

## The RF Line UHF Power Transistor

The TP3005 is designed for 960 MHz base stations in both analog and digital applications. It incorporates high value emitter ballast resistors, gold metallizations and offers a high degree of reliability and ruggedness.

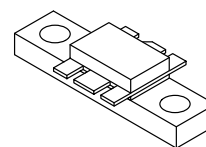
- Specified 26 Volts, 960 MHz Characteristics
  - Output Power = 4.0 Watts
  - Minimum Gain = 8.5 dB
  - Class AB
  - $I_Q = 60$  mA
- Circuit board photomaster available upon request by contacting RF Tactical Marketing in Phoenix, AZ.

**TP3005**

**4.0 W, 960 MHz  
UHF POWER  
TRANSISTOR  
NPN SILICON**

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CER}$	40	Vdc
Collector-Base Voltage	$V_{CBO}$	48	Vdc
Emitter-Base Voltage	$V_{EBO}$	4.0	Vdc
Collector Current — Continuous	$I_C$	2.0	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	25 0.2	Watts W/ $^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-65 to +150	$^\circ\text{C}$
Operating Junction Temperature	$T_J$	200	$^\circ\text{C}$



**CASE 319-07, STYLE 2**

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case (1) at $70^\circ\text{C}$ Case	$R_{\theta JC}$	7.0	$^\circ\text{C/W}$

### 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 ( $I_C = 15$ mA, $R_{BE} = 75 \Omega$ )	$V_{(BR)CER}$	45	—	—	Vdc
Emitter-Base Breakdown Voltage ( $I_C = 3.0$ mAdc)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector-Base Breakdown Voltage ( $I_E = 15$ mAdc)	$V_{(BR)CBO}$	55	—	—	Vdc
Collector-Emitter Leakage ( $V_{CE} = 26$ V, $R_{BE} = 75 \Omega$ )	$I_{CER}$	—	—	3.0	mA

### ON CHARACTERISTICS

DC Current Gain ( $I_C = 0.5$ Adc, $V_{CE} = 10$ Vdc)	$h_{FE}$	15	—	100	—
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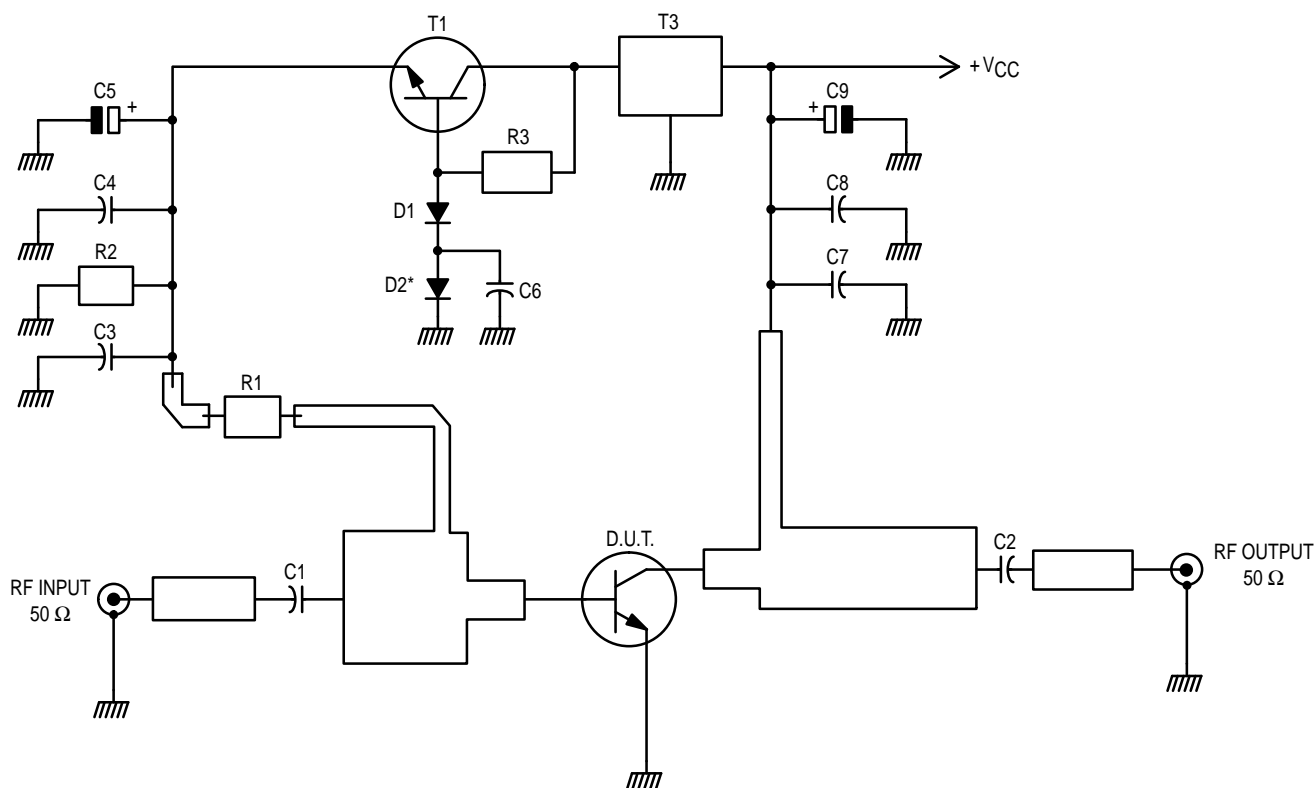
NOTE:

- Thermal resistance is determined under specified RF operating condition.

