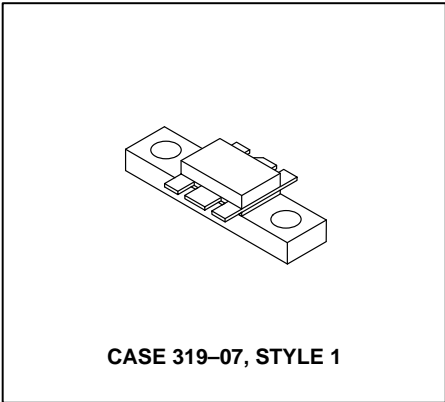


# The RF Line

## NPN Silicon

### RF Power Transistor



... designed for 24 volt UHF large-signal, common-base amplifier applications in industrial and commercial FM equipment operating in the range of 804–960 MHz.

- Specified 24 Volt, 900 MHz Characteristics
  - Output Power = 30 Watts
  - Power Gain = 7.0 dB Min
  - Efficiency = 55% Min
- Series Equivalent Large-Signal Characterization
- Capable of 30:1 VSWR Load Mismatch at Rated Output Power and Supply Voltage
- Gold Metallized, Emitter Ballasted for Long Life and Resistance to Metal Migration
- Silicon Nitride Passivated

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	$V_{CEO}$	30	Vdc
Collector–Base Voltage	$V_{CBO}$	50	Vdc
Emitter–Base Voltage	$V_{EBO}$	4.0	Vdc
Collector Current — Continuous	$I_C$	7.0	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ (1) Derate above $25^\circ\text{C}$	$P_D$	115 0.66	Watts W/°C
Storage Temperature Range	$T_{stg}$	–65 to +150	°C

#### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case (2)	$R_{\theta JC}$	1.5	°C/W

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

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

Collector–Emitter Breakdown Voltage ( $I_C = 25 \text{ mAdc}$ , $I_B = 0$ )	$V_{(BR)CEO}$	30	—	—	Vdc
Collector–Emitter Breakdown Voltage ( $I_C = 25 \text{ mAdc}$ , $V_{BE} = 0$ )	$V_{(BR)CES}$	50	—	—	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 5.0 \text{ mAdc}$ , $I_C = 0$ )	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current ( $V_{CB} = 30 \text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	—	—	10	mAdc

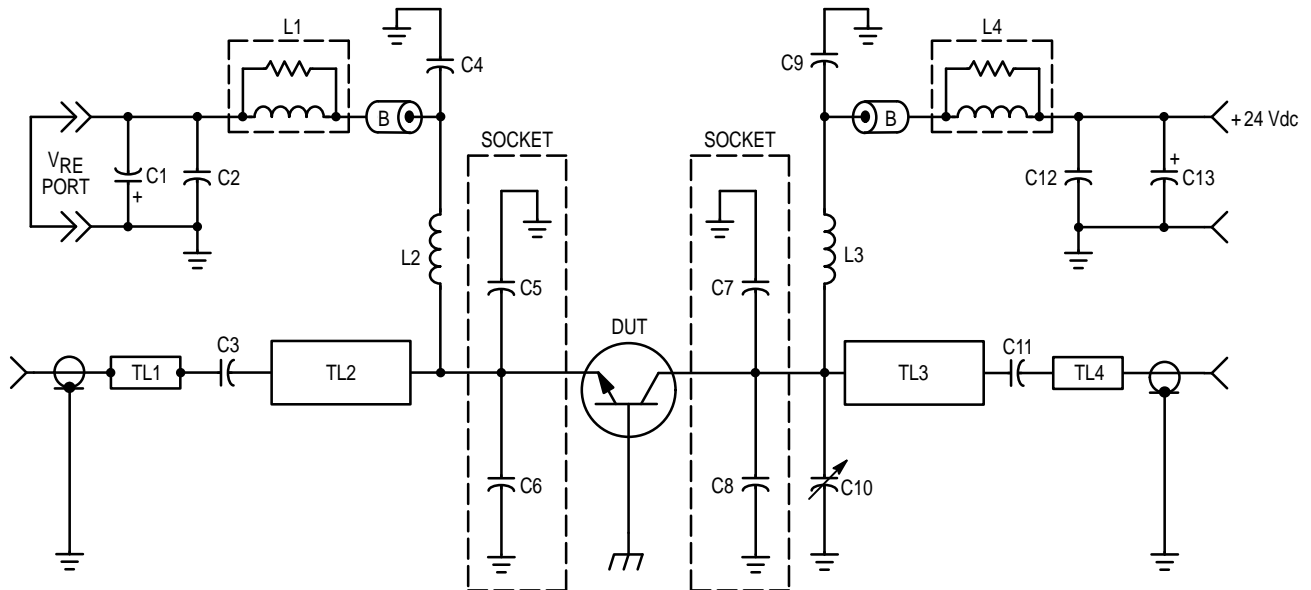
NOTES:

(continued)

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

**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 ( $I_C = 2.0 \text{ Adc}$ , $V_{CE} = 5.0 \text{ Vdc}$ )	$h_{FE}$	10	—	120	—
<b>DYNAMIC CHARACTERISTICS</b>					
Output Capacitance ( $V_{CB} = 30 \text{ Vdc}$ , $I_E = 0$ , $f = 1.0 \text{ MHz}$ )	$C_{ob}$	—	45	—	pF
<b>FUNCTIONAL TESTS</b>					
Common-Base Amplifier Power Gain ( $P_{out} = 30 \text{ W}$ , $V_{CC} = 24 \text{ Vdc}$ , $f = 900 \text{ MHz}$ )	$G_{PE}$	7.0	8.5	—	dB
Collector Efficiency ( $P_{out} = 30 \text{ W}$ , $V_{CC} = 24 \text{ Vdc}$ , $f = 900 \text{ MHz}$ )	$\eta$	55	60	—	%

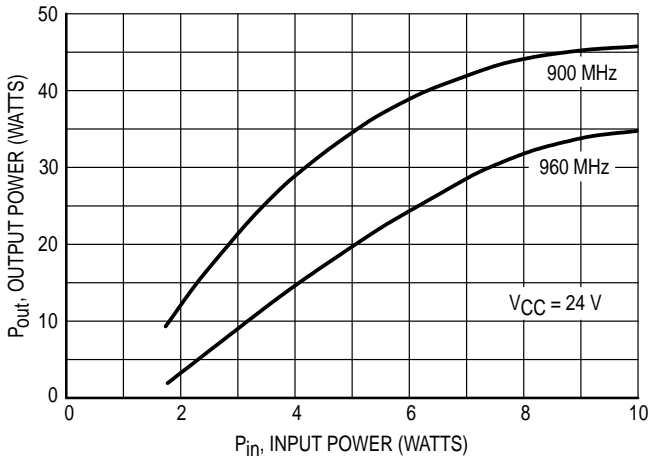


- B — Ferrite Bead, Ferroxcube 56-590-65-3B
- C1, C13 — 5.0  $\mu\text{F}$ , 50 Vdc
- C2, C12 — 1000 pF Unelco
- C3, C11 — 47 pF, 100 Mil Chip Capacitor
- C4, C9 — 91 pF, Mini-Underwood
- C5, C6 — 12 pF, Mini-Underwood
- C7 — 18 pF, Mini-Underwood
- C8 — 24 pF, Mini-Underwood
- C10 — 0.8-8.0 pF Johanson Gigatrim

