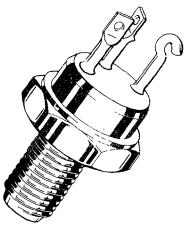
2N6380 thru 2N6382 (SILICON)

HIGH-POWER PNP SILICON TRANSISTORS

. . . designed for use in industrial-military power amplifier and switching circuit applications.

- High Collector Emitter Sustaining Voltage –
  $V_{CEO(sus)}$ = 80 Vdc (Min) – 2N6380
  = 100 Vdc (Min) – 2N6381
  = 120 Vdc (Min) – 2N6382
- High DC Current Gain –
  h_{FE} = 30-120 @ I_C = 20 Adc
  = 10 (Min) @ I_C = 50 Adc
- Low Collector-Emitter Saturation Voltage –
  $V_{CE(sat)}$ = 1.2 Vdc (Max) @ I_C = 20 Adc
- Fast Switching Times @ I_C = 20 Adc
  t_r = 0.35 μs (Max)
  t_s = 0.8 μs (Max)
  t_f = 0.25 μs (Max)

50 AMPERE
POWER TRANSISTORS
PNP SILICON
80, 100, 120 VOLTS
250 WATTS



*MAXIMUM RATINGS

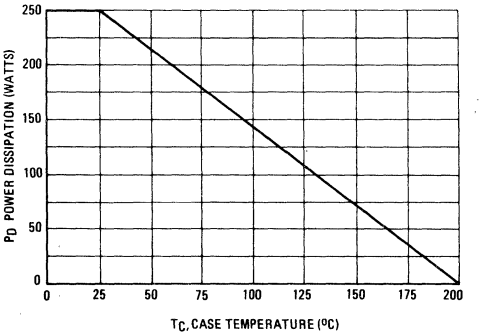
Rating	Symbol	2N6380	2N6381	2N6382	Unit
Collector-Base Voltage	V_{CB}	100	120	140	Vdc
Collector-Emitter Voltage	V_{CEO}	80	100	120	Vdc
Emitter-Base Voltage	V_{EB}	← 6.0 →			Vdc
Collector Current – Continuous	I_C	← 50 →			Adc
Peak		← 100 →			
Base Current	I_B	← 20 →			Adc
Total Device Dissipation @ $T_C = 25^oC$	P_D	← 250 →			Watts
Derate above 25^oC		← 1.43 →			$W/^oC$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	← -65 to +200 →			^oC

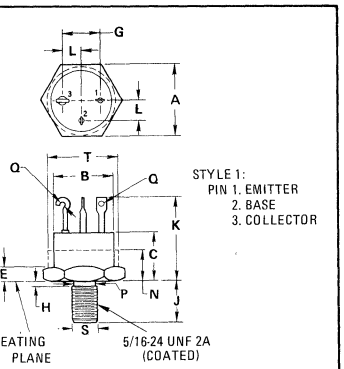
THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	θ_{JC}	0.70	$^oC/W$

*Indicates JEDEC Registered Data.

FIGURE 1 – POWER DERATING





DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	21.72	22.23	0.855	0.875
B	18.92	19.69	0.745	0.775
C	12.19	13.59	0.480	0.535
E	2.29	4.24	0.090	0.167
G	12.32	13.08	0.485	0.515
H	–	2.67	–	0.105
J	11.68	12.57	0.460	0.495
K	23.80	26.16	0.937	1.030
L	6.10	6.60	0.240	0.260
N	–	7.62	–	0.300
P	7.06	7.92	0.278	0.312
Q	1.52	2.67	0.060	0.105
S	7.127	7.249	0.2806	0.2854
T	19.69	22.23	0.775	0.875

All JEDEC notes and dimensions apply.

