2N79

JUNCTION TRANSISTOR

Germanium p-n-p Alloy Type

Hermetically Sealed
Insulated Metal Case
Low Noise Factor

For Low-Power Audio Applications Where Extreme Stability is Paramount
TENTATIVE DATA

Linotetrar 3-Pin Base
Seated Height 0.495"
Max. Diameter 0.260"

RCA-2N79 is a germanium alloy-junction transistor of the p-n-p type intended for low-power audio applications. This transistor is hermetically sealed, utilizes an insulated metal envelope, and has a linotetrar 3-pin base. It is small in size--only 0.260" in diameter and has a seated height of 0.495".

The extreme stability, very low leakage currents, and excellent uniformity of characteristics of this transistor both initially and during life are the result of its design and its closely controlled processing and manufacturing techniques. The limits for the collector-to-base current amplification ratio of this transistor are established on the basis of manufacturing controls, rather than by a selection or grading process. Because of these controls, the distribution of the characteristics within these limits follows a normal distribution pattern wherein the majority of the units fall near the center value. As a result, greater uniformity of characteristics can be maintained. Furthermore, regular production availability is feasible since it is independent of the demand for other types in the same distribution pattern.

In a common-emitter circuit, the 2N79 has a collector-to-base-connection current amplification ratio of 46; a matched-impedance, low-frequency power gain of 44db; and an average noise factor of 10db.

GENERAL DATA

Electrical:

Collector:		
Cutoff Voltage:		
Minimum value with dc collector current = −20 microamperes and emitter open. . .	−35	volts
Cutoff Current:		
Maximum value with dc collector voltage = −12 volts and emitter open	−10	μamp
Junction Temperature Rise (In free air). . .	0.3	°C/mw

Mechanical:

Maximum Overall Length	0.697"
Maximum Seated Length.	0.495"
Maximum Diameter	0.260"
Case	Metal, Insulated
Base . . . .Small-Round Linotetrar 3-Pin (JETEC No.3E-25)	
Mounting Position.	Any

AUDIO-FREQUENCY AMPLIFIER SERVICE

Voltage values are given with respect to base connection unless otherwise specified

Maximum Ratings, *Absolute Values:*

COLLECTOR:		
DC voltage	−30 max.	volts
DC current	−50 max.	ma
Dissipation.	−35 max.	mw
EMITTER:		
DC current	50 max.	ma
AMBIENT TEMPERATURE		
Operating.	70 max.	°C
Storage.	−55 to +85	°C

Common Base-Connection Circuit

Characteristics at Ambient Temperature = 25°C:

With input circuit between emitter and base-connection, and output circuit between collector and base-connection

Alpha Frequency Cutoff:♦		
Collector-to-emitter (f_{ce}):		
With dc collector-to-emitter voltage = −6 volts and dc collector current = −1.0 milliampere	780	Kc
With dc collector-to-emitter voltage = −3 volts and dc collector current = −0.2 milliampere	620	Kc
Power Gain:		
With dc collector voltage = −6 volts, dc collector current = −1.0 milliampere, load resistance = 500,000 ohms and input resistance = 160 ohms	34	db

Common-Collector Circuit

Characteristics at Ambient Temperature = 25°C:

With input circuit between base-connection and collector, and output circuit between emitter and collector

Power Gain:		
With dc collector voltage = −3 volts, dc collector current = −0.2 milliampere, load resistance = 18000 ohms, and input resistance = 0.62 megohm .	18	db

Common-Emitter Circuit

Characteristics at Ambient Temperature = 25°C:

With input circuit between base-connection and emitter, and output circuit between collector and emitter.

Collector:	
Average Characteristics.	See Figs.1 and 2
Base-Connection:	
Average Characteristics.	See Fig.3

♦ The cutoff frequency is defined as the frequency at which the collector-to-emitter current amplification ratio has dropped to 0.7 of its low-frequency value.

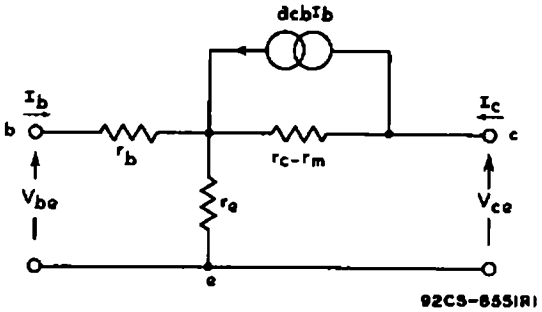
TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

2N79-9-55
Photolithographed
in U.S.A.

