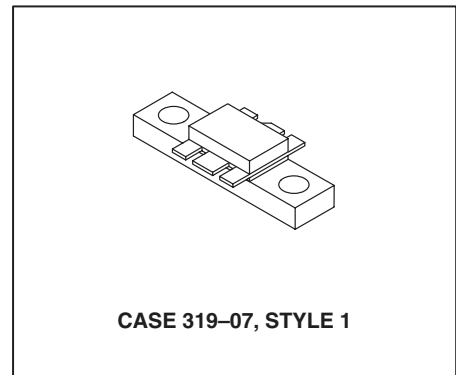


The RF Line  
**NPN Silicon**  
**RF Power Transistor**



. . . designed for 12.5 volt UHF large-signal, **common-base** amplifier applications in industrial and commercial FM equipment operating in the range of 806–960 MHz.

- Specified 12.5 Volt, 870 MHz Characteristics  
Output Power = 45 Watts  
Power Gain = 4.5 dB Min  
Efficiency = 60% Min
- Series Equivalent Large-Signal Characterization
- Internally Matched Input for Broadband Operation
- Tested for Load Mismatch Stress at All Phase Angles with 10:1 VSWR @ High Line and Rated Drive
- Gold Metallized, Emitter Ballasted for Long Life and Resistance to Metal Migration
- Silicon Nitride Passivated

ARCHIVE INFORMATION

ARCHIVE INFORMATION

**MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	$V_{CEO}$	16.5	Vdc
Collector–Base Voltage	$V_{CBO}$	38	Vdc
Emitter–Base Voltage	$V_{EBO}$	4.0	Vdc
Collector Current — Continuous	$I_C$	12	Adc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	150 0.85	Watts W/ $^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	–65 to +150	$^\circ\text{C}$
Junction Temperature	$T_J$	200	$^\circ\text{C}$

**THERMAL CHARACTERISTICS**

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.17	$^\circ\text{C}/\text{W}$

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

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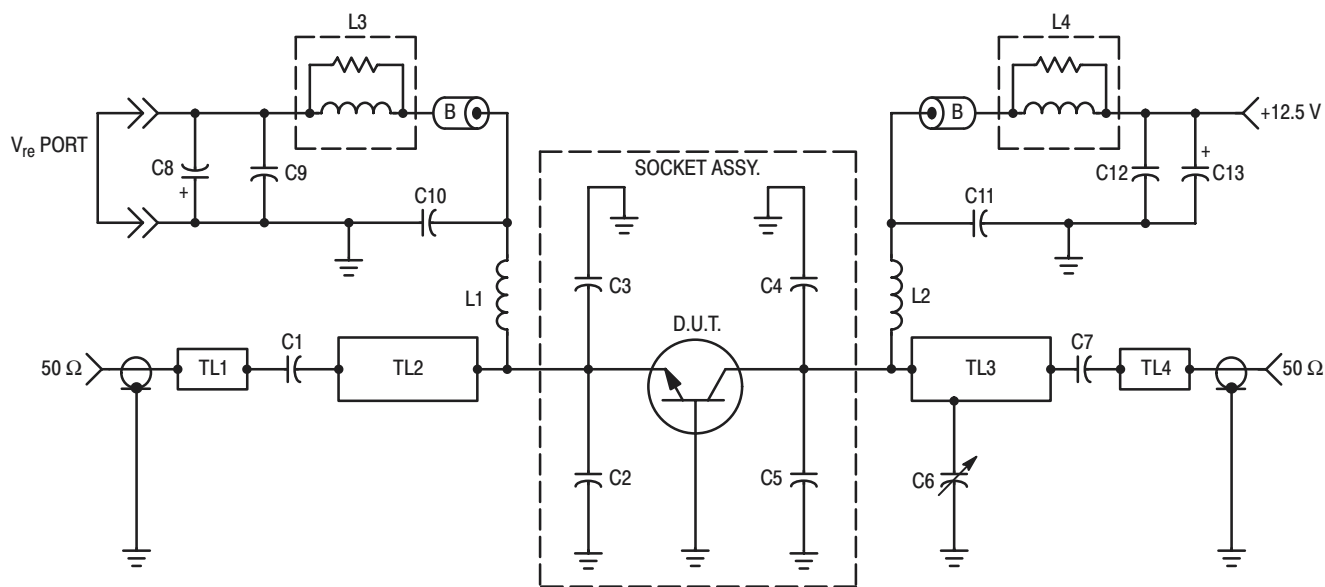
**OFF CHARACTERISTICS**

