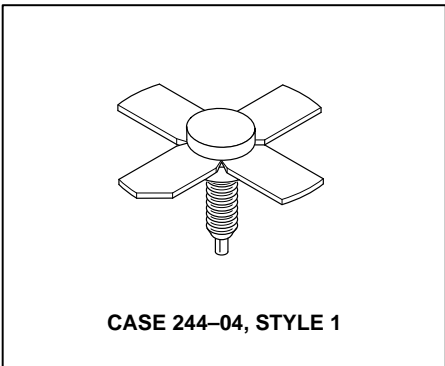
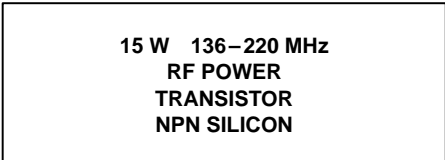


The RF Line
NPN Silicon
RF Power Transistor

... designed for 12.5 volt VHF large-signal power amplifiers in commercial and industrial FM equipment.

- Compact .280 Stud Package
- Specified 12.5 V, 175 MHz Performance
 - Output Power = 15 Watts
 - Power Gain = 12 dB Min
 - Efficiency = 60% Min
- Characterized to 220 MHz
- Load Mismatch Capability at High Line and Overdrive



MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---|------------------|-------------|---------------|
| Collector-Emitter Voltage | V _{CEO} | 18 | Vdc |
| Collector-Base Voltage | V _{CB0} | 36 | Vdc |
| Emitter-Base Voltage | V _{EBO} | 4.0 | Vdc |
| Collector Current — Continuous | I _C | 2.5 | Adc |
| Total Device Dissipation @ T _A = 25°C Derate above 25°C | P _D | 40 0.23 | Watts W/°C |
| Storage Temperature Range | T _{stg} | -65 to +150 | °C |
| Junction Temperature | T _J | 200 | °C |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|--------------------------------------|------------------|-----|------|
| Thermal Resistance, Junction to Case | R _{θJC} | 4.0 | °C/W |

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

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

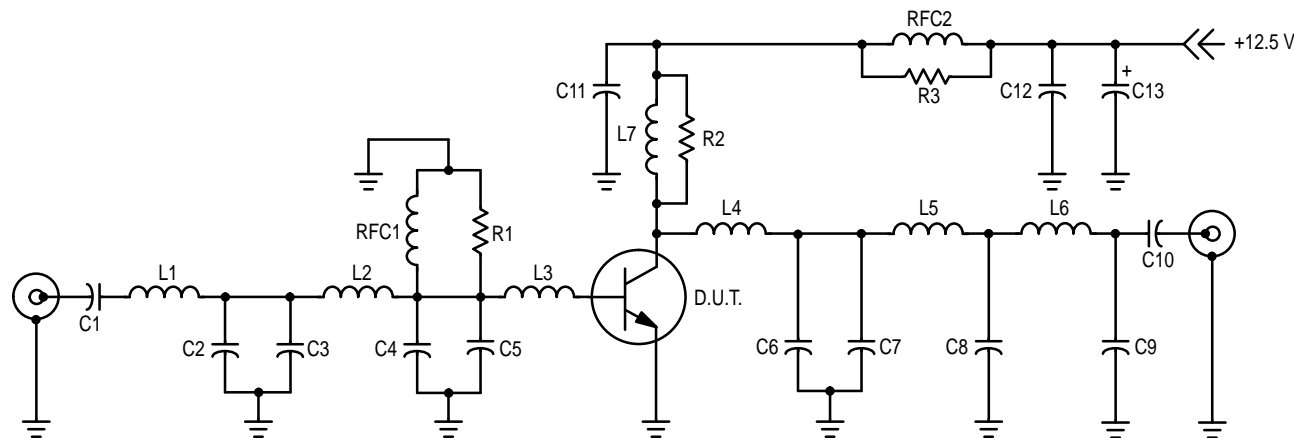
OFF CHARACTERISTICS

| | | | | | |
|--|----------------------|-----|---|-----|-----|
| Collector-Emitter Breakdown Voltage (I _C = 25 mA, I _B = 0) | V _{(BR)CEO} | 18 | — | — | Vdc |
| Collector-Emitter Breakdown Voltage (I _C = 25 mA, V _{BE} = 0) | V _{(BR)CES} | 36 | — | — | Vdc |
| Emitter-Base Breakdown Voltage (I _E = 5.0 mA, I _C = 0) | V _{(BR)EBO} | 4.0 | — | — | Vdc |
| Collector Cutoff Current (V _{CB} = 15 Vdc, I _E = 0) | I _{CB0} | — | — | 1.0 | mA |