Alpha-Frequency Cutoff:▲		
Collector-to-base-connection (f_{cb}):		
With dc collector-to-emitter voltage = −6 volts and dc collector current = −1.0 milliampere.	17	Kc
With dc collector-to-emitter voltage = −3 volts, and dc collector current = −0.2 milliampere.	16.5	Kc
Power Gain:		
With dc collector voltage = −6 volts, dc collector current = −1.0 milliampere, load resistance = 20,000 ohms, and input resistance = 1500 ohms . .	44	db
Average Noise Factor:		
Measured with a signal generator and a thermocouple voltmeter and with dc collector voltage = −6 volts, dc collector current = −1 milliampere, load resistance = 30,000 ohms, and generator resistance = 1000 ohms. Noise bandwidth = 1 Kc. .	10	db

T Parameters

Derived in the following one-generator equivalent circuit and intended to apply only for low-frequency applications



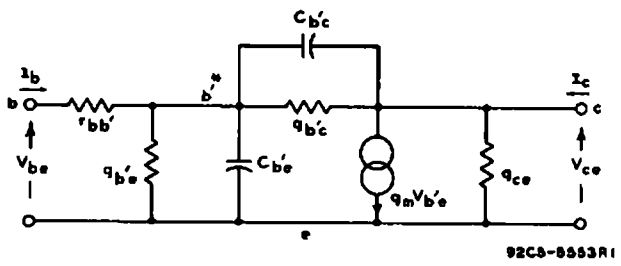
92CS-8551RI

For conditions where $a_{cb} = \left(-\frac{r_m}{r_c - r_m}\right) \approx a_{cb} = \left(-\frac{r_m - r_e}{r_c - r_m + r_e}\right)$:

Collector Voltage (V_{CE}) Approx. . .	−6	−3	volts
Collector Current (I_C)	−1.0	−0.2	ma
Emitter Resistance (r_e).	24	110	ohms
Base-Connection Resistance (r_b). . .	730	1500	ohms
Mutual Resistance (r_m)●	2.31	3.4	megohms
Collector Resistance (r_c)●	2.36	3.5	megohms
Collector-to-Base-Connection:			
Current Amplification Ratio (a_{cb}).	−46	−37	

π Parameters:

Derived in the following one-generator equivalent circuit and intended for both high-and low-frequency applications



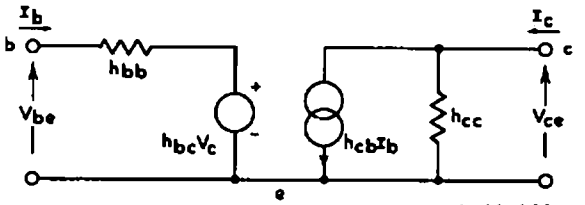
92CS-8553RI

* Internal base-connection of device.

Collector Voltage (V_{CE}) Approx. . .	−6	−3	volts
Collector Current (I_C)	−1.0	−0.2	ma
Resistance between points b and b' ($r_{bb'}$)	280	290	ohms
Conductance between points b' and e ($g_{b'e}$)	670	200	μmhos
Conductance between points c and e (g_{ce})	5.3	2.1	μmhos
Conductance between points b' and c ($g_{b'c}$)	0.19	0.1	μmhos
Capacitance between points b' and e ($C_{b'e}$)	7000	1200	μμf
Capacitance between points b' and c ($C_{b'c}$)	27	40	μμf
Intrinsic Transconductance (g_m). . .	31000	7000	μmhos

H Parameters:

Derived in the following two-generator equivalent circuit and intended to apply only for low-frequency applications



92CS-8552RI

Collector Voltage (V_{CE}) Approx. . . .	−6	−3	volts
Collector Current (I_C) .	−1.0	−0.2	ma
Input Resistance with short-circuited output (h_{bb})	1700	5550	ohms
Reverse Voltage Ratio with open-circuited input (h_{bc}).	520 x 10^{-6}	1200 x 10^{-6}	
Forward Current Amplification Ratio with short-circuited output (h_{cb})	−46	−37	
Output Conductance with open-circuited input (h_{cc}).	20	11	μmhos

▲ The cutoff frequency is defined as the frequency at which the collector-to-base-connection current amplification ratio has dropped to 0.7 of its low-frequency value.

● Measured in the common-base connection circuit.

OPERATING AND RATING CONSIDERATIONS

The *maximum ratings* in the tabulated data for the 2N79 are limiting values above which the serviceability of this transistor may be impaired from the viewpoint of life and satisfactory performance. Therefore, in order not to exceed these absolute ratings, the equipment designer has the responsibility of determining an average design value for each rating below the absolute value of that rating by an amount such that the absolute values will not be exceeded under any usual condition of supply-voltage variation, load variation, or manufacturing variation in the equipment itself.

The *base pins* of the 2N79 fit the small-round linotetrar 3-pin socket. The socket may be mounted to hold the transistor in any position.

