RCA
Solid State Division

RF Power Transistors

2N5179

RCA-2N5179* is a double-diffused epitaxial planar transistor of the silicon n-p-n type. It is extremely useful in low-noise tuned-amplifier and converter applications at UHF frequencies, and as an oscillator up to 500 MHz.

The 2N5179 utilizes a hermetically sealed four-lead JEDEC TO-72 package. All active elements of the transistor are insulated from the case, which may be grounded by means of the fourth lead in applications requiring minimum feedback capacitance, shielding of the device, or both.

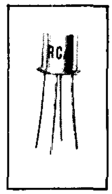
* Formerly Dev. No. TA7319.

Maximum Ratings, Absolute-Maximum Values:

COLLECTOR-TO-BASE VOLTAGE, V_{CBO}	20 max.	V
COLLECTOR-TO-EMITTER VOLTAGE, V_{CEO}	12 max.	V
EMITTER-TO-BASE VOLTAGE, V_{EBO}	2.5 max.	V
COLLECTOR CURRENT, I_C	50 max.	mA
TRANSISTOR DISSIPATION, P_T:		
For operation with heat sink:		
At case temperatures** up to 25°C	300 max.	mW
At case temperatures** above 25°C	Derate at 1.71mW/°C	
For operation at ambient temperatures:		
At ambient temperatures up to 25°C	200 max.	mW
At ambient temperatures above 25°C	Derate at 1.14mW/°C	
TEMPERATURE RANGE:		
Storage and Operating (Junction)	−65 to +200	°C
LEAD TEMPERATURE (During Soldering):		
At distances ≥ 1/32″ from seating surface for 10 seconds max.	265 max.	°C

** Measured at center of seating surface.

SILICON N-P-N EPITAXIAL PLANAR TRANSISTOR



JEDEC TO-72

For UHF Applications in Military, Communications, and Industrial Equipment

- **high gain-bandwidth product — 1000MHz min.**
- **hermetically sealed TO-72 four-lead metal package**
- **low leakage current**
- **high power gain as neutralized amplifier —**
  G_{pe} = 15dB min. at 200MHz
- **high power output as UHF oscillator —**
  20mW typ. at 500MHz
- **low noise figure —**
  NF = 4.5dB max. at 200MHz
- **low collector-to-base time constant —**
  $r_b'C_c$ = 14ps max.
- **high reliability —**
  production lots of RCA-2N5179 are subjected to and meet the minimum mechanical, environmental, and life-test requirements of the basic MILITARY specification MIL-S-19500. See page 5 for a description of the Group A and Group B Tests.

