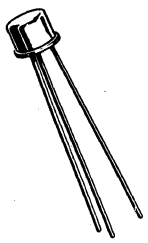
2N2381 (GERMANIUM)
2N2382



PNP germanium epitaxial mesa transistors for high-speed, high-current switching applications.

CASE 31
(TO-5)

Collector connected to case

MAXIMUM RATINGS

Rating	Symbol	2N2381	2N2382	Unit
Collector-Emitter Voltage	V_{CEO}	15	20	Vdc
Collector-Base Voltage	V_{CB}	30	45	Vdc
Emitter-Base Voltage	V_{EB}	4.0	4.0	Vdc
Collector Current-Continuous	I_C	500		mAdc
Total Device Dissipation @ $T_A = 25^oC$ Derate above 25^oC	P_D	300 4.0		mW $mW/^oC$
Total Device Dissipation @ $T_C = 25^oC$ Derate above 25^oC	P_D	750 10		mW $mW/^oC$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +100		^oC

FIGURE 1 — ACTIVE REGION TIME CONSTANT

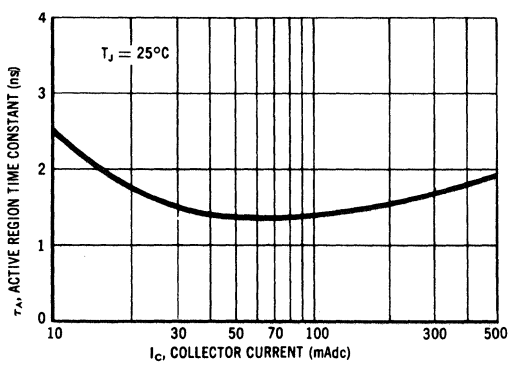
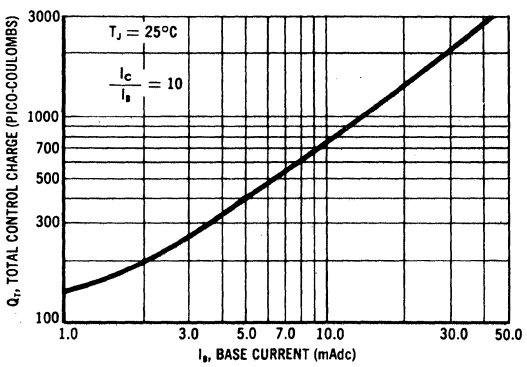


FIGURE 2 — TOTAL CONTROL CHARGE



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

Characteristic	Fig. No.	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector-Emitter Breakdown Voltage (I_C = 10 mAdc, I_E = 0) 2N2381		BV_{CEO}	15	-	-	Vdc
2N2382			20	-	-	
Collector-Base Breakdown Voltage (I_C = 100 μAdc, I_E = 0) 2N2381		BV_{CBO}	30	-	-	Vdc
2N2382			45	-	-	
Latch-Up Voltage 2N2381	7	LV_{CEX}	20	-	-	Vdc
2N2382			25	-	-	
Collector Cutoff Current (V_{CE} = 30 Vdc, V_{BE} = 0) 2N2381		I_{CES}	-	-	100	μAdc
(V_{CE} = 45 Vdc, V_{BE} = 0) 2N2382			-	-	100	
Collector Cutoff Current (V_{CB} = 5 Vdc, I_E = 0)		I_{CBO}	-	1.0	7.0	μAdc
(V_{CB} = 5 Vdc, I_E = 0, T_A = 85°C)			-	-	100	
(V_{CB} = 20 Vdc, I_E = 0) 2N2381			-	-	25	
2N2382			-	-	15	
Emitter Cutoff Current (V_{BE} = 0.5 Vdc, I_C = 0)		I_{EBO}	-	-	0.005	mAdc
(V_{BE} = 4 Vdc, I_C = 0)			-	-	1.0	
ON CHARACTERISTICS						
DC Current Gain (I_C = 200 mAdc, V_{CE} = 0.5 Vdc)	11	h_{FE}	40	-	-	-
(I_C = 400 mAdc, V_{CE} = 1.0 Vdc)			25	-	-	
Collector-Emitter Saturation Voltage (I_C = 200 mAdc, I_B = 20 mAdc)	8,10	$V_{CE(sat)}$	-	0.25	0.4	Vdc
(I_C = 400 mAdc, I_B = 40 mAdc)			-	0.4	0.7	
Base-Emitter Saturation Voltage (I_C = 200 mAdc, I_B = 20 mAdc)	9,10	$V_{BE(sat)}$	0.45	0.54	0.7	Vdc
(I_C = 400 mAdc, I_B = 40 mAdc)			-	0.71	0.9	
DYNAMIC CHARACTERISTICS						
Current-Gain — Bandwidth Product (I_C = 20 mAdc, V_{CE} = 10 Vdc, f = 100 MHz)		f_T	300	-	-	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 4 MHz)	13	C_{ob}	-	3.5	6.0	pF
Input Capacitance (V_{BE} = 1 Vdc, I_C = 0, f = 4 MHz)	13	C_{ib}	-	8.0	15	pF
Delay Time	4	t_d	-	4.5	7.0	ns
Rise Time	4	t_r	-	8.0	15	ns
Storage Time	3,4	t_s	-	20	30	ns
Fall Time	4	t_f	-	8.0	15	ns
Active Region Time Constant	1,4	τ_A	-	1.6	3.0	ns