Emitter–Base Breakdown Voltage ( $I_E = 5.0 \text{ mAdc}$ , $I_C = 0$ )	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector–Emitter Breakdown Voltage ( $I_C = 50 \text{ mAdc}$ , $I_B = 0$ )	$V_{(BR)CEO}$	16.5	—	—	Vdc
Collector–Emitter Breakdown Voltage ( $I_C = 50 \text{ mAdc}$ , $V_{BE} = 0$ )	$V_{(BR)CES}$	38	—	—	Vdc
Collector Cutoff Current ( $V_{CE} = 15 \text{ Vdc}$ , $V_{BE} = 0$ )	$I_{CES}$	—	—	10	mAdc

(continued)

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

Characteristic	Symbol	Min	Typ	Max	Unit
<b>ON CHARACTERISTICS</b>					
DC Current Gain ( $I_C = 2.0 \text{ Adc}$ , $V_{CE} = 5.0 \text{ Vdc}$ )	$h_{FE}$	40	65	120	—
<b>DYNAMIC CHARACTERISTICS</b>					
Output Capacitance ( $V_{CB} = 12.5 \text{ Vdc}$ , $I_E = 0$ , $f = 1.0 \text{ MHz}$ )	$C_{ob}$	—	75	90	pF
<b>FUNCTIONAL TESTS</b>					
Common-Base Amplifier Power Gain ( $V_{CC} = 12.5 \text{ Vdc}$ , $P_{out} = 45 \text{ W}$ , $f = 870 \text{ MHz}$ )	$G_{PB}$	4.5	5.5	—	dB
Collector Efficiency ( $V_{CC} = 12.5 \text{ Vdc}$ , $P_{out} = 45 \text{ W}$ , $f = 870 \text{ MHz}$ )	$\eta_c$	60	68	—	%
Load Mismatch ( $V_{CC} = 15.5 \text{ Vdc}$ , $P_{in} = 16 \text{ W}$ , $f = 870 \text{ MHz}$ , VSWR = 10:1, All Phase Angles)	$\psi$	No Degradation in Output Power			



- C1 — 51 pF, 100 mil Chip Capacitor
- C2 — 12 pF, Mini-Underwood
- C3 — 11 pF, Mini-Underwood
- C4, C5 — 21 pF, Mini-Underwood
- C6 — 0.08–8.0 pF Johansen Gigatrim
- C7 — 47 pF, 100 mil Chip Capacitor
- C8, C13 — 10  $\mu\text{F}$ , 25 WV Electrolytic Capacitor
- C9, C12 — 1000 pF Unelco J101

- C10, C11 — 91 pF Mini-Underwood
- L1, L2 — 4 Turns #18 Enameled, 200 mil ID
- L3, L4 — 12 Turns #22 Enameled, Wound Over 10  $\Omega$  Resistor
- TL1, TL4 — 50  $\Omega$  Microstrip Line
- TL2 — Microstrip ( $Z_o = 38 \text{ ohms}$ ,  $\lambda/4 @ 838 \text{ MHz}$ )
- TL3 — Microstrip ( $Z_o = 28 \text{ ohms}$ ,  $\lambda/4 @ 838 \text{ MHz}$ )
- Board Material — 0.032" Glass-Teflon, 2 oz. cu. clad,  $\epsilon_r = 2.56$
- B — Ferrite Bead, Ferroxcube 56–590–65–3B

