

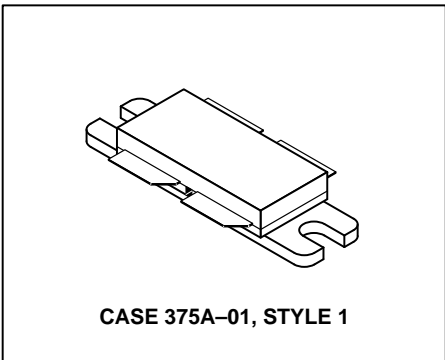
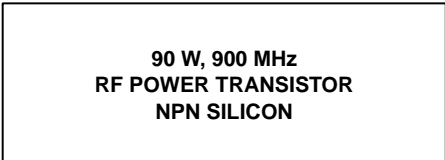
# The RF Line

## NPN Silicon

### RF Power Transistor

Designed for 26 V UHF large-signal, common emitter, class-AB linear amplifier applications in industrial and commercial FM/AM equipment operating in the range 800-960 MHz.

- Specified 26 V, 900 MHz Characteristics
  - Output Power = 90 Watts
  - Gain = 8.5 dB Min. @ 900 MHz, class AB
  - Efficiency = 35% Min. @ 900 MHz, 90 Watts (PEP)
  - Intermodulation Distortion -29 dBc Max. @ 90 Watts (PEP)
- Characterized with Series Equivalent Large-Signal Parameters from 800 to 960 MHz
- Silicon Nitride Passivated
- 100% Tested for Load Mismatch Stress at all Phase Angles with 5:1 VSWR @ 26 Vdc, and rated output power
- Gold Metallized, Emitter Ballasted for Long Life and Resistance to Metal Migration
- Circuit board photomaster available upon request by contacting RF Tactical Marketing in Phoenix, AZ.



#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	28	Vdc
Collector-Emitter Voltage	$V_{CES}$	60	Vdc
Emitter-Base Voltage	$V_{EBO}$	4.0	Vdc
Collector Current — Continuous	$I_C$	15	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	140 0.80	Watts W/ $^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-65 to +150	$^\circ\text{C}$
Operating Junction Temperature	$T_J$	200	$^\circ\text{C}$

#### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.25	$^\circ\text{C/W}$

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

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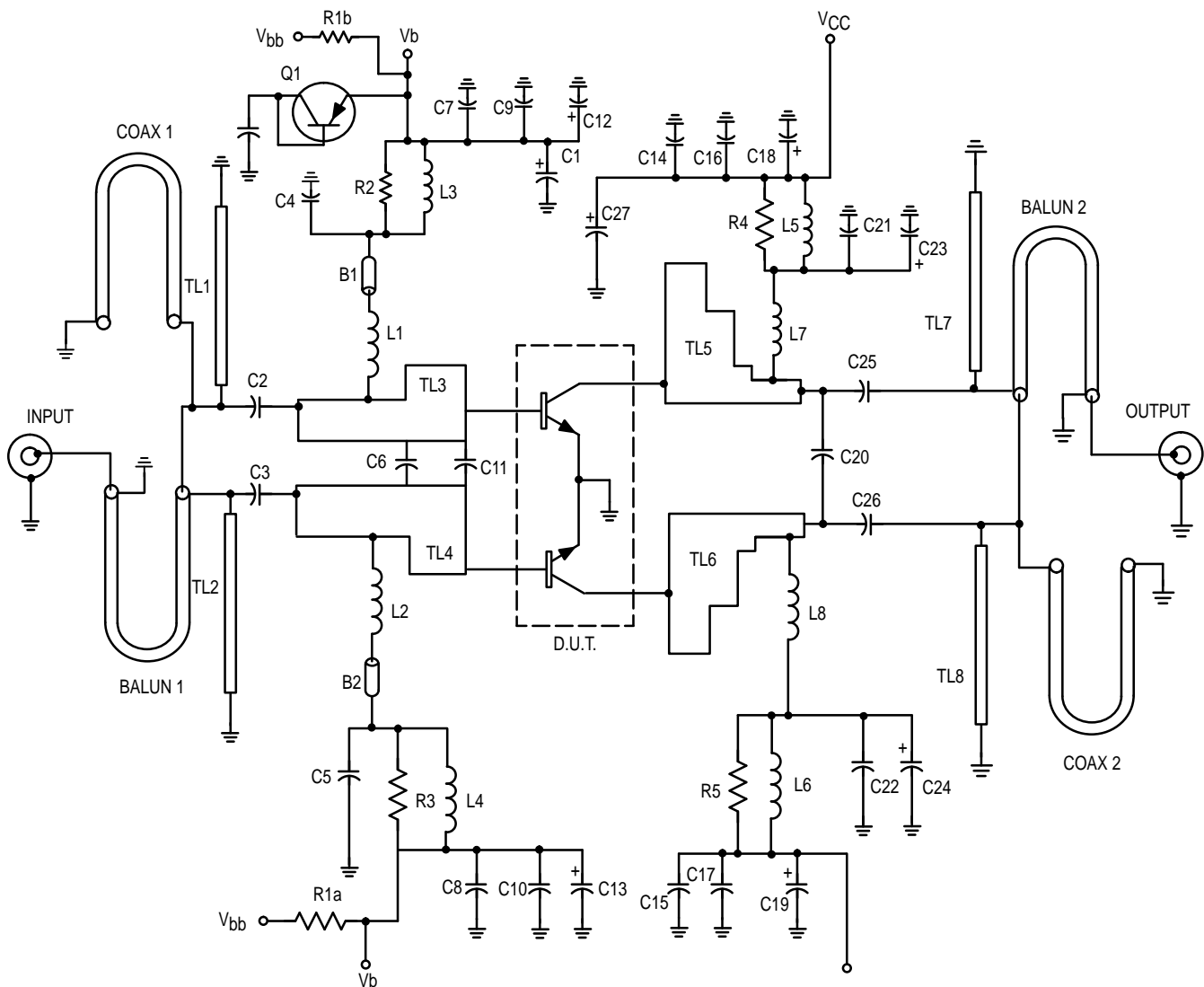
#### OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage ( $I_C = 50 \text{ mAdc}$ , $I_B = 0$ )	$V_{(BR)CEO}$	28	33	—	Vdc
Collector-Emitter Breakdown Voltage ( $I_C = 50 \text{ mAdc}$ , $V_{BE} = 0$ )	$V_{(BR)CES}$	60	75	—	Vdc
Emitter-Base Breakdown Voltage ( $I_E = 10 \text{ mAdc}$ , $I_C = 0$ )	$V_{(BR)EBO}$	4.0	4.5	—	Vdc
Collector Cutoff Current ( $V_{CE} = 30 \text{ Vdc}$ , $V_{BE} = 0$ )	$I_{CES}$	—	—	10.0	mAdc

(continued)

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

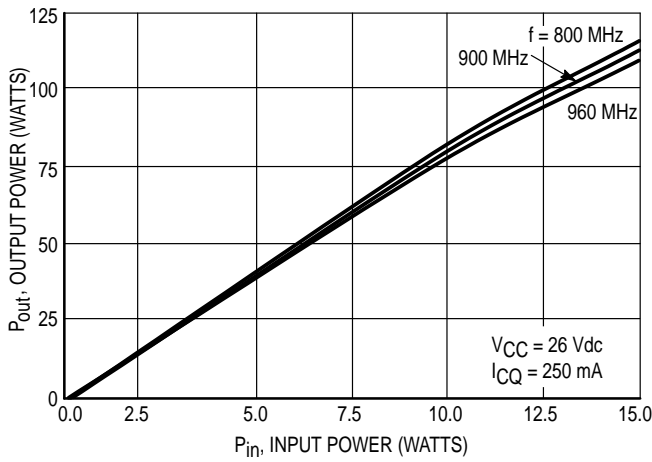
Characteristic	Symbol	Min	Typ	Max	Unit
<b>ON CHARACTERISTICS</b>					
DC Current Gain ( $I_{CE} = 1.0 \text{ Adc}$ , $V_{CE} = 5.0 \text{ Vdc}$ )	$h_{FE}$	30	60	120	—
<b>DYNAMIC CHARACTERISTICS</b>					
Output Capacitance ( $V_{CB} = 24 \text{ Vdc}$ , $I_E = 0$ , $f = 1.0 \text{ MHz}$ ) — for information only. This part is collector matched.	$C_{ob}$	—	45	—	pF
<b>FUNCTIONAL TESTS</b>					
Common-Emitter Amplifier Power Gain ( $V_{CC} = 26 \text{ Vdc}$ , $P_{out} = 90 \text{ Watts (PEP)}$ , $I_{CQ} = 250 \text{ mA}$ , $f_1 = 900 \text{ MHz}$ , $f_2 = 900.1 \text{ MHz}$ )	$G_{pe}$	8.5	9.5	—	dB
Collector Efficiency ( $V_{CC} = 26 \text{ Vdc}$ , $P_{out} = 90 \text{ Watts (PEP)}$ , $I_{CQ} = 250 \text{ mA}$ , $f_1 = 900 \text{ MHz}$ , $f_2 = 900.1 \text{ MHz}$ )	$\eta_C$	35	42	—	%
Intermodulation Distortion ( $V_{CC} = 26 \text{ Vdc}$ , $P_{out} = 90 \text{ Watts (PEP)}$ , $I_{CQ} = 250 \text{ mA}$ , $f_1 = 900 \text{ MHz}$ , $f_2 = 900.1 \text{ MHz}$ )	IMD	—	-32	-29	dBc
Output Mismatch Stress ( $V_{CC} = 26 \text{ Vdc}$ , $P_{out} = 90 \text{ Watts (PEP)}$ , $I_{CQ} = 250 \text{ mA}$ , $f_1 = 900 \text{ MHz}$ , $f_2 = 900.1 \text{ MHz}$ Load VSWR = 5:1, All phase angles at frequency of test)	$\psi$	No Degradation in Output Power Before and After Test			