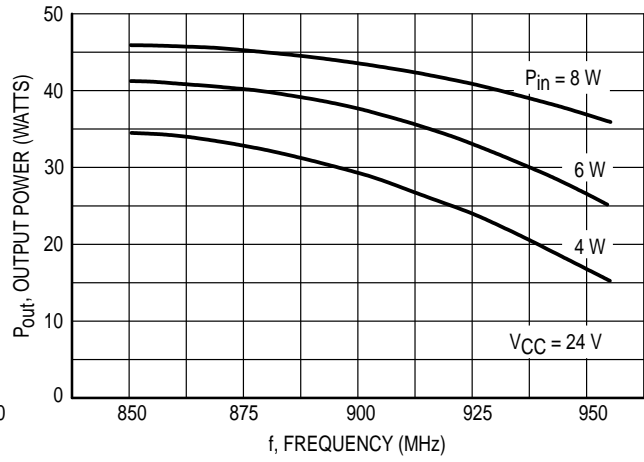
- L1, L4 — 11 Turns #20 Enameled Over 10  $\Omega$  Carbon Resistor
- L2, L3 — 4 Turns #20 Enameled, .15" ID
- TL1, TL4 — Micro Strip Line, 50  $\Omega$
- TL2 — Micro Strip,  $Z_0 = 30 \Omega$ ,  $\lambda/4$  @ 875 MHz
- TL3 — Micro Strip,  $Z_0 = 22 \Omega$ ,  $\lambda/4$  @ 875 MHz
- Board — 0.032" Glass Teflon  
2 oz. Cu CLAD,  $\epsilon_r = 2.55$

**Figure 1. 850-900 MHz Broadband Circuit Schematic**

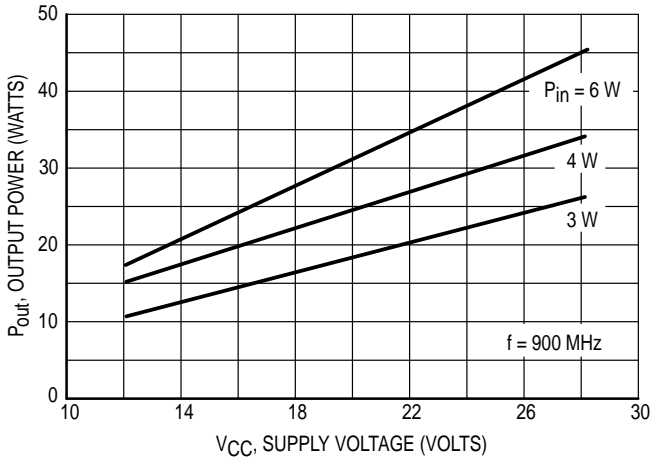
## TYPICAL CHARACTERISTICS



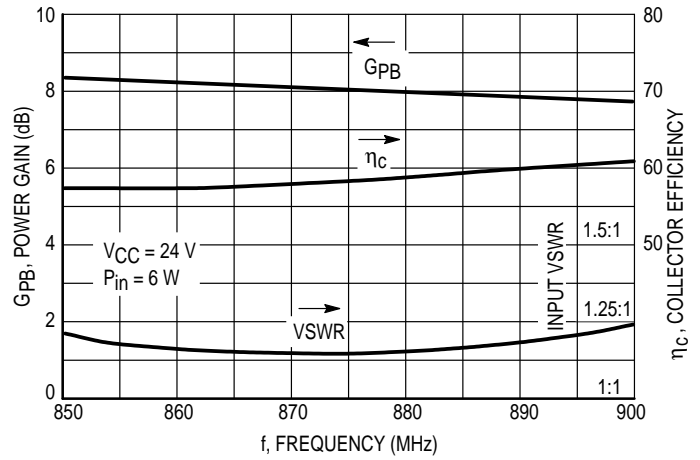
**Figure 2. Output Power versus Input Power**



