MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

2N4898 thru 2N4900

MEDIUM-POWER PNP SILICON TRANSISTORS

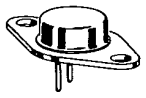
. . . designed for driver circuits, switching, and amplifier applications. These high-performance devices feature:

- Low Saturation Voltage — $V_{CE(sat)}$ = 0.6 V max @ I_C = 1.0 Amp
- Excellent Safe Operating Area
- Gain Specified to I_C = 1.0 Ampere
- 2N4900 Complementary to NPN 2N4912

4 AMPERE

GENERAL PURPOSE POWER TRANSISTORS

40-80 VOLTS
25 WATTS



MAXIMUM RATINGS

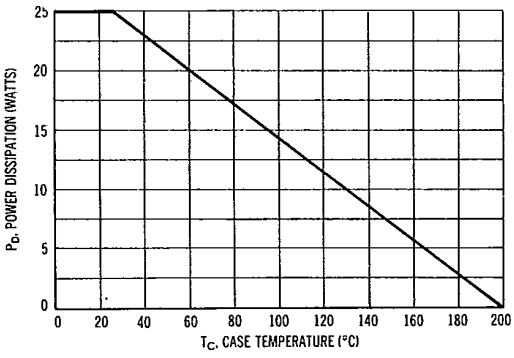
Rating	Symbol	2N4898	2N4899	2N4900	Unit
Collector-Emitter Voltage	V_{CEO}	40	60	80	Vdc
Collector-Base Voltage	V_{CB}	40	60	80	Vdc
Emitter-Base Voltage	V_{EB}	← 5.0 →			Vdc
Collector Current — Continuous*	I_C*	← 1.0 →			Adc
		← 4.0 →			
Base Current	I_B	← 1.0 →			Adc
Total Device Dissipation T_C = 25°C	P_D	← 25 →			Watts
Derate above 25°C		← 0.143 →			W/°C
Operating & Storage Junction Temperature Range	T_J, T_{stg}	← −65 to +200 →			°C

THERMAL CHARACTERISTICS

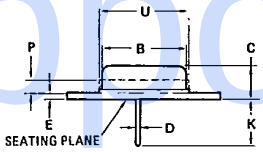
Characteristic	Symbol	Max	Unit
Thermal Reistance, Junction to Case	θ_{JC}	7.0	°C/W

*The 1.0 Amp maximum I_C value is based upon JEDEC current gain requirements. The 4.0 Amp maximum value is based upon actual current-handling capability of the device (see Figure 5).

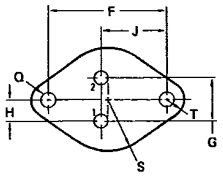
FIGURE 1 — POWER-TEMPERATURE DERATING CURVE



Safe Area Curves are indicated by Figure 5. All limits are applicable and must be observed.



STYLE 1:
PIN 1. BASE
2. EMITTER
CASE: COLLECTOR



DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
B	11.94	12.70	0.470	0.500
C	6.35	8.64	0.250	0.340
D	0.71	0.86	0.028	0.034
E	1.27	1.91	0.050	0.075
F	24.33	24.43	0.958	0.962
G	4.83	5.33	0.190	0.210
H	2.41	2.67	0.095	0.105
J	14.48	14.99	0.570	0.590
K	9.14	–	0.360	–
P	–	1.27	–	0.050
Q	3.61	3.86	0.142	0.152
S	–	8.89	–	0.350
T	–	3.68	–	0.145
U	–	15.75	–	0.620

All JEDEC Dimensions and and Notes Apply.
CASE 80-02
TO-213AA

T-33-19

2N4898 thru 2N4900

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Sustaining Voltage* (I_C = 0.1 Adc, I_B = 0)	2N4898	$V_{CEO(sus)}$*	40	-	Vdc
	2N4899		60	-	
	2N4900		80	-	
Collector Cutoff Current (V_{CE} = 20 Vdc, I_B = 0)	2N4898	I_{CEO}	-	0.5	mAdc
(V_{CE} = 30 Vdc, I_B = 0)	2N4899		-	0.5	
(V_{CE} = 40 Vdc, I_B = 0)	2N4900		-	0.5	
Collector Cutoff Current (V_{CE} = Rated V_{CEO}, $V_{BE(off)}$ = 1.5 Vdc)		I_{CEX}	-	0.1	mAdc
(V_{CE} = Rated V_{CEO}, $V_{BE(off)}$ = 1.5 Vdc, T_C = 150°C)			-	1.0	
Collector Cutoff Current (V_{CB} = Rated V_{CB}, I_E = 0)		I_{CBO}	-	0.1	mAdc
Emitter Cutoff Current (V_{BE} = 5.0 Vdc, I_C = 0)		I_{EBO}	-	1.0	mAdc
ON CHARACTERISTICS					
DC Current Gain* (I_C = 50 mAdc, V_{CE} = 1.0 Vdc)		h_{FE}*	40	-	-
(I_C = 500 mAdc, V_{CE} = 1.0 Vdc)			20	100	
(I_C = 1.0 Adc, V_{CE} = 1.0 Vdc)			10	-	
Collector-Emitter Saturation Voltage* (I_C = 1.0 Adc, I_B = 0.1 Adc)		$V_{CE(sat)}$*	-	0.6	Vdc
Base-Emitter Saturation Voltage* (I_C = 1.0 Adc, I_B = 0.1 Adc)		$V_{BE(sat)}$*	-	1.3	Vdc
Base-Emitter On Voltage* (I_C = 1.0 Adc, V_{CE} = 1.0 Vdc)		$V_{BE(on)}$*	-	1.3	Vdc
SMALL SIGNAL CHARACTERISTICS					
Current-Gain–Bandwidth Product (I_C = 250 mAdc, V_{CE} = 10 Vdc, f = 1.0 MHz)		f_T	3.0	-	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 100 kHz)		C_{ob}	-	100	pF
Small-Signal Current Gain (I_C = 250 mAdc, V_{CE} = 10 Vdc, f = 1.0 kHz)		h_{fe}	25	-	-