The 2N79 should not be inserted into or withdrawn from the socket with the power on because high transient currents may cause permanent damage to the transistor.

REFERENCES

For a discussion of T Parameters see - W. A. Shockley, *"Electrons and Holes in Semiconductors"*, D. Van Nostrand Co., Inc., New York, N.Y., 1950.

For a discussion of π Parameters see - L. J. Giacoletto, *"Study of p-n-p Alloy Junction Transistors from DC Through Medium Frequencies"*, RCA Review, December 1954, Vol.15, No.4, pp-506-562. L. J. Giacoletto, *"Terminology and Equations for Linear Active Four Terminal Networks Including Transistors"*, RCA Review March 1955, Vol.14, No.1.

For a discussion of H Parameters see - R. F. Shea, *"Transistor Audio Amplifiers"*, John Wiley and Sons Inc., New York, N.Y., 1955.

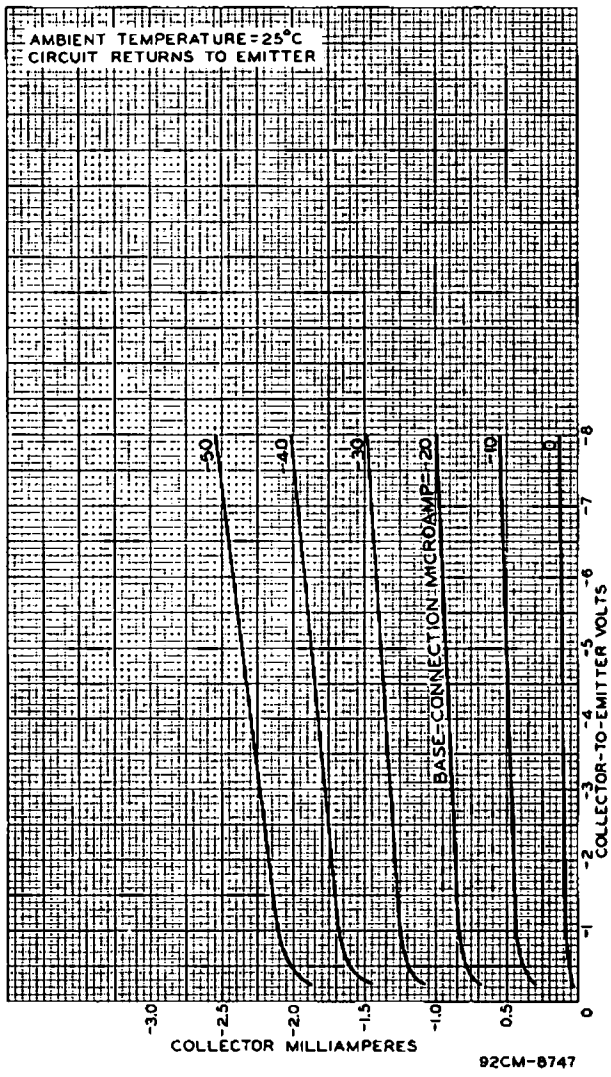


Fig. 1 - Average Collector Characteristics of Type 2N79 for Common-Emitter Circuit.

