

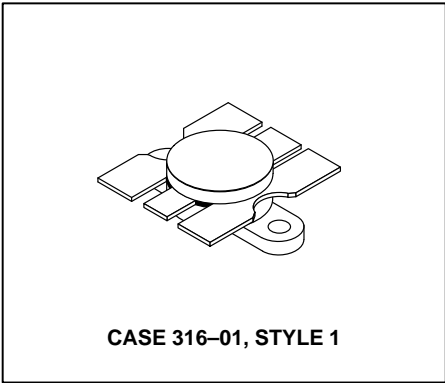
# The RF Line

## 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<sub>OUT</sub> and Supply Voltage

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V <sub>CEO</sub>	18	Vdc
Collector-Base Voltage	V <sub>CBO</sub>	36	Vdc
Emitter-Base Voltage	V <sub>EBO</sub>	4.0	Vdc
Collector Current — Peak	I <sub>C</sub>	20	Adc
Total Device Dissipation @ T <sub>C</sub> = 25°C (1) Derate above 25°C	P <sub>D</sub>	250 1.43	Watts W/°C
Storage Temperature Range	T <sub>stg</sub>	-65 to +150	°C

#### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case (2)	R <sub>θJC</sub>	0.7	°C/W

#### ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
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#### OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage (I <sub>C</sub> = 100 mAdc, I <sub>B</sub> = 0)	V <sub>(BR)CEO</sub>	18	—	—	Vdc
Collector-Emitter Breakdown Voltage (I <sub>C</sub> = 50 mAdc, V <sub>BE</sub> = 0)	V <sub>(BR)CES</sub>	36	—	—	Vdc
Emitter-Base Breakdown Voltage (I <sub>E</sub> = 10 mAdc, I <sub>C</sub> = 0)	V <sub>(BR)EBO</sub>	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
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**ON CHARACTERISTICS**

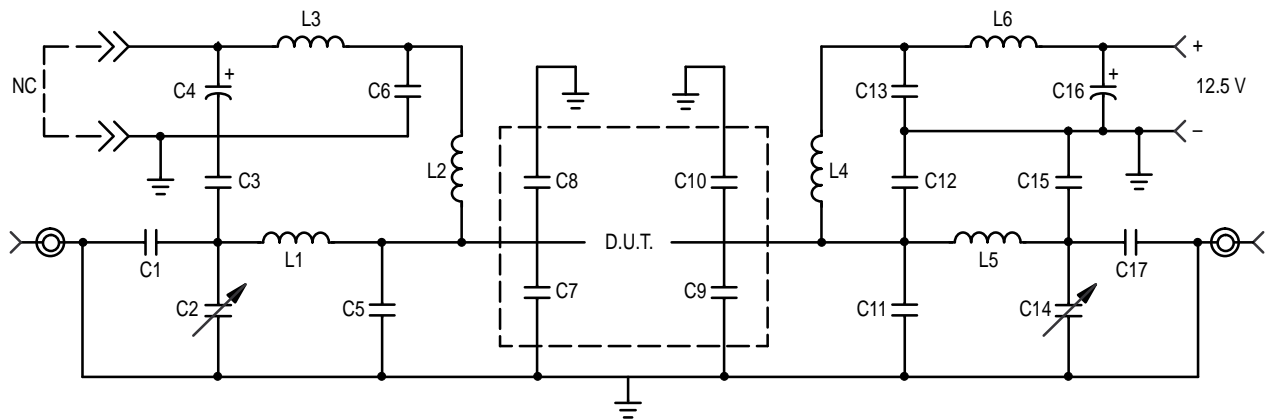
DC Current Gain ( $I_C = 5.0 \text{ Adc}$ , $V_{CE} = 5.0 \text{ Vdc}$ )	$h_{FE}$	10	75	150	—
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**DYNAMIC CHARACTERISTICS**

