

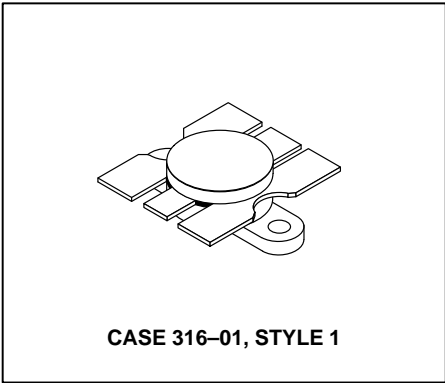
The RF Line

NPN Silicon

RF Power Transistor



**75 W, 175 MHz
CONTROLLED Q
RF POWER
TRANSISTOR
NPN SILICON**



The MRF247 is designed for 12.5 Volt VHF large-signal amplifier applications in industrial and commercial FM equipment operating to 175 MHz.

- Specified 12.5 Volt, 175 MHz Characteristics —
 - Output Power = 75 Watts
 - Power Gain = 7.0 dB Min
 - Efficiency = 55% Min
- Characterized With Series Equivalent Large-Signal Impedance Parameters
- Internal Matching Network Optimized for Minimum Gain Frequency Slope Response Over the Range 136 to 175 MHz
- Load Mismatch Capability at Rated P_{OUT} and Supply Voltage

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 — Peak | I _C | 20 | Adc |
| Total Device Dissipation @ T _C = 25°C (1) Derate above 25°C | P _D | 250 1.43 | Watts W/°C |
| Storage Temperature Range | T _{stg} | -65 to +150 | °C |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|--|------------------|-----|------|
| Thermal Resistance, Junction to Case (2) | R _{θJC} | 0.7 | °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 = 100 mAdc, I _B = 0) | V _{(BR)CEO} | 18 | — | — | Vdc |
| Collector-Emitter Breakdown Voltage (I _C = 50 mAdc, V _{BE} = 0) | V _{(BR)CES} | 36 | — | — | Vdc |
| Emitter-Base Breakdown Voltage (I _E = 10 mAdc, I _C = 0) | V _{(BR)EBO} | 4.0 | — | — | Vdc |

- (1) This device is designed for RF operation. The total device dissipation rating applies only when the device is operated as an RF amplifier
 (2) Thermal Resistance is determined under specified RF operating conditions by infrared measurement techniques.

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

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

ON CHARACTERISTICS

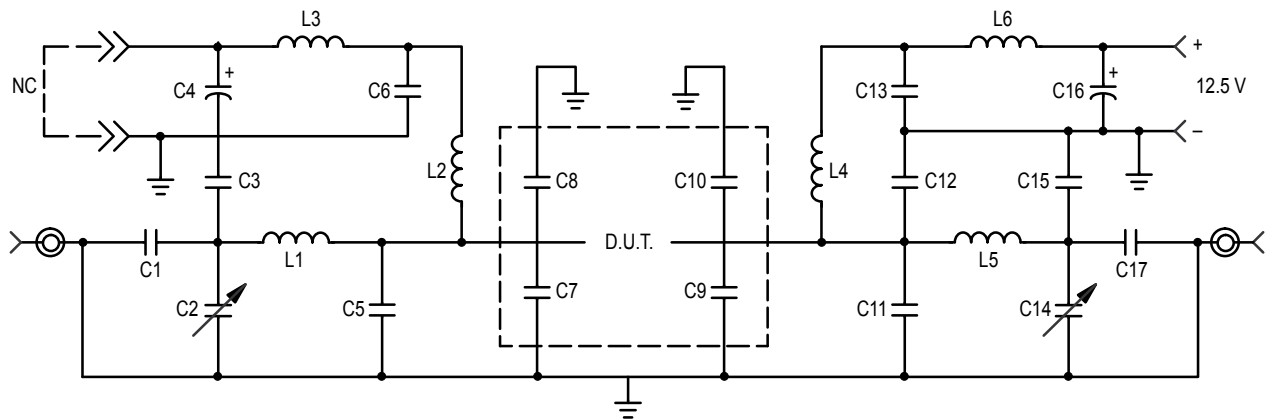
| | | | | | |
|---|----------|----|----|-----|---|
| DC Current Gain ($I_C = 5.0 \text{ Adc}$, $V_{CE} = 5.0 \text{ Vdc}$) | h_{FE} | 10 | 75 | 150 | — |
|---|----------|----|----|-----|---|

