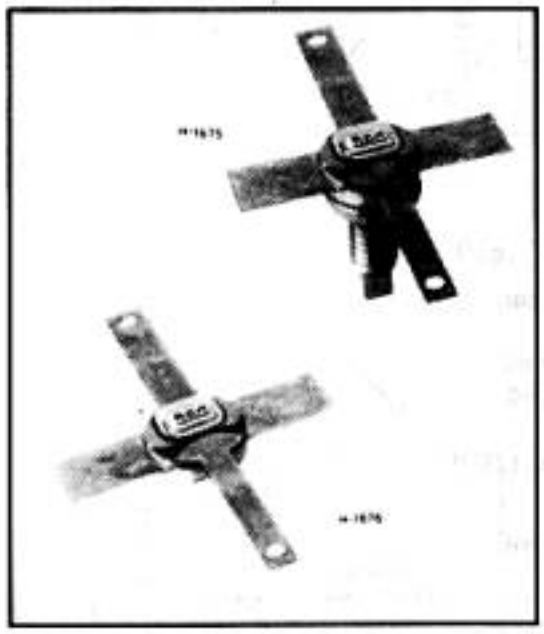
RCA
Solid State
Division

RF Power Transistors

2N5916 2N5917



High-Gain Silicon N-P-N Overlay Transistors

For VHF/UHF Communications Equipment

FEATURES

- Radial leads for microstripline circuits
- 2 watts (min.) output at 400 MHz (10-dB gain)
- 2 watts (typ.) output at 1 GHz (5-dB gain)
- Low-inductance, ceramic-metal hermetic packages
- All electrodes isolated from stud

MAXIMUM RATINGS, *Absolute-Maximum Values:*

		2N5916 2N5917	
*COLLECTOR-TO-BASE VOLTAGE	V_{CBO}	55	V
*COLLECTOR-TO-EMITTER VOLTAGE With base open	V_{CEO}	24	V
*EMITTER-TO-BASE VOLTAGE	V_{EBO}	3.5	V
*CONTINUOUS COLLECTOR CURRENT	I_C	0.2	A
*TRANSISTOR DISSIPATION	P_T		
At case temperatures up to 100°C		4	W
At case temperatures above 100°C		Derate linearly at 0.04 W/°C	
*TEMPERATURE RANGE: Storage & Operating (Junction)		−65 to +200	°C
* CASE TEMPERATURE (During soldering): For 10 s max		230	°C

*In accordance with JEDEC registration data format JS-6, RDF-3/JS-9 RDF-7

RCA 2N5916 and 2N5917▲ are epitaxial silicon n-p-n planar transistors featuring "overlay" emitter electrode construction. They are intended for large-signal and small-signal high-gain rf amplifiers and driver applications for VHF/UHF communications equipment.

Type 2N5916 features a new hermetic, ceramic-metal package having terminals isolated from the mounting stud. These rugged, low-inductance, radial leads are designed for microstripline as well as lumped-constant circuits. 2N5917 is a 2N5916 without the mounting stud.

▲Formerly RCA Dev. Type Nos. TA7411 and TA7852, respectively.

ELECTRICAL CHARACTERISTICS, Case Temperature (T_C) = 25°C

STATIC

	CHARACTERISTIC	SYMBOL	TEST CONDITIONS					LIMITS		UNITS
			DC Collector Voltage	DC Base Voltage	DC Current mA					
			V_{CE}	V_{BE}	I_E	I_B	I_C	MIN.	MAX.	
*	Collector-to-Emitter Cutoff Current: Base-emitter junction shorted	I_{CES}	30[b]	0				–	1	mA
*	Collector-to-Emitter Breakdown Voltage:	$V_{(BR)CES}$		0			5[a]	55	–	V
	With base open	$V_{(BR)CEO}$					5[a]	24	–	
*	Emitter-to-Base Breakdown Voltage	$V_{(BR)EBO}$			0.1		0	3.5	–	V
	Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$				10	100	–	0.5	V
	Thermal Resistance: (Junction-to-Case)	$\theta_{J\text{-}C}$						–	25	°C/W

[a] Pulsed through a 25-mH inductor; duty factor = 50%

[b] Case temperature = 100°C

DYNAMIC

	CHARACTERISTIC	SYMBOL	TEST CONDITIONS				LIMITS		UNITS
			DC Collector Supply (V_{CC}) – V	Output Power (P_{OE}) – W	Input Power (P_{IE}) – W	Frequency (f) – MHz	MIN.	MAX.	
*	Power Output (See Fig. 10)	P_{OE}	28		0.2	400	2.0	–	W
*	Power Gain	G_{PE}	28	2		400	10	–	dB
*	Collector Efficiency	η_C	28		0.2	400	50	–	%
*	Collector–Base Capacitance	C_{cb}	30(V_{CB})			1	–	4.5	pF

* In accordance with JEDEC registration data format JS-6 RDF-3/JS-9 RDF-7.

