RCA
Solid State
Division

RF Power Transistors

2N5918

10-W, 400-MHz High-Gain Silicon N-P-N Emitter-Ballasted Overlay Transistor

For VHF/UHF Communications Equipment

Features

- 10 W output at 400 MHz (8 dB min. gain)
- Emitter-ballasting resistors
- Broadband performance (225—400 MHz)
- Low-inductance, ceramic-metal hermetic package
- All electrodes isolated from stud
- Radial leads for stripline circuits

MAXIMUM RATINGS, *Absolute-Maximum Values.*

* COLLECTOR-TO-EMITTER VOLTAGE:			
With base open	V_{CEO}	30	V
* COLLECTOR-TO-BASE VOLTAGE	V_{CBO}	60	V
* EMITTER-TO-BASE VOLTAGE	V_{EBO}	4	V
* CONTINUOUS COLLECTOR CURRENT	I_C	0.75	A
* TRANSISTOR DISSIPATION	P_T		
At case temperatures up to 75°C		10	W
At case temperatures above 75°C		Derate linearly at 0.08 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 type 2N5918* is an epitaxial silicon n-p-n planar transistor employing "overlay" emitter-electrode construction. This device features emitter-ballasting resistors which improve ruggedness and overdrive capability, and a hermetic ceramic-metal package with terminals isolated from the mounting stud. The terminals are rugged, low-inductance, radial leads suitable for microstrip as well as lumped-constant circuits.

The 2N5918 is intended for use in large-signal, high-power, broadband and narrow-band amplifiers in vhf/uhf communications equipment.

* Formerly RCA Dev. Type No. TA7367.

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	0				–	5	mA
* Collector-to-Emitter Breakdown Voltage:	$V_{(BR)CES}$		0			100[a]	60	–	V
With base open	$V_{(BR)CEO}$					100[a]	30	–	V
* Emitter-to-Base Breakdown Voltage	$V_{(BR)EBO}$			1		0	4	–	V
Thermal Resistance: (Junction-t o-Case)	$\theta_{J\text{-}C}$						–	12.5	°C/W

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

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		1.59	400	10	–	W
* Power Gain	G_{PE}	28	10		400	8	–	dB
* Collector Efficiency	η_C	28	10		400	60	–	%
* Collector-to-Base Output Capacitance	C_{obo}	30(V_{CB})			1	–	13	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	10.0	1.35	75	10
225/400–MHz Broadband Amplifier	10.0	1.25–1.55	63–81	11

PERFORMANCE DATA

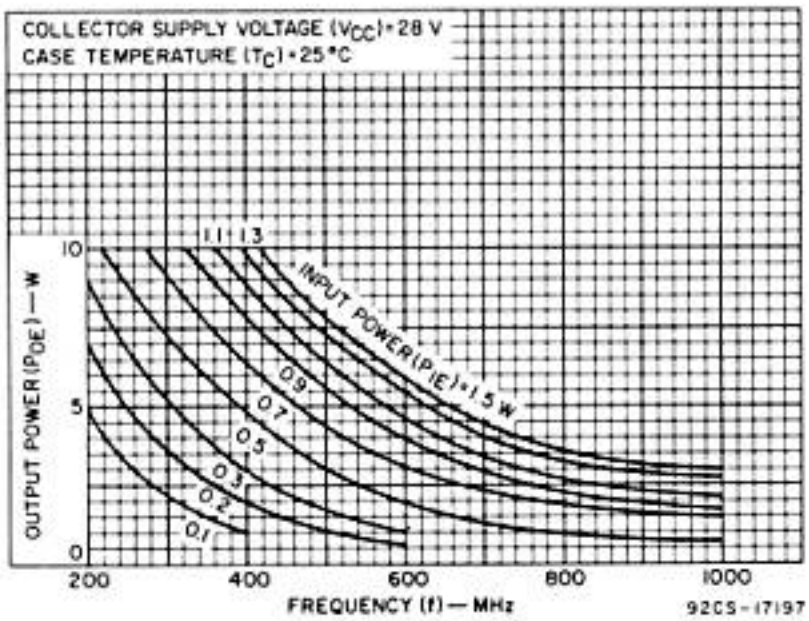


Fig. 1 - Typical output power vs. frequency.

