RCA Solid State Division

RF Power Transistors

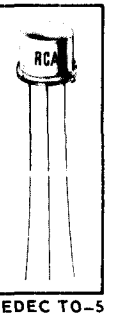
2N3118

RCA-2N3118 is a triple-diffused planar transistor of the silicon n-p-n type intended for use in RF amplifiers in military and industrial HF and VHF communication equipment. It is designed especially for large-signal Class-C and small-signal Class-A service.

Maximum Ratings, *Absolute-Maximum Values:*

Collector-to-Emitter Voltage:		
Reverse bias (V_{CEX})		
For V_{BE} = -1.5 volts	85 max.	volts
With base open (V_{CEO})	60 max.	volts
Emitter-to-Base Voltage (V_{EBO})	4 max.	volts
Collector Current (I_C)	0.5 max.	ampere
Transistor Dissipation (P_T):		
At case temperatures up to 25° C	4 max.	watts
At free-air temperatures up to 25° C	1 max.	watt
At temperatures above 25° C	See *Fig.1*	
Temperature Range:		
Storage	-65 to +200	°C
Operating (Junction)	-65 to +200	°C

For Large-Signal VHF Class-C and Small-Signal VHF Class-A Amplifier Service



JEDEC TO-5

- High power dissipation — 4 watts at case temperature of 25° C
- High output power — Class-C service; 28-volt operation: 1 watt minimum at 50 Mc; 0.4 watt minimum at 150 Mc
- High collector-to-emitter voltage ratings — V_{CEX} = 85 volts; V_{CEO} = 60 volts
- High gain-bandwidth product — 380 Mc typical
- High power gain — Class-A service, neutralized: 25 db at 50 Mc, 200 mw output

ELECTRICAL CHARACTERISTICS

Characteristics	Symbols	TEST CONDITIONS: Case Temperature (T_C) °C	Frequency Mc	DC Collector-to-Base Voltage (volts) V_{CB}	DC Collector-to-Emitter Voltage (volts) V_{CE}	DC Emitter-to-Base Voltage (volts) V_{EB}	DC Collector Current (ma) I_C	DC Emitter Current (ma) I_E	DC Base Current (ma) I_B	LIMITS Min.	LIMITS Max.	Units
Collector-Cutoff Current	I_{CBO}	25(T_{FA})▲ 150(T_{FA})▲		30 30				0 0			0.1 100	μa μa
Emitter-to-Base Breakdown Voltage	BV_{EBO}	25					0	0.1		4		volts
Collector-to-Emitter Breakdown Voltage (Sustaining)	BV_{CEO}(sus)	25					10 pulsed□		0	60		volts
Reverse Collector-to-Emitter Breakdown Voltage	BV_{CEX}	25				1.5	0.1			85		volts
Feedback Capacitance	$C_{b'c}$	25	1	28			0				6	pf
$r_{bb'}$ $C_{b'c}$ Product	$r_{bb'}C_{b'c}$	25	50		28		25				60	psec
DC Forward-Current Transfer Ratio□	h_{FE}	25			28		25			50	275	
Small-Signal Forward-Current Transfer Ratio	h_{fe}	25	50		28		25			5		
Real Part of Short-Circuit Input Impedance	$h_{ie(real)}$	25	50		28		25			25	75	ohms
Real Part of Short-Circuit Output Impedance	$1/Y_{22(real)}$	25	50		28		25			500	1000	ohms
Output Power Class-C Service P_{in} = 0.1 watt (with heat sink)	P_{OUT}	25 25	50* 150♦		28 28					1.0 0.4		watt watt
Power Gain Class-A Service P_{out} = 0.2 watt (with heat sink)	PG	25	50★		28		25			18		db

▲ T_{FA} = free-air temperature □ Pulse duration, 300 μsec; duty factor, less than 1.8% * See *Fig.5* ♦ See *Fig.3* ★ See *Fig.13*

