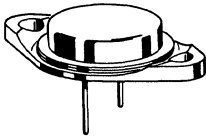


2N176 (GERMANIUM) 2N669

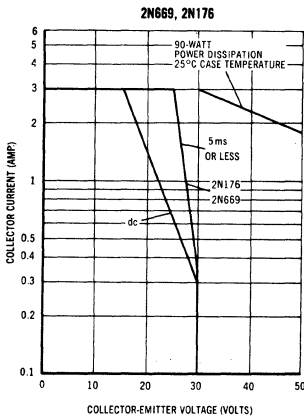


PNP germanium power transistors for economical power switching circuits and commercial grade power amplifier applications.

CASE 11 (TO-3)

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Base Voltage	V_{CB}	40	Vdc
Collector-Emitter Voltage	V_{CES}	30	Vdc
Collector Current (Continuous)	I_C	3.0	Amp
Storage and Junction Temperature	T_J, T_{stg}	-65 to +100	°C
Total Device Dissipation (At 25°C Case Temperature)	P_D	90	Watts
Thermal Resistance (Junction to Case)	θ_{JC}	0.8	°C/W



SAFE OPERATING AREAS

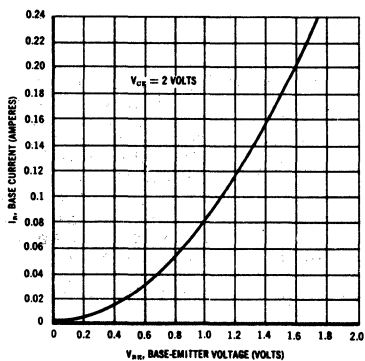
The Safe Operating Area Curves indicate $I_C - V_{CE}$ limits below which the device will not go into secondary breakdown. Collector load lines for specific circuits must fall within the applicable Safe Area to avoid causing a collector-emitter short. (Case temperature and duty cycle of the excursions make no significant change in these safe areas.) To insure operation below the maximum T_J , the power-temperature de-rating curve must be observed for both steady state and pulse power conditions.

2N176, 2N669 (continued)

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Minimum	Typical	Maximum	Unit
Collector-Base Cutoff Current $V_{CB} = 30\text{ V}, I_E = 0$ $V_{CB} = 2.0\text{ V}, I_E = 0$ $V_{CB} = 30\text{ V}, I_E = 0, T_C = 90^\circ\text{C}$	I_{CB0}	— — —	— 50 —	3.0 — 20	mA μA mA
Emitter-Base Cutoff Current $V_{EB} = 10\text{ V}, I_C = 0$	I_{EBO}	—	—	2.0	mA
Collector-Emitter Breakdown Voltage $I_C = 330\text{ mA}, R_{BE} = 10\text{ Ohms}$	BV_{CER} BV_{CES}	30 30	— —	— —	Vdc
Collector-Emitter Saturation Voltage $I_C = 3\text{ A}, I_B = 300\text{ mA}$	$V_{CE(SAT)}$	—	—	0.4	Vdc
DC Forward Current Transfer Ratio $V_{CE} = 2.0\text{ V}, I_C = 0.5\text{ A}$	h_{FE}	25 75	— —	— 250	—
Power Gain $P_{out} = 2\text{ Watts}, V_{CE} = 12\text{ V}, I_C = 0.5\text{ Amp},$ $f = 1\text{ kHz}, R_S = 10\text{ Ohms}, R_L = 26.6\text{ Ohms}$	G_{PE}	34 38	— —	37 —	dB
Total Harmonic Distortion (under same conditions of power gain)		—	—	5.0	%
Small-Signal Current Gain Cutoff Frequency $V_{CE} = 12\text{ V}, I_C = 0.5\text{ Amp}, f = 1\text{ kHz ref}$	$f_{\omega e}$	4.0 3.0	7.0 5.0	— —	kHz
Small-Signal Forward-Current Transfer Ratio $V_{CE} = 2.0\text{ V}, I_C = 0.5\text{ Amp}, f = 1\text{ kHz}$	h_{fe}	— —	45 90	— —	—
Small-Signal Input Impedance $V_{CE} = 2.0\text{ V}, I_C = 0.5\text{ Amp}, f = 1\text{ kHz}$	h_{ie}	7.0 10	— —	25 50	Ohms

INPUT CURRENT versus EMITTER DRIVE VOLTAGE
(Both Types)



POWER-TEMPERATURE DERATING CURVE
(Both Types)

