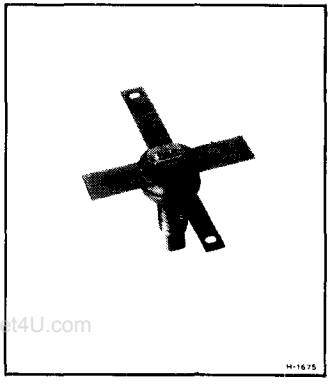
RCA
Solid State
Division

RF Power Transistors

2N5914 2N5915



High-Power Silicon N-P-N Overlay Transistors

12.5-Volt, High-Power Types For Class-C Amplifiers in VHF/UHF Communications Equipment

Features:

- Low inductance radial leads – particularly useful for strip-line circuits
- Hermetically sealed ceramic-metal package
- Electrically isolated mounting stud
- 6 watts minimum output from 2N5915 amplifier at 470 MHz
- 7-dB gain from 2N5914 driver at 470 MHz

MAXIMUM RATINGS, *Absolute-Maximum Values:*

	2N5914	2N5915	
● COLLECTOR-TO-BASE BREAKDOWN VOLTAGE . . . . . $V_{(BR)CBO}$	36	36	V
● COLLECTOR-TO-EMITTER BREAKDOWN VOLTAGE:			
With base connected to emitter $V_{(BR)CES}$	36	36	V
With base open . . . . . $V_{(BR)CEO}$	14	14	V
● EMITTER-TO-BASE VOLTAGE V_{EBO}	3.5	3.5	V
● COLLECTOR CURRENT:			
Continuous. . . . . I_C	0.5	1.5	A
● TRANSISTOR DISSIPATION: . . . P_T			
At case temperatures up to 75°C	5.7	10.7	W
At case temperatures above 75°C	See Fig. 7		
● 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 2N5914[a] and 2N5915[b] are epitaxial silicon n-p-n planar transistors featuring overlay emitter electrode construction.

2N5914 and 2N5915 feature an hermetic, ceramic-metal package having leads isolated from the mounting stud. These rugged, low-inductance, radial-lead types are designed for strip-line, as well as lumped-constant circuits.

[a]Formerly RCA Dev. Type TA7408.
[b]Formerly RCA Dev. Type TA7409.

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

Static

CHARACTERISTIC	SYMBOL	TEST CONDITIONS					LIMITS				UNITS
		DC COLLECTOR VOLTS	DC BASE VOLTS	DC CURRENT mA			2N5914		2N5915		
		V_{CE}	V_{BE}	I_E	I_B	I_C	MIN.	MAX.	MIN.	MAX.	
• Collector-Cutoff Current	I_{CEO}	10			0		–	0.3	–	1.0	mA
• Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$			0		0.5	36	–	–	–	V
						1.0	–	–	36	–	
• Collector-to-Emitter Breakdown voltage: With base open	$V_{(BR)CEO}$			0		25[a]	14	–	–	–	V
						75[a]	–	–	14	–	
With base connected to emitter	$V_{(BR)CES}$		0			25[a]	36	–	–	–	
						75[a]	–	–	36	–	
• Emitter-to-Base Breakdown Voltage	$V_{(BR)EBO}$			0.5		0	3.5	–	–	–	V
				1.0		0	–	–	3.5	–	

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

Dynamic

CHARACTERISTIC	SYMBOL	TEST CONDITIONS				LIMITS				UNITS
		DC Collector Supply (V_{CC}) – Volts		Input Power (P_{IE}) – Watts	Frequency (f) – MHz	2N5914		2N5915		
						MIN.	TYP.	MIN.	TYP.	
• Power Output	P_{OE}	12.5		0.4	470	2.0		–		W
				2.0		–		6		
• Power Gain	G_{PE}	12.5		0.4	470	7		–		dB
				2.0		–		4.8		
• Collector Efficiency	η_C	12.5		0.4	470	65		–		%
				2.0		–		65		
Load Mismatch (Fig. 14)	LM	12.5		2N5914 0.4 2N5915 2	470	GO/NO GO				
• Collector-to-Base Capacitance	C_{obo}	12 $I_C = 0$			1	–	15 (max.)	–	30 (max.)	pF
Gain-Bandwidth Product	f_T	12	I_C = 200 mA				900	–		MHz
			I_C = 300 mA			–			800	