TYPICAL APPLICATION INFORMATION

CIRCUIT	Output Power (P_{OE}) – W	Input Power (P_{IE}) – W	Collector Efficiency (η_C) – %	Figure No.
400–MHz Amplifier	2.2	0.2	60	10
50/450–MHz Broadband Amplifier	0.1	0.01	–	11
1–GHz Amplifier	2	0.6	45	12

PERFORMANCE DATA

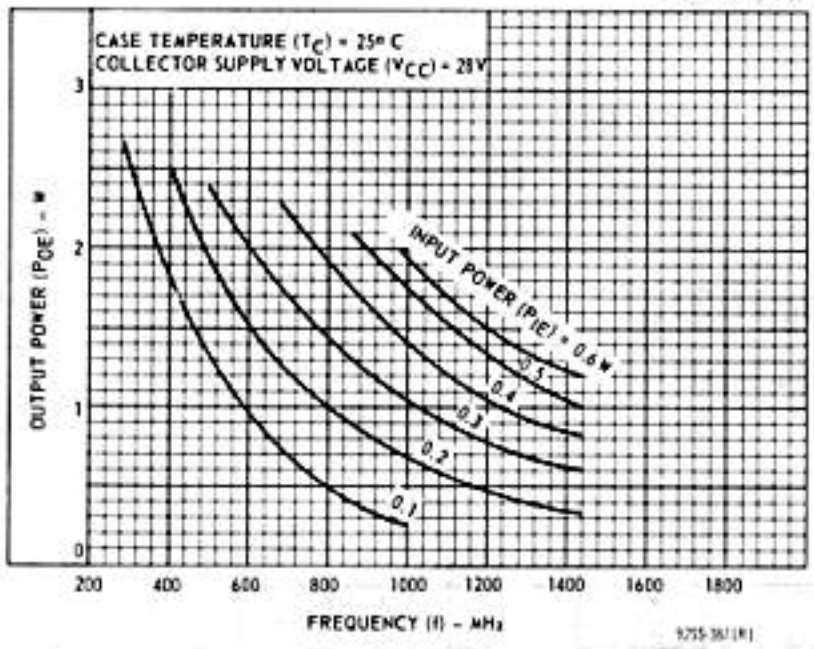


Fig. 1 - Typical power output vs. frequency (for both types).

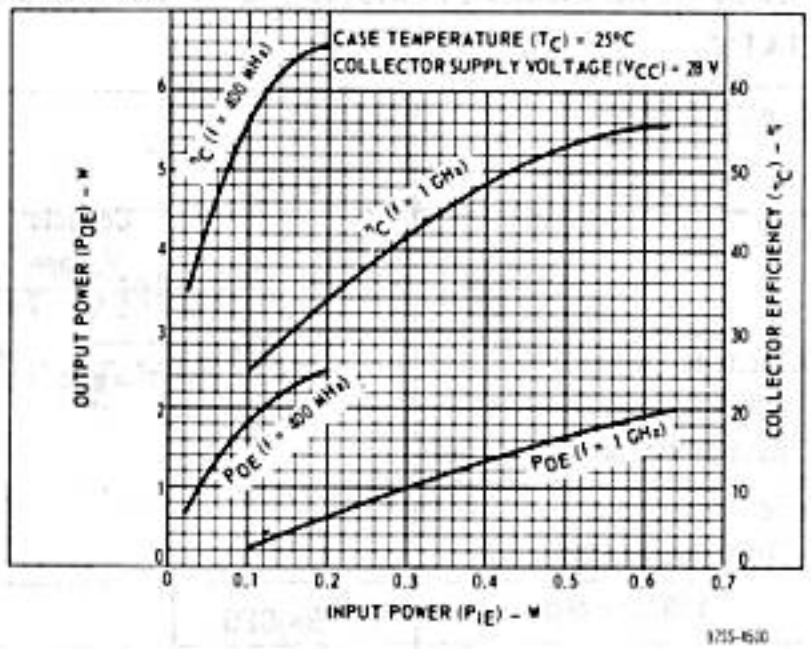


Fig. 2 - Typical power output and collector efficiency vs. power input (for both types).