(continued)

ELECTRICAL CHARACTERISTICS — continued ($T_C = 25^\circ\text{C}$ unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|--|----------|--------------------------------|-----|-----|------|
| ON CHARACTERISTICS | | | | | |
| DC Current Gain ($I_C = 500 \text{ mA}_{dc}$, $V_{CE} = 5.0 \text{ V}_{dc}$) | h_{FE} | 10 | 70 | 150 | — |
| DYNAMIC CHARACTERISTICS | | | | | |
| Output Capacitance ($V_{CB} = 15 \text{ V}_{dc}$, $I_E = 0$, $f = 1.0 \text{ MHz}$) | C_{ob} | — | 33 | 60 | pF |
| FUNCTIONAL TESTS (Figure 1) | | | | | |
| Common-Emitter Amplifier Power Gain ($V_{CC} = 12.5 \text{ V}_{dc}$, $P_{out} = 15 \text{ W}$, $f = 175 \text{ MHz}$) | G_{pe} | 12 | 13 | — | dB |
| Collector Efficiency ($V_{CC} = 12.5 \text{ V}_{dc}$, $P_{out} = 15 \text{ W}$, $f = 175 \text{ MHz}$) | η | 60 | 68 | — | % |
| Load Mismatch ($V_{CC} = 15.5 \text{ V}_{dc}$, $P_{in} = 2.0 \text{ dB Overdrive}$, Load VSWR = 30:1) | ψ | No Degradation in Output Power | | | |



- | | |
|---|---|
| C1, C10, C11 — 1000 pF Ceramic Chip Capacitor | L3 — Copper Pad, 0.200 x 0.400 x 0.060 |
| C2 — 27 pF Mini Unelco Capacitor | L4 — 1/4" #18 AWG into 1/8" High Loop |
| C3 — 33 pF Mini Unelco Capacitor | L5 — 3 Turns #24 AWG Enameled, 3/32" ID |
| C4, C5 — 270 pF Unelco J101 Capacitor | L6 — 6 Turns #24 AWG Enameled, 3/32" ID |
| C6, C9 — 18 pF Mini Unelco Capacitor | L7 — 1-3/4" #16 AWG into 3/4" High Loop |
| C7 — 91 pF Mini Unelco Capacitor | R1 — 12 Ω , 1/2 W Carbon |
| C8 — 68 pF Mini Unelco Capacitor | R2 — 100 Ω , 1.0 W Carbon |
| C12 — 0.1 μF Monolithic Capacitor | R3 — 10 Ω , 1.0 W Carbon |
| C13 — 100 μF , 15 V Electrolytic | RFC1 — 0.15 μH Molded Choke |
| L1 — 3 Turns #18 AWG, 3/16" ID | RFC2 — Ferroxcube Choke, VK200-4B |
| L2 — 1-1/8" #18 AWG into 1/2" High Loop | |

