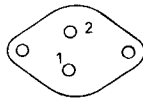
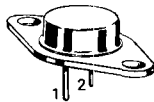


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*Consult Motorola if a direct replacement is necessary.

TABLE 3 — METAL TO-213 (Formerly TO-66)



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

CASE 80-02 (TO-213AA)

I _C Cont Amps Max	V _{CEO} (sus) Volts Min	Device Type		h _{FE} Min/Max	@ I _C Amp	Resistive Switching			f _T MHz Min	P _D (Case) Watts @ 25°C
		NPN	PNP			t _s μs Max	t _f μs Max	@ I _C Amp		
1	80	2N4912		20/100	0.5	0.6 typ	0.3 typ	0.5	3	25
	175	2N3583	2N6420	40/200	0.5	2 typ	0.23 typ	0.5	10	35
	225	2N3738		40/200	0.1	3 typ	0.3 typ	0.1	10	20
	300	2N3739		40/200	0.1	3 typ	0.3 typ	0.1	10	20
2	225		2N6211	10/100	1	2.5	0.6	1	20	35
	250	2N3584	2N6421	25/100	1	4	3	1	10	35
	300		2N6212	10/100	1	2.5	0.6	1	20	35
		2N3585	2N6422	25/100	1	4	3	1	10	35
		2N4240		30/150	0.75	6	3	0.75	15	35
	350		2N6213	10/100	1	2.5	0.6	1	20	35
3	140	2N3441		25/100	0.5				0.2	25
4	60		2N3740	30/100	0.25	1.3 typ	0.27 typ	0.25	4	25
		2N3054,A		25/100	0.5	1 typ	0.3 typ	0.5	3	75
		2N3766		40/160	0.5	0.9 typ	0.09 typ	0.5	10	20
		2N6294##	2N6296##	750/18k	2	0.9 typ	0.7 typ	2	4#	50
	80		2N3741	30/100	0.25	1.3 typ	0.27 typ	0.25	4	25
		2N3767		40/160	0.5	0.9 typ	0.09 typ	0.5	10	20
		2N6295##	2N6297##	750/18k	2	0.9 typ	0.7 typ	2	4	50
5	80	2N4233A		25/100	1.5	0.5 typ	0.2 typ	1.5	4	75
7	60		2N6317	20/100	2.5	1	0.8	2.5	4	90
	80	2N5428		60/240	2	2	0.2	2	30	40
			2N6318	20/100	2.5	1	0.8	2.5	4	90
	100	2N5429 2N5430		30/120 60/240	2 2	2 2	0.2 0.2	2 2	30 30	40 40
8	60	2N6300##	2N6298##	750/18k	4	1.5 typ	1.5 typ	4	4#	75
	80	2N6301##	2N6299##	750/18k	4	1.5 typ	1.5 typ	4	4#	75

|h_{FE}| @ 1 MHz, ## Darlington



JAN, JTX, JTXV Available

2N4912

NPN SILICON TRANSISTOR

... designed for driver circuits, switching, and amplifier applications.
This high-performance device features:

- Low Saturation Voltage — $V_{CE(sat)} = 0.6 \text{ V max @ } I_C = 1.0 \text{ Amp}$
- Excellent Safe Operating Area
- Gain Specified to $I_C = 1.0 \text{ Amp}$
- Complement to PNP 2N4900

1 AMPERE

**NPN SILICON
POWER TRANSISTOR**

**80 VOLTS
25 WATTS**

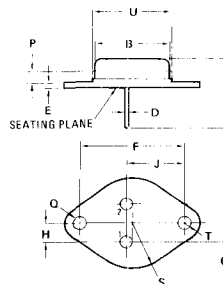
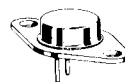
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	80	Vdc
Collector-Base Voltage	V_{CB}	80	Vdc
Emitter-Base Voltage	V_{EB}	5.0	Vdc
Collector Current — Continuous*	I_C^*	1.0	Adc
Base Current — Continuous	I_B	1.0	Adc
Total Device Dissipation $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	25 0.143	Watts mW/ $^\circ\text{C}$
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	$R_{\theta JC}$	7.0	$^\circ\text{C/W}$

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



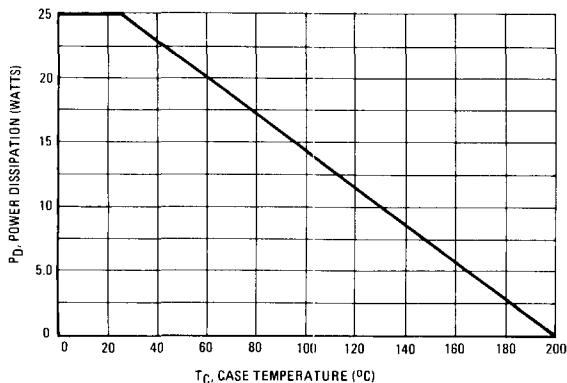
STYLE 1:
PIN 1: BASE
2: EMITTER
CASE: COLLECTOR

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	1.91	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 Notes Apply.