FIGURE 3 — STORAGE TIME VARIATIONS

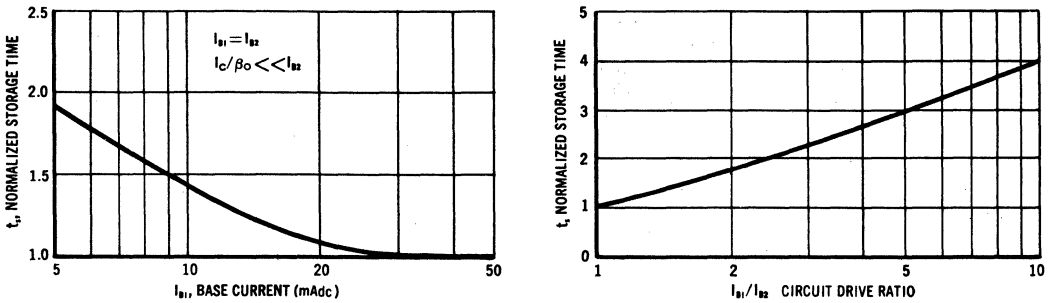


FIGURE 4 — SWITCHING TIME EQUATIONS & TEST CIRCUIT

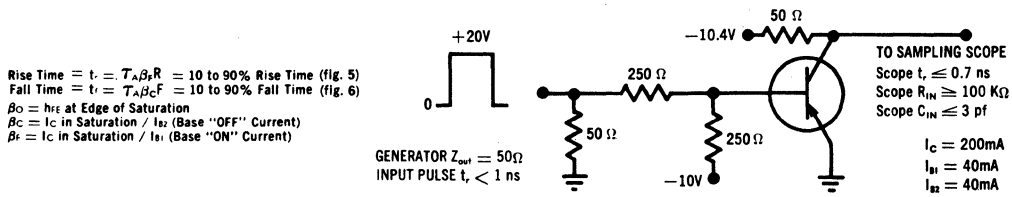


FIGURE 5 — RISE TIME FACTOR

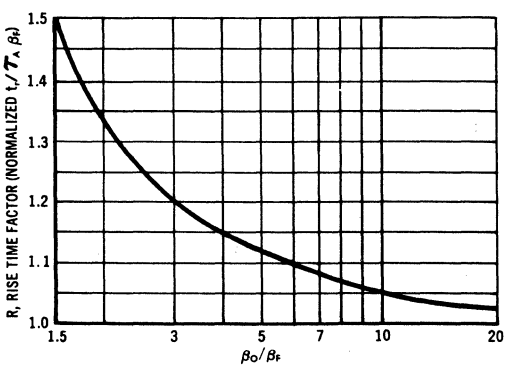


FIGURE 6 — FALL TIME FACTOR

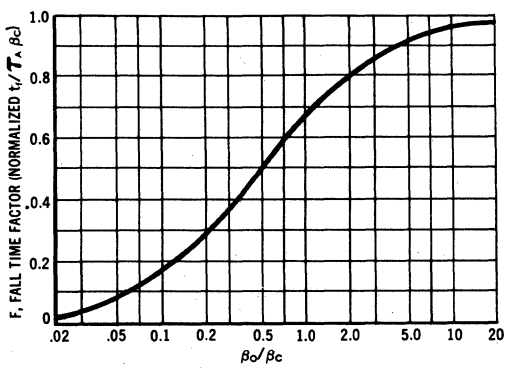


FIGURE 7 — COLLECTOR LATCH-UP VOLTAGE AND TEST CIRCUIT

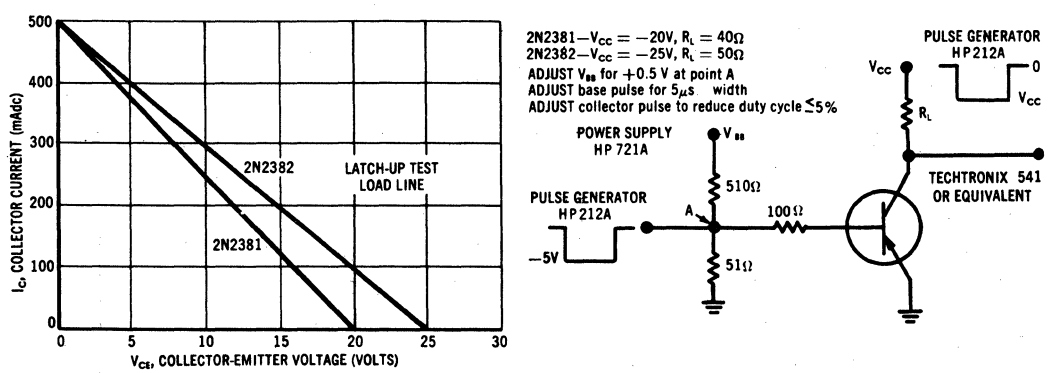


FIGURE 8 — COLLECTOR-EMITTER SATURATION VOLTAGES versus BASE CURRENT