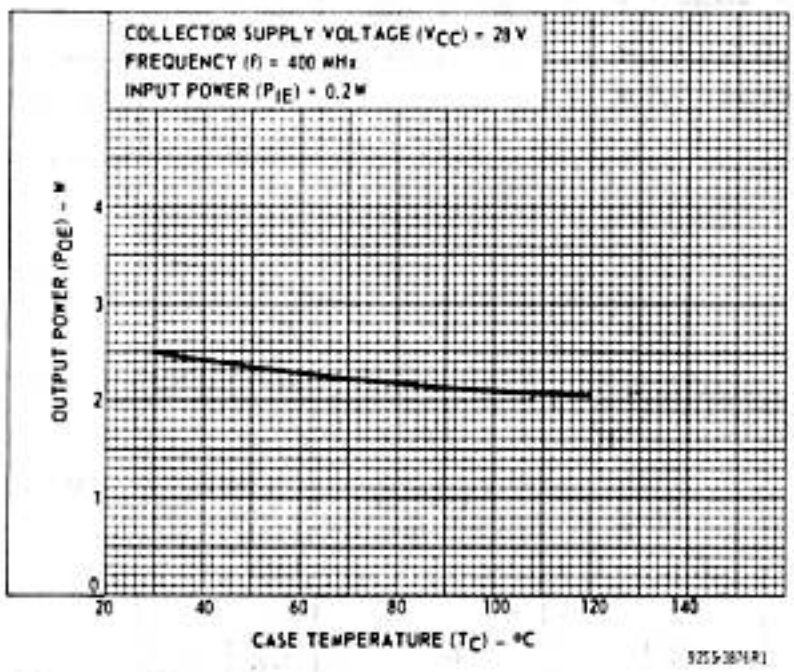


Fig. 3 - Typical power output vs. case temperature (for both types).

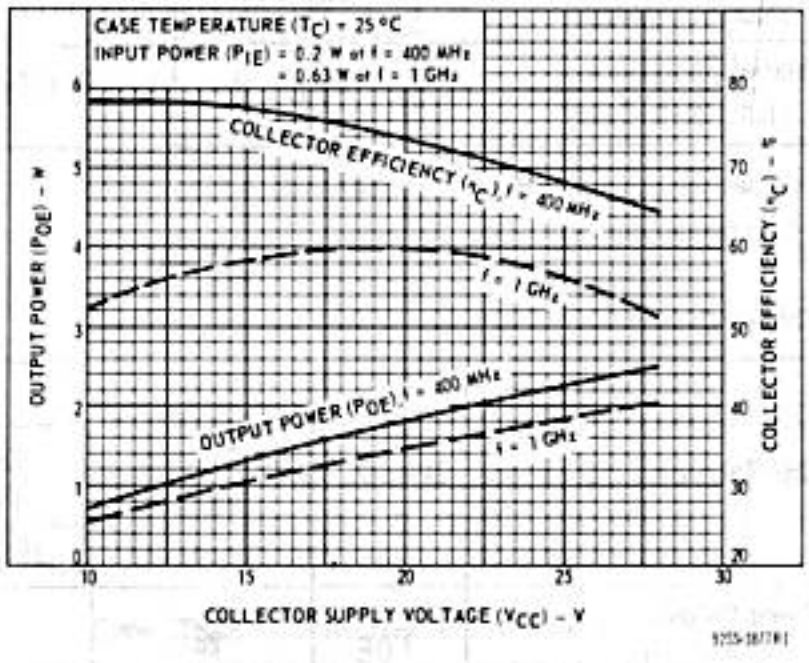


Fig. 4 - Typical power output or collector efficiency vs. collector supply voltage (for both types).

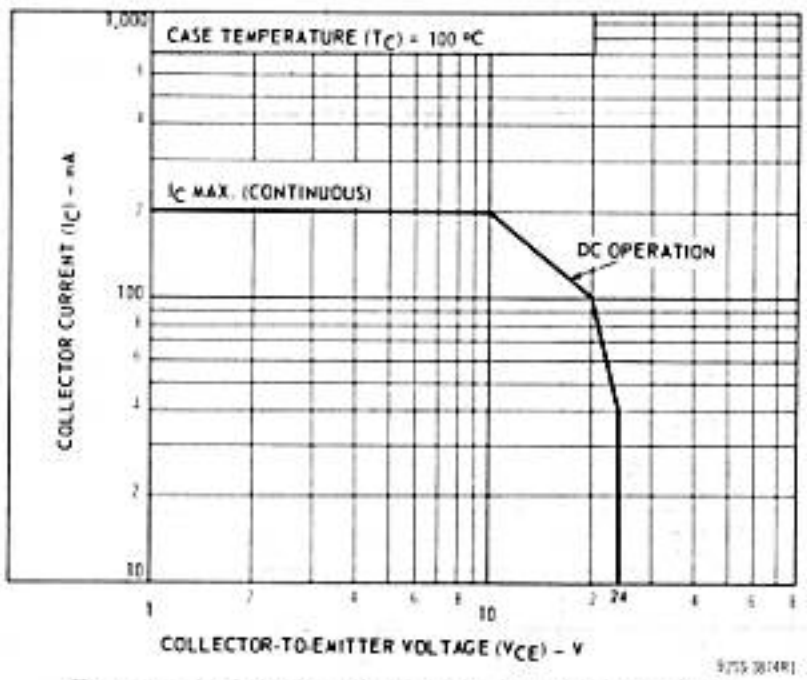


Fig. 5 - Safe operating area, for dc operation (for both types).

