



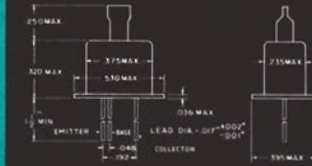
Semiconductor Products
Syracuse, New York

NEW

NPN JUNCTION TRANSISTORS

FOR THE
ENTERTAINMENT
MARKET

OUTLINE DRAWING



TYPES 2N168, 2N169A, 2N169

The 2N168, 2N169A, and 2N169 are rate grown NPN germanium transistors intended for use as IF amplifiers in broadcast radio receivers. The collector capacity is controlled to a low value so that neutralization in most circuits is not required. The power gain at 455 KC is maintained

at a 3 db spread for the 2N168 and 2N169A. The 2N169A is a special high voltage unit intended for second IF amplifier service where large voltage signals are encountered. The 2N169 is also intended for low gain IF amplifier and power detector applications.

IF TRANSISTOR SPECIFICATIONS

ABSOLUTE MAXIMUM RATINGS

		2N168	2N169A	2N169	
Voltage	Collector to Emitter (base open)	V_{CE}	15	25	15 volts
	Collector to Base (emitter open)	V_{CB}	15	25	15 volts
Current	Collector	I_c	-20	-20	-20 ma
	Power	Collector Dissipation at 25°C*	P_c	55	55
Temperature Range	Operating and Storage	T_s	-55 to 75 °	-55 to 75 °	-55 to 75 °C

*Derate 1.1 mw/°C increase in ambient temperature.

ELECTRICAL CHARACTERISTICS**

IF AMPLIFIER SERVICE

Maximum Ratings

Collector Supply Voltage	V_{cc}	12	12	12 volts
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Design Center Characteristics

($I_B = 1$ ma; $V_{CB} = 5$ v; $f = 455$ KC except as noted)

Input Impedance	Z_{in}	350	500	500 ohms
Output Impedance	Z_{out}	15K	15K	15K ohms
Voltage Feedback Ratio ($V_{CB} = 5$ v; $f = 1$ mc)	h_{fb}	5×10^{-3}	10×10^{-3}	15×10^{-3}
Collector to Base Capacitance ($V_{CB} = 5$ v; $f = 1$ mc)	C_{ob}	2.4	2.4	2.4 μ f
Frequency Cutoff ($V_{CB} = 5$ v)	f_{ab}	6	5	4 mc
Base Current Gain ($f = 270$ cps)	h_{fe}	20	30	40

IF Amplifier Performance (see circuit)

Collector Supply Voltage	V_{cc}	5	5	5 volts
Collector Current	I_C	1	1	1 ma
Input Frequency	f	455	455	455 KC
Power Gain	G_o	30	27	24 db
Minimum Power Gain	G_e	28	25	21 db min
Detector Output (Note #1)			.28	.28 volts min