**Figure 1. 806–870 MHz Broadband Test Circuit**

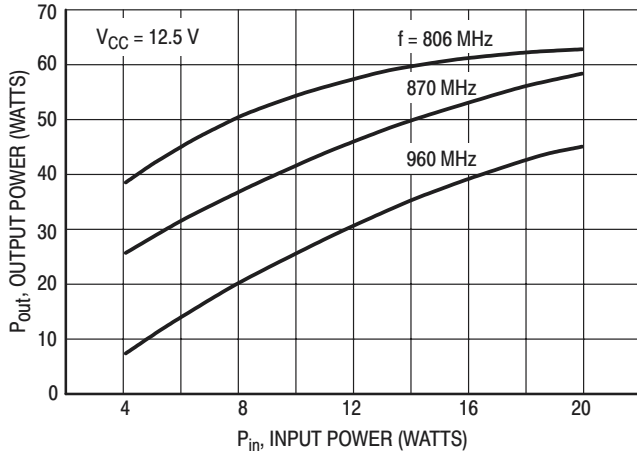


Figure 2. Output Power versus Input Power

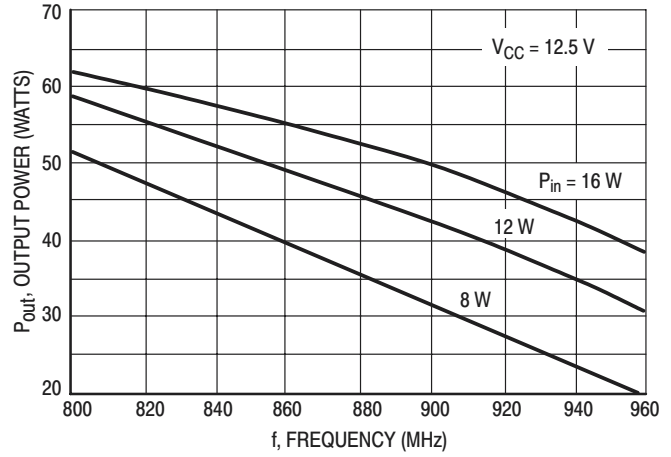


Figure 3. Output Power versus Frequency

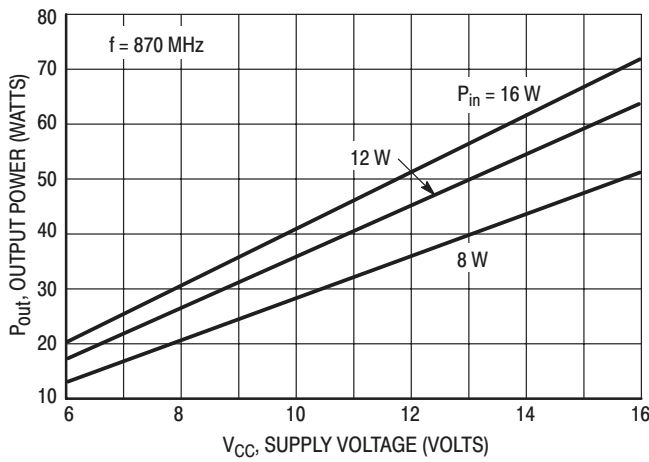


Figure 4. Output Power versus Supply Voltage

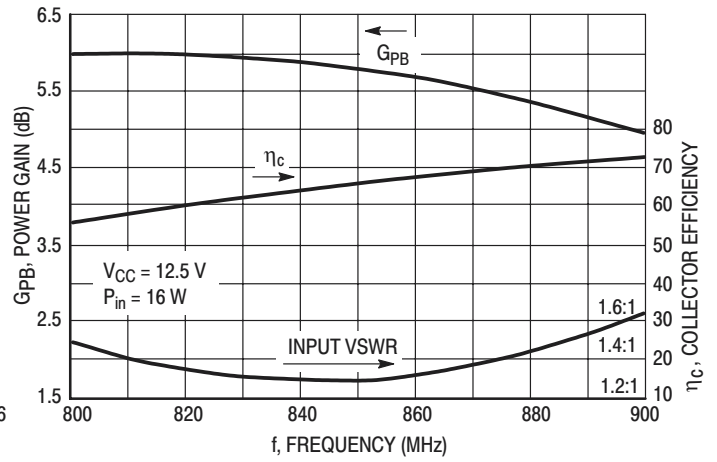


Figure 5. Typical Broadband Circuit Performance

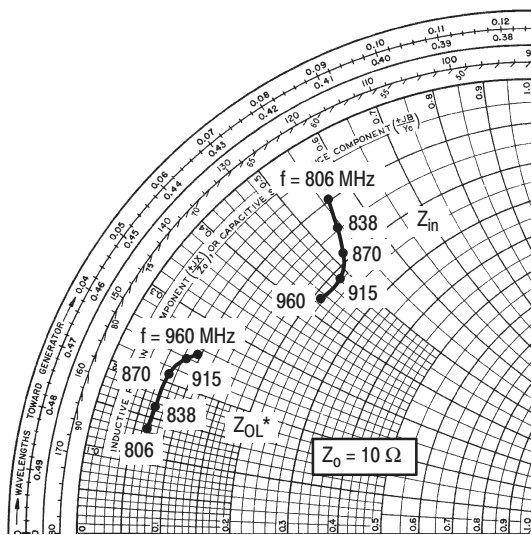