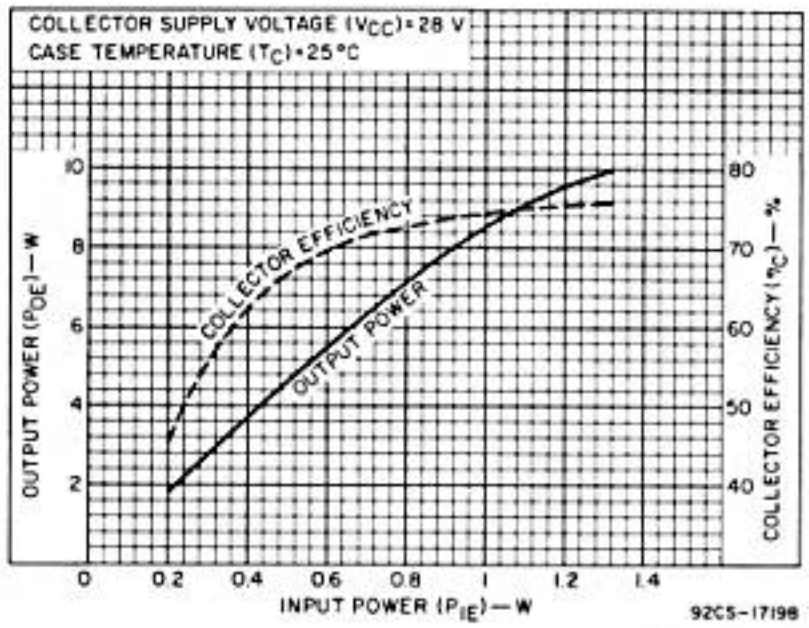


Fig. 2 - Typical output power or collector efficiency vs. input power at 400 MHz.

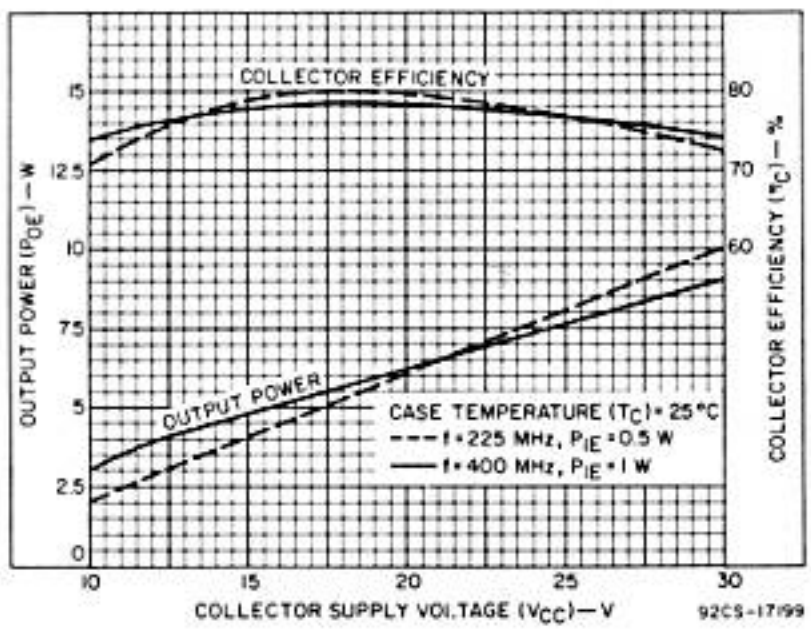


Fig. 3 - Typical output power or collector efficiency vs. collector supply voltage.