**CASE 80-02
TO-213AA
(TO-66)**

FIGURE 1 — POWER-TEMPERATURE DERATING CURVE



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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Sustaining Voltage (1) ($I_C = 0.1 \text{ A dc}$, $I_B = 0$)	$V_{CE(sus)}$	80	—	Vdc
Collector Cutoff Current ($V_{CE} = 40 \text{ Vdc}$, $I_B = 0$)	I_{CEO}	—	0.5	mA dc
Collector Cutoff Current ($V_{CE} = \text{Rated } V_{CEO}$, $V_{EB(off)} = 1.5 \text{ Vdc}$) ($V_{CE} = \text{Rated } V_{CEO}$, $V_{EB(off)} = 1.5 \text{ Vdc}$, $T_C = 150^{\circ}\text{C}$)	I_{CEX}	—	0.1 1.0	mA dc
Collector Cutoff Current ($V_{CB} = \text{Rated } V_{CB}$, $I_E = 0$)	I_{CBO}	—	0.1	mA dc
Emitter Cutoff Current ($V_{EB} = 5.0 \text{ Vdc}$, $I_C = 0$)	I_{EBO}	—	1.0	mA dc
ON CHARACTERISTICS (1)				
DC Current Gain ($I_C = 50 \text{ mA dc}$, $V_{CE} = 1.0 \text{ Vdc}$) ($I_C = 500 \text{ mA dc}$, $V_{CE} = 1.0 \text{ Vdc}$) ($I_C = 1.0 \text{ A dc}$, $V_{CE} = 1.0 \text{ Vdc}$)	h_{FE}	40 20 10	— 100 —	—
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 ($I_C = 250 \text{ mA dc}$, $V_{CE} = 10 \text{ Vdc}$, $f = 1.0 \text{ MHz}$)	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 ($I_C = 250 \text{ mA dc}$, $V_{CE} = 10 \text{ Vdc}$, $f = 1.0 \text{ kHz}$)	h_{fe}	25	—	

(1) Pulse Test: Pulse Width = $300 \mu\text{s}$, Duty Cycle = 2.0%.

3

FIGURE 2 — SWITCHING TIME EQUIVALENT CIRCUIT

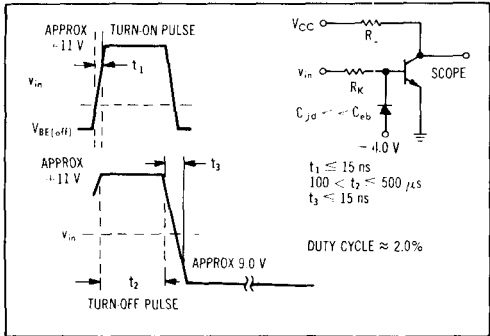


FIGURE 3 — TURN-ON TIME

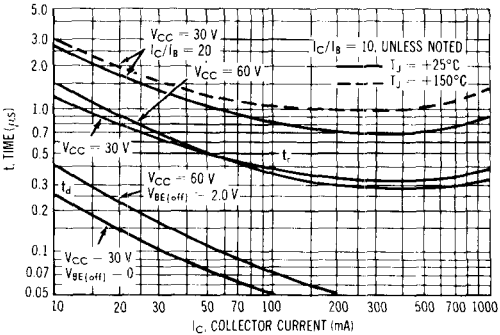


FIGURE 4 — THERMAL RESPONSE

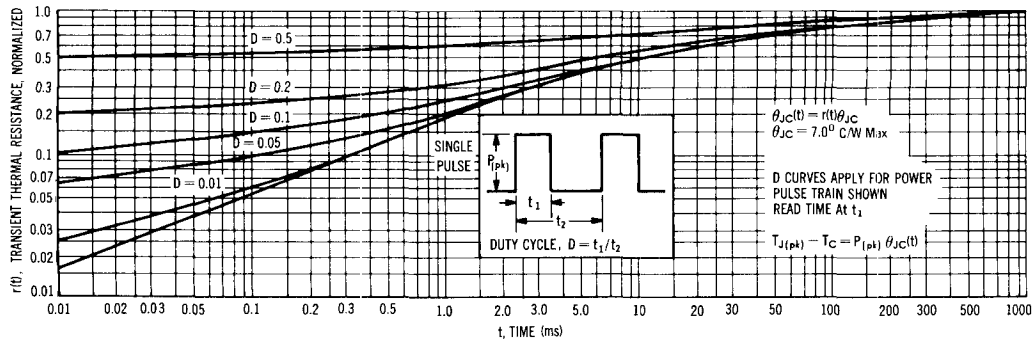
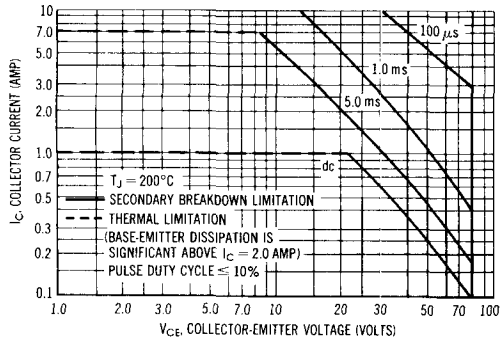


FIGURE 5 — ACTIVE-REGION SAFE OPERATING AREA



There are two limitations on the power handling ability of a transistor: junction temperature and secondary breakdown. Safe operating area curves indicate $I_C - V_{CE}$ limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

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

FIGURE 6 — STORAGE TIME

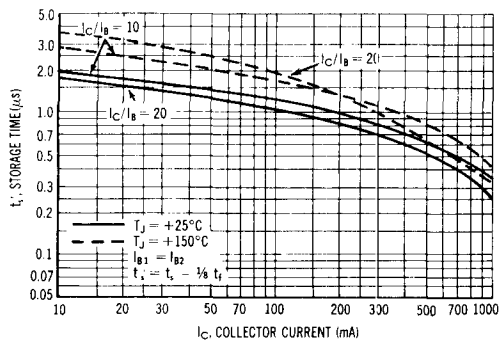


FIGURE 7 — FALL TIME

