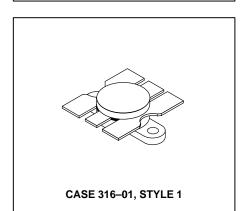
The RF Line NPN Silicon RF Power Transistor

Designed for 12.5 Volt UHF large—signal, common emitter, class—C amplifier applications in industrial and commercial FM equipment operating to 520 MHz.

- Specified 12.5 Volt, 512 MHz Characteristics
 Output Power = 65 Watts
 Minimum Gain = 4.15 dB
 Minimum Efficiency = 50%
- Characterized with Series Equivalent Large—Signal Impedance Parameters from 400 to 520 MHz
- Built-In Matching Network for Broadband Operation
- Triple Ion Implanted for More Consistent Characteristics
- · Implanted Emitter Ballast Resistors for Improved Ruggedness
- Silicon Nitride Passivated
- Capable of Surviving Load Mismatch Stress at all Phase Angles with 20:1 VSWR @ 15.5 Vdc and 2.0 dB Overdrive

MRF658

65 W, 512 MHz RF POWER TRANSISTOR NPN SILICON



MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--|------------------|--------------|---------------|
| Collector–Emitter Voltage | VCEO | 16.5 | Vdc |
| Collector–Emitter Voltage | VCES | 38 | Vdc |
| Emitter–Base Voltage | V _{EBO} | 4.0 | Vdc |
| Collector Current — Continuous | IC | 15 | Adc |
| Total Device Dissipation @ T _C = 25°C Derate above 25°C | PD | 175 1.0 | Watts W/°C |
| Storage Temperature Range | T _{stg} | - 65 to +150 | °C |

THERMAL CHARACTERISTICS

| Characteristic | | Max | Unit |
|--------------------------------------|--|-----|------|
| Thermal Resistance, Junction to Case | | 1.0 | °C/W |

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

| Characteristic | Symbol | Min | Тур | Max | Unit |
|--|----------|------|-----|-----|------|
| OFF CHARACTERISTICS | | | | | |
| Collector–Emitter Breakdown Voltage (I _C = 50 mAdc, I _B = 0) | V(BR)CEO | 16.5 | 29 | _ | Vdc |
| Collector–Emitter Breakdown Voltage (IC = 50 mAdc, VBE = 0) | V(BR)CES | 38 | 45 | _ | Vdc |
| Emitter–Base Breakdown Voltage (IE = 10 mAdc, IC = 0) | V(BR)EBO | 4.0 | 4.6 | _ | Vdc |
| Collector Cutoff Current (V _{CE} = 15 Vdc, V _{BE} = 0, T _C = 25°C) | ICES | _ | 0.1 | 10 | mAdc |

(continued)



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

| Characteristic | Symbol | Min | Тур | Max | Unit | |
|---|--|--------------------------------|-----|-----|------|--|
| ON CHARACTERISTICS | | | | | | |
| DC Current Gain (IC = 10 Adc, VCE = 5.0 Vdc) | hFE | 40 | 85 | 120 | _ | |
| DYNAMIC CHARACTERISTICS | | | | | | |
| Output Capacitance (V _{CB} = 12.5 Vdc, I _E = 0, f = 1.0 MHz) | C _{ob} | _ | 170 | 220 | pF | |
| FUNCTIONAL TESTS (In Motorola Test Fixture. See Figure 1.) | FUNCTIONAL TESTS (In Motorola Test Fixture. See Figure 1.) | | | | | |
| Output Power $(V_{CC} = 12.5 \text{ Vdc}, P_{in} = 25 \text{ W}, f = 470 \& 512 \text{ MHz})$ | Pout | 65 | _ | _ | W | |
| Collector Efficiency (V _{CC} = 12.5 Vdc, P _{Out} = 65 W, f = 470 & 512 MHz) | η | 50 | 60 | _ | % | |
| Output Mismatch Stress (V _{CC} = 15.5 Vdc, P _{in} = 32 W, f = 512 MHz, VSWR 20:1, All Phase Angles) | Ψ | No Degradation in Output Power | | | | |