DYNAMIC CHARACTERISTICS

| | | | | | |
|---|----------|---|-----|-----|----|
| Output Capacitance ($V_{CB} = 15 \text{ Vdc}$, $I_E = 0$, $f = 1.0 \text{ MHz}$) | C_{ob} | — | 235 | 300 | pF |
|---|----------|---|-----|-----|----|

FUNCTIONAL TESTS

| | | | | | |
|---|----------|--------------------------------|-----|---|----|
| Common-Emitter Amplifier Power Gain ($V_{CC} = 12.5 \text{ Vdc}$, $P_{out} = 75 \text{ Watts}$, $f = 175 \text{ MHz}$) | G_{PE} | 7.0 | 8.5 | — | dB |
| Collector Efficiency ($V_{CC} = 12.5 \text{ Vdc}$, $P_{out} = 75 \text{ Watts}$, $f = 175 \text{ MHz}$) | η | 55 | 60 | — | % |
| Load Mismatch ($V_{CC} = 12.5 \text{ Vdc}$, $P_{out} = 75 \text{ Watts}$, $f = 175 \text{ MHz}$, $V_{SWR} = 30:1$ All Phase Angles) | ψ | No Degradation in Output Power | | | |



- | | | | |
|---------|--|--------|---|
| C1, C17 | 330 pF ATC 100 mil Ceramic Capacitor | C11 | 150 pF Standard Unelco Clamped Mica Capacitor |
| C2, C14 | Johansen 1–20 pF Trimmer Capacitor | C12 | 33 pF Mini-Unelco Clamped Mica Capacitor |
| C3 | 40 pF Standard Unelco Clamped Mica Capacitor | C15 | 27 pF Mini-Unelco Clamped Mica Capacitor |
| C4, C16 | Sprague 10 μF – 35 Vdc Electrolytic Capacitor | L1 | 2 Turns, 16 AWG Enameled, IDIA 0.13" |
| C5 | 80 pF Standard Unelco Clamped Mica Capacitor | L2, L4 | 4 Turns, 18 AWG Enameled, IDIA 0.18" |
| C6, C13 | 91 pF Mini-Unelco Clamped Mica Capacitor | L3, L6 | VK 200 with Ferrite Bead |
| C7, C8 | 240 pF ATC 100 mil Ceramic Capacitor | L5 | 2 Turns, 16 AWG Enameled, IDIA 0.15" |
| C9, C10 | 180 pF ATC 100 mil Ceramic Capacitor | | |

