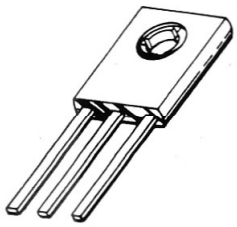
MOTOROLA

2N4918 thru 2N4920 (SILICON)

CASE 77



Medium-power plastic PNP silicon transistors designed for driver circuits, switching, and amplifier applications.

MAXIMUM RATINGS

Rating	Symbol	2N4918	2N4919	2N4920	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 3.0			Adc
Base Current	I_B	1.0			Adc
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	30 0.24			Watts W/°C
Operating & Storage Junction Temperature Range	T_J, T_{stg}	-65 to +150			°C

THERMAL CHARACTERISTICS **

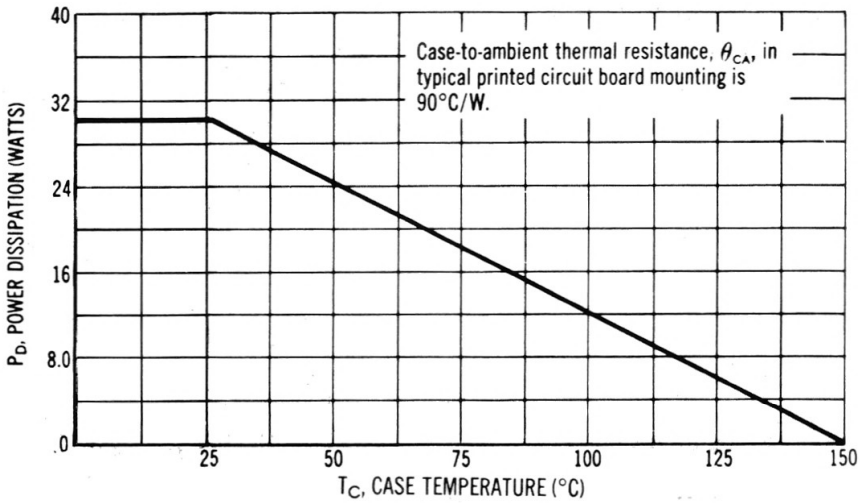
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	θ_{JC}	4.16	°C/W

* The 1.0 Amp maximum I_C value is based upon JEDEC current gain requirements.

The 3.0 Amp maximum value is based upon actual current-handling capability of the device (see Figure 5).

** Recommend use of thermal compound for lowest thermal resistance.

FIGURE 1 — POWER-TEMPERATURE DERATING CURVE



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

2N4918 thru 2N4920 (continued)

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

Characteristic	Fig. No.	Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Sustaining Voltage* (I_C = 0.1 Adc, I_B = 0) 2N4918	-	$BV_{CEO(sus)}$*	40	-	Vdc
2N4919			60	-	
2N4920			80	-	
Collector Cutoff Current (V_{CE} = 20 Vdc, I_B = 0)	-	I_{CEO}	-	0.5	mAdc
(V_{CE} = 30 Vdc, I_B = 0)			-	0.5	
(V_{CE} = 40 Vdc, I_B = 0)			-	0.5	
Collector Cutoff Current (V_{CE} = Rated V_{CEO}, $V_{BE(off)}$ = 1.5 Vdc)	12	I_{CEX}	-	0.1	mAdc
(V_{CE} = Rated V_{CEO}, $V_{BE(off)}$ = 1.5 Vdc, T_C = 125°C)			-	0.5	
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)	8	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)	9, 11, 13	$V_{CE(sat)}$*	-	0.6	Vdc
Base-Emitter Saturation Voltage* (I_C = 1.0 Adc, I_B = 0.1 Adc)	11, 13	$V_{BE(sat)}$*	-	1.3	Vdc
Base-Emitter On Voltage* (I_C = 1.0 Adc, V_{CE} = 1.0 Vdc)	11, 13	$V_{BE(on)}$*	-	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