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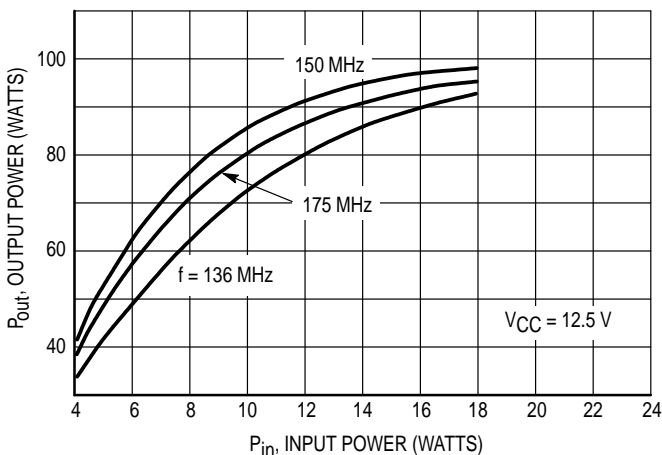
**FUNCTIONAL TESTS**

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 ( $V_{CC} = 12.5 \text{ Vdc}$ , $P_{Out} = 75 \text{ Watts}$ , $f = 175 \text{ MHz}$ )	$\eta$	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)	$\psi$	No Degradation in Output Power			

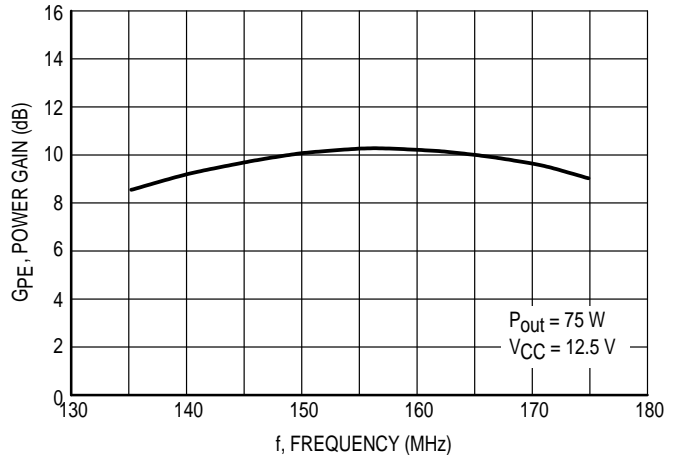


- |         |                                                          |        |                                               |
|---------|----------------------------------------------------------|--------|-----------------------------------------------|
| C1, C17 | 330 pF ATC 100 mil Ceramic Capacitor                     | 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 $\mu\text{F}$ – 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**