RATING CHART

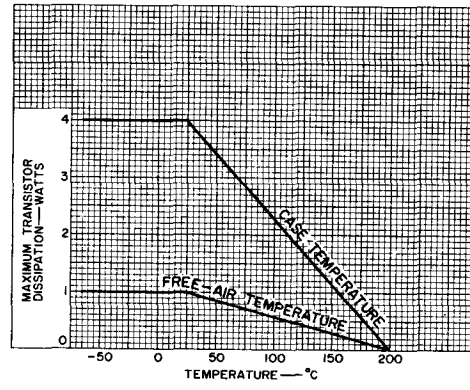


Fig.1

TYPICAL LARGE-SIGNAL OPERATION, CLASS-C SERVICE, 150 MC

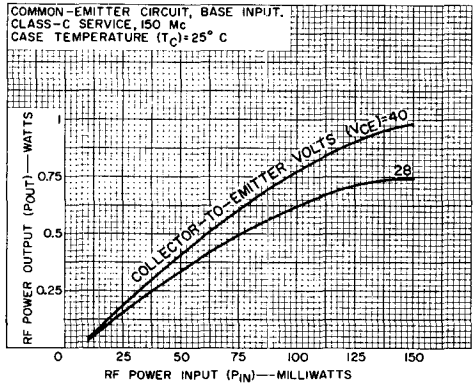
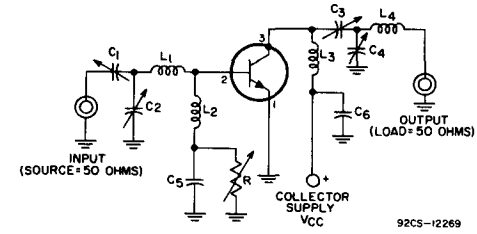


Fig.2



C_1, C_2: 1.5-20 pf
C_3: 4-40 pf
C_4: 7-100 pf
C_5: 1800 pf
C_6: 0.01 μf
R: 100 ohms, variable

L_1: 0.1 μh, 4 turns, No.18 wire, 1/4" ID, closely wound
L_2: 750-ohm ferrite choke
L_3: 0.075 μh, 4 turns, No.16 wire, 1/4" ID x 3/8" long
L_4: 0.055 μh, 3 turns, No.16 wire, 1/4" ID x 1/4" long

Fig.3

TYPICAL LARGE-SIGNAL OPERATION, CLASS-C SERVICE, 50 MC

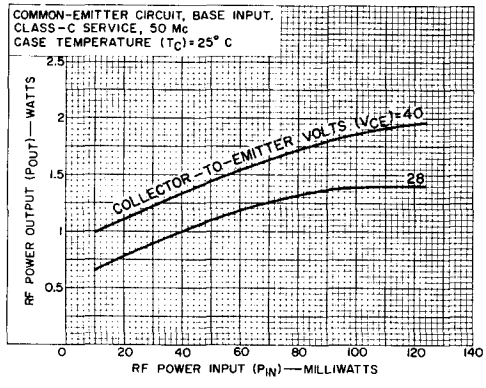
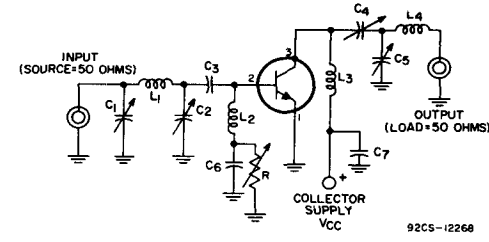


Fig.4



C_1: 70-350 pf
C_2, C_4, C_5: 7-100 pf
C_3: 0.01 μf
C_6: 0.002 μf
C_7: 0.02 μf
R: 1000 ohms, variable

L_1: 0.13 μh, 4 turns, No.18 wire, 1/4" ID, closely wound
L_2: 2.4 μh, choke, Miller Part No.4606
L_3: 0.6 μh, 10 turns, No.18 wire, 3/8" ID, closely wound
L_4: 0.6 μh, 10 turns, No.18 wire, 3/8" ID, closely wound