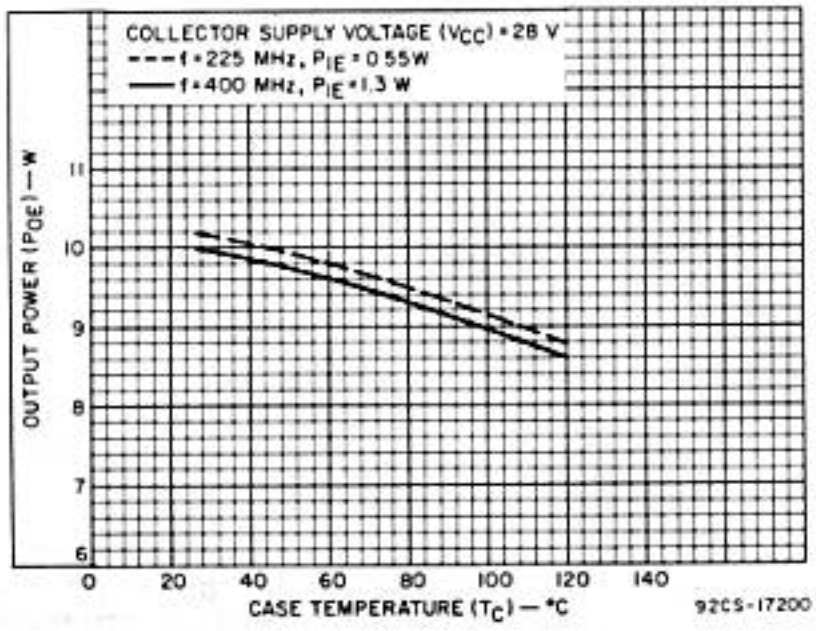


Fig. 4 - Typical output power vs. case temperature.

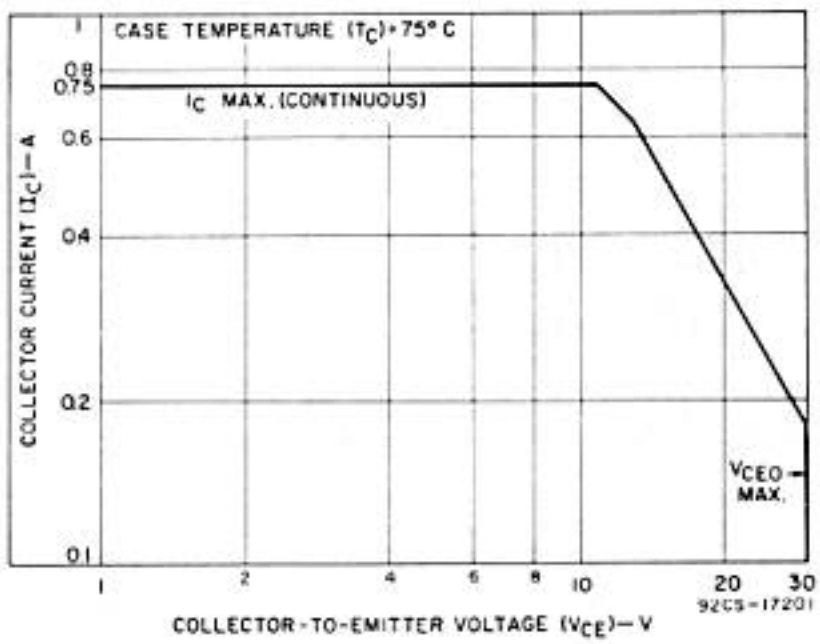


Fig. 5 - Maximum operating area for dc operation.

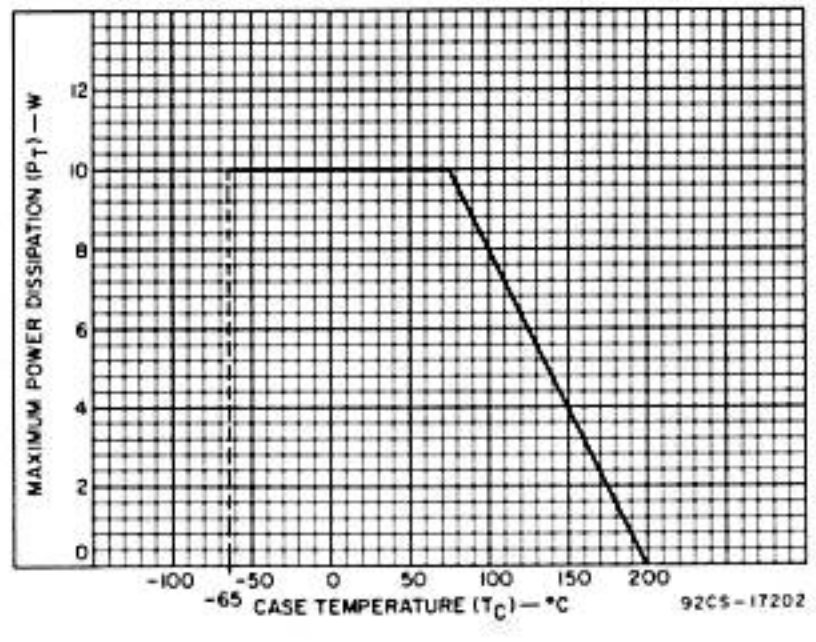


Fig. 6 - Dissipation derating curve for rf class-C operation.