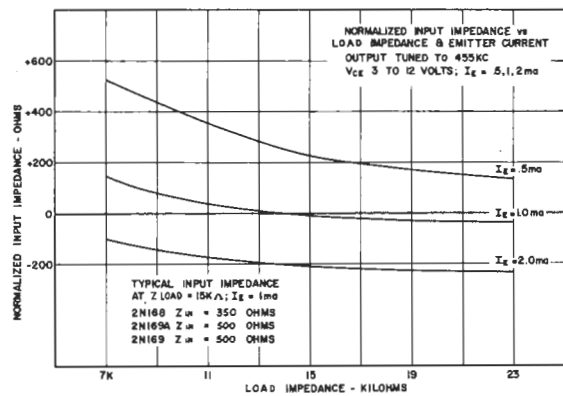
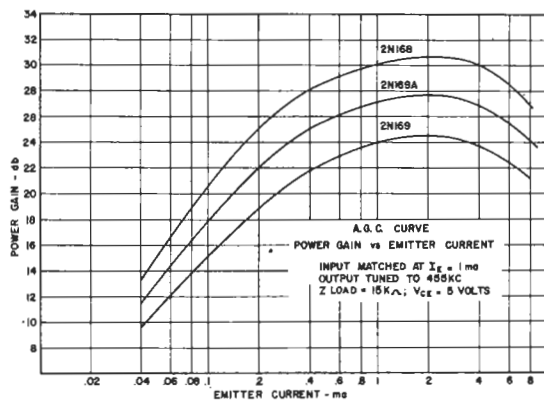
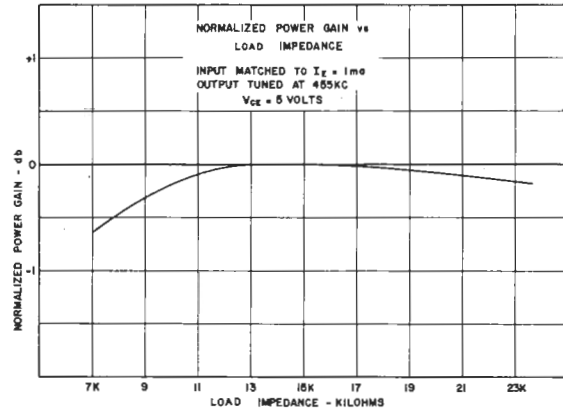
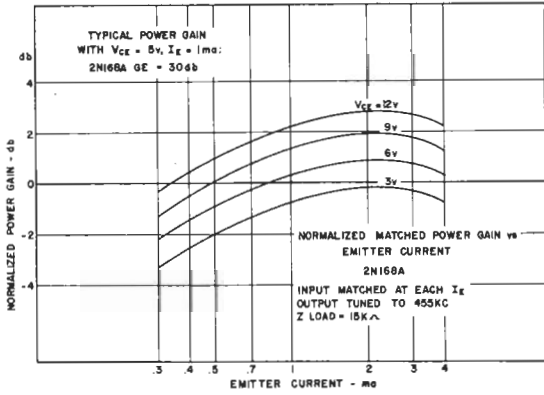
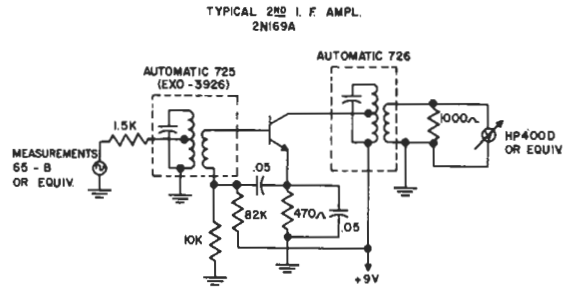
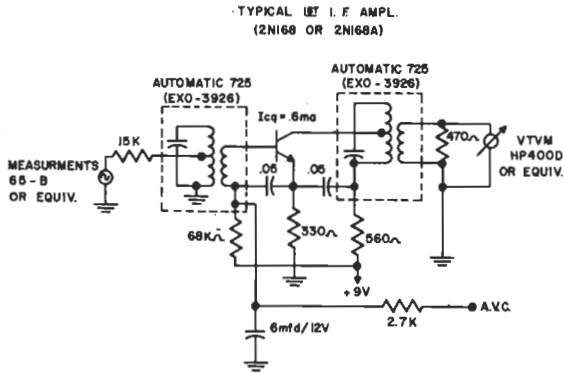
CUTOFF CHARACTERISTICS

Collector Cutoff Current ($V_{CB} = 5$ v)	I_{co}	.5	.5	.5 μ a
Collector Cutoff Current ($V_{CB} = 15$ v)	I_{co}	5	5	5 μ a max

**All values are typical unless indicated as a min or max.

TYPES 2N168, 2N169A, 2N169

NOTE 1. With a base to emitter bias of .08v, a signal of 0.12 volts, 455 KC modulated wave is applied to the base from a transformer. The collector output voltage is measured across a load of 2K ohms and .05 μ fd in parallel.



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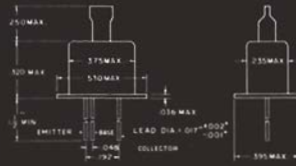
Semiconductor Products
Syracuse, New York

NEW

NPN JUNCTION TRANSISTORS

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OUTLINE DRAWING



TYPE 2N168A

The 2N168A is a rate grown NPN germanium transistor intended for mixer/oscillator and IF amplifier applications in radio receivers. Special manufacturing techniques provide a low value and a narrow spread in collector capacity so that neutralization in many circuits is not required.

The 2N168A has a frequency cutoff control to insure proper operation as an oscillator or autodyne mixer. For IF amplifier service the range in power gain is controlled to 3 db.

CONVERTER TRANSISTOR SPECIFICATIONS

ABSOLUTE MAXIMUM RATINGS

Voltage		
Collector to Emitter (base open)	V_{CE}	15 volts
Collector to Base (emitter open)	V_{CB}	15 volts
Current		
Collector	I_c	-20 ma
Power		
Collector Dissipation at 25°C*	P_c	65 mw
Temperature Range		
Operating and Storage	T_a	-55 to 85 °C

*Derate 1.1 mw/°C increase in ambient temperature over 25°C.