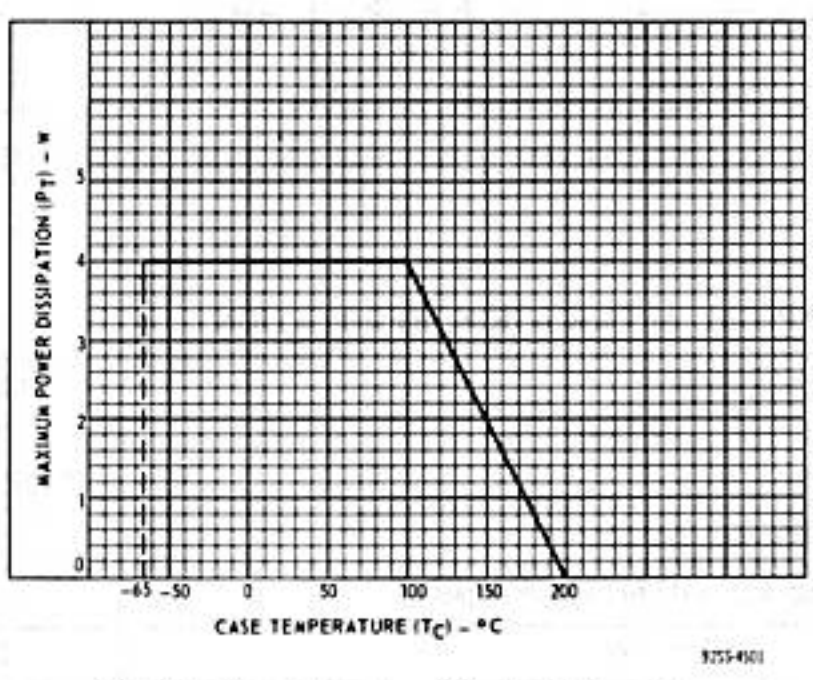


Fig. 6 - Derating curve (for both types).

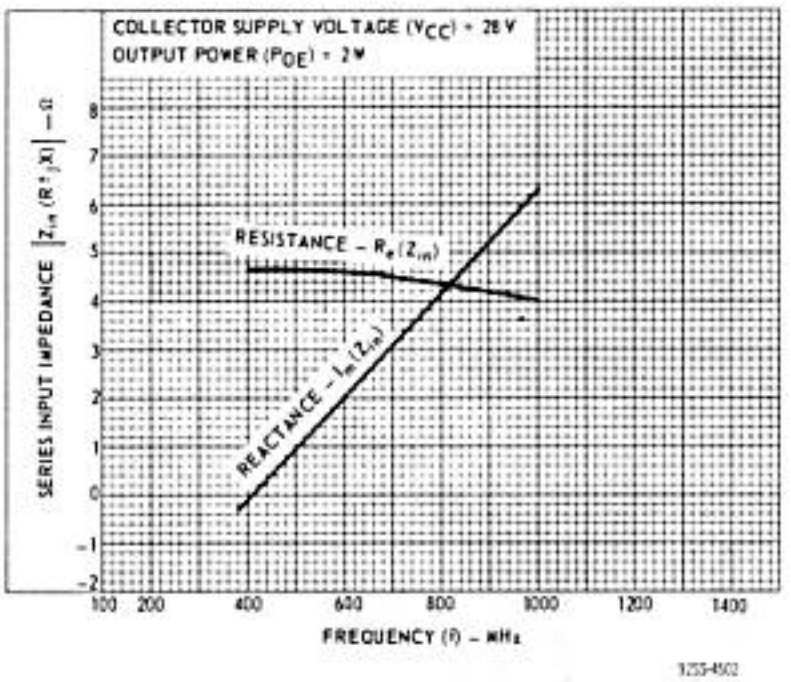


Fig. 7 - Typical large-signal series input impedance vs. frequency (for both types).

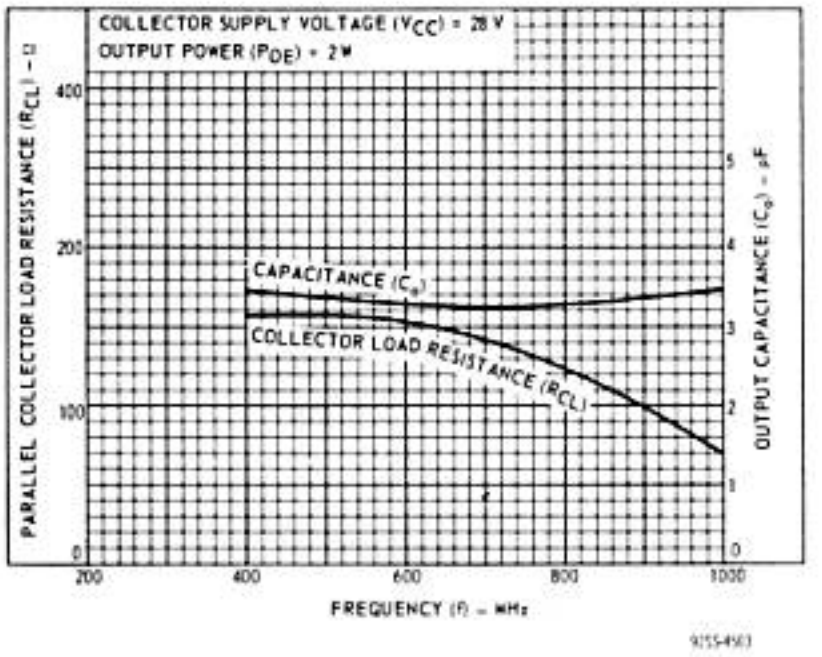


Fig. 8 - Typical large-signal, parallel collector load and parallel output capacitance vs. frequency (for both types).