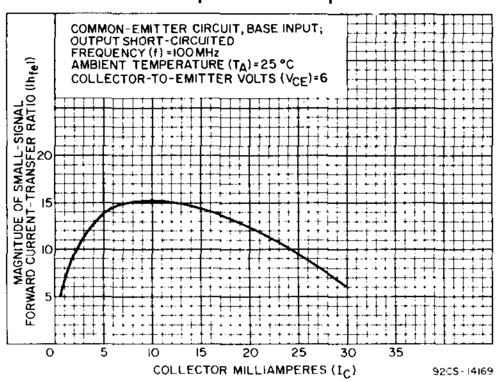


Fig. 1 — Small-Signal Beta Characteristic for Type 2N5179

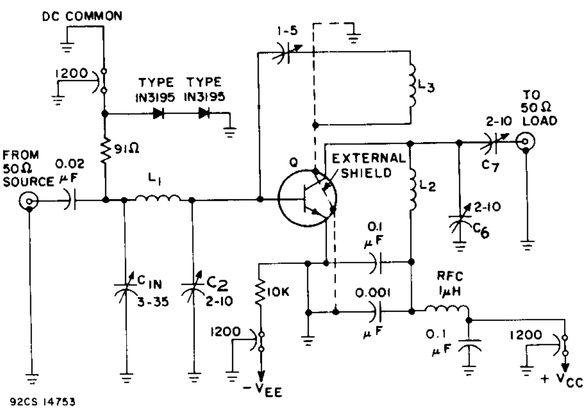
ELECTRICAL CHARACTERISTICS

Characteristics	Symbols	TEST CONDITIONS: Ambient Temp. T_A (°C)	Frequency f (MHz)	DC Collector-to-Base Voltage V_{CB} (V)	DC Collector-to-Emitter Voltage V_{CE} (V)	DC Emitter-to-Base Voltage V_{EB} (V)	DC Emitter Current I_E (mA)	DC Collector Current I_C (mA)	DC Base Current I_B (mA)	LIMITS Type 2N5179 Min.	Typ.	Max.	Units
Collector-Cutoff Current	I_{CBO}	25 150		15 15			0 0			- -	- -	0.02 1	μA μA
Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$	25					0	0.001		20	-	-	V
Collector-to-Emitter Sustaining Voltage	$V_{CEO}(sus)$	25						3	0	12	-	-	V
Emitter-to-Base Breakdown Voltage	$V_{(BR)EBO}$	25					−0.01	0		2.5	-	-	V
Collector-to-Emitter Saturation Voltage	$V_{CE}(sat)$	25						10	1	-	-	0.4	V
Base-to-Emitter Saturation Voltage	$V_{BE}(sat)$	25						10	1	-	-	1	V
Static Forward Current-Transfer Ratio	h_{FE}	25			1			3		25	70	250	
Magnitude of Small-Signal Forward Current-Transfer Ratio[a]	$\|h_{fe}\|$	25	100 1 kHz		6 6			5 2		9 25	14 90	20 300	
Collector-to-Base Feedback Capacitance[b]	C_{cb}	25	0.1 to 1	10			0			-	0.7	1	pF
Common-Base Input Capacitance[c]	C_{ib}	25	0.1 to 1			0.5		0		-	-	2	pF
Collector-to-Base Time Constant[a]	$r_b'C_c$	25	31.9	6				2		3	7	14	ps
Small-Signal Power Gain in Neutralized Common-Emitter Amplifier Circuit[a] (See Fig. 2)	G_{pe}	25	200		12			5		15	21	-	dB
Power Output in Common-Emitter Oscillator Circuit[c] (See Fig. 3)	P_o	25	>500	10			-12			20	-	-	mW
Noise Figure[a]	NF	25	200		6			1.5		-	3	4.5	dB

[a] Lead No.4(case) grounded; Rg = 125Ω

[b] Three-terminal measurement of the collector-to-base capacitance with the case and emitter leads connected to the guard terminal.

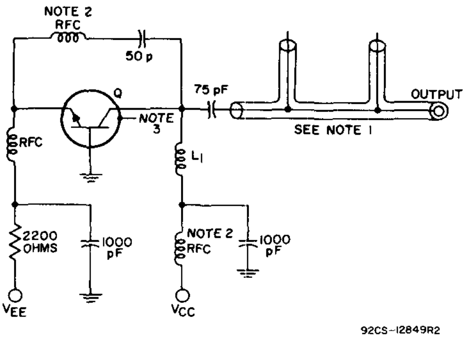
[c] Lead No. 4 (case) floating.



NOTE: (Neutralization Procedure): (a) Connect a 50-Ω rf voltmeter to the output of a 200-MHz signal generator (R_g = 50Ω), and adjust the generator output to 5mV. (b) Connect the generator to the input and the rf voltmeter to the output of the amplifier, as shown above. (c) Apply V_{EE} and V_{CC}, and adjust the generator output to provide an amplifier output of 5mV. (d) Tune C_2, C_6, and C_7 for maximum amplifier output, readjusting the generator output, as required, to maintain an output of 5mV from the amplifier. (e) Interchange the connections to the signal generator and the rf voltmeter. (f) With sufficient signal applied to the output terminals of the amplifier, adjust C_N for a minimum indication at the amplifier input. (g) Repeat steps (a), (b), (c), and (d) to determine if retuning is necessary.

Q = Type 2N5179

Fig. 2 – Neutralized Amplifier Circuit Used to Measure Power Gain and Noise Figure at 200MHz for Type 2N5179



Note 1 — Coaxial-Line output network consisting of:

- 2 General Radio Type 874 TEE or equivalent
- 1 General Radio Type 874-D20 Adjustable Stub or equivalent
- 1 General Radio Type 874-LA Adjustable Line or equivalent
- 1 General Radio Type 874-WN3 Short-circuit termination or equivalent

Note 2 — RFC = 0.2μH Ohmite #2-460 or equivalent

Note 3 — Lead Number 4 (case) floating

L_1 — 2 turns #16AWG wire, ⅜ inch OD, 1¼ inch long

Q = 2N5179

Fig. 3 – Circuit Used to Measure 500MHz Oscillator Power Output for Type 2N5179

TWO-PORT ADMITTANCE (y) PARAMETERS AS FUNCTIONS OF COLLECTOR CURRENT (I_C) FOR RCA TYPE 2N5179

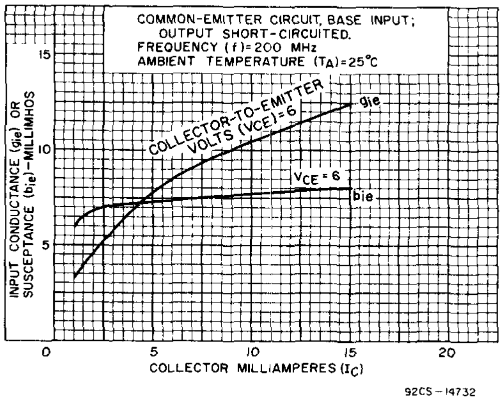


Fig. 4 – Input Admittance (y_{ie})