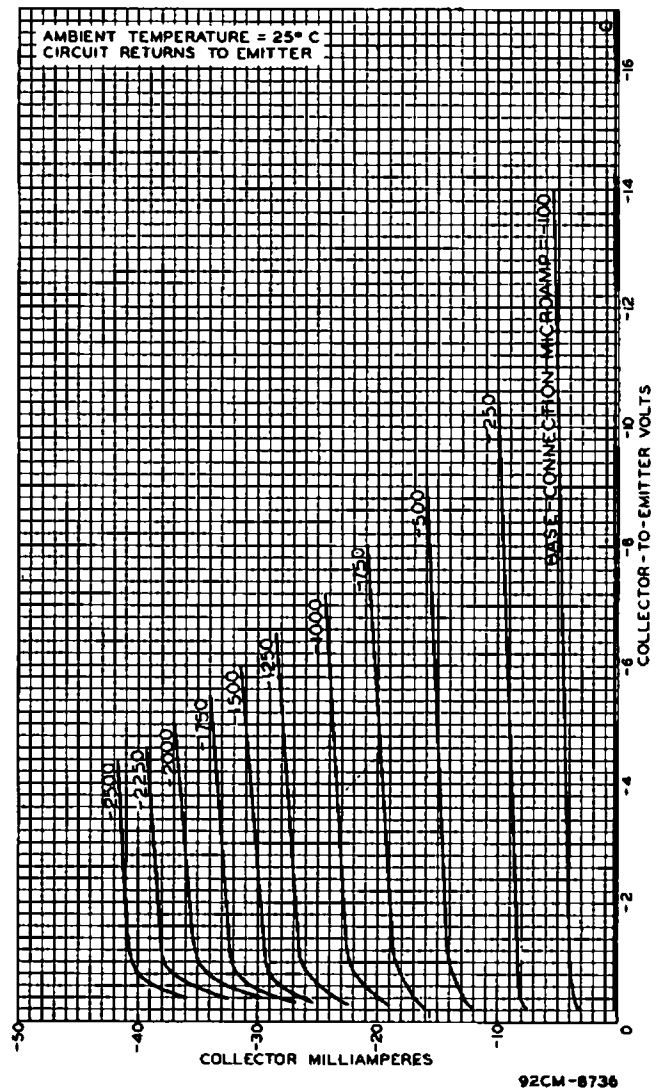


Fig. 2 - Average Collector Characteristics of Type 2N79 for Common-Emitter Circuit.

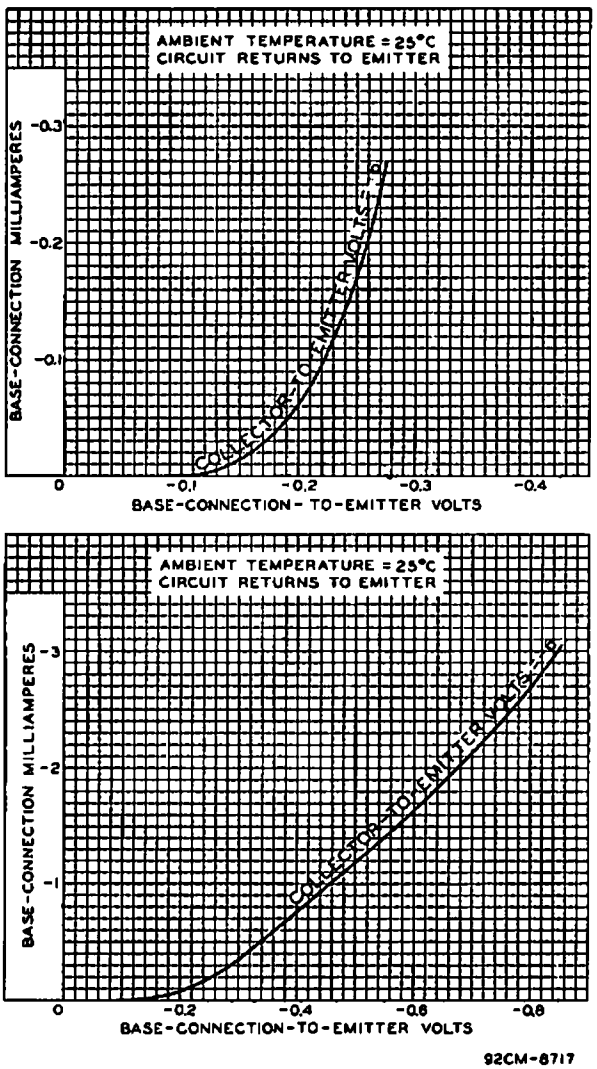
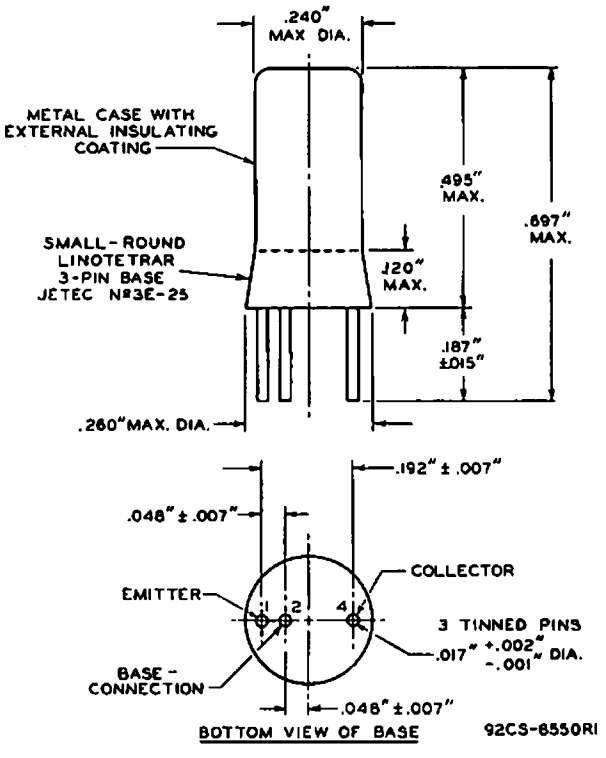


Fig.3 - Average Base-Connection Characteristic of Type 2N79 for Common-Emitter Circuit.

DIMENSIONAL OUTLINE



PIN-SPACING TOLERANCES ARE NOT CUMULATIVE

GRAPHICAL SYMBOL For 2N79