

2N5983 2N5984 2N5985 (SILICON) MJE5983 MJE5984 MJE5985

HIGH POWER NPN SILICON TRANSISTORS

... designed for use in general purpose amplifier and switching applications.

- DC Current Gain Specified to 8 Amperes
 $h_{FE} = 20-120 @ I_C = 4.0 \text{ Adc}$
 $= 7.0 (\text{Min}) @ I_C = 8.0 \text{ Adc}$
- Collector-Emitter Sustaining Voltage –
 $V_{CEO(\text{sus})} = 40 \text{ Vdc (Min)} - 2N5983, \text{ MJE5983}$
 $= 60 \text{ Vdc (Min)} - 2N5984, \text{ MJE5984}$
 $= 80 \text{ Vdc (Min)} - 2N5985, \text{ MJE5985}$
- High Current Gain – Bandwidth Product –
 $f_T = 2.0 \text{ MHz (Min)} @ I_C = 500 \text{ mAdc}$
- Complements to PNP Transistors –
 $2N5980, 2N5981, 2N5982 \text{ and } MJE5980, MJE5981, MJE5982$
- Choice of Packages – 2N5983 Series – Case 90
 $MJE5983 \text{ Series – Case 199}$

*MAXIMUM RATINGS

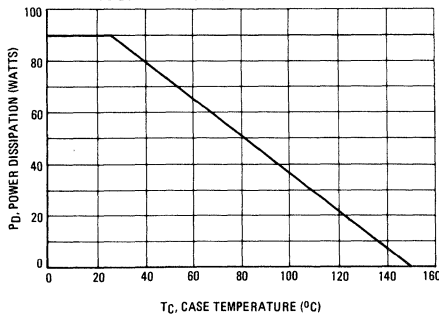
Rating	Symbol	2N5983 MJE5983	2N5984 MJE5984	2N5985 MJE5985	Unit
Collector-Emitter Voltage	V_{CEO}	40	60	80	Vdc
Collector-Base Voltage	V_{CB}	60	80	100	Vdc
Emitter-Base Voltage	V_{EB}	 5.0 			Vdc
Collector Current - Continuous Peak	I_C	 8.0 			Adc
		 15 			
Base Current	I_B	 3.0 			Adc
Total Device Dissipation @ $T_C = 25^{\circ}\text{C}$ Derate above 25°C	P_D	 90 			Watts
		 0.72 			
Operating and Storage Junction Temperature Range	T_J, T_{stg}	 -65 to +150 			$^{\circ}\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	θ_{JC}	1.39	$^\circ\text{C/W}$

*Indicates JEDEC Registered Data for 2N5983 Series.

FIGURE 1 – POWER DERATING

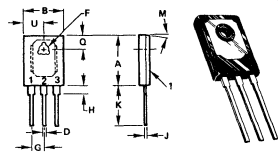


8 AMPERE POWER TRANSISTORS

NPN SILICON

40-60-80 VOLTS
90 WATTS

2N5983
2N5984
2N5985



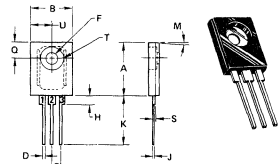
STYLE 2
PIN 1, EMITTER
2, COLLECTOR
3, BASE

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	16.13	16.38	0.635	0.645
B	12.57	12.83	0.495	0.505
C	3.18	3.43	0.125	0.135
D	1.09	1.24	0.043	0.049
E	3.51	3.76	0.138	0.148
F	4.22	80C	0.166	80C
G	2.67	2.92	0.105	0.115
H	0.313	0.684	0.032	0.034
J	15.11	16.28	0.595	0.645
K	4.70	4.95	0.185	0.195
L	1.91	2.16	0.075	0.085
M	6.22	6.48	0.245	0.255