• In accordance with JEDEC registration data fromat JS-6 RDF-3/JS-9 RDF-7

Typical Application Information

Application	Output Power (P_{OE}) W	Input Power (P_{IE}) W	Collector Efficiency (η_C) %	Circuit (Fig.)
470 MHz Amplifier				
2N5915	6.5	2	70	13
2N5914	2.3	0.4	70	13
175 MHz Amplifier				
2N5915	9	1	70	15
2N5914	4	0.25	70	15
470MHz Amplifier	6	0.4	–	16

PERFORMANCE DATA

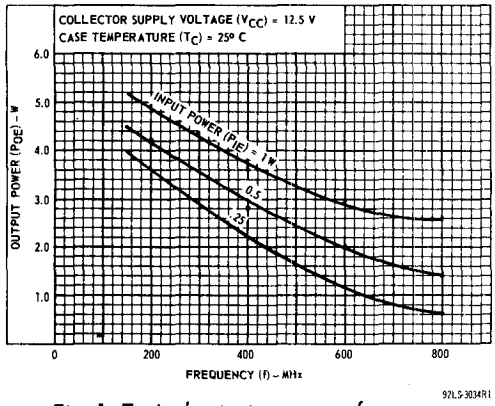


Fig. 1 - Typical output power vs. frequency for 2N5914

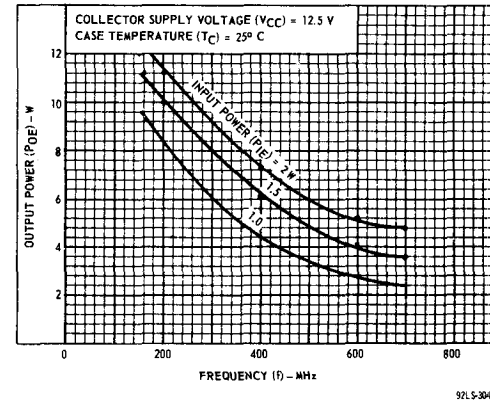


Fig. 2 - Typical output power vs. frequency for 2N5915

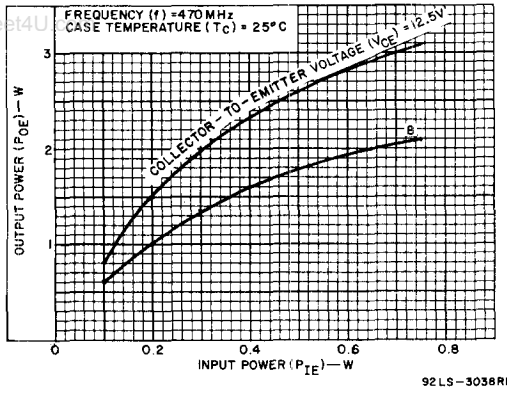


Fig. 3 - Typical output power vs. input power at 470 MHz for 2N5914 in circuit shown in Fig. 8

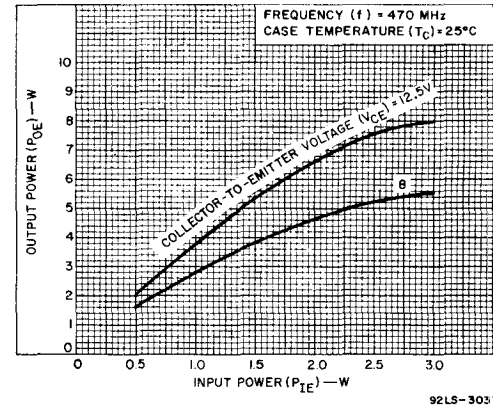


Fig. 4 - Typical output power vs. input power at 470 MHz for 2N5915 in circuit shown in Fig. 8