Fig.5

TYPICAL SMALL-SIGNAL OPERATION CHARACTERISTICS

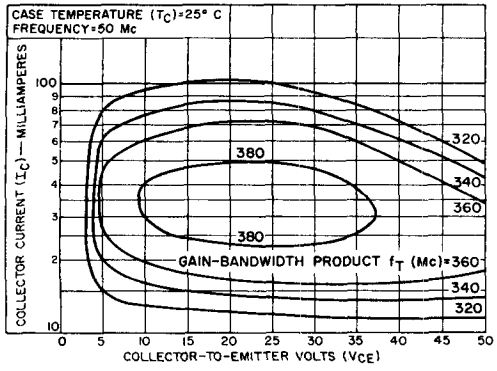


Fig.6

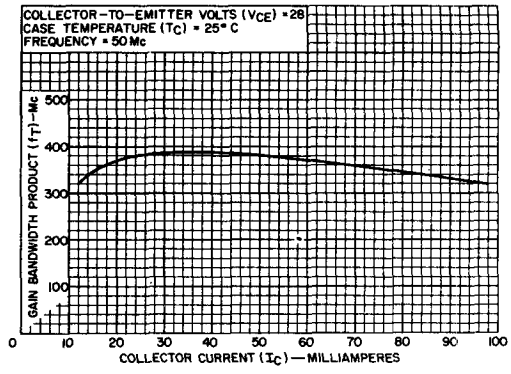


Fig.7

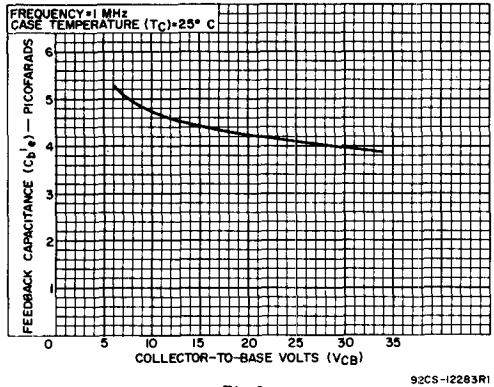


Fig.8

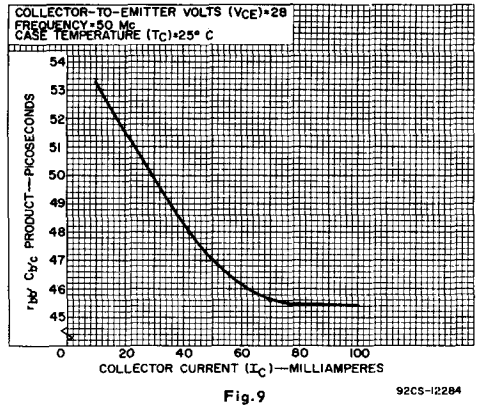


Fig.9

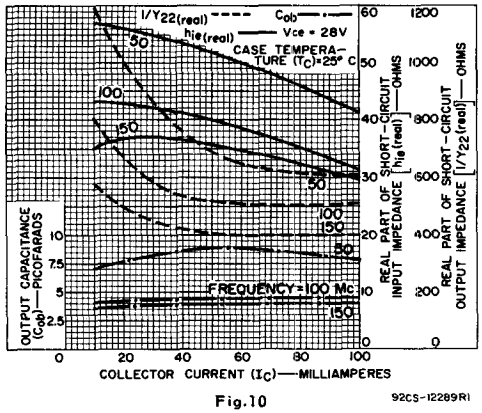


Fig.10

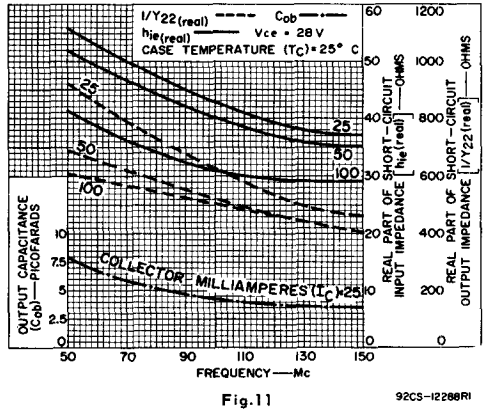


Fig.11

TYPICAL CLASS-A-SERVICE-OPERATION, 50 MC, NEUTRALIZED

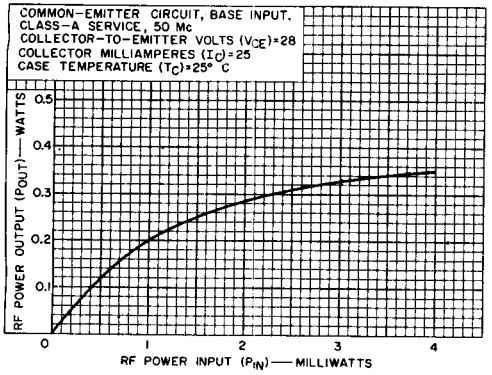
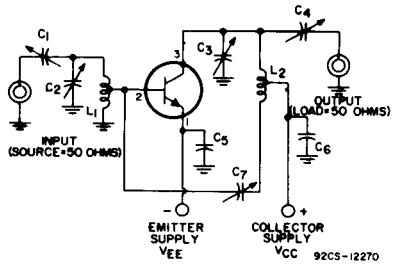


