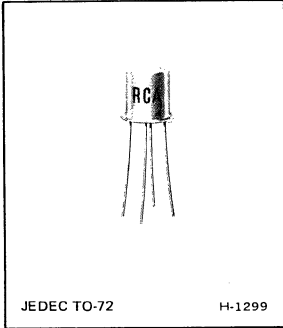




# RF Transistors

40915



## 0.2-to-1.4-GHz Low-Noise Silicon N-P-N Transistor

For High-Gain Small-Signal Applications

**Features:**

- Low noise figure:
  - NF = 2.5 dB (max.) with 11 dB gain at 450 MHz
  - = 3.0 dB (typ.) at 890 MHz
  - = 4.5 dB (typ.) at 1.3 GHz
- High gain (tuned, unneutralized):
  - $G_{PE}$  = 14 dB (min.) at 450 MHz
  - = 6.5 dB (typ.) at 1.3 GHz
- High gain-bandwidth product
- Large dynamic range
- Low distortion

RCA-40915\* is an epitaxial silicon n-p-n planar transistor intended for low-power, small-signal applications where both low noise and high gain are desirable. It utilizes a hermetically sealed four-lead JEDEC TO-72 package. All of the elements of the transistor are insulated from the case, which may be grounded by means of the fourth lead.

\*Formerly RCA Dev. No. TA8104.

**MAXIMUM RATINGS, Absolute-Maximum Values:**

Collector-to-Base Voltage	$V_{CBO}$	35	V
Collector-to-Emitter Voltage	$V_{CEO}$	15	V
Emitter-to-Base Voltage	$V_{EBO}$	3.5	V
Collector Current (Continuous)	$I_C$	40	mA
Transistor Dissipation:	$P_T$		
At ambient temperatures up to 25°C		200	mW
At ambient temperatures above 25°C		Derate linearly at 1.14 mW/°C	
Temperature Range:			
Storage and Operating (Junction)		-65 to +200 °C	

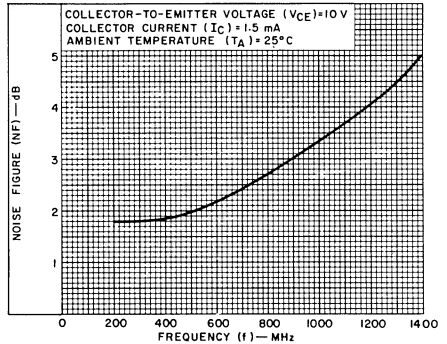


Fig. 1—Typical noise figure vs. frequency.

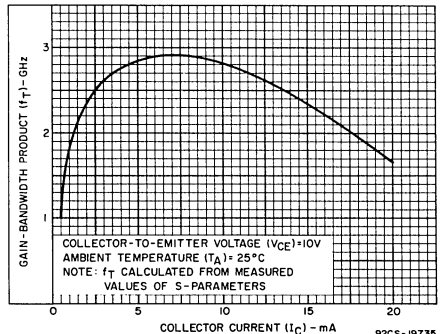


Fig. 2—Gain-bandwidth product vs. collector current.

**ELECTRICAL CHARACTERISTICS at Ambient Temperature ( $T_A$ ) = 25°C**

CHARACTERISTIC	SYMBOL	TEST CONDITIONS					LIMITS		UNITS
		DC COLLECTOR VOLTAGE (V)		DC CURRENT (mA)					
		$V_{CB}$	$V_{CE}$	$I_E$	$I_B$	$I_C$	MIN.	MAX.	

**STATIC**

Collector Cutoff Current	$I_{CBO}$	10		0			–	20	nA
Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$			0		0.01	35	–	V
Collector-to-Emitter Breakdown Voltage	$V_{(BR)CEO}$				0	0.1	15	–	V
Emitter-to-Base Breakdown Voltage	$V_{(BR)EBO}$			0.01		0	3.5	–	V
DC Forward-Current Transfer Ratio	$h_{FE}$		10			3	20	–	–
Thermal Resistance: (Junction-to-Ambient)	$R_{\theta JA}$						–	880	°C/W

**DYNAMIC**

Device Noise Figure (f = 450 MHz)	NF		10			1.5	–	2.5	dB
Small-Signal Common-Emitter Power Gain (f = 450 MHz) Unneutralized Amplifier	$G_{pE}$		10			1.5	14	–	dB
At minimum noise figure	$G_{pE}$		10			1.5	11.0	–	dB
Collector-to-Base Output Capacitance (f = 1 MHz)	$C_{obo}$	10		0			–	1.0	pF

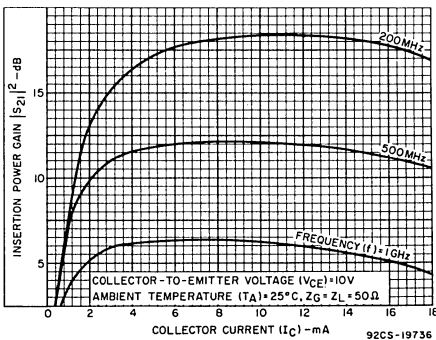


Fig.3—Typical insertion power gain vs. collector current.

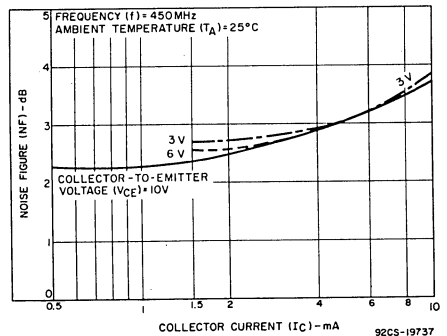


Fig.4—Typical noise figure vs. collector current.