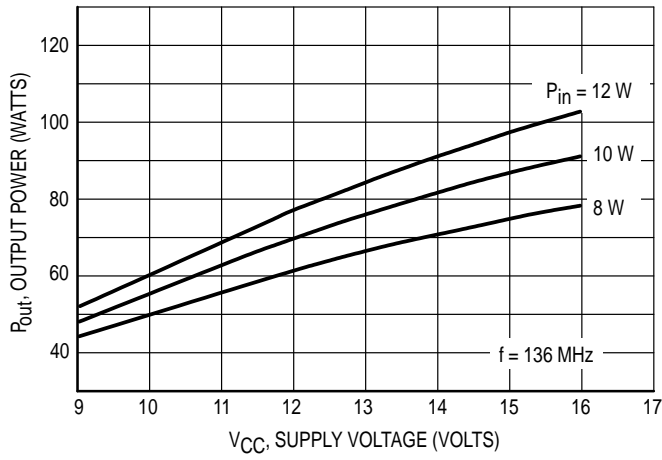


Figure 4. Output Power versus Supply Voltage

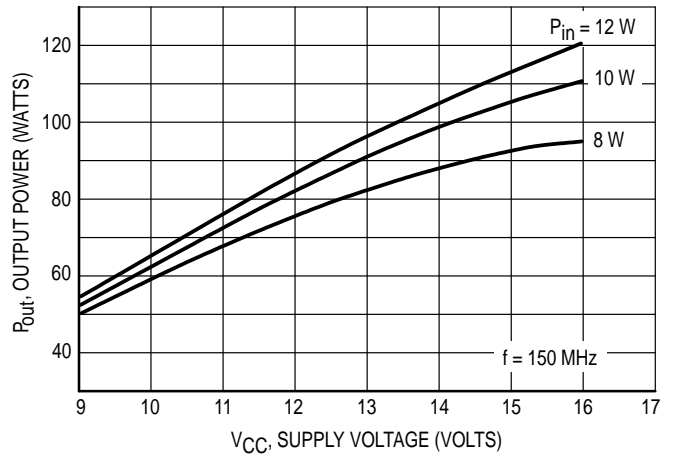


Figure 5. Output Power versus Supply Voltage

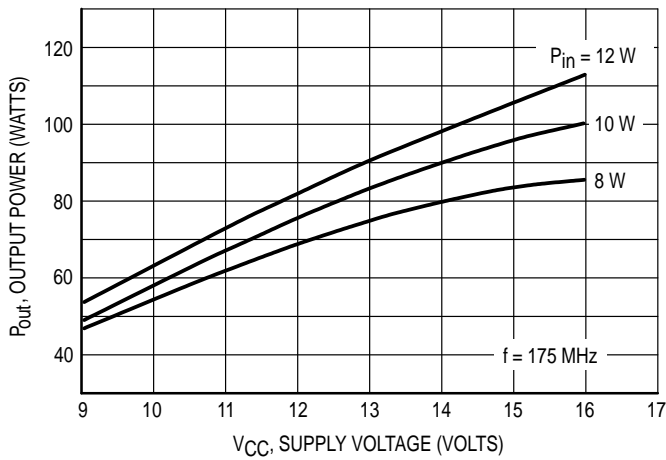


Figure 6. Output Power versus Supply Voltage

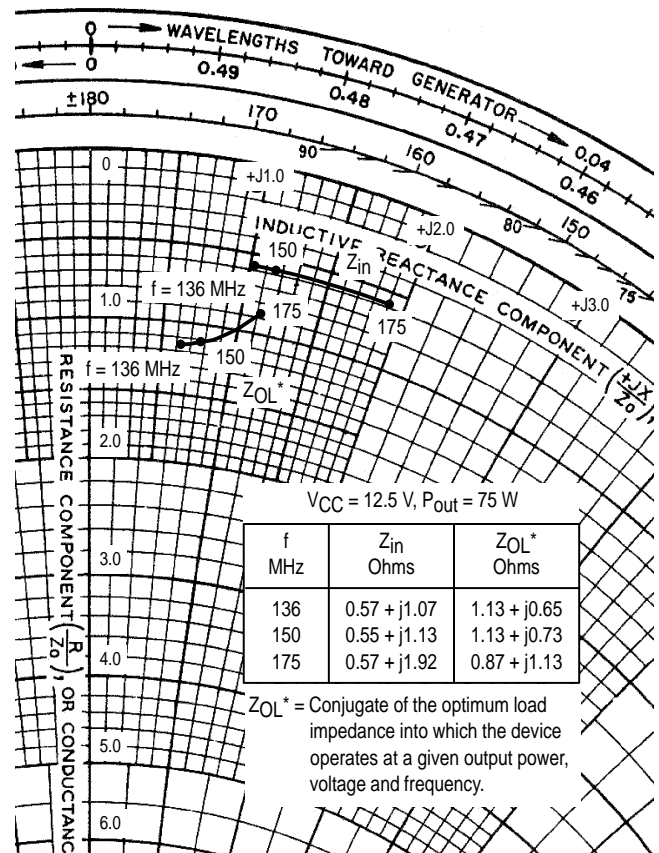
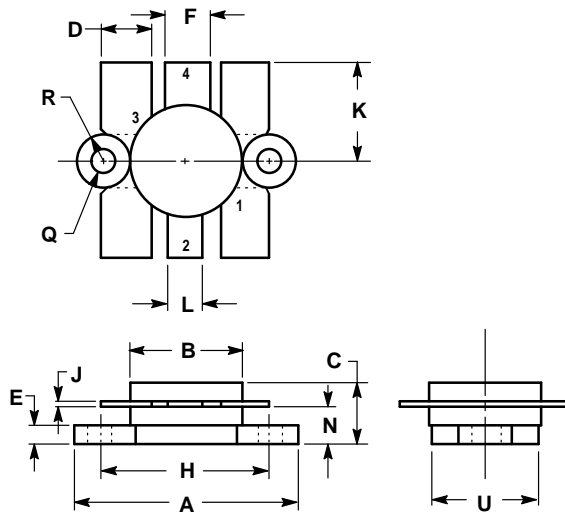


Figure 7. Series Equivalent Impedances

## 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
2. COLLECTOR
3. EMITTER
4. BASE

### CASE 316-01 ISSUE D

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