NOTE
1. LEADS WITHIN .005" RAD OF TRUE POSITION (TP) AT MMC

CASE 90-05

MJE5983
MJE5984
MJE5985



STYLE 1
PIN 1, BASE
2, COLLECTOR
3, EMITTER

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	16.08	16.37	0.633	0.643
B	12.57	12.83	0.495	0.505
C	3.18	3.43	0.125	0.135
D	0.51	0.76	0.020	0.030
E	3.51	3.86	0.142	0.152
F	2.54	85C	0.100	85C
G	2.67	2.92	0.105	0.115
H	0.43	0.69	0.017	0.027
J	14.73	14.99	0.580	0.590
K	2.16	2.41	0.085	0.095
L	1.91	2.16	0.075	0.085
M	6.22	6.48	0.245	0.255

1. DIM "G" IS TO CENTERLINE OF LEADS

CASE 199-04

2N5983, 2N5984, 2N5985/MJE5983, MJE5984, MJE5985 (continued)

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Sustaining Voltage (1) ($I_C = 200\text{ mA}$, $I_B = 0$)	$V_{CE(sus)}$	40 60 80	— —	Vdc
Collector Cutoff Current ($V_{CE} = 20\text{ Vdc}$, $I_B = 0$) ($V_{CE} = 30\text{ Vdc}$, $I_B = 0$) ($V_{CE} = 40\text{ Vdc}$, $I_B = 0$)	I_{CEO}	— — —	1.0 1.0 1.0	mA _{dc}
Collector Cutoff Current ($V_{CE} = 60\text{ Vdc}$, $V_{EB(off)} = 1.5\text{ Vdc}$) ($V_{CE} = 80\text{ Vdc}$, $V_{EB(off)} = 1.5\text{ Vdc}$) ($V_{CE} = 100\text{ Vdc}$, $V_{EB(off)} = 1.5\text{ Vdc}$) ($V_{CE} = 40\text{ Vdc}$, $V_{EB(off)} = 1.5\text{ Vdc}$, $T_C = 125^\circ\text{C}$) ($V_{CE} = 60\text{ Vdc}$, $V_{EB(off)} = 1.5\text{ Vdc}$, $T_C = 125^\circ\text{C}$) ($V_{CE} = 80\text{ Vdc}$, $V_{EB(off)} = 1.5\text{ Vdc}$, $T_C = 125^\circ\text{C}$)	I_{CEX}	— — — — — —	100 100 100 1.0 1.0 1.0	μA_{dc} mA _{dc}
Emitter Cutoff Current ($V_{BE} = 5.0\text{ Vdc}$, $I_C = 0$)	I_{EBO}	—	1.0	mA _{dc}

ON CHARACTERISTICS

DC Current Gain ($I_C = 1.0\text{ A}$, $V_{CE} = 2.0\text{ Vdc}$) ($I_C = 4.0\text{ A}$, $V_{CE} = 2.0\text{ Vdc}$) ($I_C = 8.0\text{ A}$, $V_{CE} = 2.0\text{ Vdc}$)	h_{FE}	40 20 7.0	— 120 —	—
Collector-Emitter Saturation Voltage ($I_C = 4.0\text{ A}$, $I_B = 400\text{ mA}$) ($I_C = 8.0\text{ A}$, $I_B = 1.2\text{ A}$)	$V_{CE(sat)}$	— —	0.6 1.7	Vdc
Base-Emitter Saturation Voltage ($I_C = 8.0\text{ A}$, $I_B = 1.2\text{ A}$)	$V_{BE(sat)}$	—	2.5	Vdc
Base-Emitter On Voltage ($I_C = 4.0\text{ A}$, $V_{CE} = 2.0\text{ Vdc}$)	$V_{BE(on)}$	—	1.4	Vdc

DYNAMIC CHARACTERISTICS

Current-Gain — Bandwidth Product (2) ($I_C = 500\text{ mA}$, $V_{CE} = 10\text{ Vdc}$, $f_{test} = 1.0\text{ MHz}$)	f_T	2.0	—	MHz
Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f = 0.1\text{ MHz}$)	C_{ob}	—	250	pF
Small-Signal Current Gain ($I_C = 1.0\text{ A}$, $V_{CE} = 4.0\text{ Vdc}$, $f = 1.0\text{ kHz}$)	h_{fe}	20	—	—

*Indicates JEDEC Registered Data for 2N5983 Series.