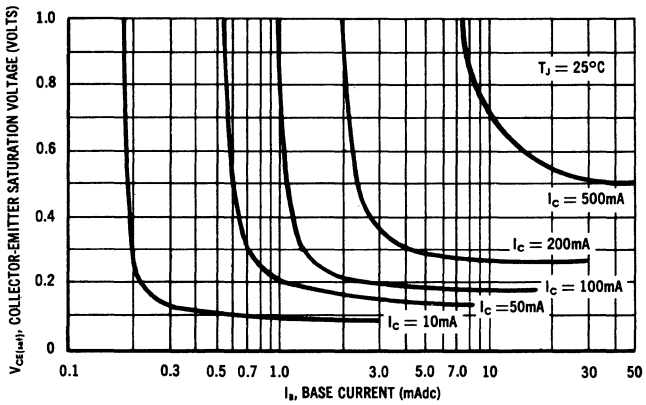


FIGURE 9 — BASE-EMITTER VOLTAGE versus COLLECTOR CURRENT

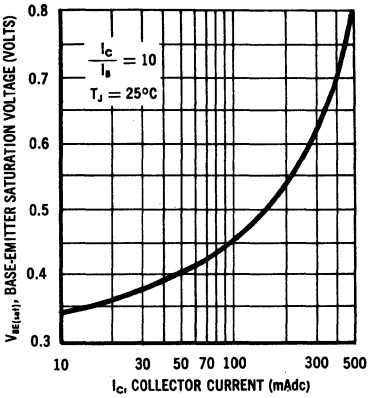


FIGURE 10 — TEMPERATURE COEFFICIENTS

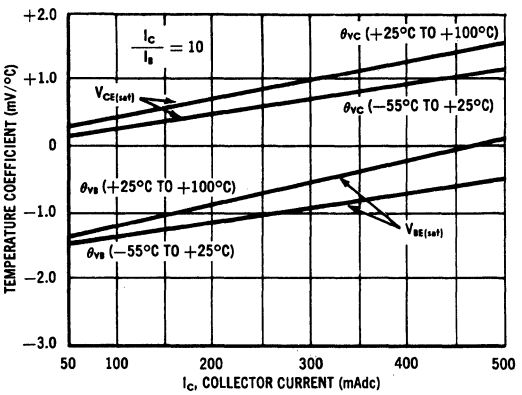


FIGURE 11 — NORMALIZED GAIN CHARACTERISTICS

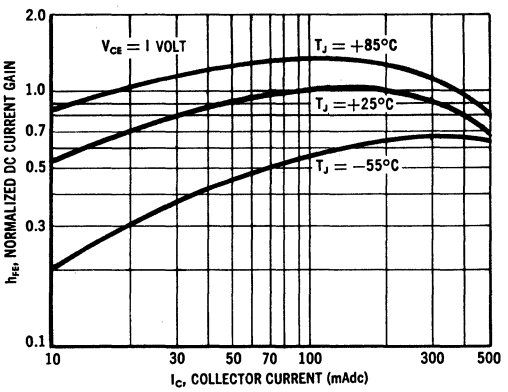


FIGURE 12 — LEAKAGE CHARACTERISTICS COMMON EMITTER

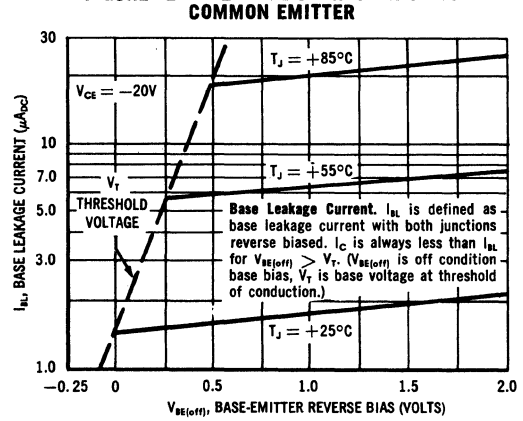
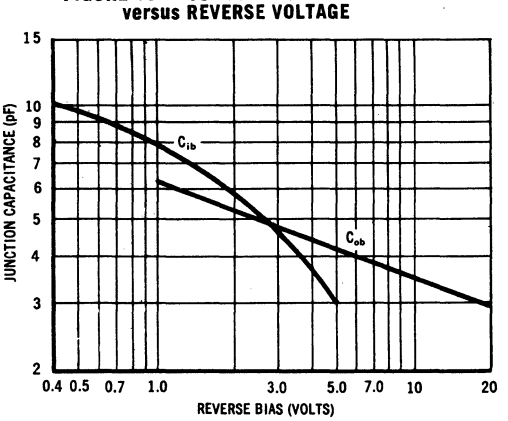



FIGURE 13 — JUNCTION CAPACITANCE versus REVERSE VOLTAGE