DESIGN DATA

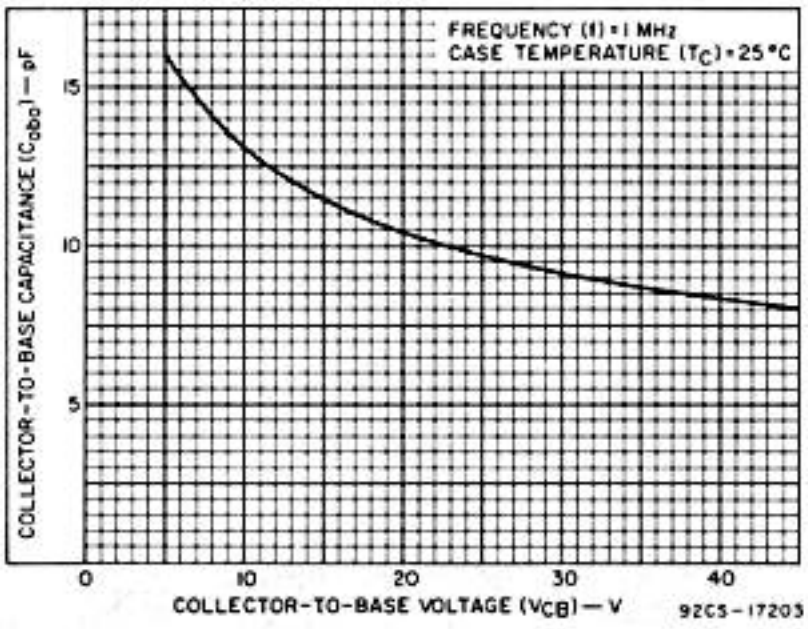


Fig. 7 - Typical variation of collector-to-base capacitance.

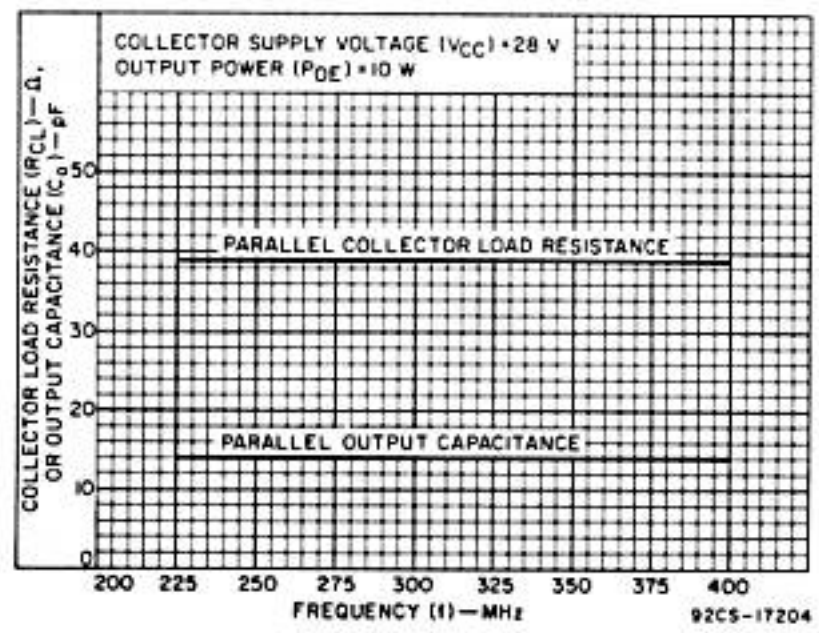


Fig. 8 - Typical large-signal parallel collector load and parallel output capacitance vs. frequency.

