

SEMICONDUCTOR

TECHNICAL DATA

2N3498JAN, JTX, JTXV, JANS
 2N3499JAN, JTX, JTXV, JANS
 2N3500JAN, JTX, JTXV, JANS
 2N3501JAN, JTX, JTXV, JANS

Processed per MIL-S-19500/366

NPN Silicon
Small-Signal Transistors

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



MAXIMUM RATINGS				
Rating	Symbol	2N3498 2N3499	2N3500 2N3501	Unit
Collector-Emitter Voltage	V_{CE0}	100	150	Vdc
Collector-Base Voltage	V_{CB0}	100	150	Vdc
Emitter-Base Voltage	V_{EB0}	6.0	6.0	Vdc
Collector Current — Continuous	I_C	500	300	mA dc
Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C @ $T_C = 25^\circ\text{C}$ 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	$R_{\theta JA}$ $R_{\theta JC}$		175 35	°C/W
Operating Junction and Storage Temperature Range	T_J, T_{stg}		-65 to 200	°C

ELECTRICAL CHARACTERISTICS (T _A = 25°C unless otherwise noted.)					
Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage ⁽¹⁾ (I _C = 10 mA, I _B = 0)	2N3498, 2N3499 2N3500, 2N3501	V _{(BR)CEO}	100 150	— —	V _{dc}
Collector-Base Breakdown Voltage (I _C = 10 μA, I _E = 0)	2N3498, 2N3499 2N3500, 2N3501	V _{(BR)CBO}	100 150	— —	V _{dc}
Emitter-Base Breakdown Voltage (I _E = 10 μA, I _C = 0)		V _{(BR)EBO}	6.0	—	μA _{dc}
Collector Cutoff Current (V _{CB} = 50 V _{dc}) (V _{CB} = 75 V _{dc}) @ T _A = 150°C (V _{CB} = 50 V _{dc}) (V _{CB} = 75 V _{dc})	2N3498, 2N3499 2N3500, 2N3501 2N3498, 2N3499 2N3500, 2N3501	I _{CBO}	— — — —	0.05 0.05 50 50	μA _{dc}
Emitter Cutoff Current (V _{EB} = 4.0 V _{dc} , I _C = 0)		I _{EBO}	—	0.025	μA _{dc}
ON CHARACTERISTICS⁽¹⁾					
DC Current Gain (I _C = 0.1 mA, V _{CE} = 10 V _{dc})	2N3498, 2N3500 2N3499, 2N3501	h _{FE}	20 35	— —	—
(I _C = 1.0 mA, V _{CE} = 10 V _{dc})	2N3498, 2N3500 2N3499, 2N3501		25 50	— —	
(I _C = 10 mA, V _{CE} = 10 V _{dc})	2N3498, 2N3500 2N3499, 2N3501		35 75	— —	
(I _C = 150 mA, V _{CE} = 10 V _{dc})	2N3498, 2N3500 2N3499, 2N3501		40 100	120 300	
(I _C = 300 mA, V _{CE} = 10 V _{dc})	2N3500 2N3501		15 20	— —	
(I _C = 500 mA, V _{CE} = 10 V _{dc})	2N3498 2N3499		15 20	— —	
(I _C = 150 mA, V _{CE} = 10 V _{dc} , T _A = -55°C)	2N3498, 2N3500 2N3499, 2N3501		22 45	— —	
Collector-Emitter Saturation Voltage (I _C = 10 mA, I _B = 1.0 mA) (I _C = 150 mA, I _B = 15 mA)	2N3500, 2N3501	V _{CE(sat)}	— —	0.2 0.4	V _{dc}
(I _C = 300 mA, I _B = 30 mA)	2N3498, 2N3499		—	0.6	
Base-Emitter Saturation Voltage (I _C = 10 mA, I _B = 1.0 mA) (I _C = 150 mA, I _B = 15 mA)	2N3500, 2N3501	V _{BE(sat)}	— —	0.8 1.2	V _{dc}
(I _C = 300 mA, I _B = 30 mA)	2N3498, 2N3499		—	1.4	

(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, 1 ≥ 10 ns, 1.0 cycle)					
Test 1 (I _C = 300 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					
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%.

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