* Pulse Test: PW ≈300 μs, Duty Cycle ≈ 2.0%

FIGURE 2 – SWITCHING TIME EQUIVALENT CIRCUIT

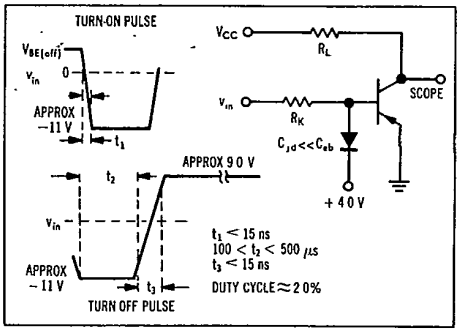


FIGURE 3 – TURN-ON TIME

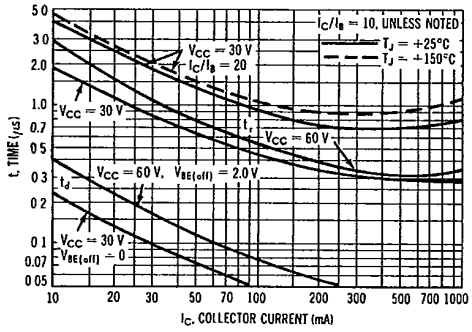


FIGURE 4 – THERMAL RESPONSE

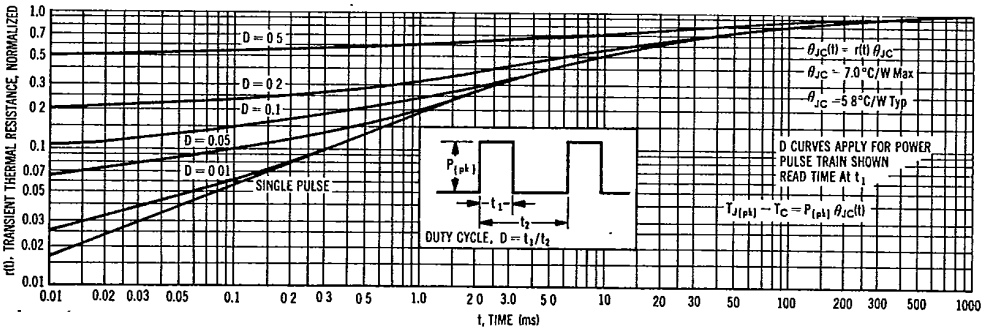
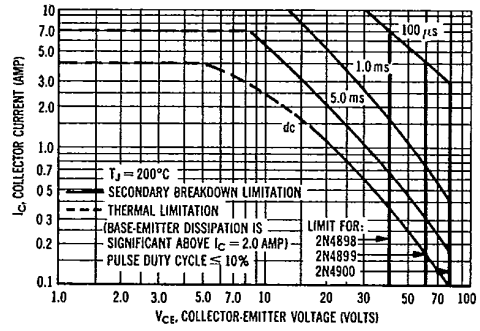


FIGURE 5 – ACTIVE-REGION SAFE OPERATING AREA



The safe operating area curves indicate $I_C - V_{CE}$ limits of the transistor which must be observed for reliable operation. Collector load lines for specific circuits must fall below the limits indicated by the applicable curve.

The data of Figure 5 is based upon $T_{J(pk)} = 200°C$; T_C is variable depending upon conditions. Pulse curves are valid for duty cycles to 10% provided $T_{J(pk)} \leq 200°C$. $T_{J(pk)}$ may be calculated from the data in Figure 4. At high case temperatures, thermal limitations will reduce the power which can be handled to values less than the limitations imposed by secondary breakdown.

3

FIGURE 6 – STORAGE TIME

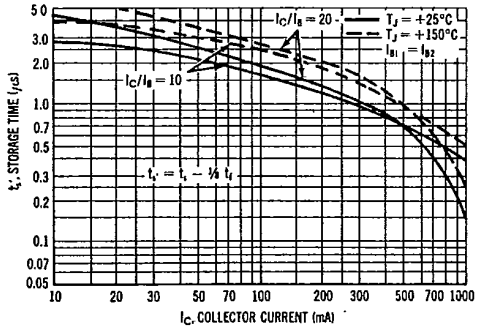


FIGURE 7 – FALL TIME