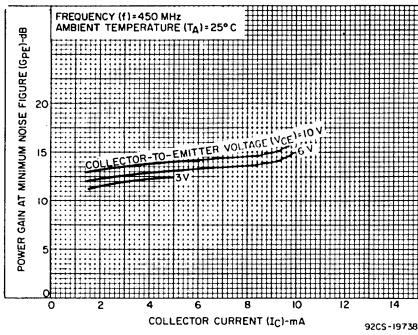


Fig. 5—Typical power gain (at minimum noise figure) vs. collector current.

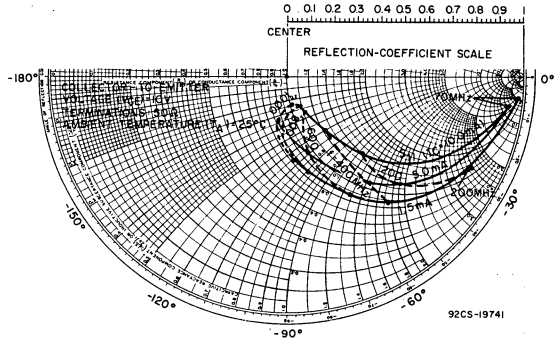


Fig. 8—Typical input reflection coefficient.

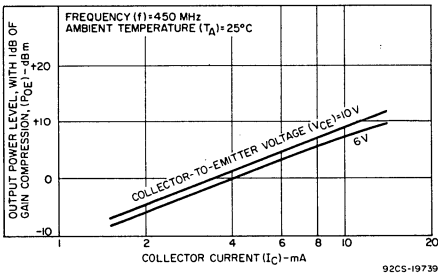


Fig. 6—Typical output power level (with 1 dB of gain compression) vs. collector current.

COLLECTOR-TO-EMITTER VOLTAGE (VCE) = 10 V  
 TERMINATIONS: 50Ω  
 AMBIENT TEMPERATURE (TA) = 25°C

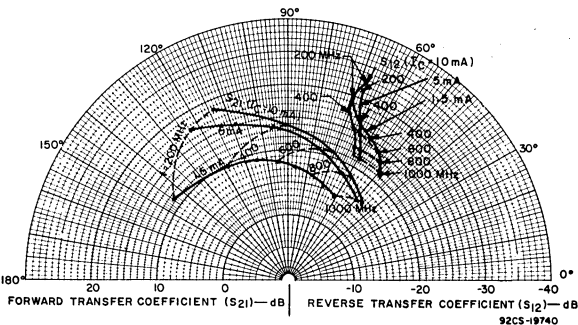
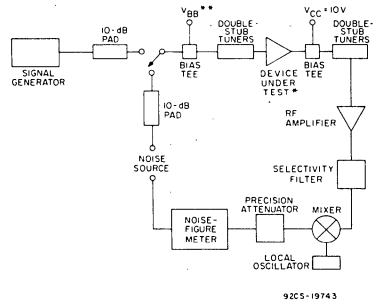


Fig. 7—Typical forward and reverse transfer coefficients.



\* In General Radio type 1607-P44 transistor mount, or equivalent.

\*\* V<sub>BB</sub> adjusted for I<sub>C</sub> = 1.5 mA.

Fig. 9—Block diagram of test setup for measurement of power gain and noise figure.

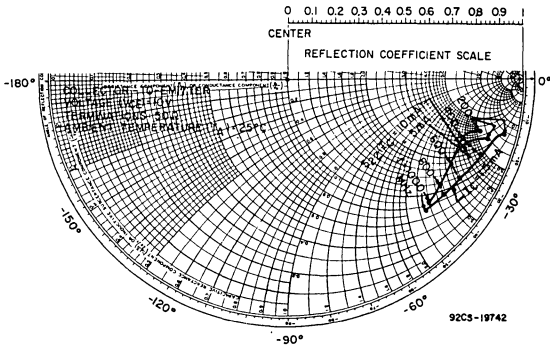
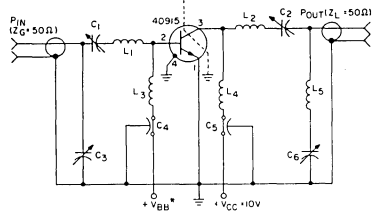


Fig. 10—Typical output reflection coefficient.



- C<sub>1</sub>: 1.0- 30 pF
- C<sub>2</sub>, C<sub>3</sub>: 1.0-20 pF
- C<sub>4</sub>, C<sub>5</sub>: 0.04 μF
- C<sub>6</sub>: 1-10 pF

- L<sub>1</sub>: 2 turns No. 18 wire, 3/16 in. (0.188 mm) ID, 0.10 in. (2.54 mm) long
- L<sub>2</sub>: 3 turns No. 18 wire, 3/16 in. (0.188 mm) ID, 0.15 in. (3.81 mm) long
- L<sub>3</sub>, L<sub>4</sub>: 0.22-μH rf choke
- L<sub>5</sub>: 3 turns No. 18 wire, 3/16 in. (0.188 mm) ID, 0.15 in. (3.81 mm) long

\* V<sub>BB</sub> adjusted for I<sub>C</sub> = 1.5 mA

Fig. 11—Circuit diagram of 450-MHz amplifier (unneutralized) used for measurement of power gain and noise figure.

**TERMINAL CONNECTIONS**

- Lead 1 — Emitter
- Lead 2 — Base
- Lead 3 — Collector
- Lead 4 — Case