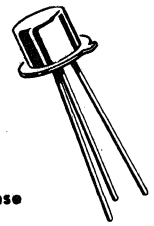
2N828 (GERMANIUM)



CASE 22
(TO-18)
Collector connected to case

PNP germanium epitaxial mesa transistor for high-speed switching applications.

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	15	Vdc
Collector-Base Voltage	V_{CB}	15	Vdc
Emitter-Base Voltage	V_{EB}	2.5	Vdc
Collector-Current	I_C	200	mAdc
Total Device Dissipation @ $T_A = 25^oC$ Derate above 25^oC	P_D	150 2.0	mW $mW/^oC$
Total Device Dissipation @ $T_C = 25^oC$ Derate above 25^oC	P_D	300 4.0	mW $mW/^oC$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +100	^oC

FIGURE 1 — SWITCHING TIME TEST CIRCUIT

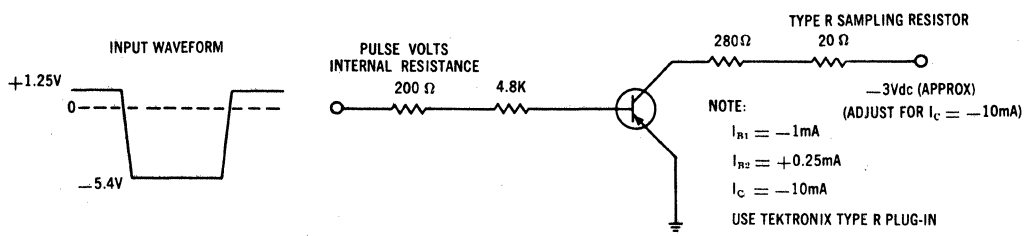


FIGURE 2 — CHARGE STORAGE TIME TEST CIRCUIT

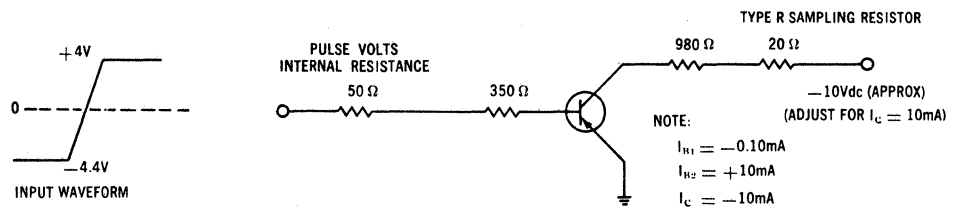


FIGURE 3 — RISE TIME FACTOR

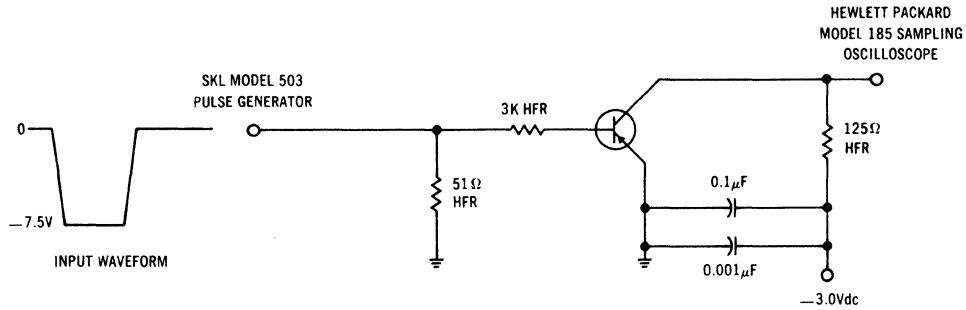
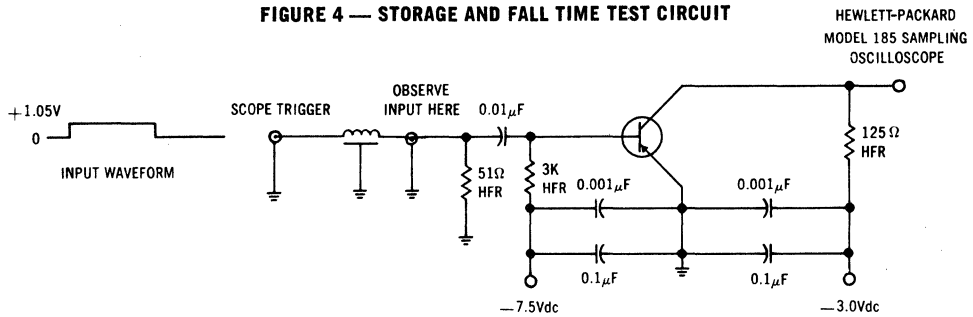