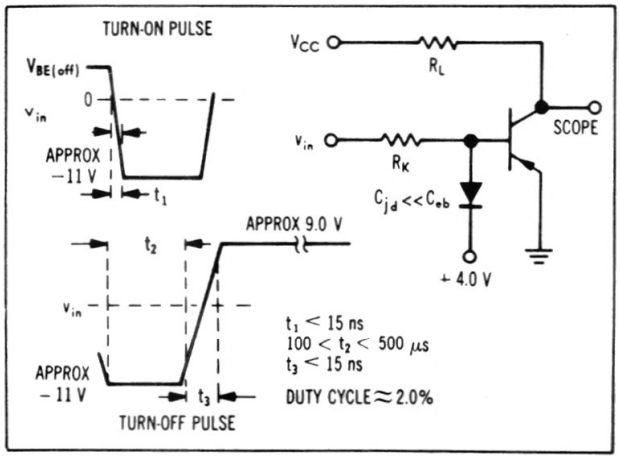
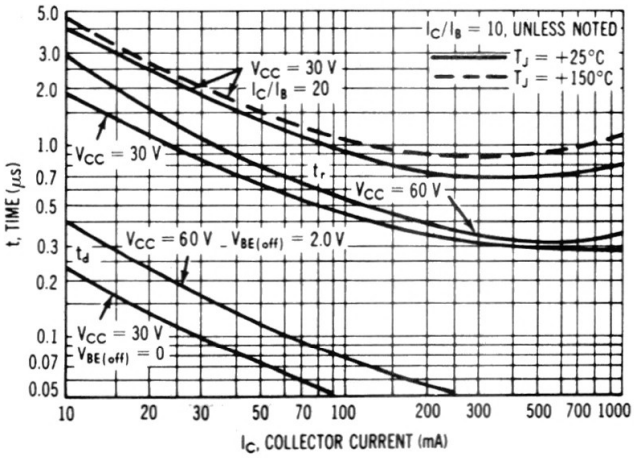


FIGURE 3 — TURN-ON TIME



2N4918 thru 2N4920 (continued)

FIGURE 4 — THERMAL RESPONSE

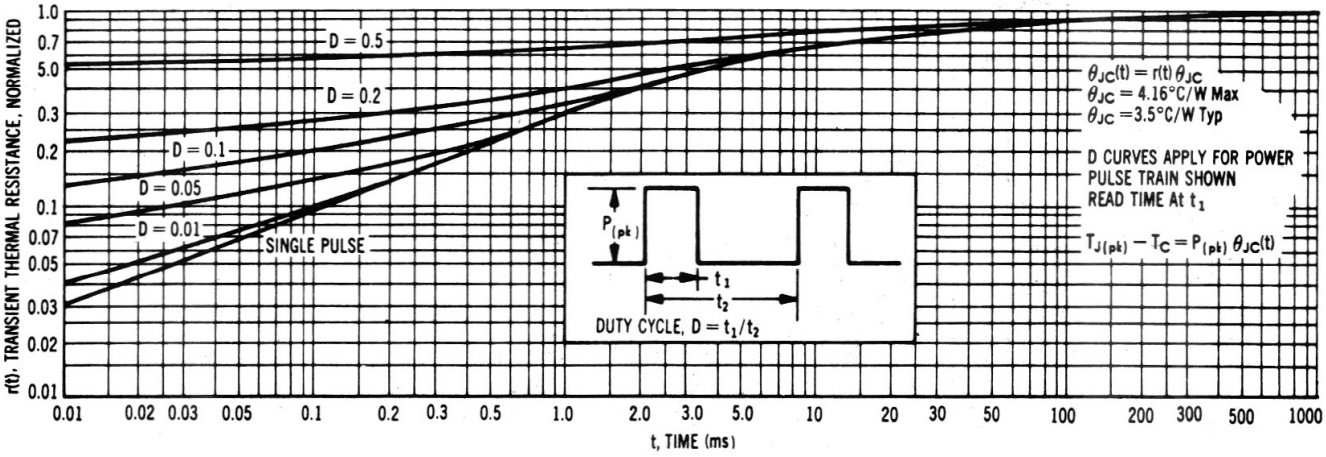
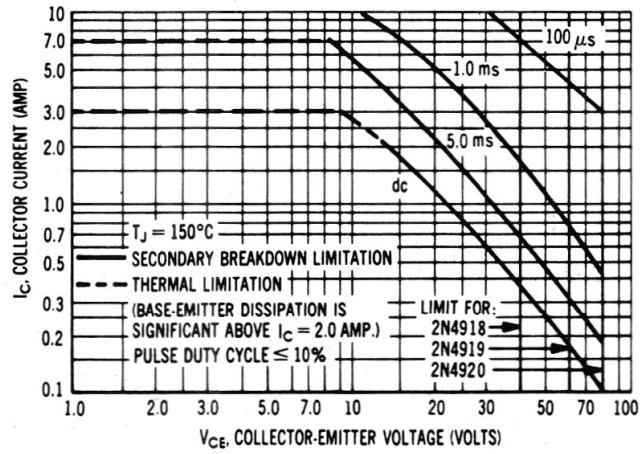