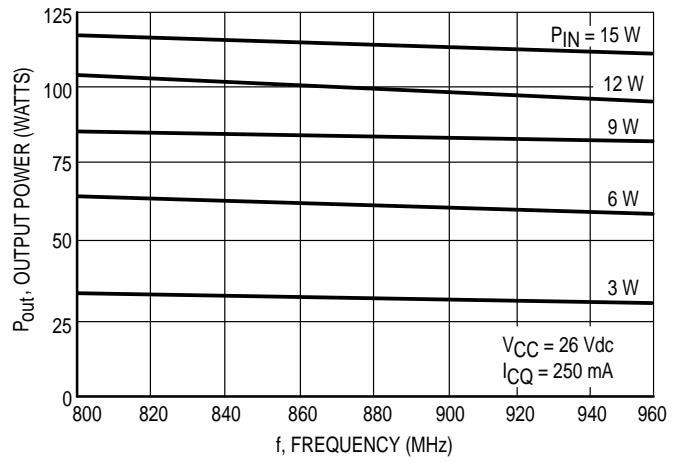
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|---|--|
| B1, B2 — Ferrite Bead                                 | C27 — 500 $\mu$ F Cap, 50 Vdc Min                                  |
| C1 — 200 $\mu$ F Cap, 50 Vdc Min                      | L1, L2, L7, L8 — 4T No. 20 AWG, 0.163" ID CW                       |
| C2, C3, C25, C26 — 43 pF Chip Cap, 100 Mil            | L3, L4, L5, L6 — 12T No. 22 AWG, 0.140" ID CW                      |
| C4, C5, C21, C22 — 100 pF Chip Cap, 100 Mil           | Q1 — BD166   |
| C6 — 3.3 pF Chip Cap, 100 Mil                         | R1a, R1b — 56 Ohm, 1 W Resistor                                    |
| C7, C8, C14, C15 — 1000 pF Chip Cap, 100 Mil          | R2, R3, R4, R5 — 4 x 39 Ohm, 1/8 W Chip Resistor                   |
| C9, C10, C16, C17 — 1800 pF Chip Cap, 100 Mil         | TL1-8 — On PCB Mask  |
| C11 — 7.5 pF Chip Cap, 50 Mil                         | Balun 1,2 Coax 1,2 — 2.20" 50 Ohm Semi-Rigid Coax, 0.088" OD       |
| C12, C13, C18, C19, C23, C24 — 10 $\mu$ F Cap, 50 Vdc | PCB — 0.030", Teflon <sup>®</sup> -Fiberglass, $\epsilon_r = 2.55$ |
| C20 — 1.8 pF Chip Cap                                 | Wear Blocks — 0.330" x 0.170" x 0.50" Beryllium Copper             |

