

6367254 MOTOROLA SC (XSTRS/R F)

96D 80338  
T-33-19

**MOTOROLA SEMICONDUCTOR TECHNICAL DATA**

**2N4898 thru 2N4900**

**MEDIUM-POWER PNP SILICON TRANSISTORS**

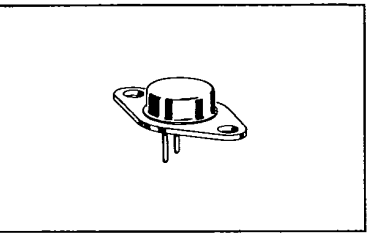
... designed for driver circuits, switching, and amplifier applications. These high-performance devices feature:

- Low Saturation Voltage -  $V_{CE(sat)} = 0.6 \text{ V max @ } I_C = 1.0 \text{ Amp}$
- Excellent Safe Operating Area
- Gain Specified to  $I_C = 1.0 \text{ Ampere}$
- 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 $T_C = 25^\circ\text{C}$	$P_D$	← 25 →			Watts
Derate above $25^\circ\text{C}$		← 0.143 →			W/ $^\circ\text{C}$
Operating & Storage Junction Temperature Range	$T_J, T_{stg}$	← -65 to +200 →			$^\circ\text{C}$



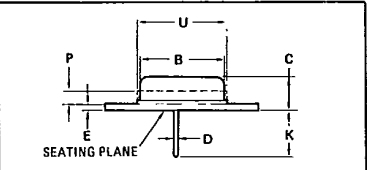
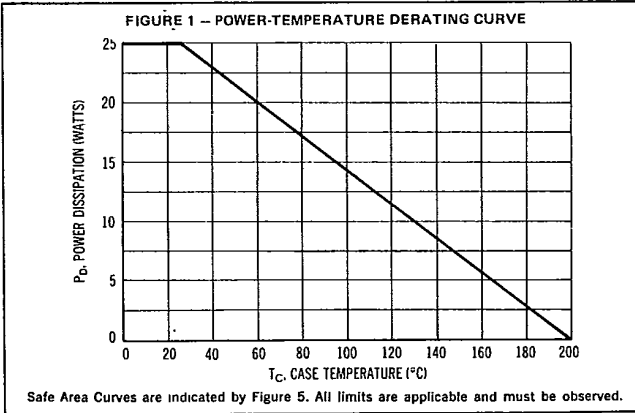
**THERMAL CHARACTERISTICS**

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$\theta_{JC}$	7.0	$^\circ\text{C/W}$

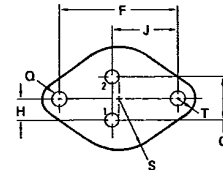
\*The 1.0 Amp maximum  $I_C$  value is based upon JEDEC current gain requirements. The 4.0 Amp maximum value is based upon actual current-handling capability of the device (see Figure 5).



**FIGURE 1 - POWER-TEMPERATURE DERATING CURVE**



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



DIM	MILLIMETERS		INCHES	
	MIN	MAX	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	1.51	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 Notes Apply.  
**CASE 80-02**  
**TO-213AA**

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

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector-Emitter Sustaining Voltage* ( $I_C = 0.1 \text{ A dc}, I_B = 0$ )	$V_{CE(sus)}$ *	40	-	Vdc
2N4898		60	-	
2N4900		80	-	
Collector Cutoff Current ( $V_{CE} = 20 \text{ Vdc}, I_B = 0$ )	$I_{CEO}$	-	0.5	mAdc
( $V_{CE} = 30 \text{ Vdc}, I_B = 0$ )		-	0.5	
( $V_{CE} = 40 \text{ Vdc}, I_B = 0$ )		-	0.5	
Collector Cutoff Current ( $V_{CE} = \text{Rated } V_{CEO}, V_{BE(off)} = 1.5 \text{ Vdc}$ )	$I_{CEX}$	-	0.1	mAdc
( $V_{CE} = \text{Rated } V_{CEO}, V_{BE(off)} = 1.5 \text{ Vdc}, T_C = 150^\circ\text{C}$ )		-	1.0	
Collector Cutoff Current ( $V_{CB} = \text{Rated } V_{CB}, I_E = 0$ )	$I_{CBO}$	-	0.1	mAdc
Emitter Cutoff Current ( $V_{BE} = 5.0 \text{ Vdc}, I_C = 0$ )	$I_{EBO}$	-	1.0	mAdc

**ON CHARACTERISTICS**

DC Current Gain* ( $I_C = 50 \text{ mAdc}, V_{CE} = 1.0 \text{ Vdc}$ )	$h_{FE}$ *	40	-	-
( $I_C = 500 \text{ mAdc}, V_{CE} = 1.0 \text{ Vdc}$ )		20	100	
( $I_C = 1.0 \text{ A dc}, V_{CE} = 1.0 \text{ Vdc}$ )		10	-	
Collector-Emitter Saturation Voltage* ( $I_C = 1.0 \text{ A dc}, I_B = 0.1 \text{ A dc}$ )	$V_{CE(sat)}$ *	-	0.6	Vdc
Base-Emitter Saturation Voltage* ( $I_C = 1.0 \text{ A dc}, I_B = 0.1 \text{ A dc}$ )	$V_{BE(sat)}$ *	-	1.3	Vdc
Base-Emitter On Voltage* ( $I_C = 1.0 \text{ A dc}, V_{CE} = 1.0 \text{ Vdc}$ )	$V_{BE(on)}$ *	-	1.3	Vdc