FIGURE 5 — ACTIVE-REGION SAFE OPERATING AREA



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 $T_{J(pk)} = 150°C$; T_C is variable depending upon conditions. Pulse curves are valid for duty cycles to 10% provided $T_{J(pk)} \leq 150°C$. $T_{J(pk)}$ 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

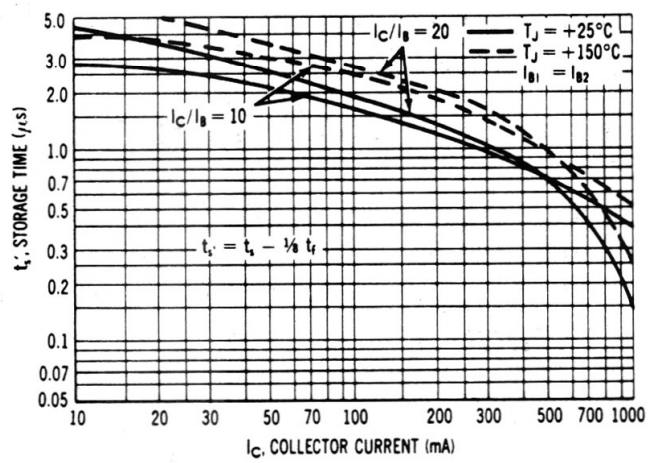
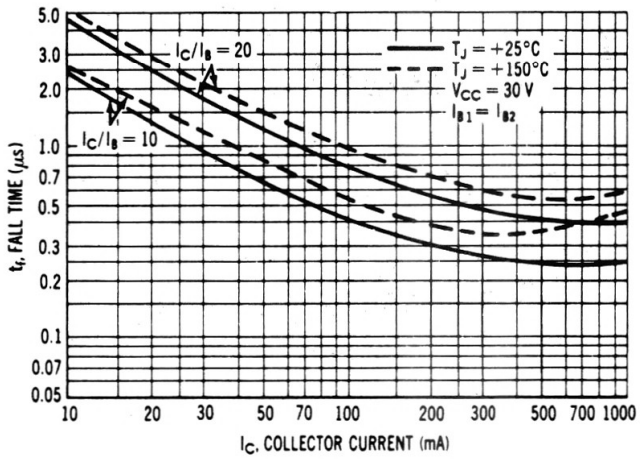