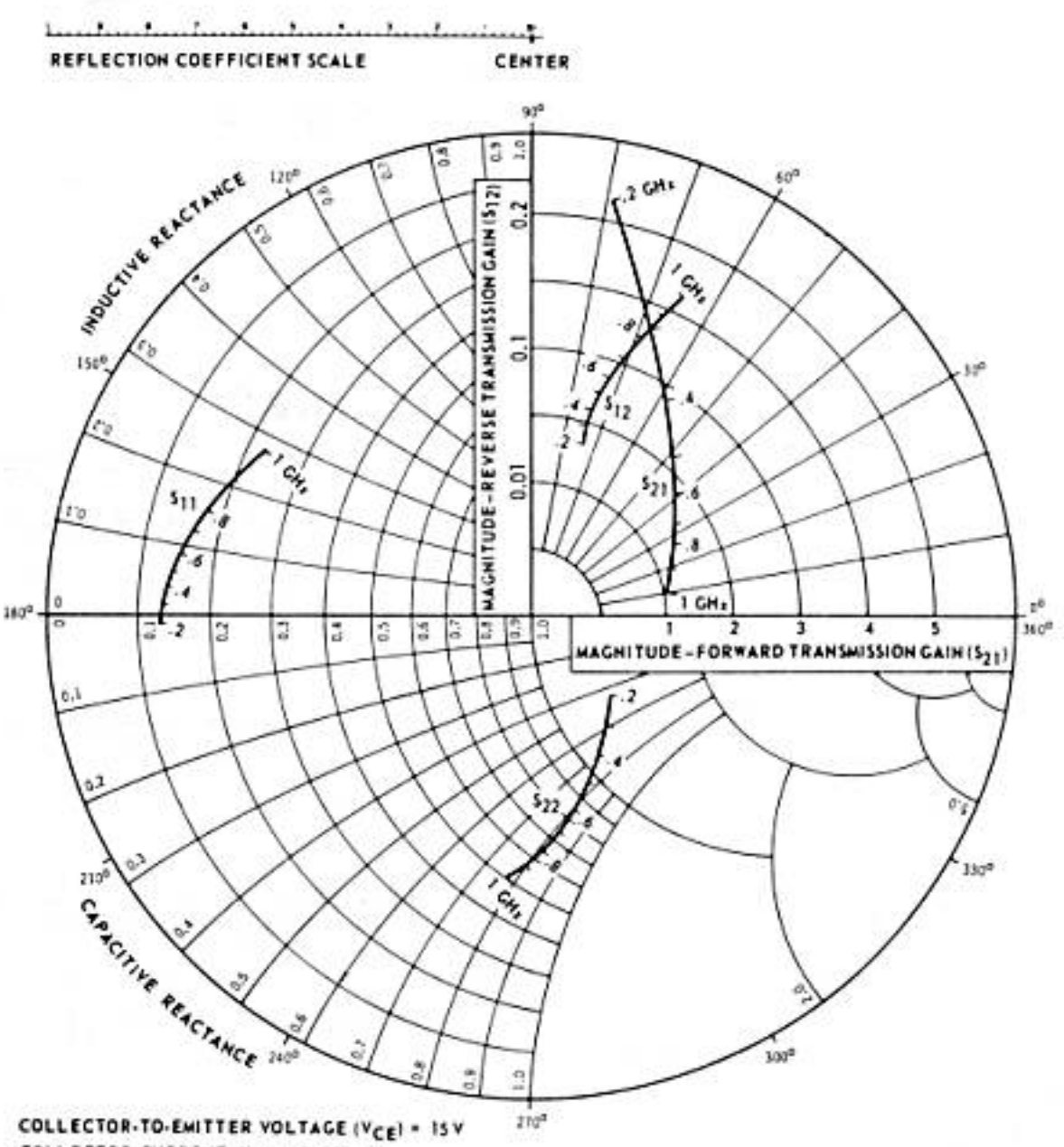
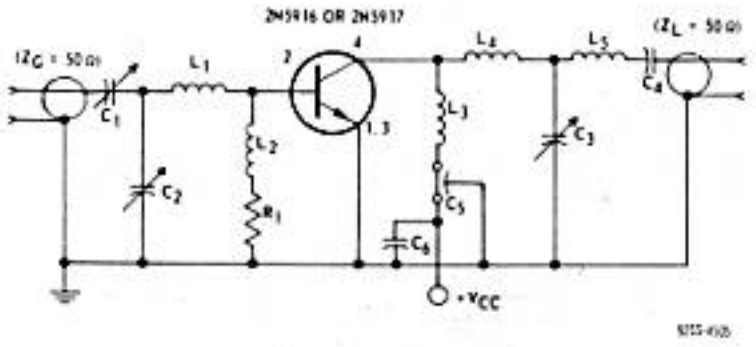


