2N650A, 2N650 (GERMANIUM)
2N651A, 2N651
2N652A, 2N652

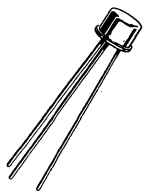
GERMANIUM PNP MILLIWATT TRANSISTORS

. . . designed primarily for low-power audio amplifier and medium-speed switching applications.

- Stabilization Bake at 100°C for 120 Hours for Greater Gain Stability
- Low Collector-Emitter Saturation Voltage — 0.2 Vdc Typ @ I_C = 200 mA

AUDIO TRANSISTORS
GERMANIUM PNP

45 VOLTS
200 MILLIWATTS



*MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage (R_{BE} = 10 k ohms)	V_{CER}	30	Vdc
Collector-Base Voltage	V_{CB}	45	Vdc
Emitter-Base Voltage	V_{EB}	30	Vdc
Collector Current — Continuous (1)	I_C	500	mAdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	200 2.67	mW mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−65 to +100	°C

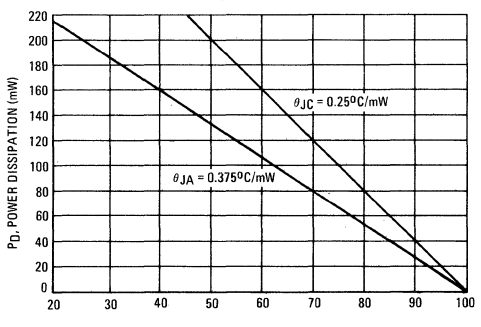
Maximum lead temperature is 250°C for 3.0 seconds,
1/16" ± 1/32" from case.
(1) Limited by power dissipation.

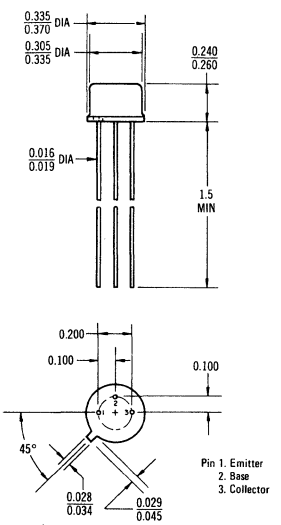
*THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	θ_{JC}	0.250	°C/mW
Thermal Resistance, Junction to Ambient	θ_{JA}	0.375	°C/mW

*Indicates JEDEC Registered Data.

FIGURE 1 — POWER-TEMPERATURE DERATING





CASE 31 (1)
TO-5

(All leads isolated from Case)

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

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Floating Potential (1) (V_{CB} = 45 Vdc, I_E = 0, voltmeter input resistance ≥ 10 megohms)		V_{EBF}	–	1.0	Vdc
Collector Cutoff Current (V_{CE} = 30 Vdc, R_{BE} = 10 k ohms)		I_{CER}	–	600	μAdc
Collector Cutoff Current		I_{CBO}			μAdc
(V_{CB} = 30 Vdc, I_E = 0)			–	10	
(V_{CB} = 45 Vdc, I_E = 0)			–	50	
(V_{CB} = 10 Vdc, I_E = 0, T_A = +71°C)			–	100	
Emitter Cutoff Current (V_{EB} = 30 Vdc, I_C = 0)		I_{EBO}	–	10	μAdc
ON CHARACTERISTICS					
DC Current Gain		h_{FE}			–
(I_C = 10 mAdc, V_{CE} = 1.0 Vdc)	2N650		30	–	
	2N650A		33	–	
	2N651, A		45	–	
	2N652, A		80	–	
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$			Vdc
(I_C = 50 mAdc, I_B = 2.5 mAdc)	2N650, A		–	0.250	
(I_C = 50 mAdc, I_B = 1.67 mAdc)	2N651, A		–	0.250	
(I_C = 50 mAdc, I_B = 1.25 mAdc)	2N652, A		–	0.250	
(I_C = 100 mAdc, I_B = 5.0 mAdc)	2N650, A		–	0.500	
(I_C = 100 mAdc, I_B = 3.33 mAdc)	2N651, A		–	0.500	
(I_C = 100 mAdc, I_B = 2.5 mAdc)	2N652, A		–	0.500	
Base-Emitter Voltage		V_{BE}			Vdc
(I_C = 10 mAdc, V_{CE} = 1.0 Vdc)	2N650, A		–	0.270	
	2N651, A		–	0.260	
	2N652, A		–	0.250	
SMALL-SIGNAL CHARACTERISTICS					
Common-Base Cutoff Frequency		$f_{\alpha b}$			MHz
(I_E = 1.0 mAdc, V_{CB} = 6.0 Vdc)	2N650, A		0.75	–	
	2N651, A		1.0	–	
	2N652, A		1.25	–	
Output Capacitance (1) (V_{CB} = 6.0 Vdc, I_E = 0, f = 1.0 MHz)		C_{ob}	–	25	pF
Input Impedance (I_E = 1.0 mAdc, V_{CB} = 6.0 Vdc, f = 1.0 kHz)		h_{ib}	27	37	Ohms
Small-Signal Current Gain		h_{fe}			–
(I_E = 1.0 mAdc, V_{CE} = 6.0 Vdc, f = 1.0 kHz)	2N650, A		30	70	
	2N651, A		50	120	
	2N652, A		100	225	
Output Admittance (1) (I_E = 1.0 mAdc, V_{CB} = 6.0 Vdc, f = 1.0 kHz)		h_{ob}	0.15	1.0	μmhos
Noise Figure (I_E = 0.5 mAdc, V_{CE} = 4.5 Vdc, R_S = 1.0 k ohms, f = 1.0 kHz, Δ f = 1.0 Hz)		NF	–	15	dB

(1) Applies only to 2N650A, 2N651A, and 2N652A Devices

*Indicates JEDEC Registered Data.

FIGURE 2 – DC CURRENT GAIN

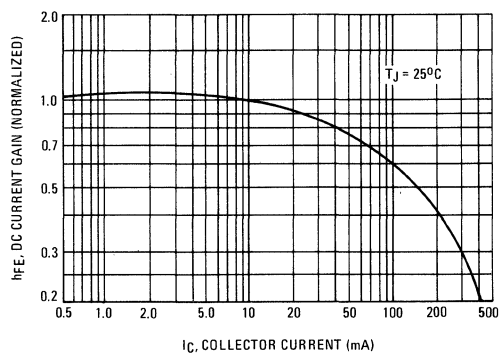


FIGURE 3 – "ON" VOLTAGES