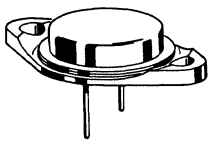
2N176 (GERMANIUM)
2N669

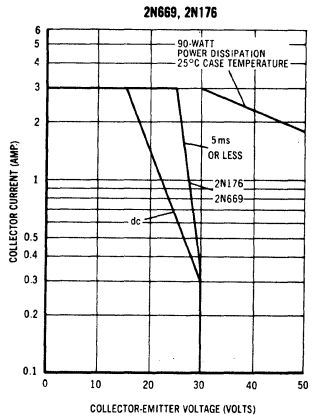


CASE 11
(TO-3)

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

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



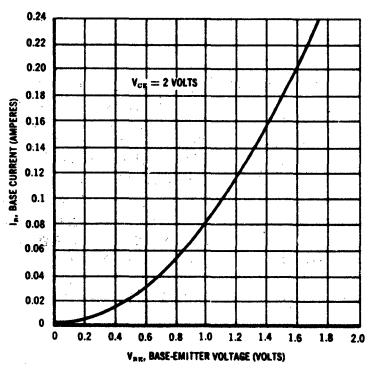
SAFE OPERATING AREAS

The Safe Operating Area Curves indicate Ic — 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 derating curve must be observed for both steady state and pulse power conditions.

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

Characteristic		Symbol	Minimum	Typical	Maximum	Unit
Collector-Base Cutoff Current		I_{CBO}				
V_{CB} = 30 V, I_E = 0			—	—	3.0	mA
V_{CB} = 2.0 V, I_E = 0			—	50	—	μA
V_{CB} = 30 V, I_E = 0, T_C = 90°C			—	—	20	mA
Emitter-Base Cutoff Current		I_{EBO}				mA
V_{EB} = 10 V, I_C = 0			—	—	2.0	
Collector-Emitter Breakdown Voltage						Vdc
I_C = 330 mA, R_{BE} = 10 Ohms	2N176	BV_{CER}	30	—	—	
	2N669	BV_{CES}	30	—	—	
Collector-Emitter Saturation Voltage		$V_{CE(SAT)}$				Vdc
I_C = 3 A, I_B = 300 mA			—	—	0.4	
DC Forward Current Transfer Ratio		h_{FE}				—
V_{CE} = 2.0 V, I_C = 0.5 A	2N176		25	—	—	
	2N669		75	—	250	
Power Gain		G_{PE}				dB
P_{out} = 2 Watts, V_{CE} = 12 V, I_C = 0.5 Amp,						
f = 1 kHz, R_S = 10 Ohms, R_L = 26.6 Ohms	2N176		34	—	37	
	2N669		38	—	—	
Total Harmonic Distortion						%
(under same conditions of power gain)			—	—	5.0	
Small-Signal Current Gain Cutoff Frequency		$f_{\alpha e}$				kHz
V_{CE} = 12 V, I_C = 0.5 Amp, f = 1 kHz ref	2N176		4.0	7.0	—	
	2N669		3.0	5.0	—	
Small-Signal Forward-Current Transfer Ratio		h_{fe}				—
V_{CE} = 2.0 V, I_C = 0.5 Amp, f = 1 kHz	2N176		—	45	—	
	2N669		—	90	—	
Small-Signal Input Impedance		h_{ie}				Ohms
V_{CE} = 2.0 V, I_C = 0.5 Amp, f = 1 kHz	2N176		7.0	—	25	
	2N669		10	—	50	

INPUT CURRENT versus EMITTER DRIVE VOLTAGE
(Both Types)



POWER-TEMPERATURE DERATING CURVE
(Both Types)