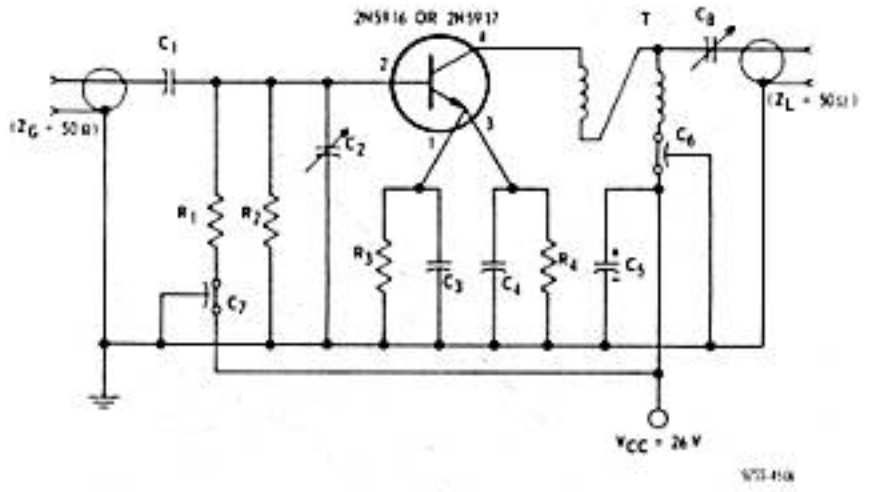
Fig. 9 - Typical S parameters vs. frequency (for both types).



C_1, C_3 – 0.9–7 pF, ARCO 400*
C_2 – 1.5–20 pF, ARCO 402*
C_4 – 0.0015 μF, disc ceramic
C_5 – 1,000 pF, feedthrough type, Allen-Bradley FA5C*
C_6 – 1 μF, electrolytic
L_1, L_5 – 1 turn ▲
L_2 – RFC, .1 μH
L_3 – 3 turns ▲
L_4 – 2 turns ▲
R_1 – 10 Ω, carbon

* Or equivalent
▲ All coils 5/32 in. (3.96 mm) I.D. #18 wire, 12 turns per inch

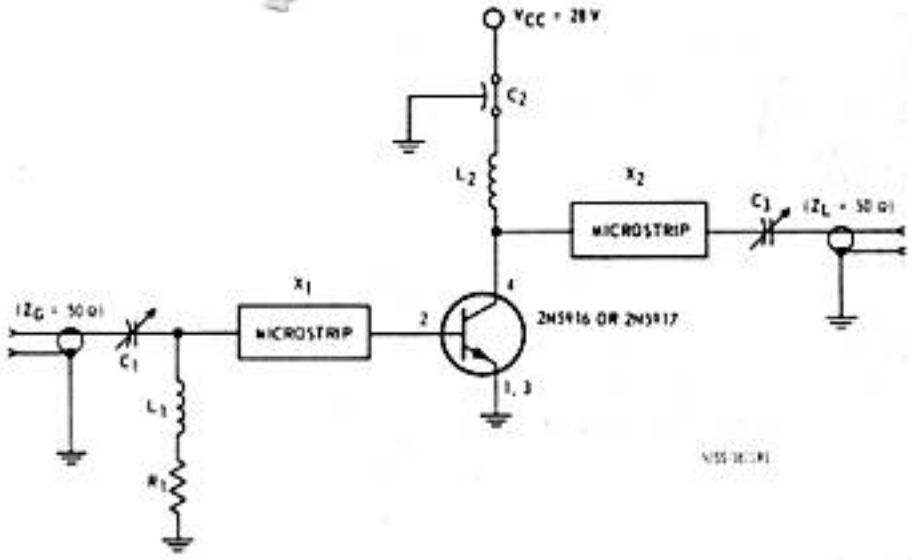
Fig. 10 - 400-MHz amplifier test circuit for measurement of power output.



C_1 – 0.0015 μF, disc ceramic
C_2, C_8 – 2–18 pF, Amperex H.T. 10mA/218, or equivalent
C_3, C_4 – 680 pF, chip cap., Allen-Bradley B166811, or equivalent
C_5 – 1 μF, electrolytic
C_6, C_7 – 1,000 pF, feedthrough type

R_1 – 2 kΩ, ½ W, carbon
R_2 – 500Ω, ½ W, carbon
R_3, R_4 – 250Ω, ½ W, carbon
T – Twisted pair of #22 wire, 10 twists, 1 in. long

Fig. 11 - 50/450 – MHz broadband amplifier using type 2N5916 or 2N5917.