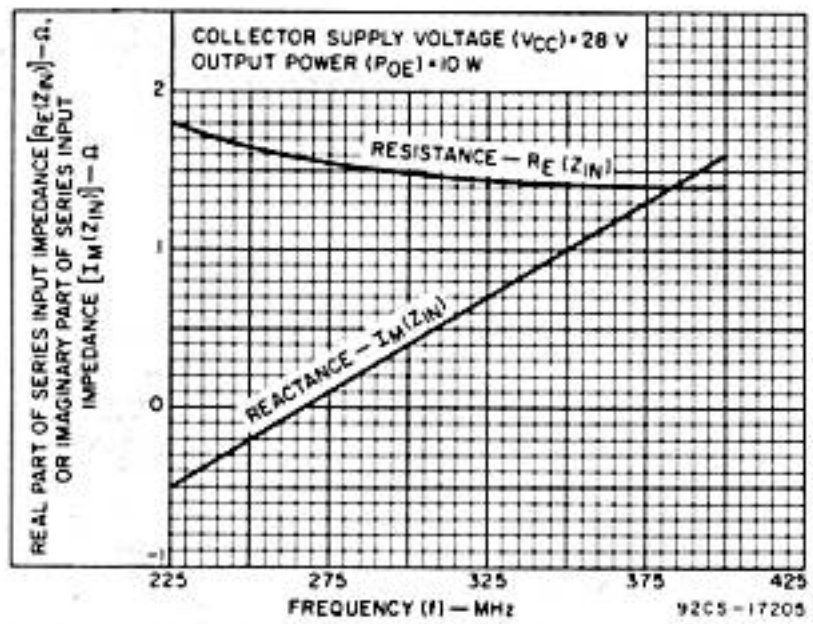
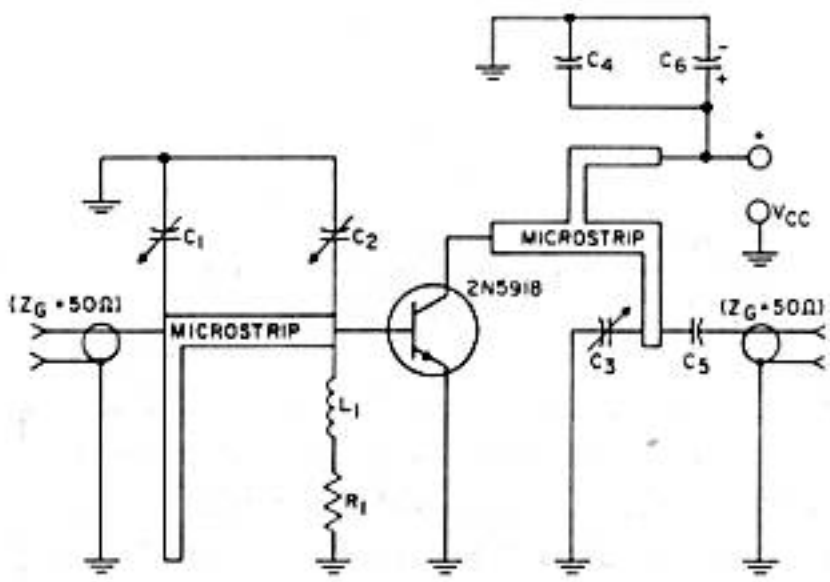
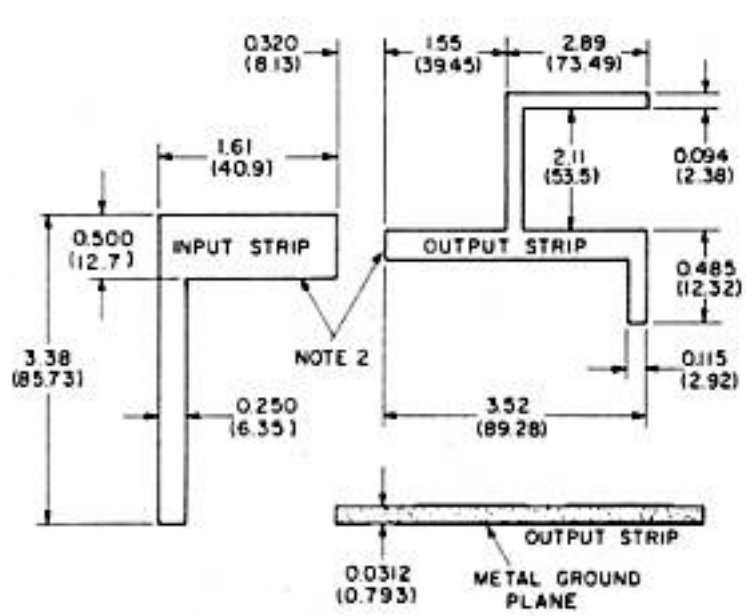


Fig. 9 - Typical large-signal series input impedance $[R_e(Z_{in}) + j\ I_m(Z_{in})]$ vs. frequency.