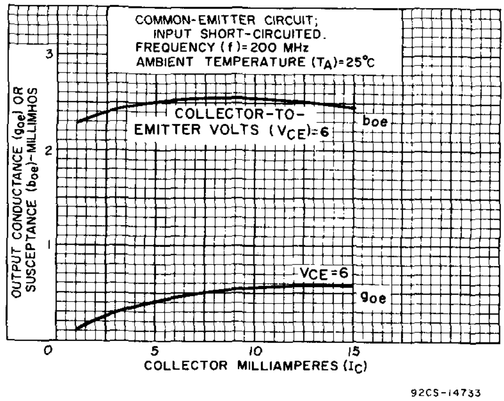


Fig. 5 – Output Admittance (y_{oe})

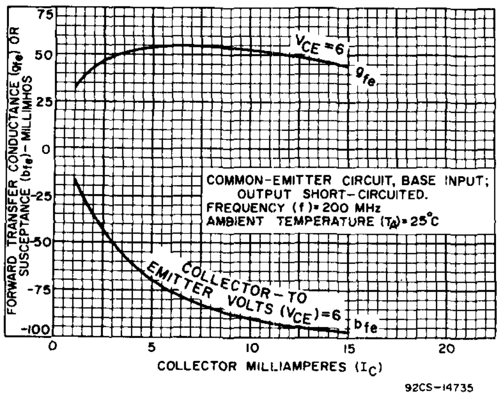


Fig. 6 – Forward Transadmittance (y_{fe})

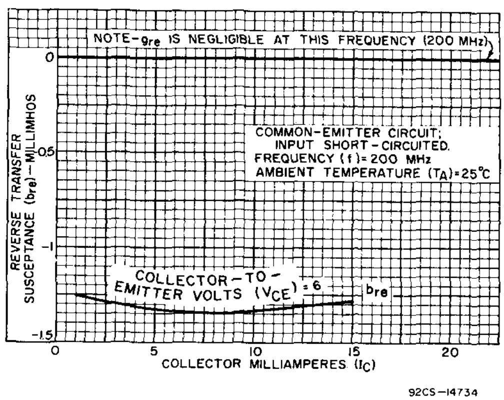


Fig. 7 – Reverse Transadmittance (y_{re})

TWO-PORT ADMITTANCE (y) PARAMETERS AS FUNCTIONS OF FREQUENCY (f) FOR RCA TYPE 2N5179

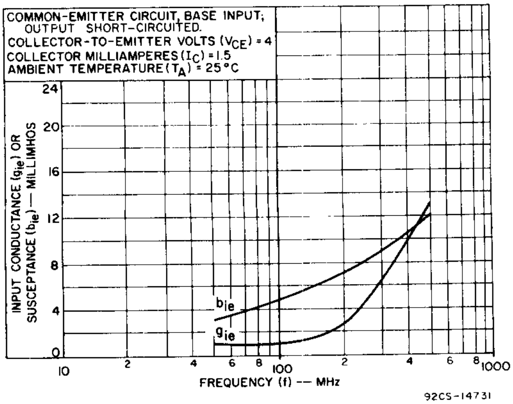


Fig. 8 – Input Admittance (y_{ie})

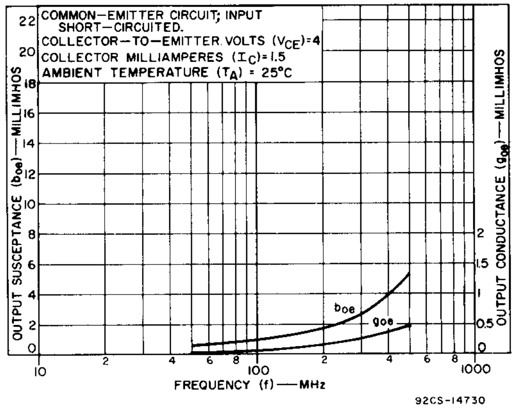


Fig. 9 – Output Admittance (y_{oe})

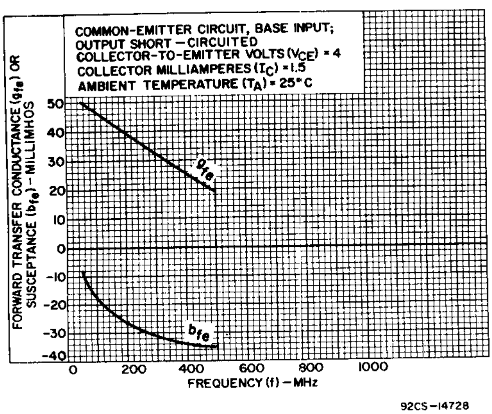


Fig. 10 – Forward Transadmittance (y_{fe})

