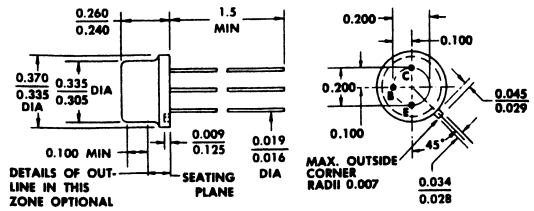
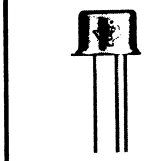
2N1309

P-N-P ALLOY-JUNCTION GERMANIUM TRANSISTOR

The transistors are in a JEDEC TO-5 hermetically sealed welded package with glass to metal seal between case and leads. Approximate weight is one gram.

THE BASE IS IN ELECTRICAL CONTACT WITH CASE





DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED

*absolute maximum ratings at 25°C free-air temperature (unless otherwise noted)

Collector-Base Voltage	30 v
Emitter-Base Voltage	25 v
Collector Current	300 ma
Total Device Dissipation at (or below) 25°C Free-Air Temperature (See Note 1)	150 mw
Operating Collector Junction Temperature	85°C
Storage Temperature Range	−65°C to 100°C

electrical characteristics at 25°C free-air temperature

PARAMETER		TEST CONDITIONS	2N1309 MIN	2N1309 TYP	2N1309 MAX	UNIT
BV_{CBO}	Collector-Base Breakdown Voltage	$I_C = -100\ \mu a$, $I_E = 0$	−30	—	—	v
BV_{EBO}	Emitter-Base Breakdown Voltage	$I_E = -100\ \mu a$, $I_C = 0$	−25	—	—	v
*V_{pt}	Punch Through Voltage†	$V_{EBfl} = -1$ v	−15	—	—	v
*I_{CBO}	Collector Cutoff Current	$V_{CB} = -25$ v, $I_E = 0$	—	−2	−6	μa
*I_{EBO}	Emitter Cutoff Current	$V_{EB} = -25$ v, $I_C = 0$	—	−1.5	−6	μa
*h_{FE}	Static Forward Current Transfer Ratio	$V_{CE} = -1$ v, $I_C = -10$ ma	80	160	—	—
		$V_{CE} = -0.35$ v, $I_C = -200$ ma	20	75	—	—
*V_{BE}	Base-Emitter Voltage	$I_B = -0.5$ ma, $I_C = -10$ ma	−0.15	−0.25	−0.35	v
*$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_B = -0.5$ ma, $I_C = -10$ ma	—	—	—	v
		$I_B = -0.25$ ma, $I_C = -10$ ma	—	—	—	v
		$I_B = -0.17$ ma, $I_C = -10$ ma	—	—	—	v
		$I_B = -0.13$ ma, $I_C = -10$ ma	—	−0.08	−0.20	v
h_{ib}	Small-Signal Common-Base Input Impedance	$V_{CB} = -5$ v, $I_E = 1$ ma, $f = 1$ kc	—	29	—	ohm
h_{rb}	Small-Signal Common-Base Reverse Voltage Transfer Ratio	$V_{CB} = -5$ v, $I_E = 1$ ma, $f = 1$ kc	—	7×10^{-4}	—	—
h_{ob}	Small-Signal Common-Base Output Admittance	$V_{CB} = -5$ v, $I_E = 1$ ma, $f = 1$ kc	—	0.40	—	μmho
h_{fe}	Small-Signal Common-Emitter Forward Current Transfer Ratio	$V_{CE} = -5$ v, $I_C = -1$ ma, $f = 1$ kc	—	190	—	—
*f_{hfb}	Common-Base Alpha—Cutoff Frequency	$V_{CB} = -5$ v, $I_E = 1$ ma	15	20	—	mc
*C_{ob}	Common-Base Open-Circuit Output Capacitance	$V_{CB} = -5$ v, $I_E = 0$, $f = 1$ mc	—	10	20	pf
C_{ib}	Common-Base Open-Circuit Input Capacitance	$V_{EB} = -5$ v, $I_C = 0$, $f = 1$ mc	—	9	—	pf

†V_{PT} is determined by measuring the emitter-base floating potential V_{EBfl}. The collector-base voltage, V_{CB}, is increased until $V_{EBfl} = -1$ volt; this value of $V_{CB} = (V_{PT} - 1$ v).

switching characteristics at 25°C free-air temperature

PARAMETER		TEST CONDITIONS††	2N1309 MIN	2N1309 TYP	2N1309 MAX
t_d	Delay Time	$I_C = -10$ ma, $I_{B(1)} = -1.3$ ma, $I_{B(2)} = 0.7$ ma, $V_{BE(off)} = 0.8$ v, $R_L = 1$ kΩ (See Fig. 1)	—	0.05	—
t_r	Rise Time		—	0.14	—
t_s	Storage Time		—	0.76	—
t_f	Fall Time		—	0.30	—
Q_{sb}	Stored Base Charge	$I_{B(1)} = -1$ ma, $I_C = -10$ ma (See Fig. 2)	—	800	—

††Voltage and current values shown are nominal, exact values vary slightly with devic

operating characteristics at 25°C free-air temperature

PARAMETER		TEST CONDITIONS	2N1309 MIN	2N1309 TYP	2N1309 MAX
NF	Spot Noise Figure	$V_{CB} = -5$ v, $I_E = 1$ ma, $f = 1$ kc, $R_G = 1$ kΩ	—	3	—

dicates JEDEC registered data (typical values excluded).