C_1, C_2, C_3: 12-18pF, AMPEREX HTIOMA/218, OR EQUIVALENT
C_4, C_5: 1000pF, ATC-100, OR EQUIVALENT
C_6: 10μF, ELECTROLYTIC
L_1: 0.12μH RF CHOKE
R_1: 51Ω, 1/2 W CARBON



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: PRODUCED BY REMOVING UPPER LAYER OF DOUBLE-CLAD TEFLON BOARD, 1/32 IN. THICK, (ϵ = 2.6).

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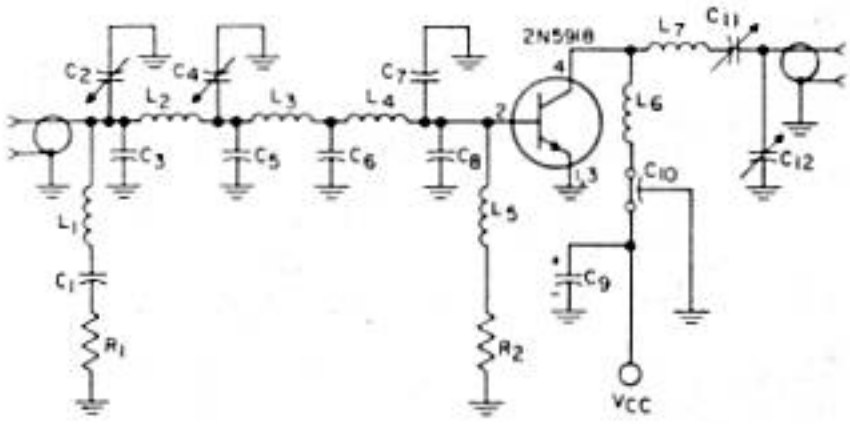
Fig. 10 - 400-MHz amplifier test circuit for measurement of power output.



C_1 - 3 pF, ATC-100*
C_2 - 0.8-10 pF, JOHANSON 3957*
C_3 - 5 pF SILVER MICA
C_4 - 2-18 pF, AMPEREX HTIOMA/218*
C_5 - 24 pF, SILVER MICA
C_6 - 51 pF, ATC-100*
C_7 - 47 pF, ATC-100*
C_8 - 68 pF, ATC-100*
C_9 - 1 μF, ELECTROLYTIC
C_{10} - 1000 pF, FEEDTHROUGH TYPE, ALLEN-BRADLEY FASC*
C_{12} - 15-20 pF, ARCO 402*
C_{11} - 0.9-7 pF, ARCO 400*

L_1 - 0.12 μH RFC, NYTRONICS, P No DD-0.18*
L_2 - No 18 WIRE, 0.64 IN. LONG
L_3 - COPPER STRIP 5 MILS THICK, 150 MILS W, 670 MILS L
L_4 - TRANSISTOR BASE LEAD, 0.16 IN. LONG
L_5 - 0.1 μH RFC, NYTRONICS, P. No. DD-0.10*
L_6 - No 18 WIRE, 1.08 IN. LONG
L_7 - 2 TURNS, 5/32 IN. I.D. No 18 WIRE, 12 TURNS PER IN
R_1 - 100 Ω, 1/2 W, CARBON
R_2 - 51 Ω, 1/4 W, CARBON

*OR EQUIVALENT

92CS-17207

Fig. 11 - 225/400-MHz broadband amplifier using 2N5918.