ELECTRICAL CHARACTERISTICS**

CONVERTER SERVICE

Maximum Ratings		
Collector Supply Voltage	V_{CC}	12 volts
Design Center Characteristics		
Input Impedance ($I_E = 1\text{ ma}$; $V_{CE} = 5\text{v}$; $f = 455\text{ KC}$)	Z_{in}	350 ohms
Output Impedance ($I_E = 1\text{ ma}$; $V_{CE} = 5\text{v}$; $f = 455\text{ KC}$)	Z_{out}	15K ohms
Voltage Feedback Ratio ($I_E = 1\text{ ma}$; $V_{CB} = 5\text{v}$; $f = 1\text{ mc}$)	h_{rb}	5×10^{-3}
Collector to Base Capacitance ($I_E = 1\text{ ma}$; $V_{CB} = 5\text{v}$; $f = 1\text{ mc}$)	C_{cb}	2.4 μf
Frequency Cutoff ($I_E = 1\text{ ma}$; $V_{CB} = 5\text{v}$)	f_{ab}	8 mc
Min. Frequency Cutoff ($I_E = 1\text{ ma}$; $V_{CB} = 5\text{v}$)	f_{ab}	5 mc min.
Base Current Gain ($I_E = 1\text{ ma}$; $V_{CE} = 5\text{v}$; $f = 270\text{ cps}$)	h_{fe}	40
Conversion Gain (see circuit)	CG_o	25 db

IF AMPLIFIER PERFORMANCE (SEE CIRCUIT)

Collector Supply Voltage	V_{CC}	5 volts
Collector Current	I_E	1 ma
Input Frequency	f	455 KC
Power Gain	G_o	30 db
Min. Power Gain	G_o	28 db min

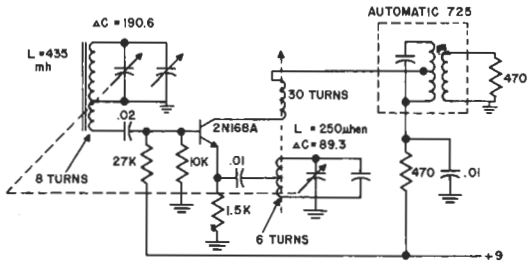
CUTOFF CHARACTERISTICS

Collector Cutoff Current ($V_{CB} = 5\text{v}$)	I_{co}	.5 μa
Collector Cutoff Current ($V_{CB} = 15\text{v}$)	I_{co}	5 μa max

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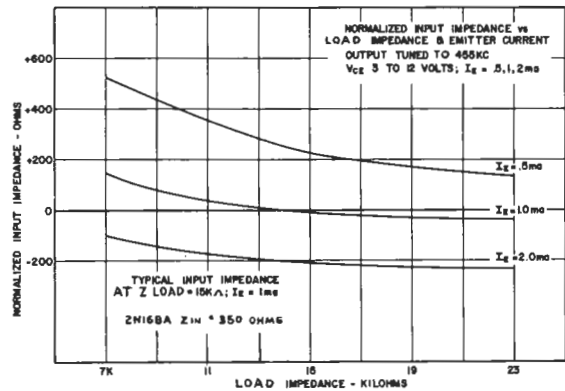
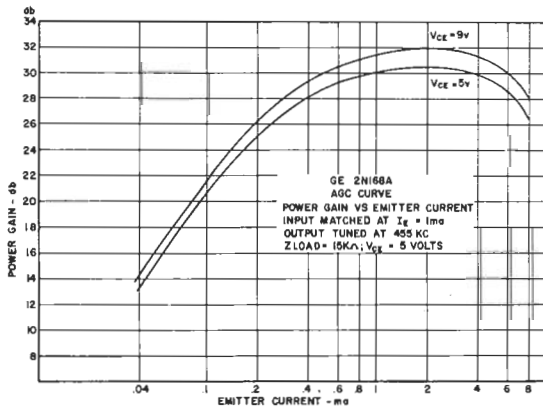
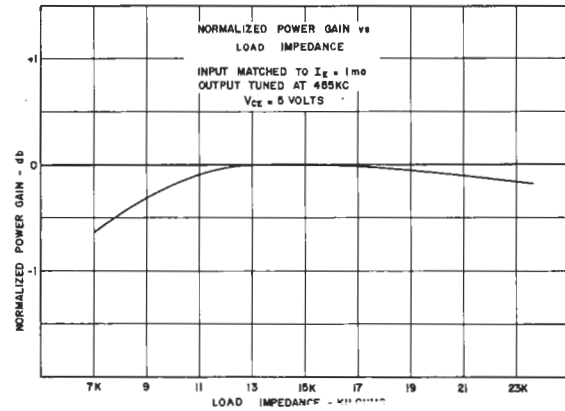
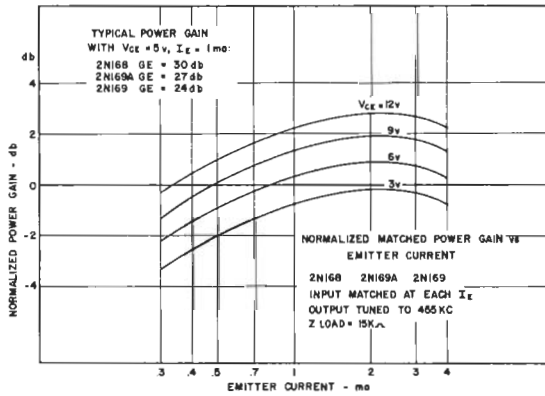
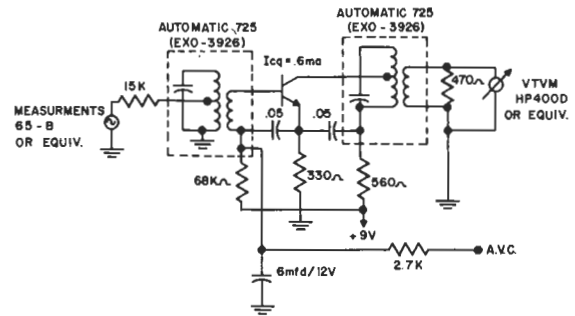
TYPE 2N168A

