New Jersey Semi-Conductor Products, Inc.

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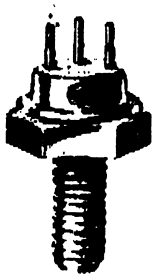
RF POWER TRANSISTORS

2N5090

SILICON N-P-N "overlay" TRANSISTOR

High-Gain Type for Class-A, -B, or -C Operation in VHF/UHF Circuits



JEDEC TO-60

RCA-2N5090* is an epitaxial silicon n-p-n planar transistor employing an advanced version of the RCA-developed overlay emitter-electrode design. It is intended for rf amplifier, frequency-multiplier, and oscillator service in VHF and UHF communications equipment.

This overlay transistor features a structure with many isolated emitter sites connected in parallel by means of a diffused-grid structure and a deposited metal overlay. The overlay design provides a very high emitter periphery-to-emitter area ratio resulting in low output capacitance, high rf-current handling capability, and high power gain.

*Formerly RCA Dev. Type No. TA7146

- Maximum Safe-Area-of-Operation Curve
- 1.2 Watts (Min.) Output at 400 MHz (7.8-dB Gain)
- 1.6 Watts (Typ.) Output at 175 MHz (12-dB Gain)
- Hermetic Stud-Type Package
- All Electrodes Isolated from Stud

MAXIMUM RATINGS, *Absolute-Maximum Values:*

COLLECTOR-TO-BASE VOLTAGE ... V_{CBO}	55	V
COLLECTOR-TO-EMITTER VOLTAGE:		
With external base-to-emitter resistance, R_{BE} = 10 Ω ..... V_{CER}	55	V
With base open ..... V_{CEO}	30	V
EMITTER-TO-BASE VOLTAGE..... V_{EBO}	3.5	V
COLLECTOR CURRENT ..... I_C	0.4	A
TRANSISTOR DISSIPATION ..... P_T		
At case temperatures up to 75° C	5	W
At case temperatures above 75° C	Derate linearly at 0.04 W/°C	
TEMPERATURE RANGE:		
Storage & Operating (Junction)	−65 to +200	°C
LEAD TEMPERATURE (During soldering):		
At distances ≥ 1/32 in. (0.79 mm) from insulating wafer for 10 s max	230	°C

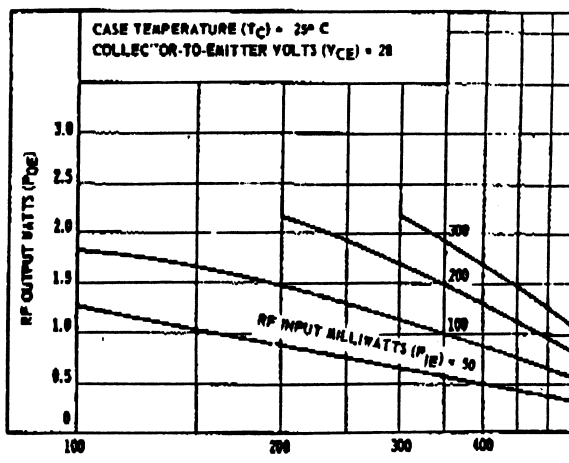


Fig. 1 - Typical Output Power vs. Frequency

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

CHARACTERISTIC	SYMBOL	TEST CONDITIONS					LIMITS		UNITS
		DC COLLECTOR VOLTS		DC CURRENT mA					
		V_{CB}	V_{CE}	I_E	I_B	I_C	Min.	Max.	
Collector-Cutoff Current	I_{CEO}		28		0		-	20	μA
Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$			0		0.1	55	-	V
Collector-to-Emitter Sustaining Voltage: With external base-to-emitter resistance (R_{BE}) = 10 Ω	$V_{CER(sus)}$					5	55[a]	-	V
With base open	$V_{CEO(sus)}$				0	5	30	-	V
Emitter-to-Base Breakdown Voltage	$V_{(BR)EBO}$			0.1		0	3.5	-	V
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$				20	100	-	1.0	V
Collector-to-Base Capacitance (Measured at 1 MHz)	C_{obo}	30		0			-	3.5	pF
RF Power Output: As Class-C Amplifier, Unneutralized At 400 MHz *(See Fig. 2 & 3)*	P_{OE}		28 (V_{CC})				1.2[b]	-	W
Gain-Bandwidth Product	f_T		15			50	500	-	MHz

[a] Pulsed through an inductor (25 mH); duty factor = 0.05.

[b] For P_{IE} = 0.2 W; minimum efficiency = 45%.

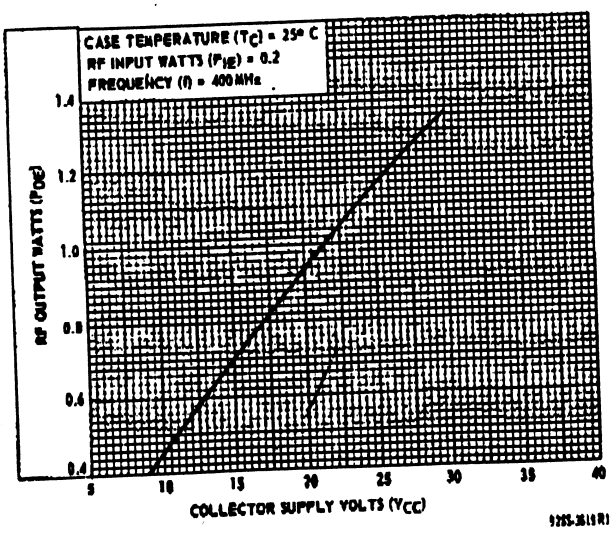
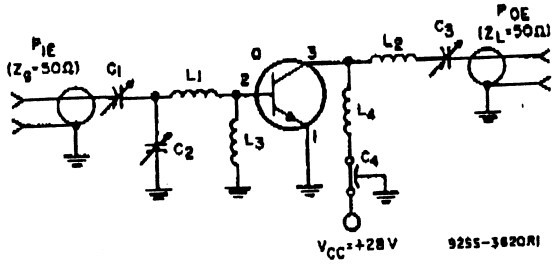


Fig. 2 - Typical Output Power vs. Collector Supply Voltage for Circuit Shown in Fig. 3



C_1: 0.9-7 pF, ARCO 400, or equivalent
C_2, C_3: 1.5-20 pF, ARCO 402, or equivalent
C_4: 1,000 pF, feed through type

L_1: 2 turns No. 18 wire, 1/4 in. ID, 1/8 in. long
L_2: 3 turns No. 16 wire, 1/4 in. ID, 3/8 in. long
L_3: 0.1 μH, rf choke
L_4: 2 turns No. 18 wire, 1/8 in. ID, 1/8 in. long
Q: 2N5090

Fig. 3 - 400-MHz RF Amplifier Test Circuit for Measurement of Output Power