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2N5679
2N5680

PNP SILICON

2N5681
2N5682

NPN SILICON

CASE 79-02, STYLE 1
TO-5 (TO-205AA)

GENERAL PURPOSE TRANSISTOR

MAXIMUM RATINGS

Rating	Symbol	2N5679 2N5681	2N5680 2N5682	Unit
Collector-Emitter Voltage	V_{CEO}	100	120	Vdc
Collector-Base Voltage	V_{CBO}	100	120	Vdc
Emitter-Base Voltage	V_{EBO}	4.0		Vdc
Base Current	I_B	0.5		Vdc
Collector Current — Continuous	I_C	1.0		Adc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	1.0 5.7		Watt mW/°C
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	10 57		Watts mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−65 to +200		°C

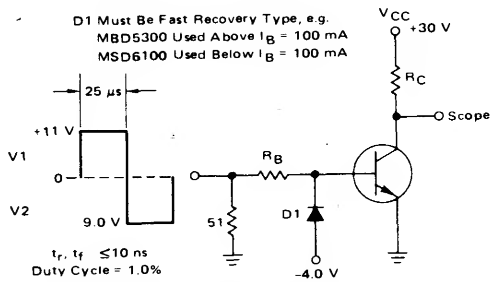
THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	17.5	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	175	°C/W

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted.)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Sustaining Voltage (I_C = 10 mAdc, I_B = 0)	2N5679, 2N5681 2N5680, 2N5682	$V_{CEO(sus)}$	100 120	— —	Vdc
Collector Cutoff Current (V_{CE} = 70 Vdc, I_B = 0) (V_{CE} = 80 Vdc, I_B = 0)		I_{CEO}	— —	10 10	μAdc
Collector Cutoff Current (V_{CE} = 100 Vdc, V_{EB} = 1.5 Vdc) (V_{CE} = 120 Vdc, V_{EB} = 1.5 Vdc)	2N5679, 2N5681 2N5680, 2N5682	I_{CEX}	— —	1.0 1.0	μAdc
(V_{CE} = 100 Vdc, V_{EB} = 1.5 Vdc, T_C = 150°C) (V_{CE} = 120 Vdc, V_{EB} = 1.5 Vdc, T_C = 150°C)	2N5679, 2N5681 2N5680, 2N5682		— —	1.0 1.0	mAdc
Collector Cutoff Current (V_{CB} = 100 Vdc, I_E = 0) (V_{CB} = 120 Vdc, I_E = 0)	2N5679, 2N5681 2N5680, 2N5682	I_{CBO}	— —	1.0 1.0	μAdc
Emitter Cutoff Current (V_{EB} = 4.0 Vdc, I_C = 0)		I_{EBO}	—	1.0	μAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 250 mAdc, V_{CE} = 2.0 Vdc) (I_C = 1.0 Adc, V_{CE} = 2.0 Vdc)		h_{FE}	40 5.0	150 —	—
Collector-Emitter Saturation Voltage (I_C = 250 mAdc, I_B = 25 mAdc) (I_C = 500 mAdc, I_B = 50 mAdc) (I_C = 1.0 Adc, I_B = 200 mAdc)		$V_{CE(sat)}$	— — —	0.6 1.0 2.0	Vdc
Base-Emitter Saturation Voltage (I_C = 250 mAdc, V_{CE} = 2.0 Vdc)		$V_{BE(sat)}$	—	1.0	Vdc
SMALL-SIGNAL CHARACTERISTICS					
Current-Gain — Bandwidth Product (I_C = 100 mAdc, V_{CE} = 10 Vdc, f = 10 MHz)		f_T	30	—	—
Output Capacitance (V_{CB} = 20 Vdc, I_E = 0, f = 1.0 MHz)		C_{obo}	—	50	pF
Small-Signal Current Gain (I_C = 0.2 Adc, V_{CE} = 1.5 Vdc, f = 1.0 kHz)		h_{fe}	40	—	—

FIGURE 1 – SWITCHING TIMES TEST CIRCUIT



R_B and R_C Varied to Obtain Desired Current Levels

For t_d and t_r, D1 is disconnected and V2 = 0
For PNP test circuit, reverse diode and voltage polarities.