TYPICAL AUTODYNE CONVERTER
2N168A



ANTENNA - DELTA COIL #1 - 105A OR EQUIVALENT
OSCILLATOR COIL - E. STANWYCH CO. #1129 (MODIFIED) OR EQUIVALENT
CAPACITOR - RADIO CONDENSER #242 OR EQUIVALENT
I F TRANSFORMER - AUTOMATIC 725 (EXO-3926) OR EQUIVALENT

TYPICAL I.F. AMPL.
(2N168 OR 2N168A)



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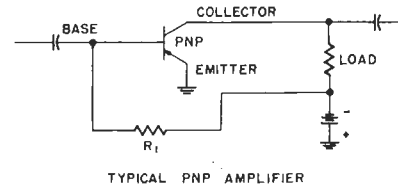
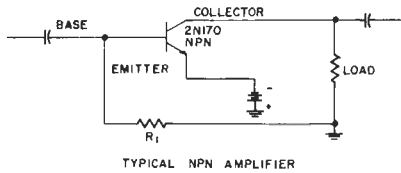


NPN JUNCTION TRANSISTOR



TYPE 2N170

The 2N170 is a rate grown NPN germanium transistor intended for use in high frequency circuits by amateurs, hobbyists, and experimenters. The 2N170 can be used in any of the many published circuits where a low voltage, high frequency transistor is necessary such as for regenerative receivers, high frequency oscillators, etc. If you desire to use the 2N170 NPN transistor in a circuit showing a PNP type transistor, it is only necessary to change the connections to the power supply as sketched below:



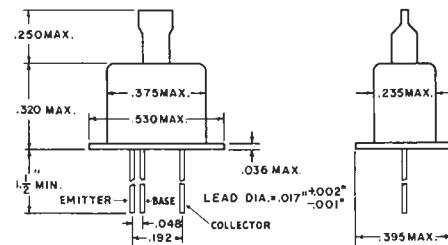
SPECIFICATIONS

ABSOLUTE MAXIMUM RATINGS

Voltage			
Collector to Emitter	V_{CE}	6 volts	
Current			
Collector	I_C	20 ma	
Power			
Collector Dissipation @ 25°C*	P_C	25 mw	
Temperature Range			
Operating and Storage	T_H	-55 to 50 °C	

*Derate 1 mw/°C increase in ambient temperature.

OUTLINE DRAWING



ELECTRICAL CHARACTERISTICS**

High Frequency Characteristics

($I_E = 1 \text{ ma}$; $V_{CE} = 5\text{v}$; $f = 455 \text{ KC}$ except as noted)

Input Impedance (Common Emitter)

Output Impedance (Common Emitter)

Collector to Base Capacitance ($f = 1 \text{ mc}$)

Frequency Cutoff ($V_{CE} = 5\text{V}$)

Power Gain (Common Emitter)

Z_{in}	800 ohms
Z_{out}	15K ohms
C_{cb}	3 μmf
f_{cb}	5 mc
G_e	24 db

Low Frequency Characteristics

($I_E = 1 \text{ ma}$; $V_{CE} = 5\text{v}$; $f = 270 \text{ cps}$)

Input Impedance

Voltage Feedback Ratio

Current Gain

Output Admittance

Common Emitter Base Current Gain

h_{ib}	55 ohms
h_{rb}	4×10^{-4}
h_{fb}	.97
h_{ob}	$.3 \times 10^{-8} \mu\text{mhos}$
h_{re}	32

Cutoff Characteristics

Collector Cutoff Current ($V_{CE} = 5\text{v}$)

I_{co}	5 μa max
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**All values are typical unless indicated as a min. or max.

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