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

(2) $f_T = |h_{fe}| \bullet f_{test}$

FIGURE 2 — SWITCHING TIME TEST CIRCUIT

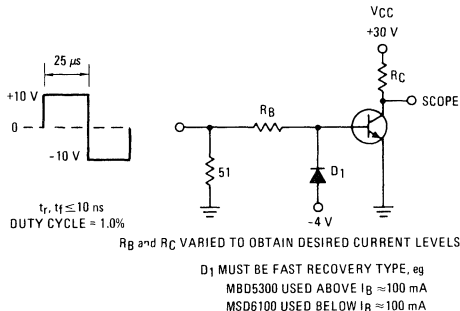


FIGURE 3 — TURN-ON TIME

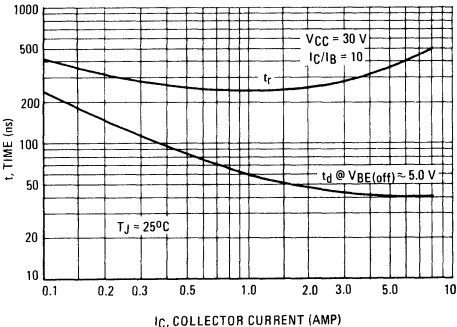


FIGURE 4 – THERMAL RESPONSE

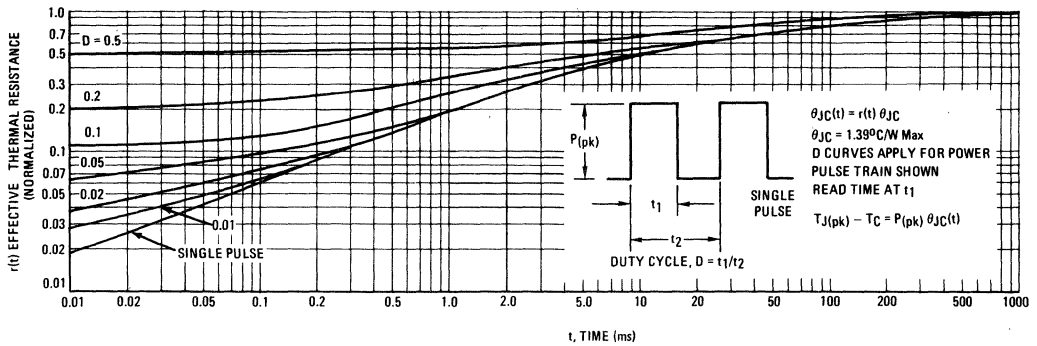
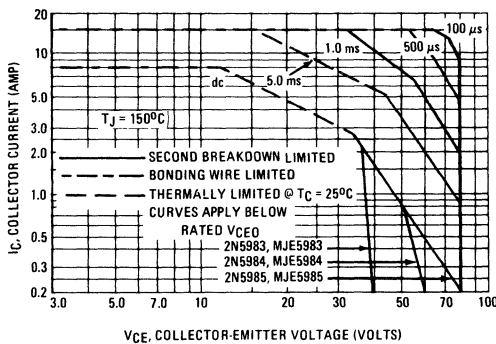


FIGURE 5 – ACTIVE-REGION SAFE OPERATING AREA



There are two limitations on the power handling ability of a transistor: average junction temperature and second 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 $T_{J(pk)} = 150^\circ\text{C}$; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \leq 150^\circ\text{C}$. $T_{J(pk)}$ 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 second breakdown. (See AN-415)