C_1, C_3: 0.35-3.5 pF, Johanson 4701, or equivalent

C_2: 470 pF, feed-through type, Allen Bradley FA5C, or equivalent

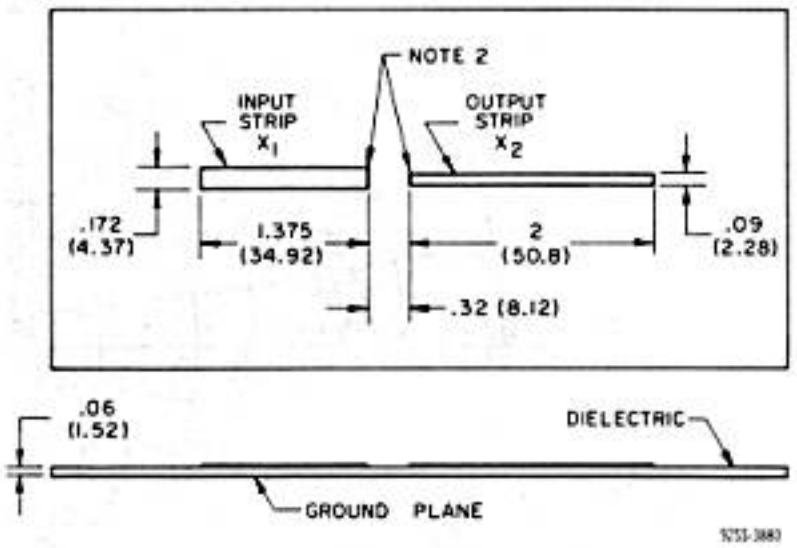
L_1: 3 turns No. 22 wire 5/32 in. (3.96 mm) ID, 3/8 in. (9.52 mm) long

L_2: 1½ turns No. 22 wire 5/32 in. (3.96 mm) ID, 3/8 in. (9.52 mm) long

R_1: 10-Ω, 1/4-W carbon

X_1, X_2: Microstrip details given in Fig. 13

Fig. 12 - 1 – GHz amplifier using type 2N5916 or 2N5917.

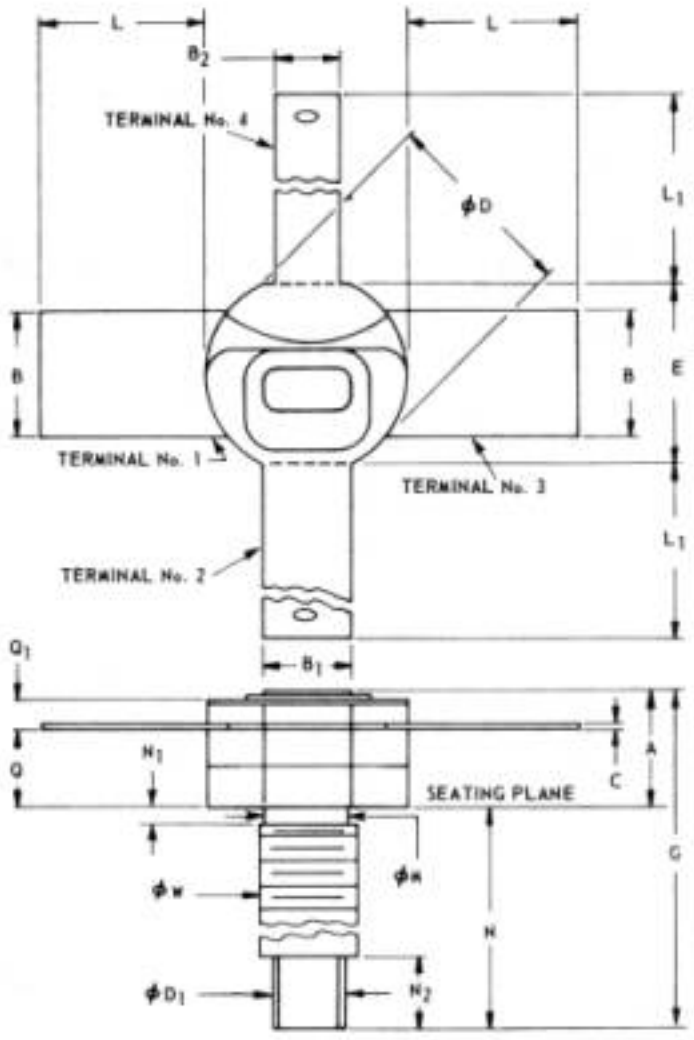


Note 1: Dimensions in parentheses are in millimeters and are derived from the basic inch dimensions as indicated.