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FIGURE 2 – TURN-ON TIME

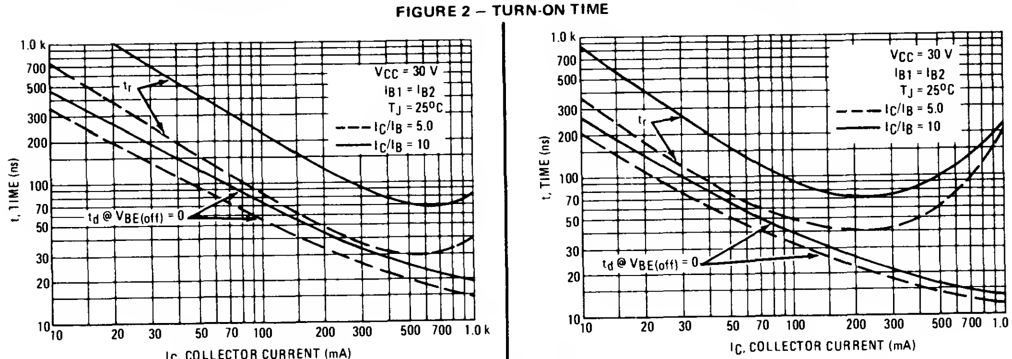


FIGURE 3 – TURN-OFF TIME

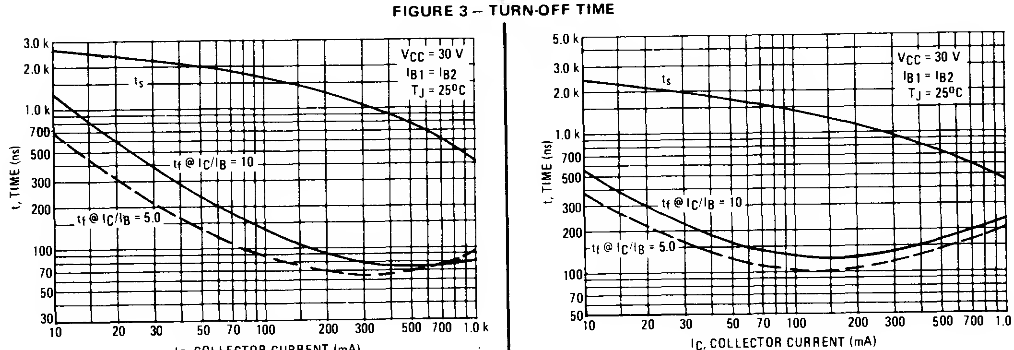


FIGURE 4 – CURRENT-GAIN – BANDWIDTH PRODUCT

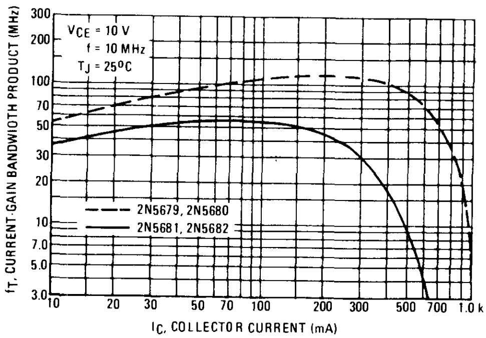


FIGURE 5 – CAPACITANCE

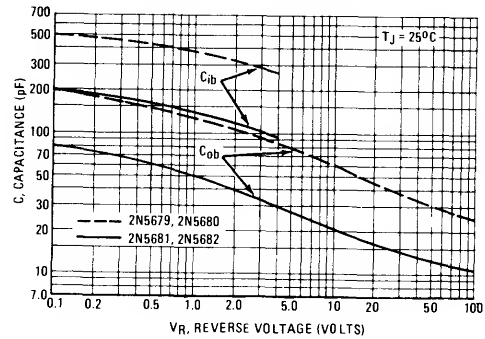


FIGURE 6 – THERMAL RESISTANCE

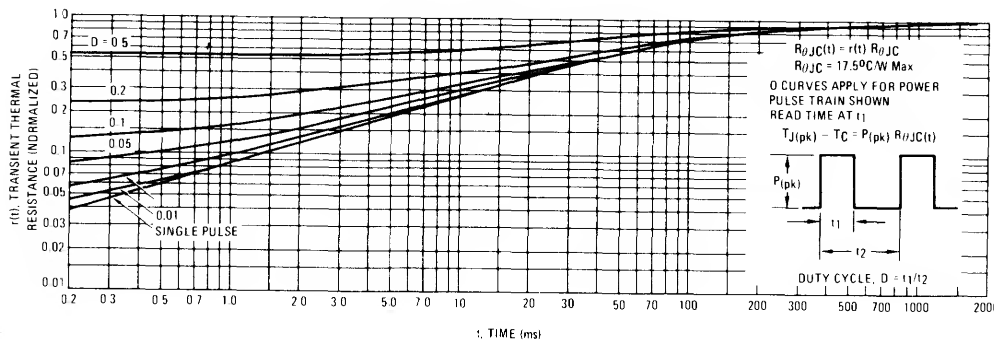


FIGURE 7 – ACTIVE-REGION SAFE OPERATING AREA

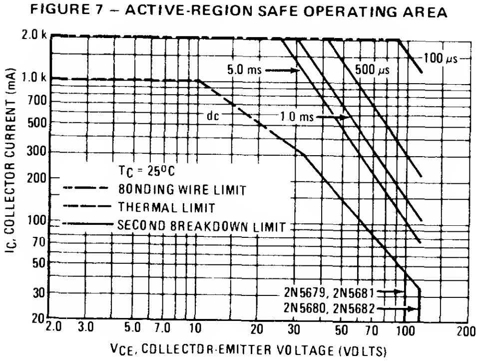
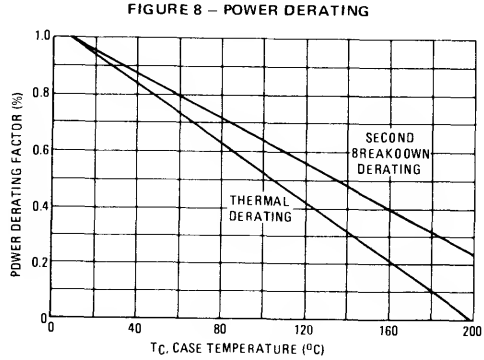


FIGURE 8 – POWER DERATING



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 7 is based on T_C = 25°C; $T_{J(pk)}$ is variable depending on power level. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \leqslant 200$°C. $T_{J(pk)}$ may be calculated from the data in Figure 6. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown. Second breakdown limitations do not derate the same as thermal limitations. Allowable current at the voltages shown on Figure 7 may be found at any case temperature by using the appropriate curve on Figure 8.