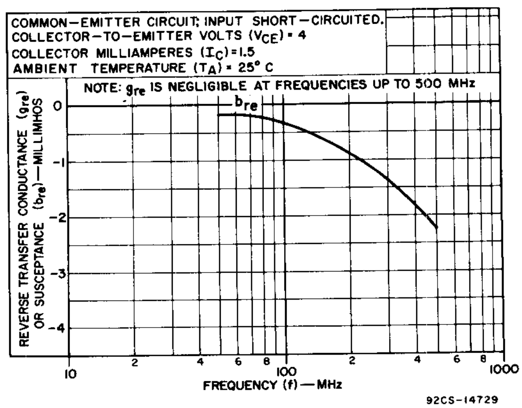
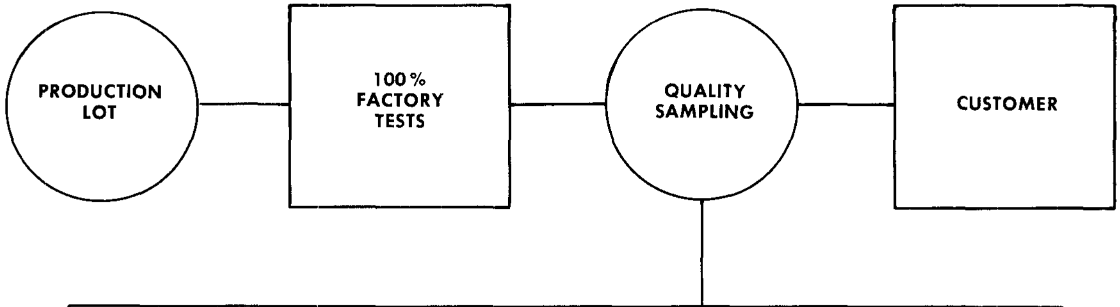


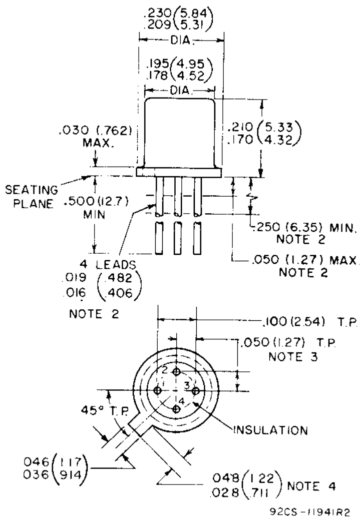
Fig. 11 – Reverse Transadmittance (y_{re})

GROUP A AND GROUP B QUALITY SAMPLING TESTS



ITEM	TEST DESCRIPTION	LTPD
GROUP A TESTS		
Subgroup 1.	Visual and Mechanical Examination	5%
Subgroup 2.	Electrical	10%
GROUP B TESTS		
Subgroup 1.	Physical Dimensions	20%
Subgroup 2.	Solderability, Temperature Cycling, Thermal Shock, Moisture Resistance	20%
Subgroup 3.	Shock, Vibration Fatigue, Vibration Variable Frequency, Constant Acceleration	20%
Subgroup 4.	Terminal Strength	20%
Subgroup 5.	Salt Atmosphere	20%
Subgroup 6.	High-Temperature Life, Non-Operating (T_A = 200°C)	λ = 10%
Subgroup 7.	Steady-State-Operation Life (P_D = 300mW, T_A = 25°C)	λ = 10%

DIMENSIONAL OUTLINE
JEDEC TO-72



Dimensions in inches and millimeters

Note 1: *Dimensions in parentheses are in millimeters and are derived from the basic inch dimensions as indicated.*

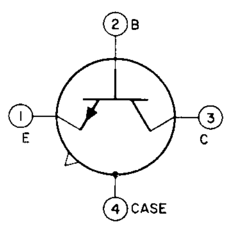
Note 2: The specified lead diameter applies in the zone between 0.050" (1.27 mm) and 0.250" (6.35 mm) from the seating plane. From 0.250" (6.35 mm) to the end of the lead a maximum diameter of 0.021" (0.533 mm) is held. Outside of these zones, the lead diameter is not controlled.

Note 3: Leads having a maximum diameter of 0.019" (0.482 mm) at a gauging plane of 0.054" (1.372 mm) + 0.001" (0.025 mm) - 0.000" (0.000 mm) below seating plane shall be within 0.007" (0.177 mm) of their true position (location) relative to a maximum width of tab.

Note 4: Measured from actual maximum diameter.

TERMINAL DIAGRAM
Bottom View

LEAD 1 – EMITTER
LEAD 2 – BASE



LEAD 3 – COLLECTOR
LEAD 4 – CONNECTED TO CASE