FIGURE 4 — STORAGE AND FALL TIME TEST CIRCUIT



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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 1 mAdc, I_B = 0)	BV_{CEO}	-	10	-	Vdc
Collector-Emitter Breakdown Voltage (I_C = 100 μAdc, V_{BE} = 0)	BV_{CES}	15	25	-	Vdc
Collector-Base Breakdown Voltage (I_C = 100μAdc, I_E = 0)	BV_{CBO}	15	25	-	Vdc
Emitter-Base Breakdown Voltage (I_E = 100 μAdc, I_C = 0)	BV_{EBO}	2.5	-	-	Vdc
Collector Cutoff Current (V_{CB} = 6 Vdc, I_E = 0)	I_{CBO}	-	0.4	3.0	μAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 10 mAdc, V_{CE} = 0.3 Vdc)	h_{FE}	25	40	-	-
Collector-Emitter Saturation Voltage (I_C = 10 mAdc, I_B = 1 mAdc)	$(V_{CE(sat)}$	-	0.12	0.2	Vdc
(I_C = 50 mAdc, I_B = 5 mAdc)		-	0.18	0.25	
Base-Emitter Saturation Voltage (I_C = 10 mAdc, I_B = 1 mAdc)	$V_{BE(sat)}$	0.34	0.39	0.44	Vdc

2N828 (continued)

ELECTRICAL CHARACTERISTICS (continued)

Characteristic	Symbol	Min	Typ	Max	Unit
DYNAMIC CHARACTERISTICS					
Current-Gain — Bandwidth Product (I_C = 10 mAdc, V_{CE} = 1 Vdc, f = 100 MHz)	f_T	300	400	-	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0)	C_{ob}	-	3.5	-	pF
Small Signal Current Gain (I_C = 10 mAdc, V_{CE} = 1 Vdc, f = 100 MHz)	h_{fe}	3	4.0	-	-
Delay Plus Rise Time (Figure 1)	$t_d + t_r$	-	50	70	ns
Storage Time (Figure 1)	t_s	-	33	50	ns
Fall Time (Figure 1)	t_f	-	35	50	ns
Charge Storage Time Constant (Figure 2)	τ_s	-	14	25	ns
Rise Time (Figure 3)	t_r	-	7.0	-	ns
Storage Time (Figure 4)	t_s	-	5.0	-	ns
Fall Time (Figure 4)	t_f	-	3.0	-	ns

2N828A (GERMANIUM)
2N829

CASE 22
(TO-18)

Collector connected to case

PNP germanium epitaxial mesa transistors for high-speed switching applications

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector to Base Voltage	V_{CB}	15	Vdc
Collector to Emitter Voltage	V_{CES}	15	Vdc
Emitter to Base Voltage	V_{EB}	2.5	Vdc
Collector Current (Continuous)	I_C	200	mAdc
Total Device Dissipation at 25°C case Temperature (Derate 4.0mw/°C above 25°C)	P_D	300	mW
Total Device Dissipation at 25°C Ambient Temperature (Derate 2.0mw/°C)	P_D	150	mW
Junction Temperature	T_J	+100	°C
Storage Temperature	T_{stg}	-65 to +100	°C