Figure 1. Output Power versus Input Power

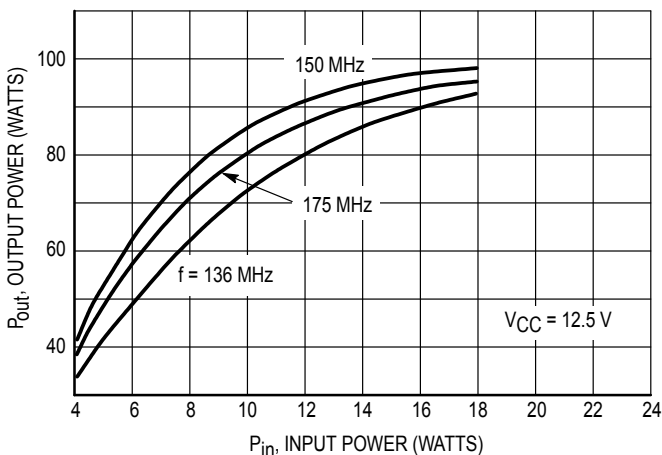


Figure 2. Output Power versus Input Power

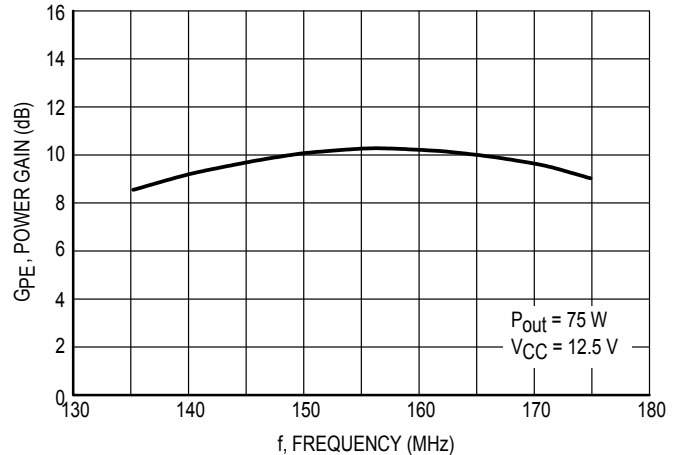


Figure 3. Power Gain versus Frequency

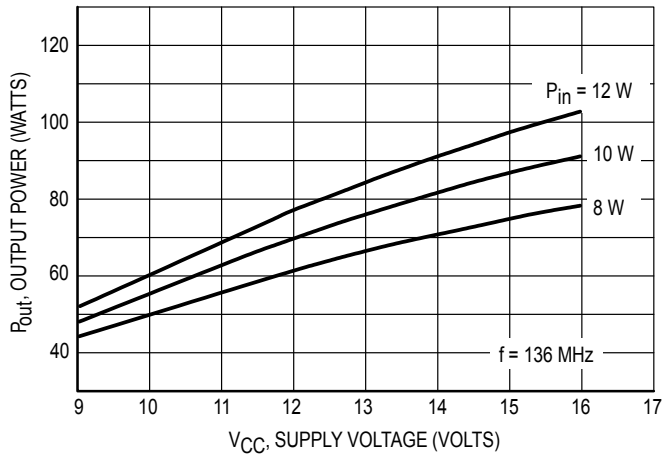


Figure 4. Output Power versus Supply Voltage

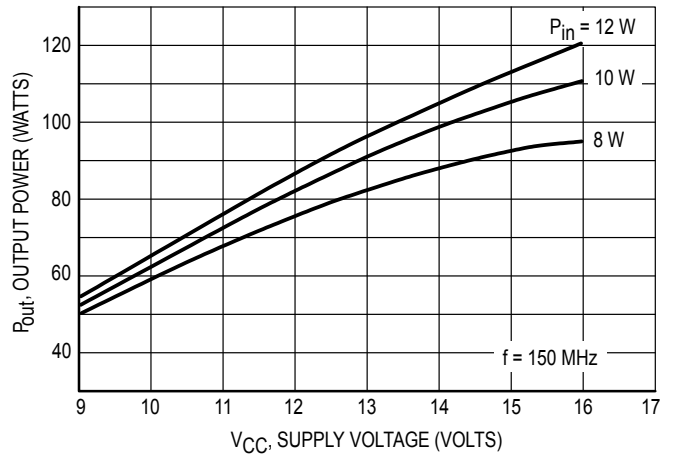


Figure 5. Output Power versus Supply Voltage

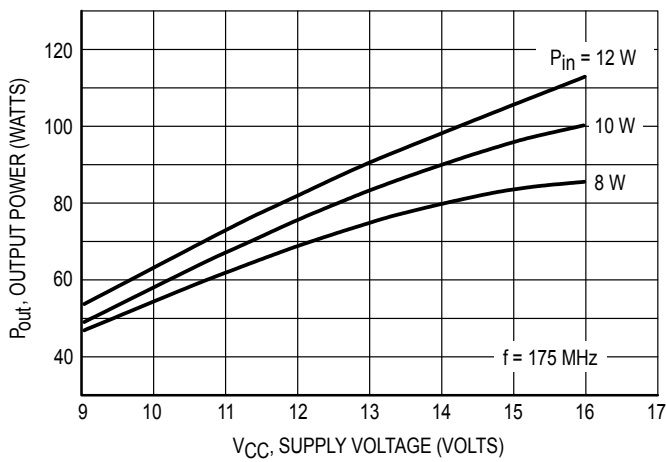


Figure 6. Output Power versus Supply Voltage

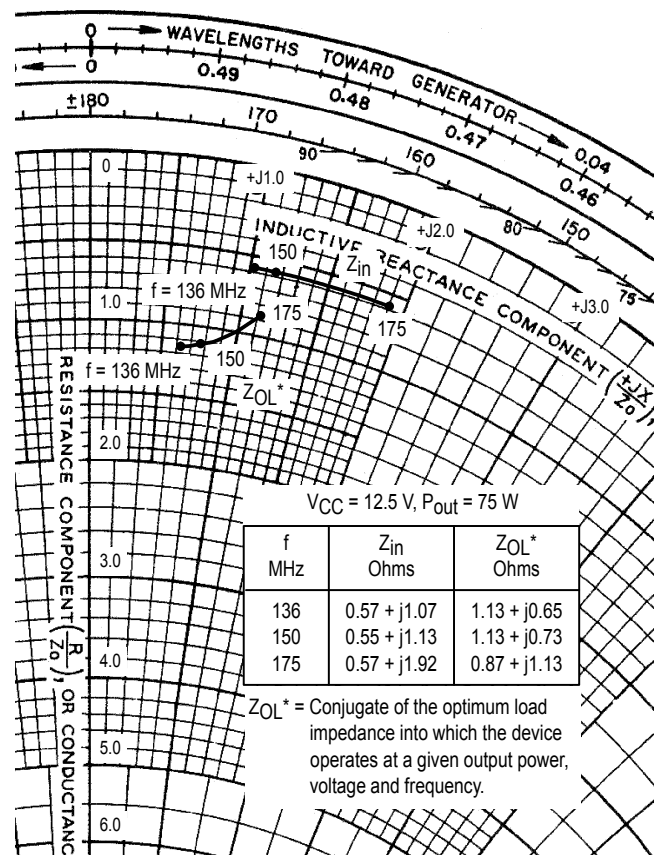
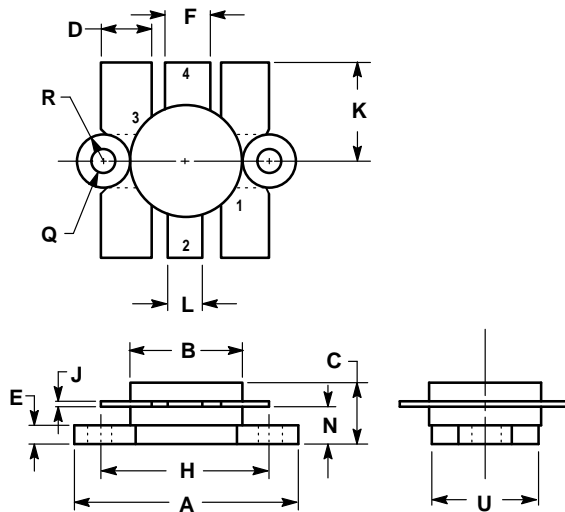


Figure 7. Series Equivalent Impedances

PACKAGE DIMENSIONS



NOTES:


1. FLANGE IS ISOLATED IN ALL STYLES.

| DIM | INCHES | | MILLIMETERS | |
|-----|--------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 24.38 | 25.14 | 0.960 | 0.990 |
| B | 12.45 | 12.95 | 0.490 | 0.510 |
| C | 5.97 | 7.62 | 0.235 | 0.300 |
| D | 5.33 | 5.58 | 0.210 | 0.220 |
| E | 2.16 | 3.04 | 0.085 | 0.120 |
| F | 5.08 | 5.33 | 0.200 | 0.210 |
| H | 18.29 | 18.54 | 0.720 | 0.730 |
| J | 0.10 | 0.15 | 0.004 | 0.006 |
| K | 10.29 | 11.17 | 0.405 | 0.440 |
| L | 3.81 | 4.06 | 0.150 | 0.160 |
| N | 3.81 | 4.31 | 0.150 | 0.170 |
| Q | 2.92 | 3.30 | 0.115 | 0.130 |
| R | 3.05 | 3.30 | 0.120 | 0.130 |
| U | 11.94 | 12.57 | 0.470 | 0.495 |

STYLE 1:

- PIN 1. EMITTER
- COLLECTOR
- EMITTER
- BASE

CASE 316-01 ISSUE D

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