N3501 2N3498, 2N3499	$V_{BE(sat)}$	— — —	0.8 1.2 1.4	Vdc

(1) Pulsed. Pulse Width 250 to 350 μs . Duty Cycle 1.0 to 2.0%.

(continued)

2N3498JAN THRU 2N3501JAN SERIES

ELECTRICAL CHARACTERISTICS — continued (T _A = 25°C unless otherwise noted.)					
Characteristic	Symbol	Min	Max	Unit	
SMALL-SIGNAL CHARACTERISTICS					
Output Capacitance (V _{CB} = 10 Vdc, f = 0.1 to 1.0 MHz)	2N3498, 2N3499 2N3500, 2N3501	C _{obo}	— —	10 8.0	pF
Input Capacitance (V _{EB} = 0.5 Vdc, f = 0.1 to 1.0 MHz)		C _{ibo}	—	80	pF
Current Gain (I _C = 10 mAdc, V _{CE} = 10 Vdc, f = 1.0 kHz)	2N3498, 2N3500 2N3499, 2N3501	h _{fe}	50 75	300 375	—
Small-Signal Current Transfer Ratio, Magnitude (I _C = 20 mAdc, V _{CE} = 20 Vdc, f = 100 MHz)		h _{fe}	1.5	8.0	—
Noise Figure (I _C = 0.5 mAdc, V _{CE} = 10 Vdc, R _G = 1.0 kohms)	(f = 1.0 kHz) (f = 10 kHz)	NF	— —	16 6.0	dB
SWITCHING CHARACTERISTICS (See Figure 17) (I _C = 150 mAdc, I _B = 15 mAdc)					
Turn-On Time (V _{EB} = -2.0 Vdc)		t _(on)	—	115	ns
Turn-Off Time		t _(off)	—	1150	ns
SAFE OPERATING AREA					
DC Tests (T _C = 25°C, t ≥ 10 ns, 1.0 cycle)					
Test 1 (I _C = 500 mAdc, V _{CE} = 10 Vdc) 2N3498, 2N3499 (I _C = 300 mAdc, V _{CE} = 16.67 Vdc) 2N3500, 2N3501					
Test 2 (I _C = 125 mAdc, V _{CE} = 40 Vdc) All types					
Test 3 (I _C = 60 mAdc, V _{CE} = 80 Vdc) All types					
Clamped Inductive Tests (T _A = 25°C) (I _B = 85 mAdc, I _C = 500 mAdc) 2N3498, 2N3499 (I _B = 50 mAdc, I _C = 300 mAdc) 2N3500, 2N3501					
END POINT ELECTRICAL MEASUREMENTS					
Collector-Base Cutoff Current (Bias Condition D) (V _{CB} = 50 Vdc) (V _{CB} = 75 Vdc)	2N3498, 2N3499 2N3500, 2N3501	I _{CBO}	— —	50 50	nAdc
Collector-Emitter Saturation Voltage ⁽¹⁾ (I _C = 10 mAdc, I _B = 1.0 mAdc)		V _{CE(sat)}	—	0.2	Vdc
DC Current Gain ⁽¹⁾ (V _{CE} = 10 Vdc, I _C = 150 mAdc)	2N3498, 2N3500 2N3499, 2N3501	h _{FE}	40 100	120 300	—

(1) Pulsed. Pulse Width 250 to 350 μs. Duty Cycle 1.0 to 2.0%.

ASSURANCE TESTING (Pre/Post Burn-In)					
Burn-In Conditions: T _A = 30 ± 5°C, V _{CB} = 60 Vdc 2N3498,99, 100 Vdc 2N3500,01, 30 Vdc JANS					
P _T = 1.0 W					
Characteristics Tested	Symbol	Initial and End Point Limits		Unit	
		Min	Max		
Collector Cutoff Current (V _{CB} = 50 Vdc) (V _{CB} = 75 Vdc)	2N3498, 2N3499 2N3500, 2N3501	I _{CBO}	— —	50 50	nAdc
DC Current Gain ⁽¹⁾ (I _C = 150 mAdc, V _{CE} = 10 Vdc)	2N3498, 2N3500 2N3499, 2N3501	h _{FE}	40 100	120 300	—

Delta from Pre-Burn-In Measured Values		Min	Max	
Delta Collector Cutoff Current	ΔI _{CBO}	—	±100 or ±5.0 whichever is greater	% of Initial Value nAdc
Delta DC Current Gain ⁽¹⁾	Δh _{FE}	—	±15	% of Initial Value

(1) Pulsed. Pulse Width 250 to 350 μs. Duty Cycle 1.0 to 2.0%.