2N838 (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-Base Voltage	V_{CB}	30	Vdc
Collector-Emitter Voltage	V_{CES}	30	Vdc
Collector-Emitter Voltage	V_{CEX}	15	Vdc
Emitter-Base Boltage	V_{EB}	2.5	Vdc
Collector Current (Continuous)	I_C	100	mAdc
Junction Temperature	T_J	+100	°C
Storage Temperature	T_{stg}	-65 to+ 100	°C
Device Dissipation @ T_A = 25°C (Derate 2mW/°C above 25°C)	P_D	150 2.0	mW mW/°C

FIGURE 1 — SWITCHING TIME TEST CIRCUIT

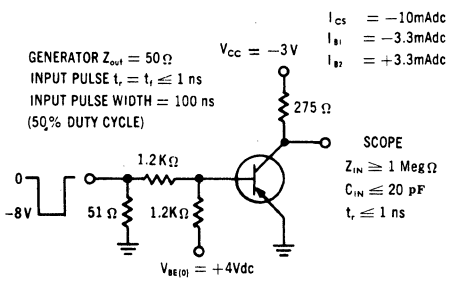
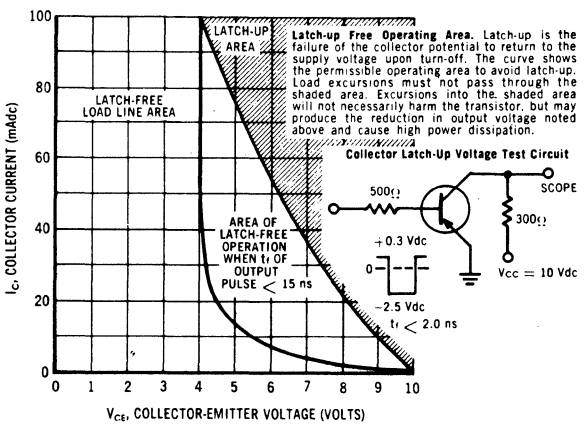


FIGURE 2 — AREA OF PERMISSIBLE LOAD LOCI



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

Characteristic	Symbol	Min	Typ	Max	Unit
Collector-Base Breakdown Voltage (I_C =100 μAdc, I_E =0)	BV_{CBO}	30	35	---	Vdc
Collector-Emitter Breakdown Voltage (I_C = 100 μAdc, V_{EB} =0)	BV_{CES}	30	35	---	Vdc
Emitter-Base Breakdown Voltage (I_E = 100 μAdc, I_C = 0)	BV_{EBO}	2.5	4.5	---	Vdc
Collector Latch-up Voltage (see Figure 2)	LV_{CEX}	15	---	---	Vdc
Collector-Emitter Cutoff Current (V_{CE} =15 Vdc, V_{EB} =0)	I_{CES}	---	1.0	10	μAdc
Collector-Base Cutoff Current (V_{CB} = 15 V, I_E = 0)	I_{CBO}	---	1.0	10	μAdc
DC Forward Current Transfer Ratio (I_C = 10mAdc, V_{CE} = 0.3 Vdc)	h_{FE}	30	70	---	---
Collector-Emitter Saturation Voltage (I_C =10 mAdc, I_B = 3.3 mAdc)	$V_{CE(sat)}$	---	0.1	0.18	Vdc
Base-Emitter Voltage (I_C = 10 mAdc, I_B = 3.3 mAdc)	V_{BE}	---	0.39	0.5	Vdc
Small-Signal Forward Current Transfer Ratio (I_C = 10 mA, V_{CE} = 1V, f = 100 MHz)	h_{fe}	3.0	4.5	---	---
Collector Output Capacitance (V_{CB} = 10 V, I_E = 0, f = 1 MHz)	C_{ob}	---	2.0	4.0	pF
Delay Time (Figure 1)	t_d	---	10	15	ns
Rise Time (Figure 1)	t_r	---	7.0	15	ns
Storage Time (Figure 1)	t_s	---	10	20	ns
Fall Time (Figure 1)	t_f	---	10	20	ns