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FIGURE 9 – DC CURRENT GAIN

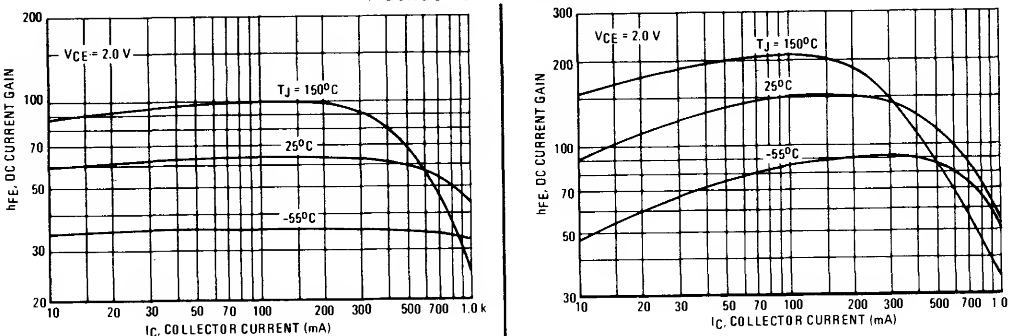

FIGURE 10 – COLLECTOR SATURATION REGION

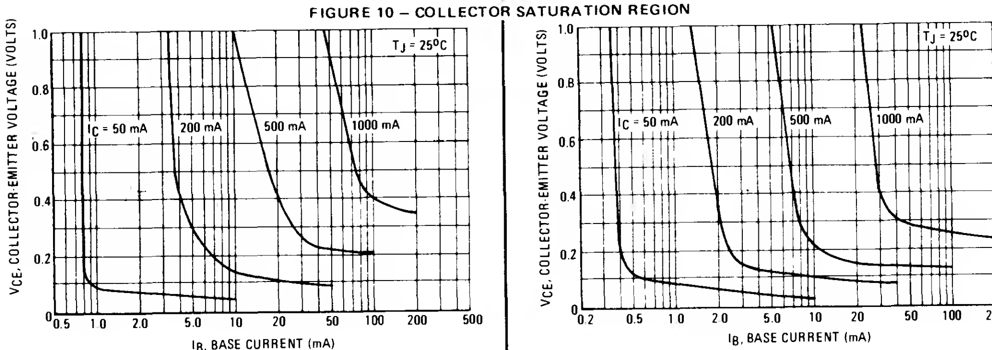

FIGURE 11 – "ON" VOLTAGES

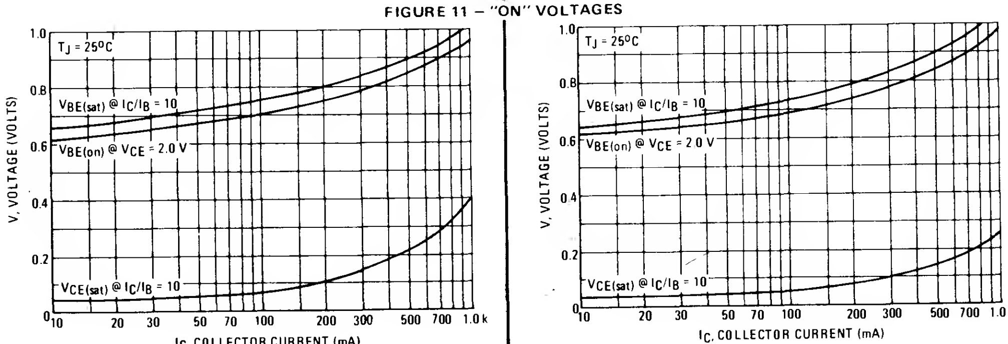

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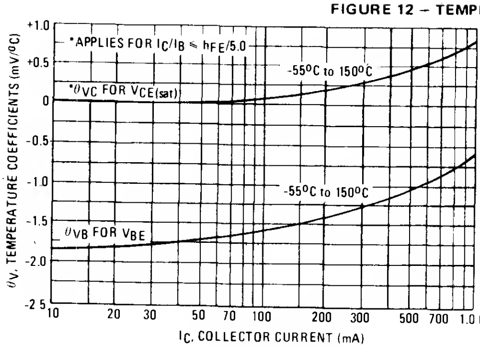
FIGURE 12 – TEMPERATURE COEFFICIENTS



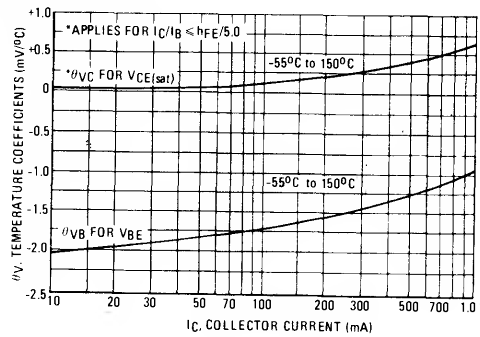
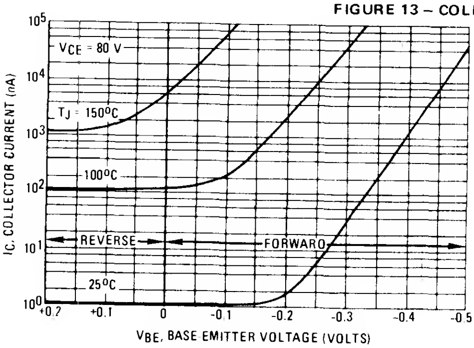


FIGURE 13 – COLLECTOR CUTOFF REGION



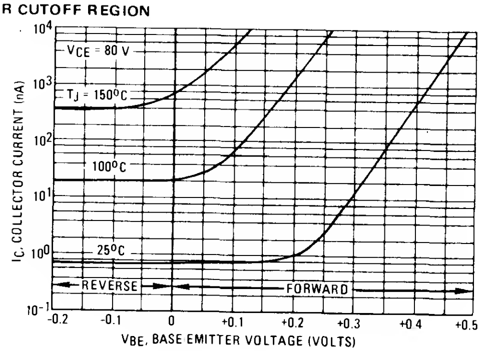


FIGURE 14 – BASE CUTOFF REGION