# 2N5090 (SILICON)

## NPN SILICON RF POWER TRANSISTOR

. . . designed for amplifier, frequency-multiplier or oscillator circuits in Military or Industrial equipment. Suitable for use as output, driver or pre-driver stages in VHF and UHF equipment.

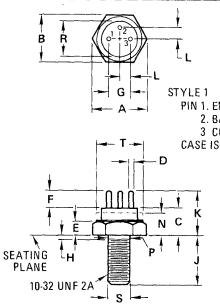
- 1.2 Watts Output Minimum at 400 MHz (7.8 dB Gain)
- 2.0 Watts Output Typical at 150 MHz (13 dB Gain)
- Multiple-Emitter Overlay Construction for Excellent High-Frequency Performance

**NPN SILICON RF POWER TRANSISTOR**

*MAXIMUM RATINGS

| Ratings | Symbol | Value | Unit |
|---|---|---|---|
| Collector-Emitter Voltage | $V_{CEO}$ | 30 | Vdc |
| Collector-Base Voltage | $V_{CB}$ | 55 | Vdc |
| Emitter-Base Voltage | $V_{EB}$ | 3.5 | Vdc |
| Collector Current - Continuous | $I_C$ | 0.4 | Adc |
| Total Device Dissipation @ $T_C = 75^oC$<br>Derate above $75^oC$ | $P_D$ | 5.0<br>0.04 | Watts<br>$W/^oC$ |
| Operating and Storage Junction Temperature Range | $T_J, T_{stg}$ | -65 to +200 | $^oC$ |

*Indicates JEDEC Registered Data.




| DIM | MILLIMETERS MIN | MILLIMETERS MAX | INCHES MIN | INCHES MAX |
|---|---|---|---|---|
| A | 12.57 | 13.08 | 0.495 | 0.515 |
| B | 10.77 | 11.10 | 0.424 | 0.437 |
| C | 5.46 | 8.13 | 0.215 | 0.320 |
| D | 0.762 | 1.17 | 0.030 | 0.046 |
| E | 2.29 | 3.43 | 0.090 | 0.135 |
| G | 4.70 | 5.46 | 0.185 | 0.215 |
| H | – | 1.98 | – | 0.078 |
| J | 9.53 | 11.56 | 0.375 | 0.455 |
| K | 9.02 | 12.19 | 0.355 | 0.480 |
| L | 2.29 | 2.79 | 0.090 | 0.110 |
| N | – | 4.19 | – | 0.165 |
| P | 4.14 | 4.80 | 0.163 | 0.189 |
| R | 8.13 | 9.14 | 0.320 | 0.360 |
| T | 9.14 | 11.10 | 0.360 | 0.437 |

All JEDEC dimensions and notes apply

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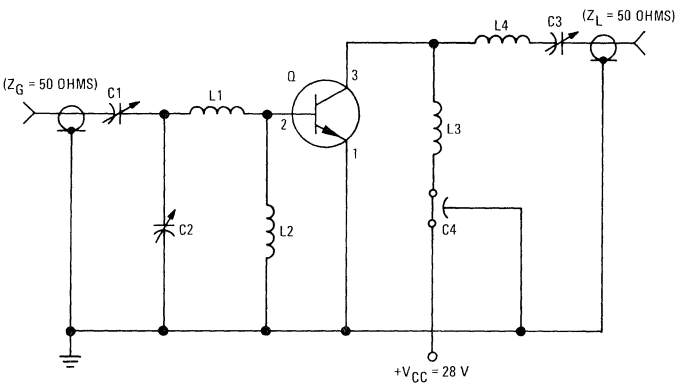
ELECTRICAL CHARACTERISTICS ($T_C$ = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | |
| Collector-Emitter Sustaining Voltage ($I_C$ = 5.0 mAdc, $I_B$ = 0) | $V_{CEO(sus)}$ | 30 | – | Vdc |
| Collector-Emitter Sustaining Voltage ($I_C$ = 5.0 mAdc, $R_{BE}$ = 10 Ohms) | $V_{CER(sus)}$ | 55 | – | Vdc |
| Collector Cutoff Current ($V_{CE}$ = 28 Vdc, $I_B$ = 0) | $I_{CEO}$ | – | 20 | μAdc |
| Collector Cutoff Current ($V_{CE}$ = 55 Vdc, $V_{BE}$ = -1.5 Vdc) ($V_{CE}$ = 30 Vdc, $V_{BE}$ = -1.5 Vdc, $T_C$ = 200°C) | $I_{CEX}$ | –<br>– | 0.1<br>5.0 | mAdc |
| Emitter Cutoff Current ($V_{BE}$ = 3.5 Vdc, $I_C$ = 0) | $I_{EBO}$ | – | 0.1 | mAdc |
| **ON CHARACTERISTICS** | | | | |
| DC Current Gain ($I_C$ = 50 mAdc, $V_{CE}$ = 5.0 Vdc) ($I_C$ = 360 mAdc, $V_{CE}$ = 5.0 Vdc) | $h_{FE}$ | 10<br>5.0 | 200<br>– | – |
| Collector-Emitter Saturation Voltage ($I_C$ = 0.1 Adc, $I_B$ = 20 mAdc) | $V_{CE(sat)}$ | – | 1.0 | Vdc |
| **DYNAMIC CHARACTERISTICS** | | | | |
| Current-Gain-Bandwidth Product ($I_C$ = 50 mAdc, $V_{CE}$ = 15 Vdc, f = 200 MHz) | $f_T$ | 500 | – | MHz |
| Output Capacitance ($V_{CB}$ = 30 Vdc, $I_E$ = O, f = 1.0 MHz) | $C_{ob}$ | – | 3.5 | pF |
| **FUNCTIONAL TEST** | | | | |
| Power Input (Figure 1) ($P_{out}$ = 1.2 Watts, $R_L$ = 50 Ohms, f = 400 MHz) | $P_{in}$ | – | 0.2 | Watt |
| Collector Efficiency (Figure 1) ($P_{out}$ = 1.2 Watts, $R_L$ = 50 Ohms, f = 400 MHz) | $\eta$ | 45 | – | % |