**SMALL SIGNAL CHARACTERISTICS**

Current-Gain-Bandwidth Product ( $I_C = 250 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}, f = 1.0 \text{ MHz}$ )	$f_T$	3.0	-	MHz
Output Capacitance ( $V_{CB} = 10 \text{ Vdc}, I_E = 0, f = 100 \text{ kHz}$ )	$C_{ob}$	-	100	pF
Small-Signal Current Gain ( $I_C = 250 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}, f = 1.0 \text{ kHz}$ )	$h_{fe}$	25	-	-

\* Pulse Test: PW  $\approx 300 \mu\text{s}$ , Duty Cycle  $\approx 2.0\%$

FIGURE 2 - SWITCHING TIME EQUIVALENT CIRCUIT

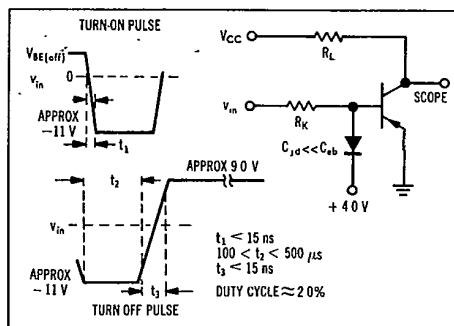
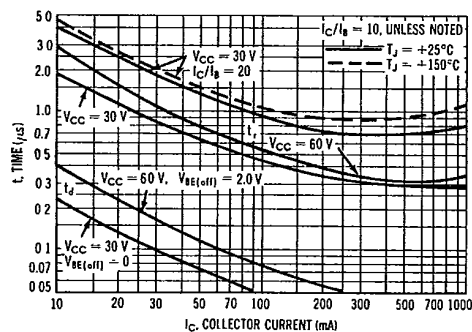


FIGURE 3 - TURN-ON TIME



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FIGURE 4 - THERMAL RESPONSE

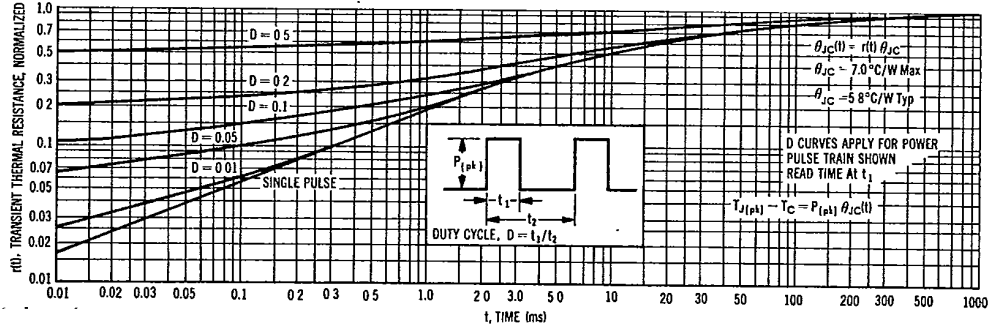
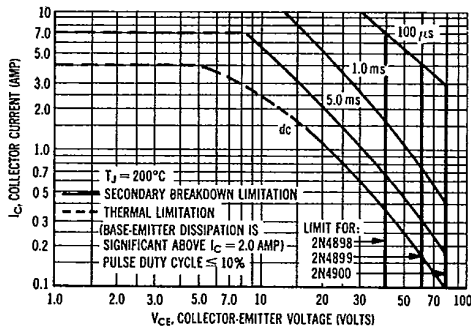


FIGURE 5 - ACTIVE-REGION SAFE OPERATING AREA



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  $T_{J(pk)} = 200^\circ\text{C}$ ;  $T_C$  is variable depending upon conditions. Pulse curves are valid for duty cycles to 10% provided  $T_{J(pk)} \approx 200^\circ\text{C}$ .  $T_{J(pk)}$  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.



FIGURE 6 - STORAGE TIME

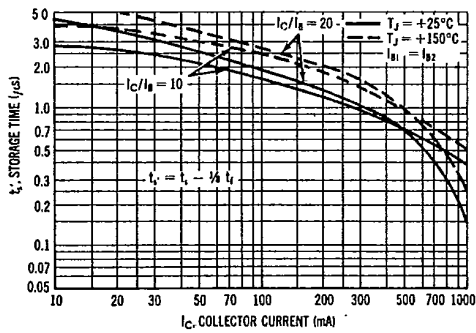


FIGURE 7 - FALL TIME