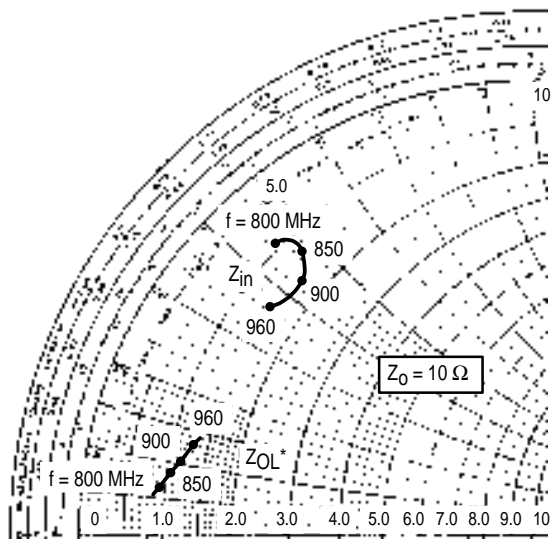
**Figure 3. Output Power versus Frequency**



**Figure 4. Output Power versus Supply Voltage**



**Figure 5. Typical Broadband Circuit Performance**



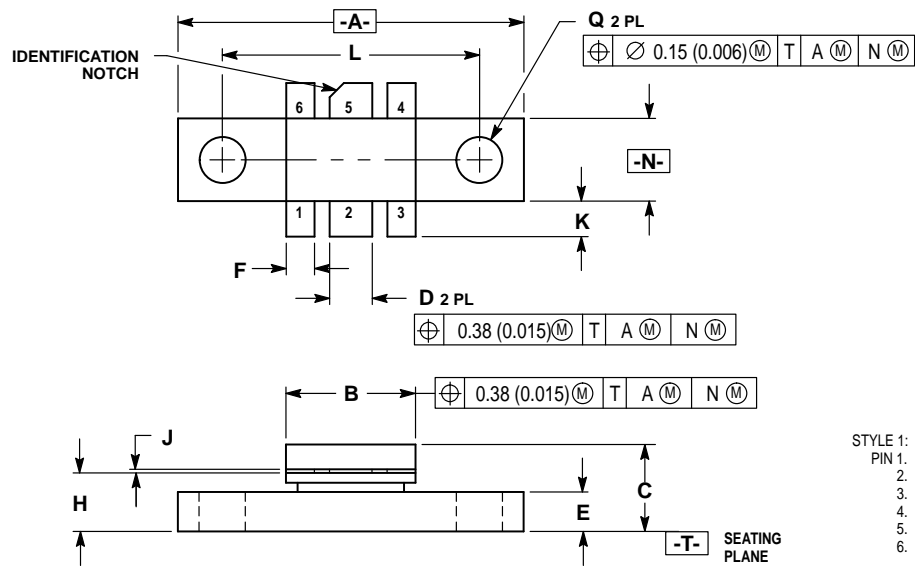
$V_{CC} = 24 \text{ Vdc}$ ,  $P_{out} = 30 \text{ W}$

f Frequency MHz	$Z_{in}$ Ohms	$Z_{OL}^*$ Ohms
800	$0.9 + j4.5$	$1.0 + j0.7$
850	$1.3 + j4.7$	$1.1 + j0.9$
900	$1.6 + j4.4$	$1.2 + j1.1$
960	$1.5 + j3.7$	$1.2 + j1.3$

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

**Figure 6. Series Equivalent Impedance**

# PACKAGE DIMENSIONS




NOTES:  
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
 2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETER	
	MIN	MAX	MIN	MAX
A	0.965	0.985	24.52	25.01
B	0.355	0.375	9.02	9.52
C	0.230	0.260	5.85	6.60
D	0.115	0.125	2.93	3.17
E	0.102	0.114	2.59	2.90
F	0.075	0.085	1.91	2.15
H	0.160	0.170	4.07	4.31
J	0.004	0.006	0.11	0.15
K	0.090	0.110	2.29	2.79
L	0.725 BSC		18.42 BSC	
N	0.225	0.241	5.72	6.12
Q	0.125	0.135	3.18	3.42

STYLE 1:  
 PIN 1. BASE (COMMON)  
 2. EMITTER (INPUT)  
 3. BASE (COMMON)  
 4. BASE (COMMON)  
 5. COLLECTOR (OUTPUT)  
 6. BASE (COMMON)

CASE 319-07  
 ISSUE M

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