Note 2: Produced by removing upper layer of double-clad, Teflon board, Budd Co. Polychem Div. Grade 108T, 1 oz. 1/16 in. (1.52 mm) thick, (ϵ = 2.6), or equivalent.

Fig. 13 - Typical microstrip layout for 1-GHz power amplifier circuit shown in Fig. 12.

DIMENSIONAL OUTLINE TYPE 2N5916



SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	.150	.230	3.81	5.84	–
B	.195	.205	4.96	5.20	–
B_1	.135	.145	3.43	3.68	–
B_2	.095	.105	2.42	2.66	–
C	.004	.010	.11	.25	3
ϕD	.305	.320	7.48	8.12	–
ϕD_1	.110	.130	2.80	3.30	1
E	.275	.300	6.99	7.62	–
G	.590	.705	14.99	17.90	–
L	.265	.290	6.74	7.36	–
L_1	.455	.510	11.56	12.95	–
ϕM	.120	.163	3.05	4.14	–
N	.425	.470	10.80	11.93	–
N_1	–	.078	–	1.98	4
N_2	.110	.150	2.80	3.81	–
Q	.120	.170	3.05	4.31	–
Q_1	.025	.045	.64	1.14	–
ϕW	.1399	.1437	3.531	3.632	2

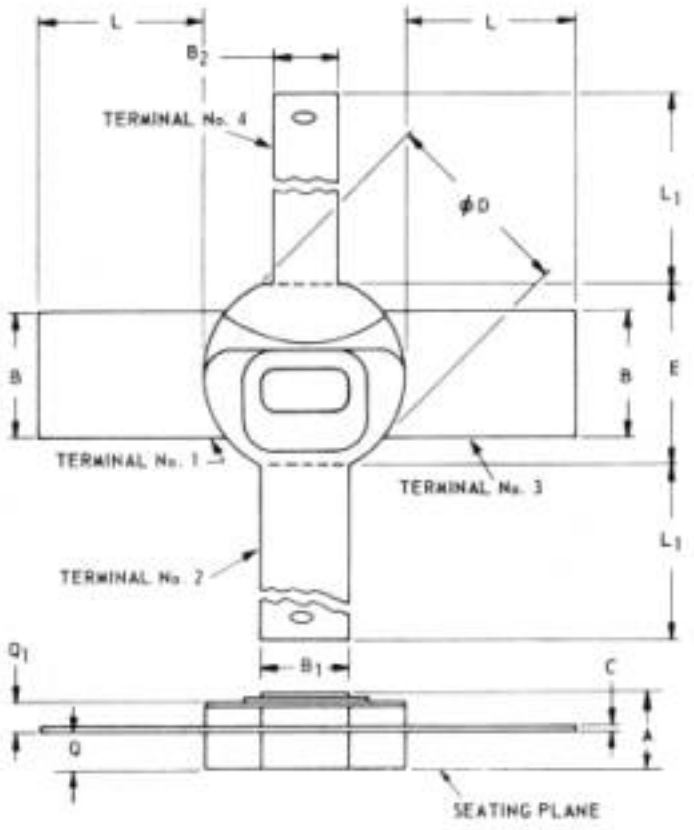
MILLIMETER DIMENSIONS ARE DERIVED FROM ORIGINAL INCH DIMENSIONS.

NOTES:
1. .053 – .064 INCH (1.35 – 1.62 mm) WRENCH FLAT.
2. PITCH DIA. OF 8-32 UNC-2A COATED THREAD. (ASA B1. 1-1960).
3. TYPICAL FOR ALL LEADS
4. LENGTH OF INCOMPLETE OR UNDERCUT THREADS OF ϕ W

TERMINAL CONNECTIONS

Terminals 1,3 – Emitter
Terminal 2 – Base
Terminal 4 – Collector

DIMENSIONAL OUTLINE TYPE 2N5917



SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	.090	.135	2.29	3.42	–
B	.195	.205	4.96	5.20	–
B_1	.135	.145	3.43	3.68	–
B_2	.095	.105	2.42	2.66	–
C	.004	.010	.11	.25	1
ϕD	.305	.320	7.48	8.12	–
E	.275	.300	6.99	7.62	–
L	.265	.290	6.74	7.36	–
L_1	.455	.510	11.56	12.95	–
Q	.055	.070	1.40	1.77	–
Q_1	.025	.045	.64	1.14	–

MILLIMETER DIMENSIONS ARE DERIVED FROM ORIGINAL INCH DIMENSIONS.

NOTE: 1. TYPICAL FOR ALL LEADS

TERMINAL CONNECTIONS

Terminals 1,3 – Emitter
Terminal 2 – Base
Terminal 4 – Collector

"WARNING: RCA types 2N5916 and 2N5917 should be handled with care. The ceramic portion of these transistors contains BERYLLIUM OXIDE as a major ingredient. Do not crush, grind, or abrade these portions of the transistors because the dust resulting from such action may be hazardous if inhaled."