FIGURE 6 – TURN-OFF TIME

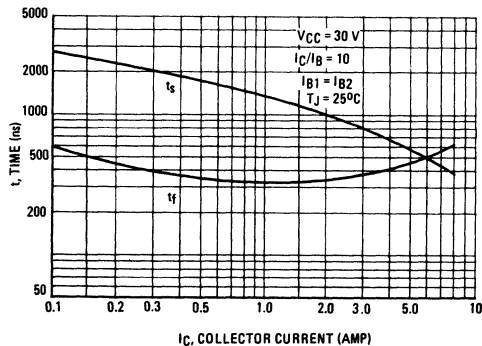


FIGURE 7 – CAPACITANCES

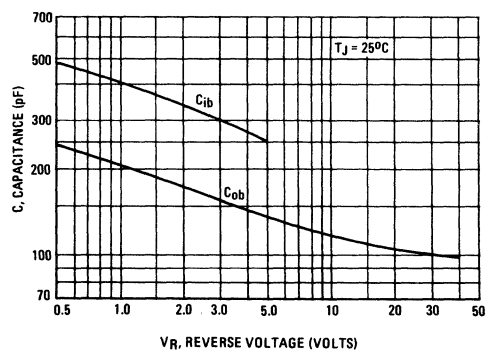


FIGURE 8 – DC CURRENT GAIN

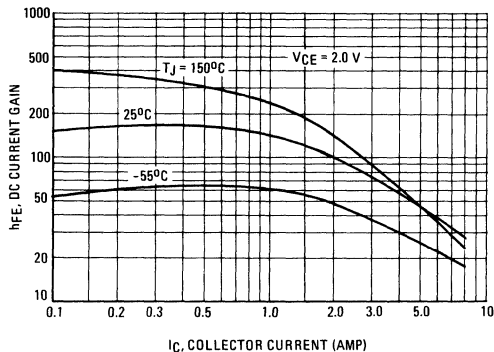


FIGURE 9 – COLLECTOR SATURATION REGION

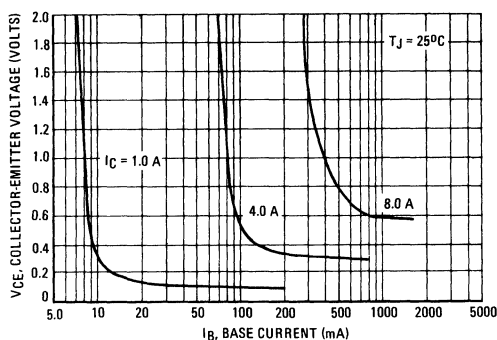


FIGURE 10 – “ON” VOLTAGES

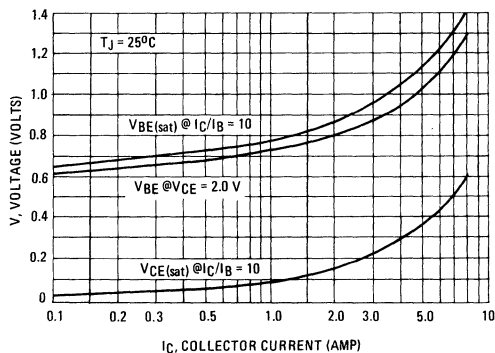


FIGURE 11 – TEMPERATURE COEFFICIENTS

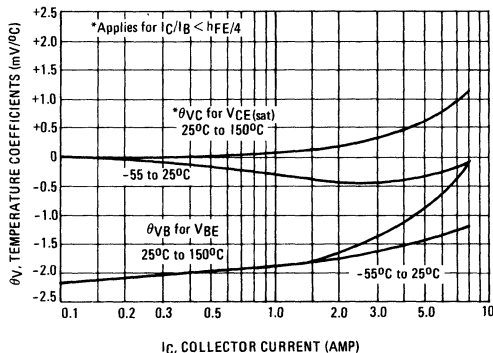


FIGURE 12 – COLLECTOR CUT-OFF REGION

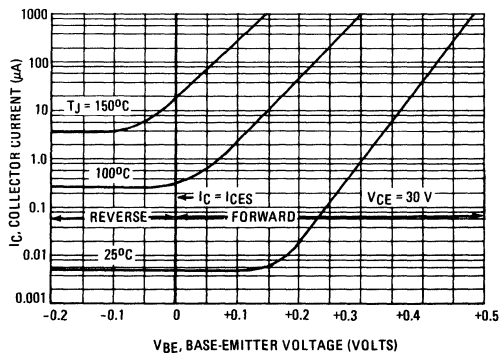


FIGURE 13 – EFFECTS OF BASE-EMITTER RESISTANCE

