

MOTOROLA SEMICONDUCTOR TECHNICAL DATA

The RF Line UHF Power Transistors

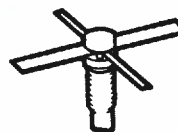
The TP3009/S is designed for 12.5 V, 900 MHz common-emitter amplifier operating in the 820–960 MHz frequency region.

- 900 MHz
- 0.75 W — P_{out}
- 12.5 V — V_{CC}
- 7.5 dB Min Gain

TP3009 TP3009S

0.75 W — 900 MHz
UHF POWER TRANSISTORS
NPN SILICON

2



CASE 305B-01, STYLE 1
(.200 SOE)
TP3009



CASE 305C-01, STYLE 1
(.200 SOE S)
TP3009S

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--------------------------------|------------------|-------------|------|
| Collector-Emitter Voltage | V _{CEO} | 16 | Vdc |
| Collector-Base Voltage | V _{CBO} | 30 | Vdc |
| Emitter-Base Voltage | V _{EBO} | 3 | Vdc |
| Collector Current — Continuous | I _C | 0.75 | Adc |
| Operating Junction Temperature | T _J | 200 | °C |
| Storage Temperature Range | T _{stg} | -50 to +200 | °C |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|--------------------------------------|------------------|-----|------|
| Thermal Resistance, Junction to Case | R _{θJC} | 26 | °C/W |

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

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

OFF CHARACTERISTICS

| | | | | | |
|--|----------------------|----|---|-----|------|
| Collector-Emitter Breakdown Voltage (I _C = 10 mA, I _B = 0) | V _{(BR)CEO} | 16 | — | — | Vdc |
| Collector-Base Breakdown Voltage (I _C = 1 mA, I _E = 0) | V _{(BR)CBO} | 30 | — | — | Vdc |
| Emitter-Base Breakdown Voltage (I _E = 0.1 mA, I _C = 0) | V _{(BR)EBO} | 3 | — | — | Vdc |
| Collector Cutoff Current (V _{CB} = 15 V, I _E = 0) | I _{CBO} | — | — | 0.1 | mAdc |

ON CHARACTERISTICS

| | | | | | |
|--|-----------------|----|---|---|---|
| DC Current Gain (I _C = 90 mA, V _{CE} = 10 V) | h _{FE} | 25 | — | — | — |
|--|-----------------|----|---|---|---|

DYNAMIC CHARACTERISTICS

| | | | | | |
|--|-----------------|---|---|---|----|
| Output Capacitance (V _{CB} = 12.5 V, I _E = 0, f = 1 MHz) | C _{ob} | — | — | 2 | pF |
|--|-----------------|---|---|---|----|

FUNCTIONAL TESTS

| | | | | | |
|---|-----------------|--------------------------------|---|---|----|
| Common-Emitter Amplifier Power Gain (V _{CE} = 12.5 V, P _{out} = 0.75 W, f = 900 MHz) | G _{PE} | 7.5 | — | — | dB |
| Collector Efficiency (V _{CE} = 12.5 V, P _{out} = 0.75 W, f = 900 MHz) | η _c | 55 | — | — | % |
| Load Mismatch (V _{CE} = 16 V, P _{out} = 0.75 W, f = 900 MHz, Load VSWR = ∞:1, All Phase Angles) | ↓ | No Degradation in Output Power | | | |