**Figure 1. Broadband Test Circuit**

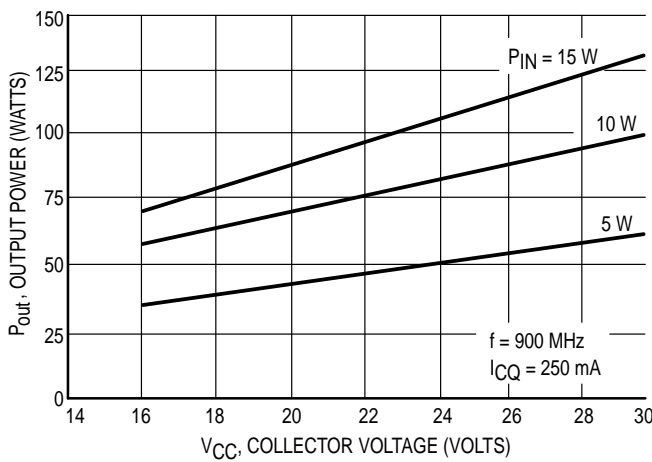
## TYPICAL CHARACTERISTICS



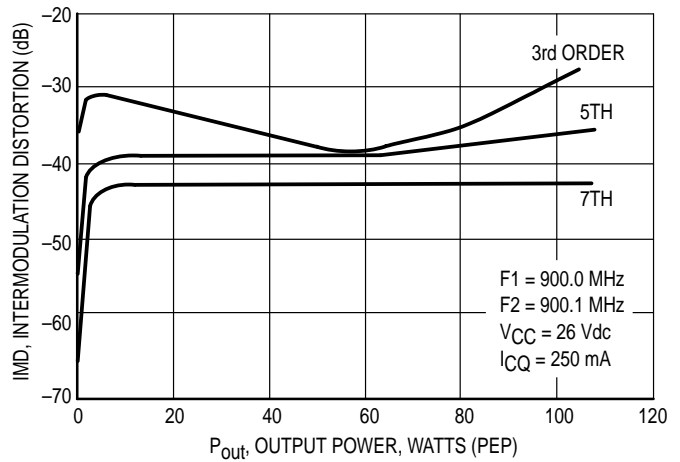
**Figure 2. Output Power versus Input Power**



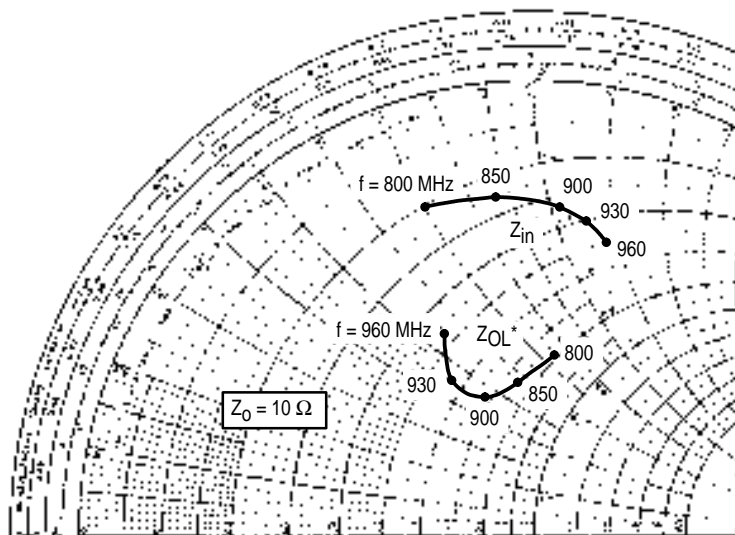
**Figure 3. Output Power versus Frequency**



**Figure 5. Output Power versus Supply Voltage**



**Figure 4. Intermodulation Distortion versus Output Power**



**Figure 6. Series Equivalent Input/Output Impedances**

$P_o = 90 \text{ W}, V_{CC} = 26 \text{ V}$

f (MHz)	$Z_{in}$ ohms	$Z_{OL}^*$ ohms
800	$2.00 + j6.90$	$7.68 + j7.33$
850	$2.45 + j8.60$	$7.38 + j5.86$
900	$3.30 + j10.1$	$6.93 + j4.53$
930	$3.90 + j10.9$	$5.89 + j4.42$
960	$5.00 + j11.5$	$4.58 + j5.57$

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

NOTE:  $Z_{in}$  &  $Z_{OL}^*$  are given from base-to-base and collector-to-collector respectively.