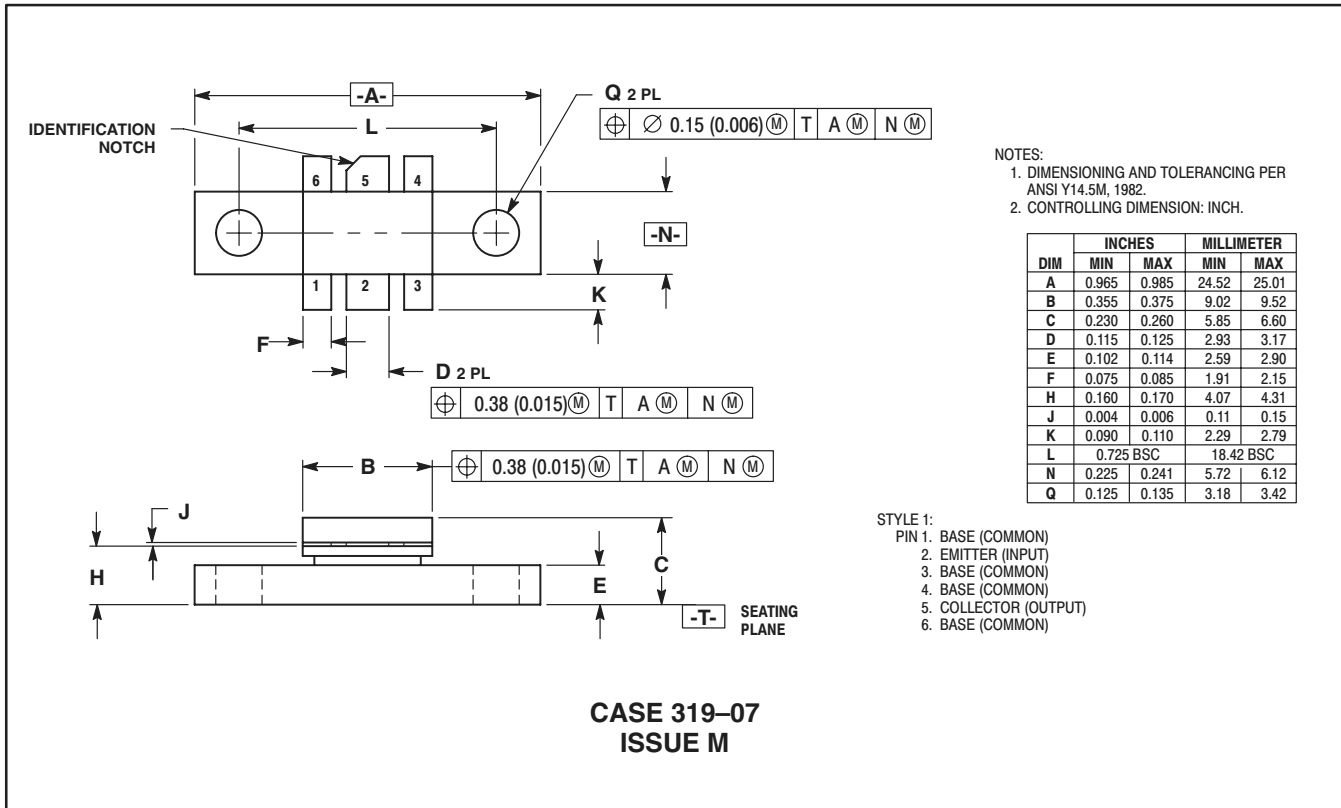
Figure 6. Series Equivalent Input/Output Impedances

$V_{CC} = 12.5 \text{ Vdc}, P_{in} = 16 \text{ W}, P_{out} = 45 \text{ W}$

f MHz	$Z_{in}$ (Ohms)	f MHz	$Z_{OL}^*$ (Ohms)
806	0.99 +j5.52	806	0.67 +j1.33
838	1.48 +j5.47	838	0.68 +j1.66
870	1.79 +j5.25	870	0.72 +j2.16
915	2.12 +j4.80	915	0.83 +j2.40
960	2.11 +j4.28	960	0.99 +j2.50

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

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