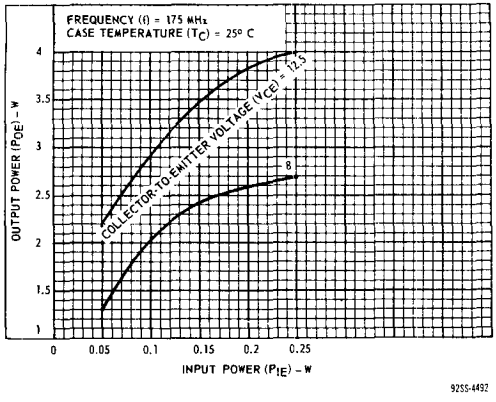


Fig. 5 - Typical output power vs. input power at 175 MHz for 2N5914 (Fig. 15)

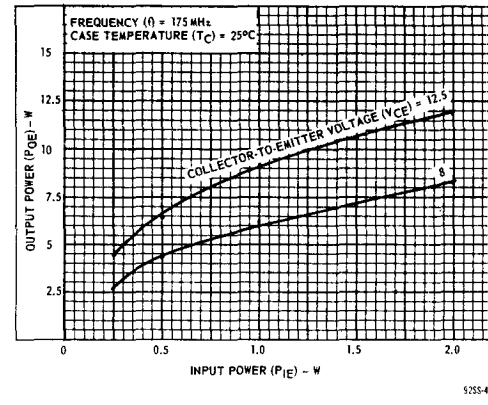


Fig. 6 - Typical output power vs. input power at 175 MHz for 2N5915 (Fig. 15)

DESIGN DATA

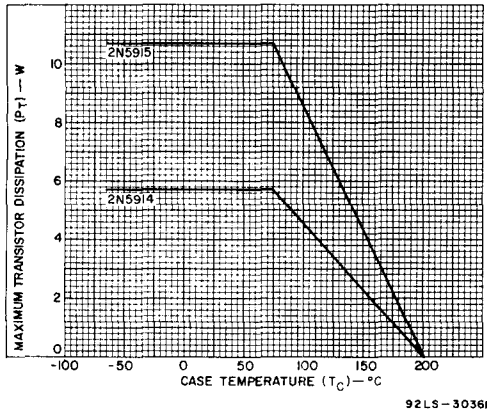


Fig. 7 - Dissipation derating for 2N5914 and 2N5915

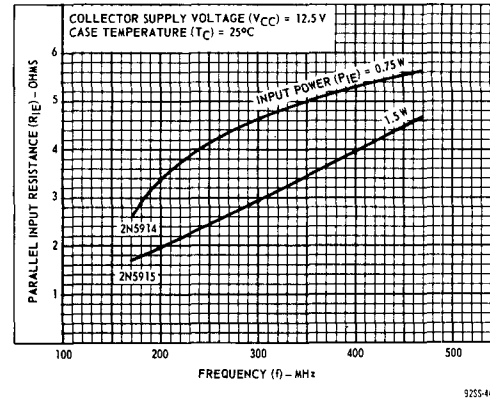


Fig. 8 - Large signal equivalent parallel input resistance vs. frequency for 2N5914 and 2N5915

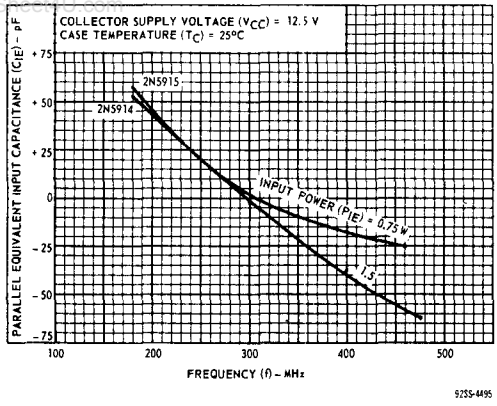


Fig. 9 - Large signal parallel equivalent input capacitance vs. frequency for 2N5914 and 2N5915

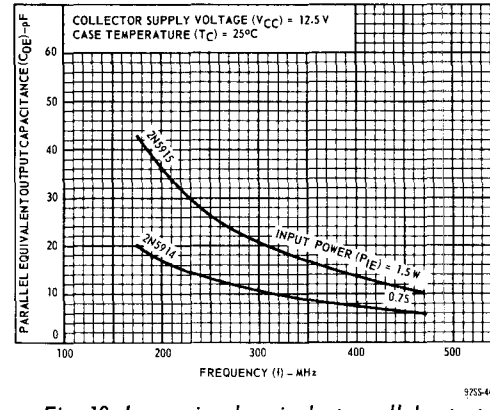


Fig. 10 - Large signal equivalent parallel output capacitance vs. frequency for 2N5914 and 2N5915