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

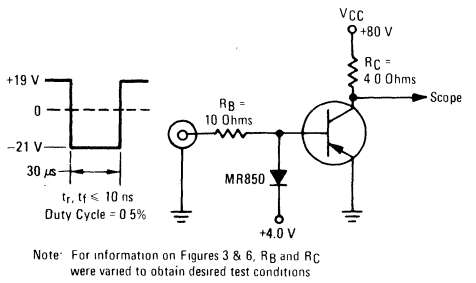
Characteristic		Symbol	Min	Max	Unit
***OFF CHARACTERISTICS**					
Collector-Emitter Sustaining Voltage (1)		$V_{CEO(sus)}$			Vdc
(I_C = 50 mAdc, I_B = 0)	2N6380		80	–	
	2N6381		100	–	
	2N6382		120	–	
Collector Cutoff Current		I_{CEO}			μAdc
(V_{CE} = 50 Vdc, I_B = 0)	2N6380		–	50	
(V_{CE} = 60 Vdc, I_B = 0)	2N6381		–	50	
(V_{CE} = 70 Vdc, I_B = 0)	2N6382		–	50	
Collector Cutoff Current		I_{CEX}			
(V_{CE} = 90% Rated V_{CB}, $V_{BE(off)}$ = 1.5 Vdc)			–	10	μAdc
(V_{CE} = 90% Rated V_{CB}, $V_{BE(off)}$ = 1.5 Vdc, T_C = 150°C)			–	1.0	mAdc
Emitter Cutoff Current		I_{EBO}	–	100	μAdc
(V_{EB} = 6.0 Vdc, I_C = 0)					
***ON CHARACTERISTICS** (1)					
DC Current Gain		h_{FE}			–
(I_C = 1.0 Adc, V_{CE} = 4.0 Vdc)			50	–	
(I_C = 20 Adc, V_{CE} = 4.0 Vdc)			30	120	
(I_C = 50 Adc, V_{CE} = 4.0 Vdc)			10	–	
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	–		Vdc
(I_C = 20 Adc, I_B = 2.0 Adc)			–	1.2	
(I_C = 50 Adc, I_B = 10 Adc)			–	3.0	
Base-Emitter Saturation Voltage		$V_{BE(sat)}$			Vdc
(I_C = 20 Adc, I_B = 2.0 Adc)			–	1.8	
(I_C = 50 Adc, I_B = 10 Adc)			–	3.5	
DYNAMIC CHARACTERISTICS					
*Current-Gain – Bandwidth Product (2) (I_C = 1.0 Adc, V_{CE} = 10 Vdc, f_{test} = 10 MHz)		f_T	30	–	MHz
Input Capacitance (V_{EB} = 2.0 Vdc, I_C = 0, f = 0.1 MHz)		C_{ib}	–	7000	pF
*Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 0.1 MHz)		C_{ob}	–	1500	pF
***SWITCHING CHARACTERISTICS** (Figure 2)					
Rise Time	(V_{CC} = 80 Vdc, I_C = 20 Adc, I_{B1} = I_{B2} = 2.0 Adc)	t_r	–	0.35	μs
Storage Time		t_s	–	0.80	μs
Fall Time		t_f	–	0.25	μs

*Indicates JEDEC Registered Data.

(1) Pulse Test: Pulse Width = 300 μs, Duty Cycle = 2.0%.

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

FIGURE 2 – SWITCHING TIMES TEST CIRCUIT



Note: For information on Figures 3 & 6, R_B and R_C were varied to obtain desired test conditions

FIGURE 3 – TURN ON TIME

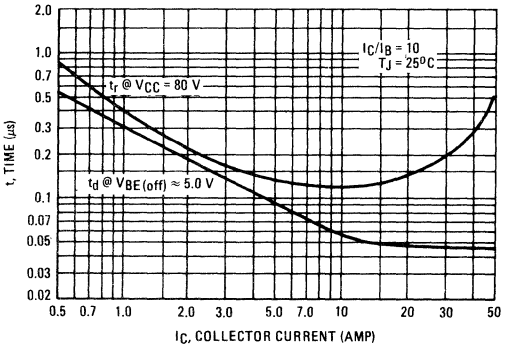


FIGURE 4 – THERMAL RESPONSE

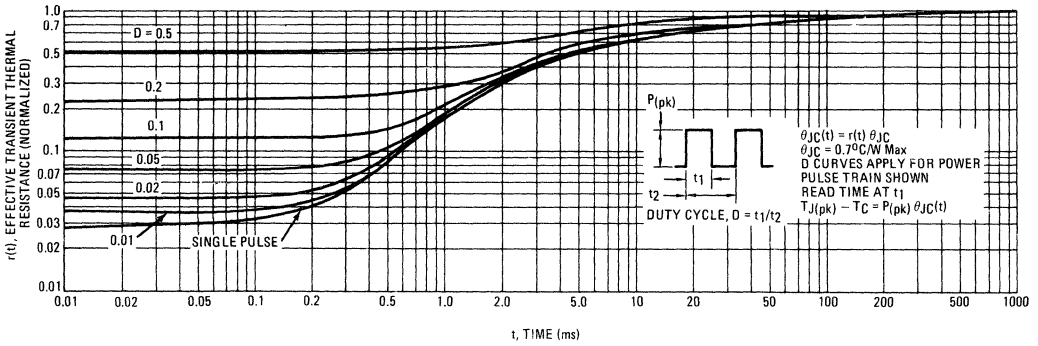
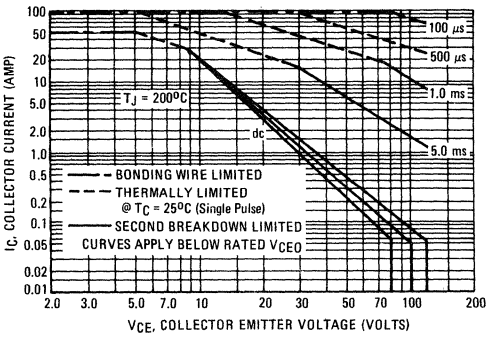