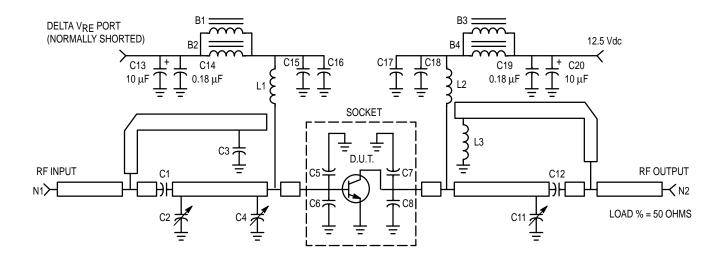




Figure 1. 512 MHz Test Circuit

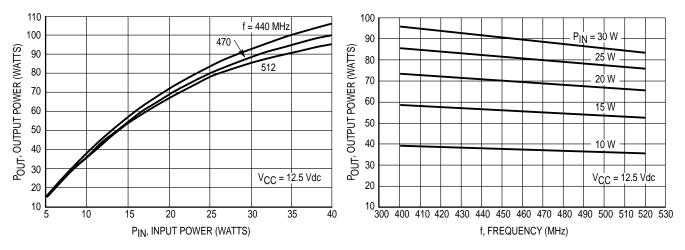


Figure 2. Output Power versus Input Power

Figure 3. Output Power versus Frequency

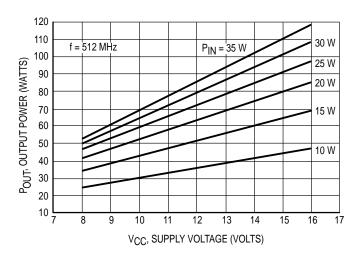
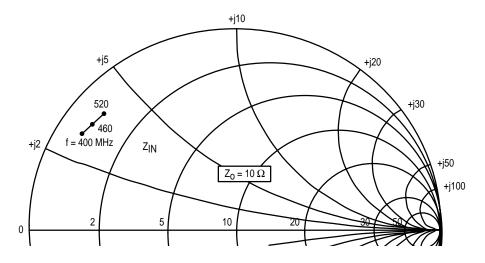
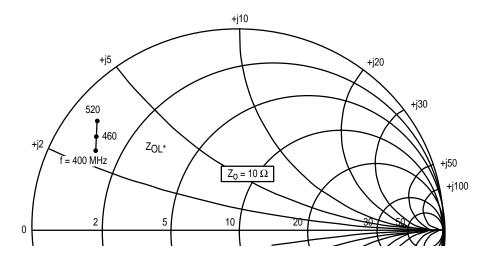


Figure 4. Output Power versus Supply Voltage



 $V_{CC} = 12.5 \text{ V} \quad P_0 = 70 \text{ W}$

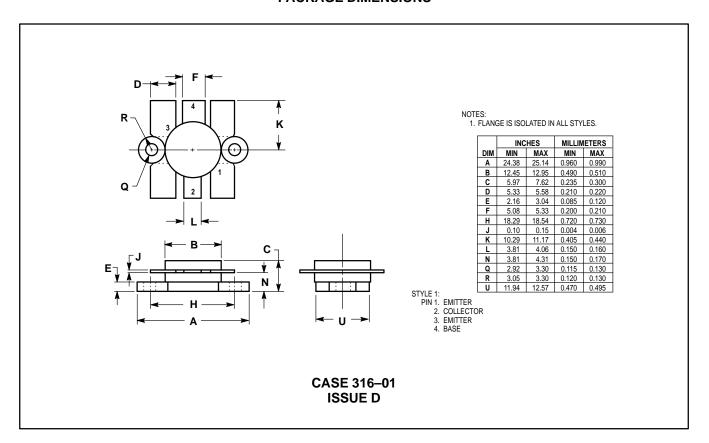
| f MHz | ZIN OHMS | Z _{OL} * OHMS | |
|----------|-------------|---------------------------|--|
| 400 | 0.62 + j2.8 | 1.20 + j2.5 | |
| 440 | 0.72 + j3.1 | 1.10 + j2.8 | |
| 480 | 0.81 + j3.3 | 0.94 + j3.1 | |
| 520 | 0.90 + j3.6 | 0.80 + j3.4 | |



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

Figure 5. Series Equivalent Input and Output Impedances

PACKAGE DIMENSIONS



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