Fig.12



C_1: 7–100 pf
C_2: 8–60 pf
C_3: 14–150 pf
C_4: 6–80 pf
C_5, C_6: 0.005 μf
C_7: 0.9–7 pf

L_1: 0.12 μh, 3 turns, No.16 wire, 7/16" ID x 1/4" long, tap at 1 turn from ground
L_2: 0.23 μh, 5 turns, No.16 wire, 7/16" ID x 1/2" long, tap at 3 turns from collector terminal

Fig.13

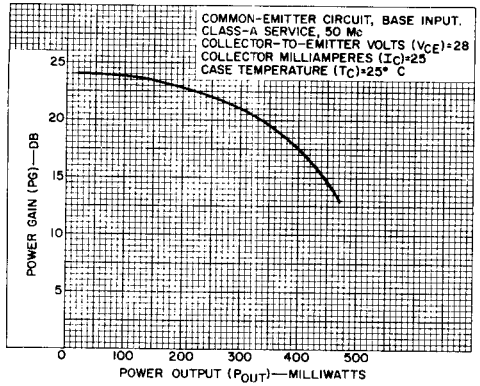


Fig.14

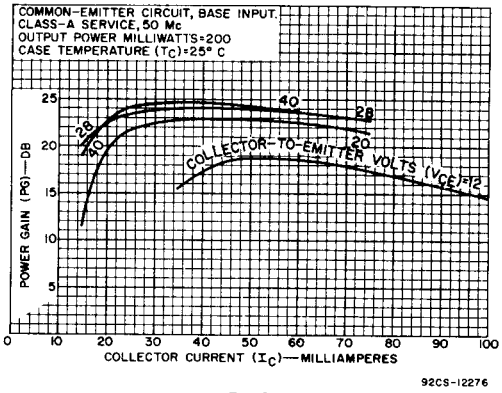
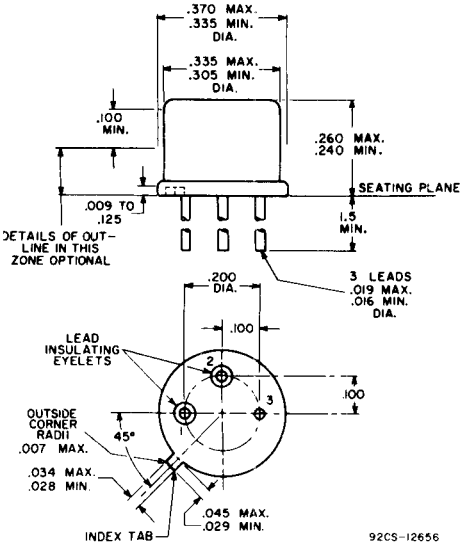


Fig.15

DIMENSIONAL OUTLINE

All Dimensions in Inches
JEDEC No.TO-5



NOTE 1: THIS ZONE IS CONTROLLED FOR AUTOMATIC HANDLING. THE VARIATION IN ACTUAL DIAMETER WITHIN THE ZONE SHALL NOT EXCEED 0.010.

NOTE 2: THE SPECIFIED LEAD DIAMETER APPLIES IN THE ZONE BETWEEN 0.050 AND 0.250 FROM THE SEATING PLANE. BETWEEN 0.250 AND 1.5 A MAXIMUM OF 0.021 DIAMETER IS HELD. OUTSIDE OF THESE ZONES THE LEAD DIAMETER IS NOT CONTROLLED.

NOTE 3: MEASURED FROM MAX. DIAMETER OF THE ACTUAL DEVICE.

NOTE 4: LEADS HAVING MAXIMUM DIAMETER (0.019) MEASURED IN GAUGING PLANE 0.054 + 0.001 − 0.000 BELOW THE SEATING PLANE OF THE DEVICE SHALL BE WITHIN 0.007 OF THEIR TRUE LOCATIONS RELATIVE TO A MAXIMUM-WIDTH TAB.

TERMINAL DIAGRAM

LEAD 1 – EMITTER
LEAD 2 – BASE
LEAD 3 – COLLECTOR, CASE