FIGURE 5 – ACTIVE REGION SAFE OPERATING AREA



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 $T_{J(pk)} = 200^oC$; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \leq 200^oC$. $T_{J(pk)}$ 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

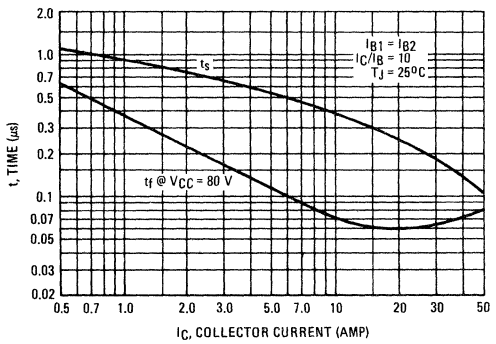


FIGURE 7 – CAPACITANCE

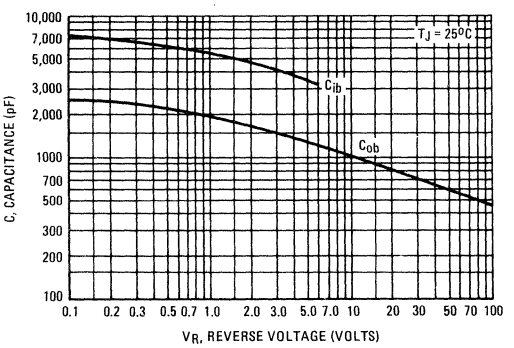


FIGURE 8 – DC CURRENT GAIN

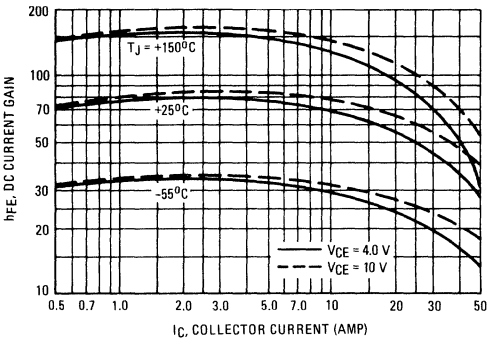


FIGURE 9 – COLLECTOR SATURATION REGION

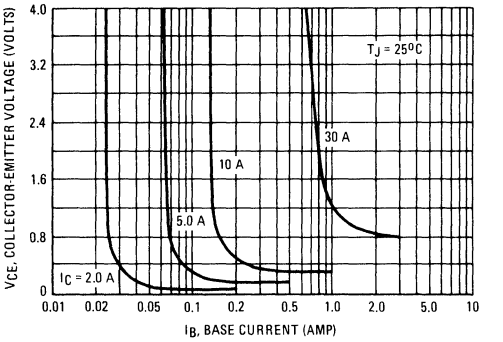


FIGURE 10 – "ON" VOLTAGES

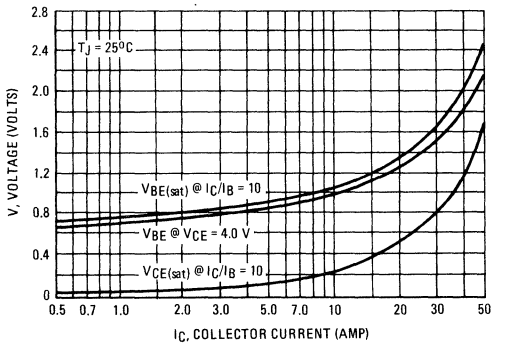


FIGURE 11 – TEMPERATURE COEFFICIENTS

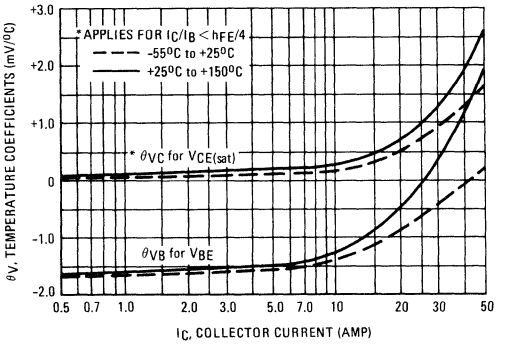


FIGURE 12 – COLLECTOR CUT-OFF REGION

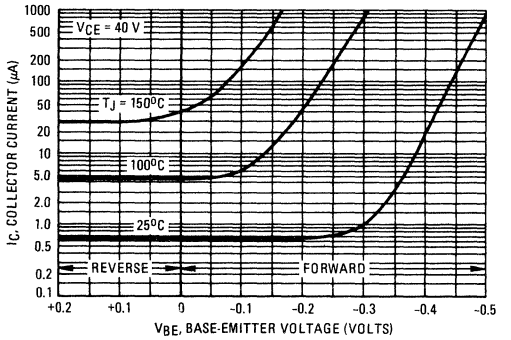


FIGURE 13 – BASE CUT-OFF REGION