Figure 1. Broadband Circuit

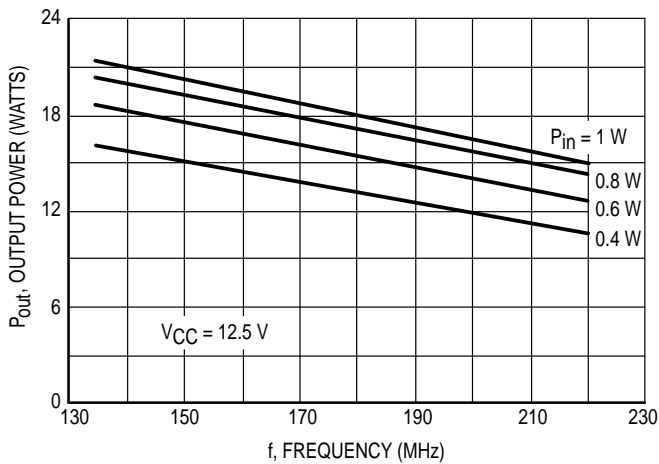


Figure 2. Output Power versus Frequency

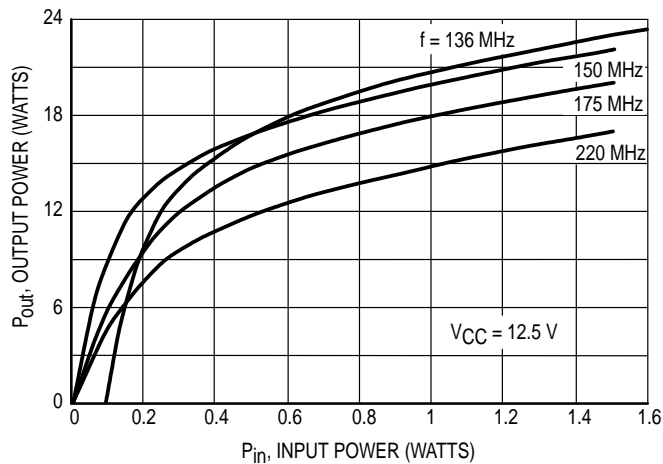


Figure 3. Output Power versus Input Power

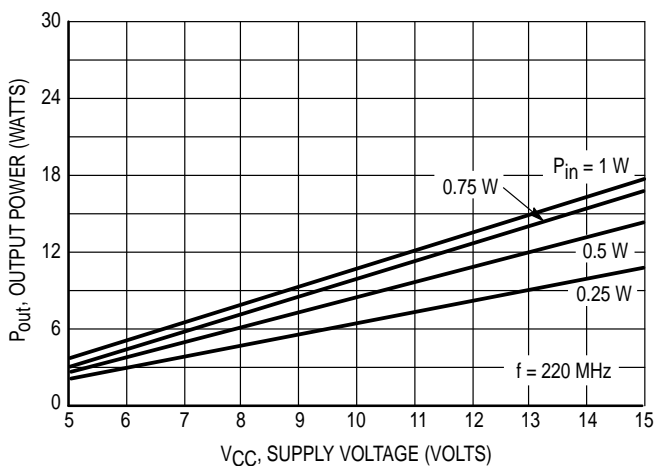


Figure 4. Output Power versus Supply Voltage

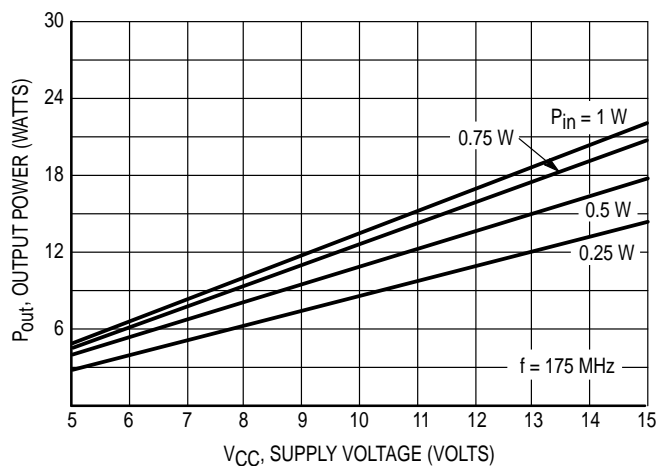


Figure 5. Output Power versus Supply Voltage

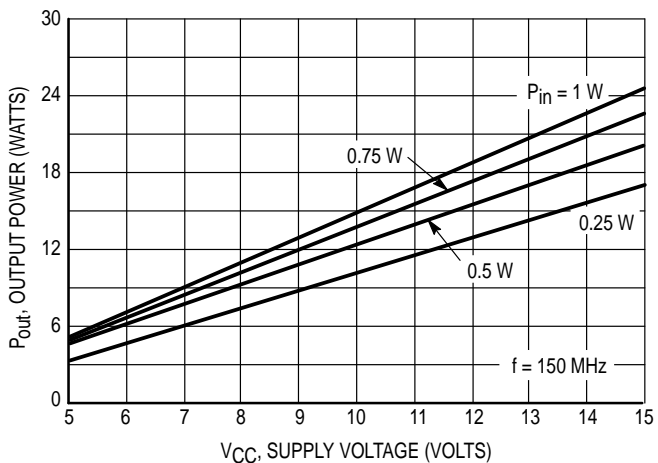


Figure 6. Output Power versus Supply Voltage

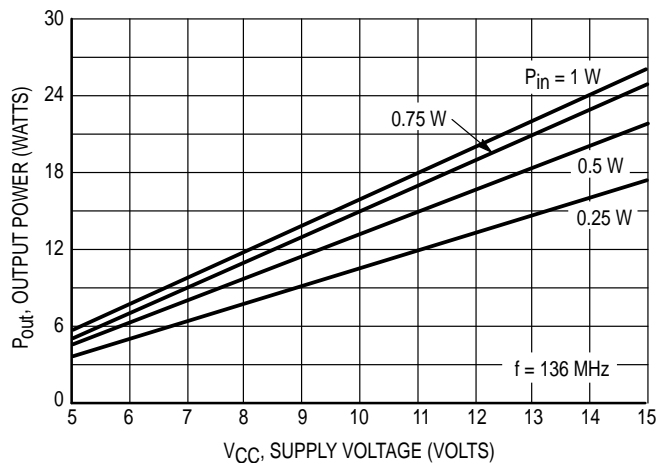


Figure 7. Output Power versus Supply Voltage

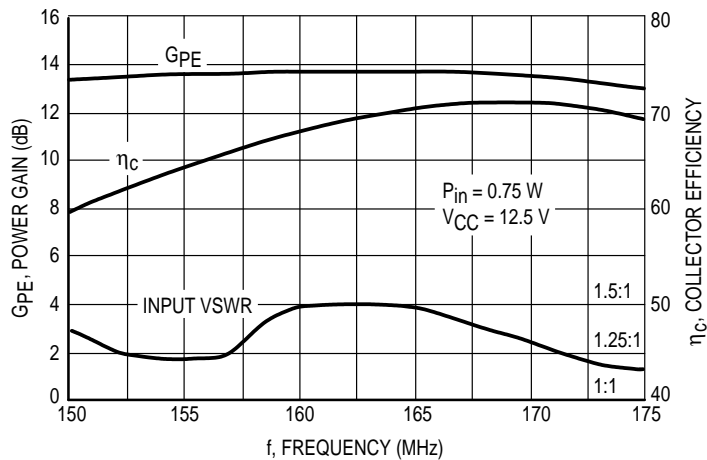
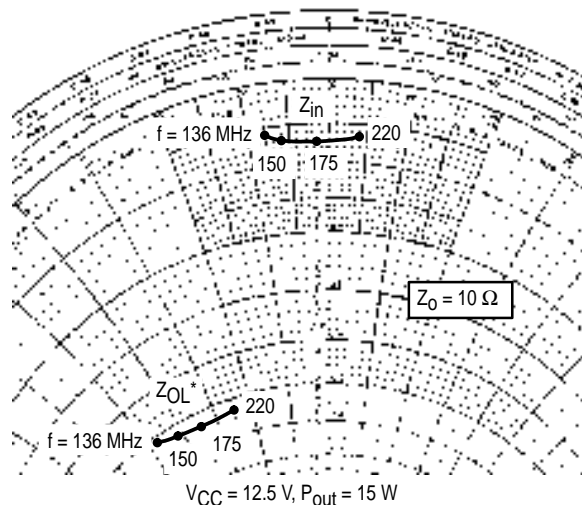


Figure 8. Typical Performance in a Broadband Circuit

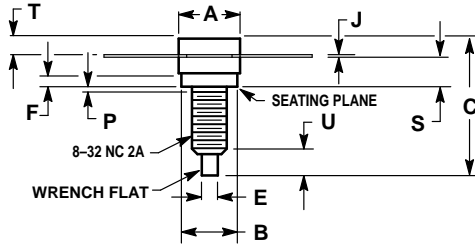
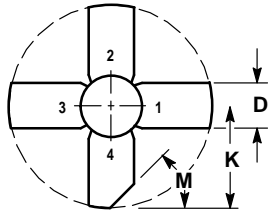


| f MHz | Z _{in} Ohms | Z _{OL} * Ohms |
|----------|-------------------------|---------------------------|
| 136 | 0.59 - j0.80 | 5.07 - j4.76 |
| 150 | 0.68 - j0.61 | 5.23 - j4.14 |