*Indicates JEDEC Registered Data.

FIGURE 1 – 400 MHz TEST CIRCUIT




C1 = 0.9–7.0 pF, ARCO 400 or equivalent
C2 = 1.5–20 pF, ARCO 402 or equivalent
C3 = 1.5–20 pF, ARCO 402 or equivalent
C4 = 1000 pF
L1 = 2 turns No. 18 AWG wire, 1/4" ID, 1/8" Long
L2 = RF Choke, 0.1 μH
L3 = 2 turns No. 18 AWG wire, 1/8" ID, 1/8" Long
L4 = 3 turns No. 16 AWG wire, 1/4" ID, 3/8" Long

FIGURE 2 – POWER OUTPUT versus FREQUENCY

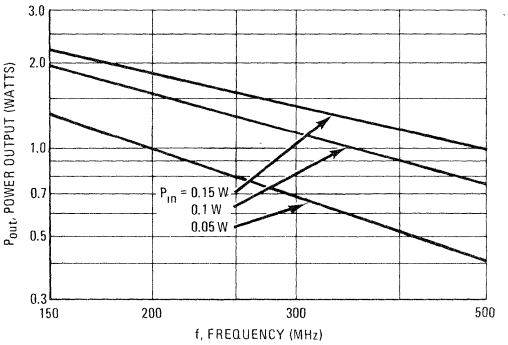



FIGURE 3 – POWER OUTPUT versus POWER INPUT

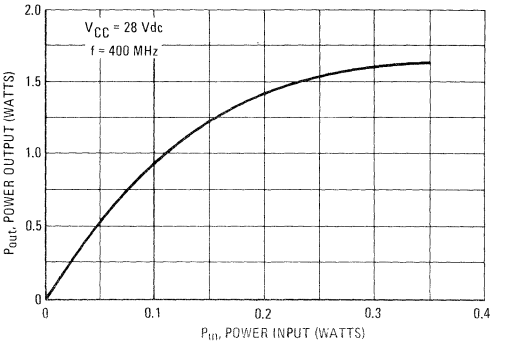



FIGURE 4 – PARALLEL EQUIVALENT INPUT RESISTANCE versus FREQUENCY

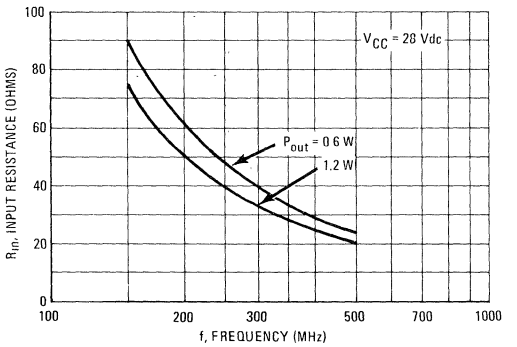



FIGURE 5 – PARALLEL EQUIVALENT INPUT CAPACITANCE versus FREQUENCY

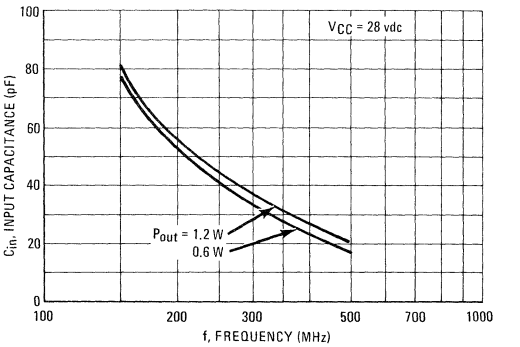



FIGURE 6 – PARALLEL EQUIVALENT OUTPUT CAPACITANCE versus FREQUENCY