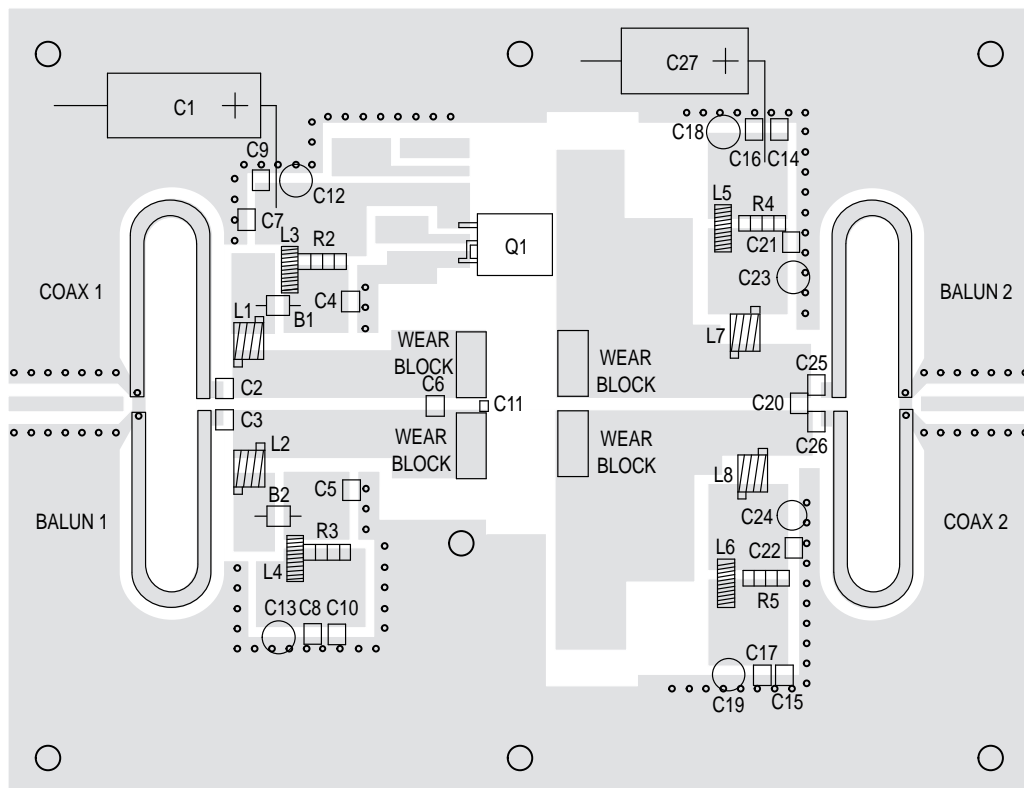
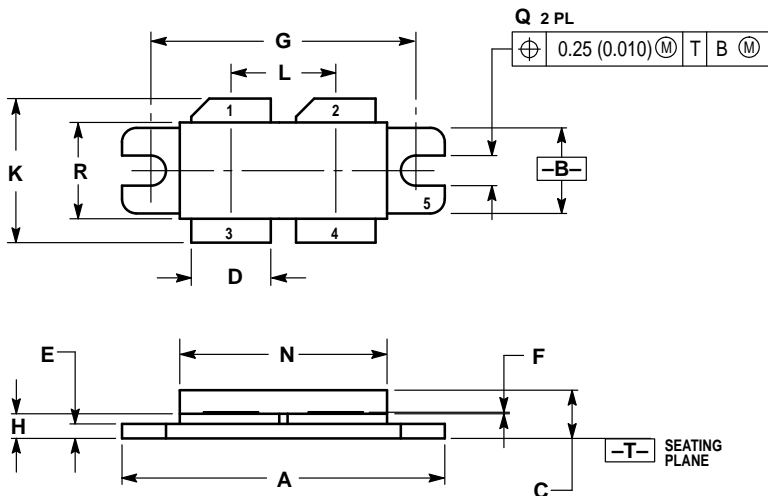


Figure 7. Fixture Component Layout

# PACKAGE DIMENSIONS



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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	1.330	1.350	33.79	34.29
B	0.375	0.395	9.52	10.03
C	0.180	0.205	4.57	5.21
D	0.320	0.340	8.13	8.64
E	0.060	0.070	1.52	1.77
F	0.004	0.006	0.11	0.15
G	1.100 BSC		27.94 BSC	
H	0.082	0.097	2.08	2.46
K	0.580	0.620	14.73	15.75
L	0.435 BSC		11.05 BSC	
N	0.845	0.875	21.46	22.23
Q	0.118	0.130	3.00	3.30
R	0.390	0.410	9.91	10.41

- STYLE 1:  
 PIN 1. COLLECTOR  
 2. COLLECTOR  
 3. BASE  
 4. BASE  
 5. EMITTER

CASE 375A-01  
 ISSUE O

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