| 175 | 0.69 - j0.17 | 5.26 - j3.46 |
| 220 | 0.62 + j0.39 | 5.25 - j2.46 |

Z_{OL}* = Conjugate of the optimum load impedance into which the device output operates at a given output power, voltage and frequency.

Figure 9. Series Equivalent Impedance


PACKAGE DIMENSIONS



| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|-------|---------|-------|
| | MIN | MAX | MIN | MAX |
| A | 7.06 | 7.26 | 0.278 | 0.286 |
| B | 6.20 | 6.50 | 0.244 | 0.256 |
| C | 14.99 | 16.51 | 0.590 | 0.650 |
| D | 5.46 | 5.96 | 0.215 | 0.235 |
| E | 1.40 | 1.65 | 0.055 | 0.065 |
| G | 1.52 | — | 0.060 | — |
| J | 0.08 | 0.17 | 0.003 | 0.007 |
| K | 11.05 | — | 0.435 | — |
| M | 45° NOM | | 45° NOM | |
| P | — | 1.27 | — | 0.050 |
| S | 3.00 | 3.25 | 0.118 | 0.128 |
| T | 1.40 | 1.77 | 0.055 | 0.070 |
| U | 2.92 | 3.68 | 0.115 | 0.145 |

STYLE 1:
 PIN 1. EMITTER
 2. BASE
 3. EMITTER
 4. COLLECTOR

**CASE 244-04
 ISSUE J**

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