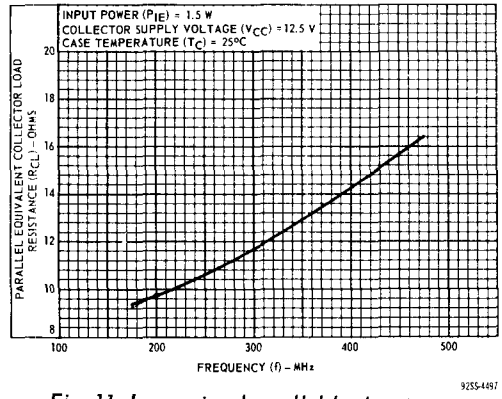


Fig. 11 - Large signal parallel load resistance vs. frequency for 2N5915

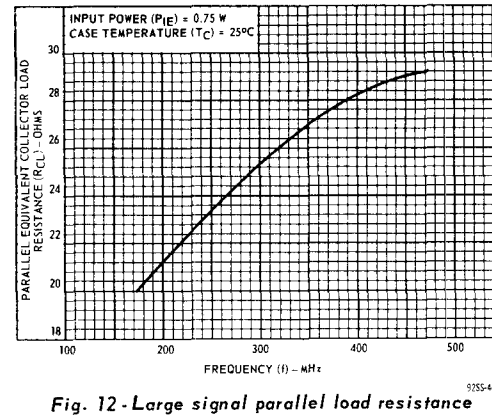
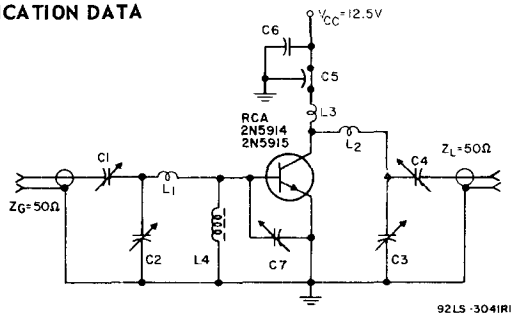


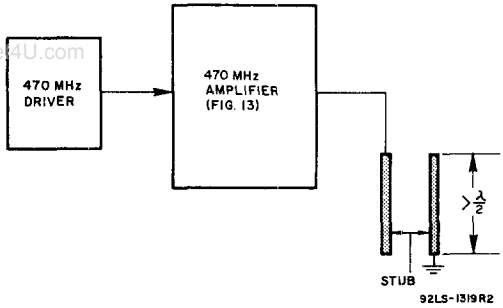
Fig. 12 - Large signal parallel load resistance vs. frequency for 2N5914

APPLICATION DATA



C_1, C_2, C_3 - 0.9-7.0 pF, ARCO # 400, or equivalent
C_4 - 1.5-20. pF, ARCO # 402, or equivalent
C_5 - 1000 pF (feed-through)
C_6 - 0.1 μF (ceramic)
C_7 - 2-18 pF, Amperex HT10MA/218, or equivalent connect between the base and emitter with the shortest possible leads.
L_1, L_2 - 1 turn # 16 wire, 3/16 in. I.D., 1/8 in. long
L_3 - 1 turn # 20 wire, 3/16 in. I.D., 1/8 in. long
L_4 - Ferrite choke, 450Ω impedance, Ferroxcube VK-200-09-3B, or equivalent

Fig. 13. 470 MHz amplifier used for measuring power output and power gain in 2N5914 and 2N5915

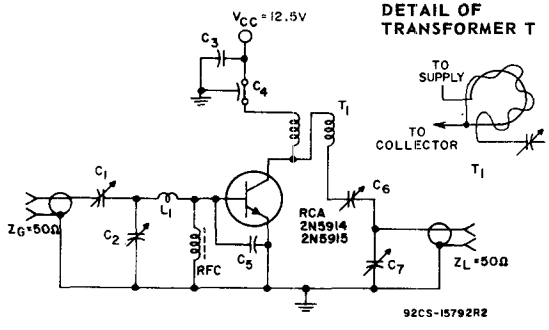


SPECIAL PERFORMANCE DATA

The transistor can withstand any mismatch in load, which can be demonstrated in the following test:

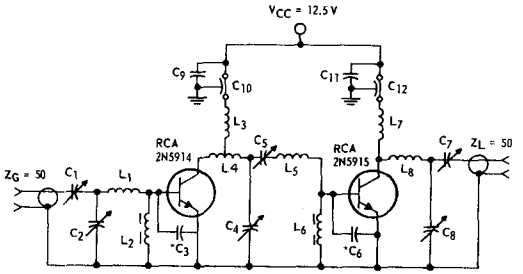
1. The test is performed using the arrangement shown.
2. The tuning stub is varied through a half wavelength, which effectively varies the load from an open circuit to a short circuit.
3. Operating conditions; V_{CC} = 12.5
   RF input power = 0.4 W for 2N5914, 2.0 W for 2N5915
4. Transistor Dissipation Rating must not be exceeded. During the above test, the transistor will not be damaged or degraded.

Fig. 14 - Test set-up for testing load mismatch capability of 2N5914 and 2N5915



L_1 - 1/2 turn # 14 wire, 1/4-in. I.D.
RFC - Z = 450Ω, Ferroxcube VK-200-09/3B, or equivalent
C_1 - 7-100 pF, Arco 423, or equivalent
C_2 - 4-40 pF, Arco 422, or equivalent
C_3 - 0.1 μF ceramic
C_4 - 0.001 μF feedthrough
C_5 - 62 pF silver mica
C_6 - 14-150 pF, Arco 424, or equivalent
C_7 - 24-200 pF, Arco 425, or equivalent
T_1 - Twisted pair of # 20 enameled wire; 14 turns/in. Formed in a loop 3/8 in. diameter, cross connected (End of one winding connected to beginning of other)

Fig. 15 - 175-MHz amplifier for measuring power output and power gain in 2N5914 and 2N5915



C_1, C_2, C_4, C_5, C_7, C_8 0.9 – 7.0 pF

C_3, C_6 18 pF

C_9, C_{11} 0.1 μF

C_{10}, C_{12} .001 μF

L_1 1 TURN NO. 16 WIRE 3/16 IN. I.D. 1/8 IN LONG

L_2, L_6 FERRITE CHOKE Z = 450 Ω FERROX CUBE VK-200-09-3B OR EQUIV.

L_3, L_7 1 TURN NO. 20 WIRE 3/16 IN. I.D. 1/8 LONG

L_4 1 TURN NO. 18 WIRE 1/4 IN. I.D., 1/8 IN. LONG TAP AT 1/4 TURN FROM COLLECTOR

L_5 1 TURN NO. 20 WIRE 1/8 IN. I.D., 1/8 IN LONG

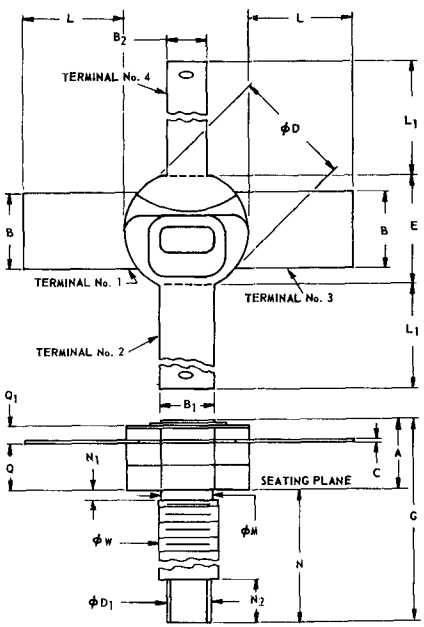
L_8 1 TURN NO. 18 WIRE 1/4 IN. I.D. 1/8 IN. LONG

*CONNECT C_3 AND C_6 BETWEEN THE BASE AND EMITTER

92SM-4499

Fig. 16 - Typical 470 MHz amplifier with 0.4 W input and 6.0 W output

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	–
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 ϕW

92SS-3763R3

TERMINAL CONNECTIONS

Terminal No. 1, 3 – Emitter
Terminal No. 2 – Base
Terminal Nol 4 – Collector