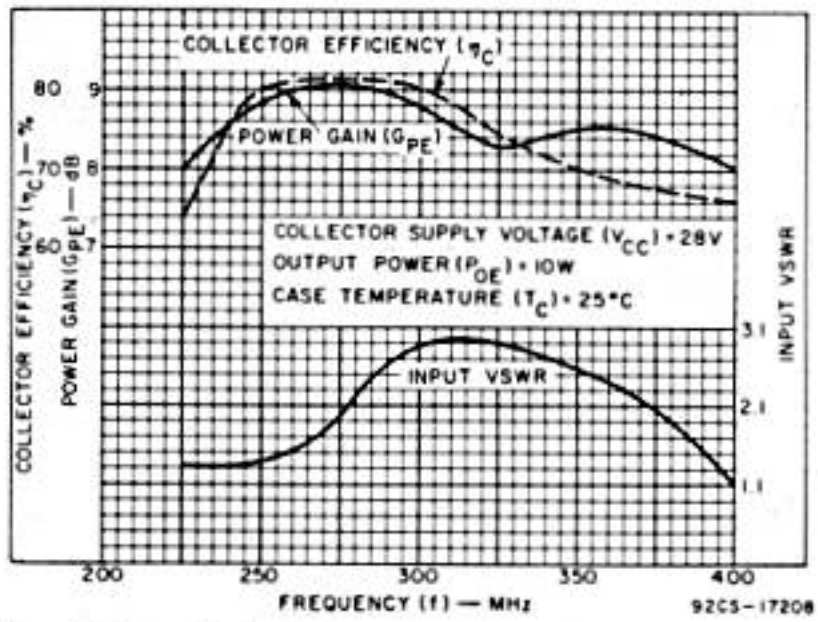
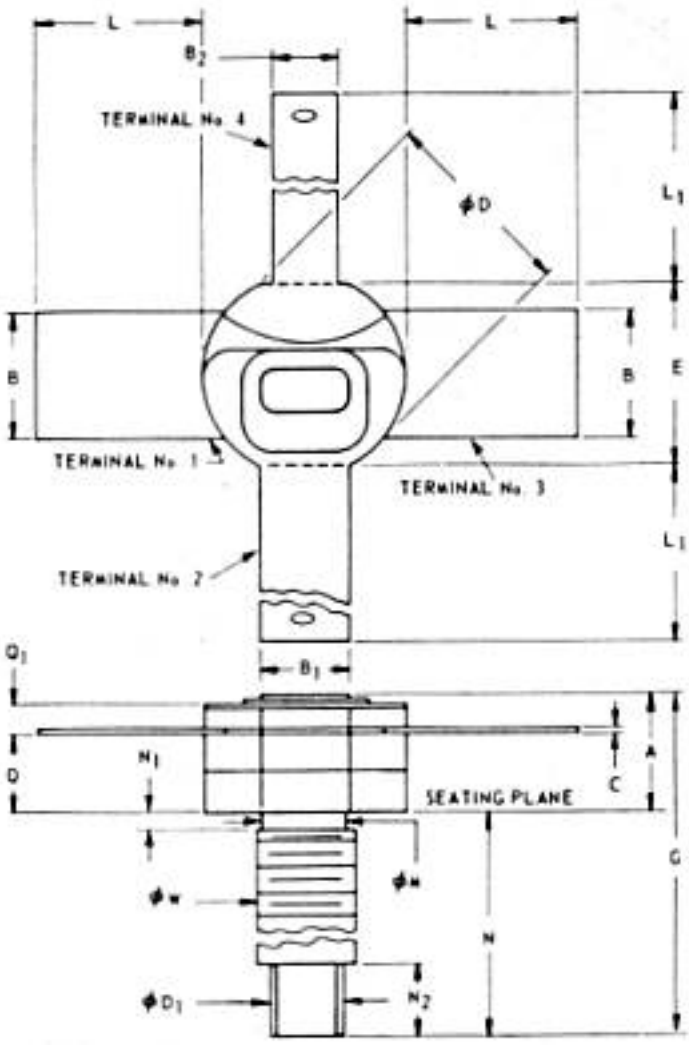


Fig. 12 - Typical broadband performance of the 225/400-MHz amplifier circuit shown in Fig. 11.

DIMENSIONAL OUTLINE



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	-
ϕw	.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 ϕw

92SS-11631

TERMINAL CONNECTIONS

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

WARNING: RCA Type 2N5918 should be handled with care. The ceramic portion of this transistor contains BERYLLIUM OXIDE as a major ingredient. Do not crush, grind, or abrade these portions of the transistor because of dust resulting from such action may be hazardous if inhaled.