FIGURE 7 — FALL TIME



TYPICAL DC CHARACTERISTICS

FIGURE 8 — CURRENT GAIN

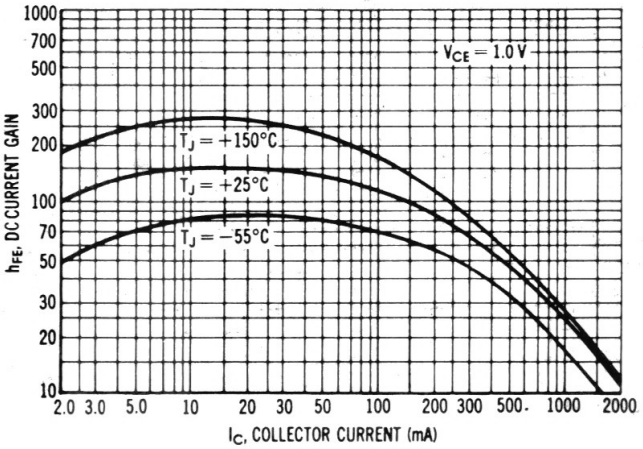


FIGURE 9 — COLLECTOR SATURATION REGION

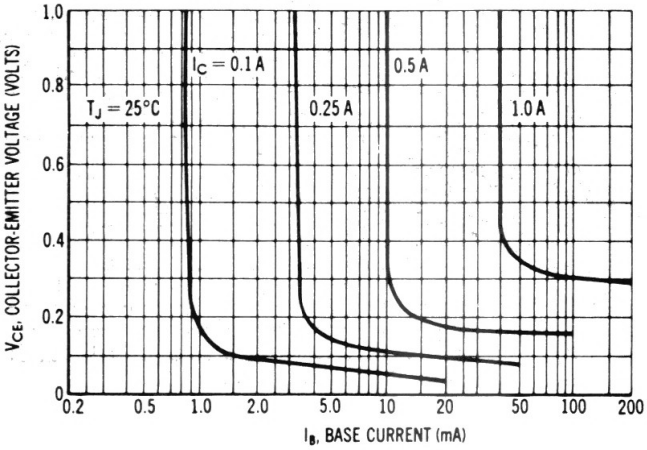


FIGURE 10 — EFFECTS OF BASE-EMITTER RESISTANCE

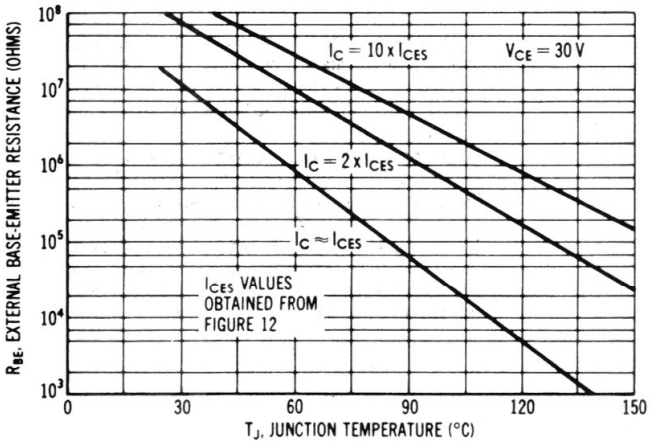


FIGURE 11 — "ON" VOLTAGE

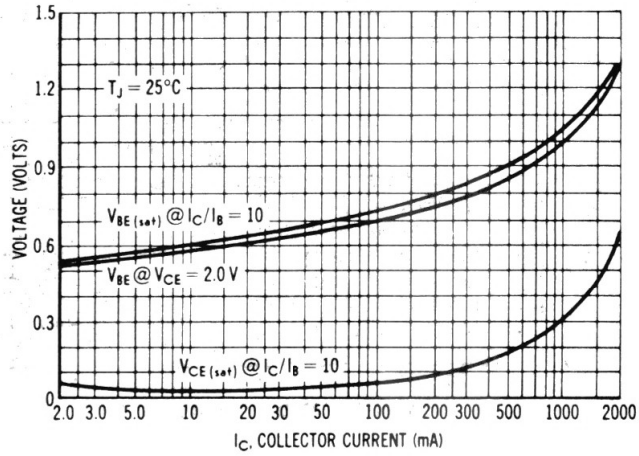


FIGURE 12 — COLLECTOR CUTOFF REGION

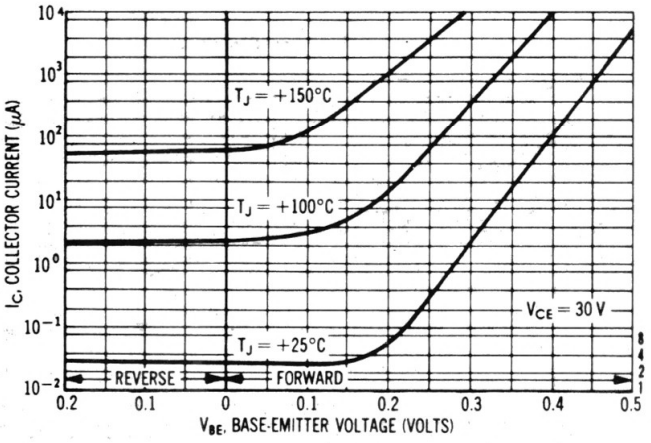


FIGURE 13 — TEMPERATURE COEFFICIENTS