TYPICAL CHARACTERISTICS

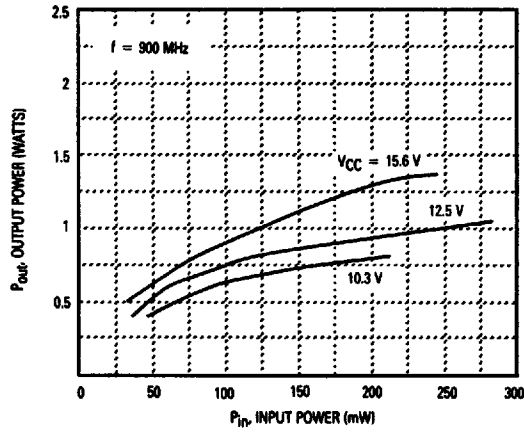


Figure 1. Output Power versus Input Power

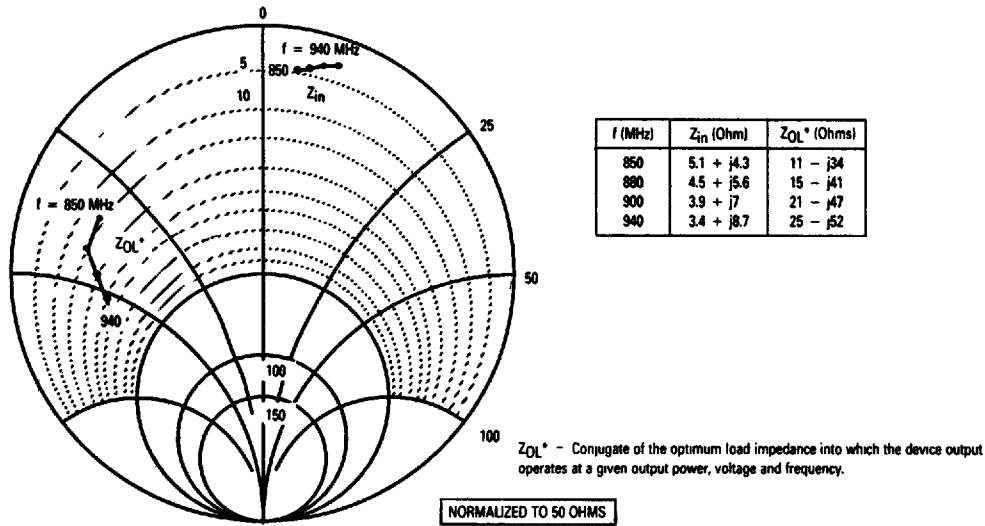


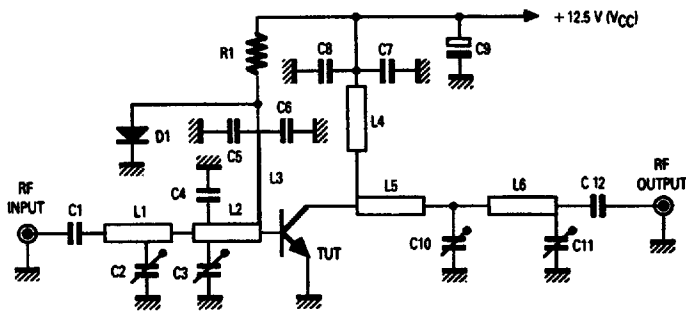
Figure 2. Series Equivalent Input/Output Impedances

TP3009, TP3009S

MOTOROLA SC (XSTRS/R F) 46E D ■ 6367254 0095197 T ■ MOT6

T-31-23

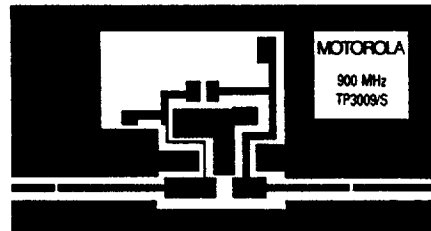
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| | | | |
|----------------|---|----|-----------------|
| C1 C5 C7 C12 | CAPA CHIP 330 pF CGO SMT | L1 | 50Ω Line L=15mm |
| C2 C3 C10 C11 | 0.5-5 pF GKU Trimmer Capacitor | L2 | 25Ω Line L=7mm |
| C4 | CAPA CHIP 3.9 pF | L3 | 75Ω Line L=27mm |
| C6 C8 | 15 nF Chip Capacitor 0605 | L4 | 50Ω Line L=20mm |
| C9 | ELECTROLYTIC CAPACITOR 10MF 16V | L5 | 25Ω Line L=7mm |
| R1 | RESISTOR // 2 X 270Ω 1/2 W | L6 | 50Ω Line L=28mm |
| D1 | 0.57 for Class B Operation | | |
| Board Material | TEFLON GLASS 1/50 inch $\epsilon_r = 2.55$ Cu 35 μm | | |

Note: Amplifier tunable from 820 to 960 MHz.
Instantaneous Bandwidth — 40 MHz Typ.

Figure 3. Broadband Amplifier Circuit



Board Material: .020 In. Glass Teflon $\epsilon_r = 2.55$

Figure 4. Printed Circuit Board Layout (Not to Scale)

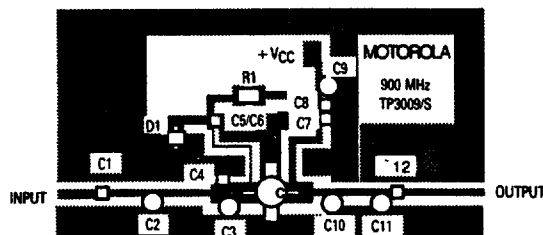


Figure 5. Component Layout

MOTOROLA RF DEVICE DATA

2-1175