(continued)

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

Characteristic	Symbol	Min	Typ	Max	Unit
DYNAMIC CHARACTERISTICS					
Output Capacitance ( $V_{CB} = 26\text{ V}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )	$C_{ob}$	7.5	—	12.5	pF
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain ( $V_{CC} = 26\text{ V}$ , $P_{out} = 4.0\text{ W}$ , $I_{CQ} = 60\text{ mA}$ , $f = 960\text{ MHz}$ )	$G_p$	8.5	9.5	—	dB
Load Mismatch ( $V_{CC} = 26\text{ V}$ , $P_{out} = 4.0\text{ W}$ , $I_{CQ} = 60\text{ mA}$ , Load VSWR = 5:1, at all phase angles)	$\psi$	No Degradation in Output Power Before and After Test			
Collector Efficiency ( $V_{CC} = 26\text{ V}$ , $P_{out} = 4.0\text{ W}$ , $f = 960\text{ MHz}$ )	$\eta_c$	50	55	—	%
Power Saturation $P_{in} = 1.0\text{ W}$	$P_{sat}$	7.0	—	—	W



\*Contact with RF Transistor

C1 — Capacitor Chip 0805 22 pF 5%

C2, C3, C6, C8 — Capacitor Chip 0805 330 pF 5%

C4, C7 — Capacitor Chip 0805 15 nF 5%

C5, C9 — Capacitor Chip 0805 6.0, 8.0 nF 35 V

D1, D2 — SMD Diode

R1 — Chip Resistor 2.2  $\Omega$  1206 5%

R2 — Chip Resistor 51  $\Omega$  0805 5%

R3 — Chip Resistor 470  $\Omega$  0805 5%  
to be adjusted for  $I_Q = 60$  mA

T1 — SMD Transistor BCX54 or Similar

### T3 — Voltage Regulator 7805

Board Material — 0.8 mm, Epoxy Glass, Cu Clad, 2 Sides, 35  $\mu$ m Thick

### Figure 1. 960 MHz Test Circuit

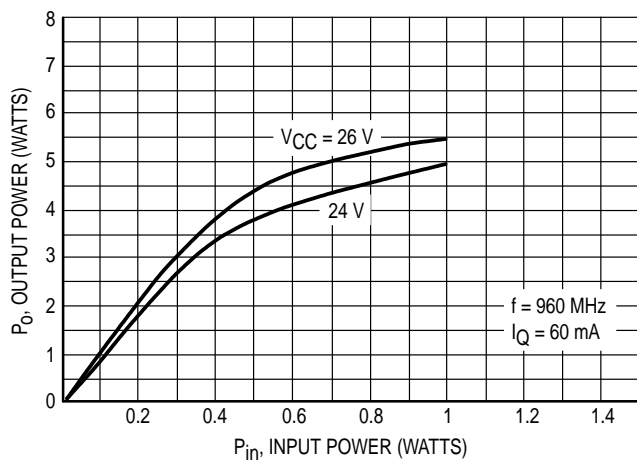


Figure 2. Output Power versus Input Power

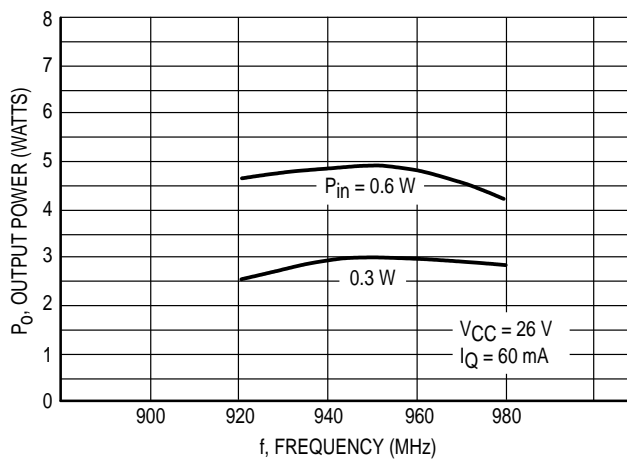


Figure 3. Output Power versus Frequency

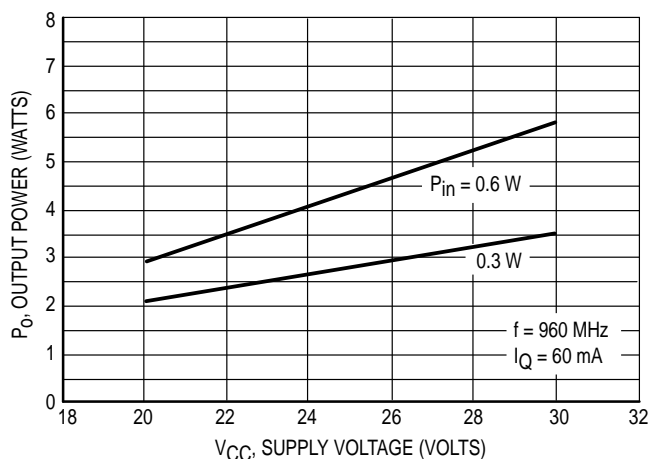


Figure 4. Output Power versus Supply Voltage

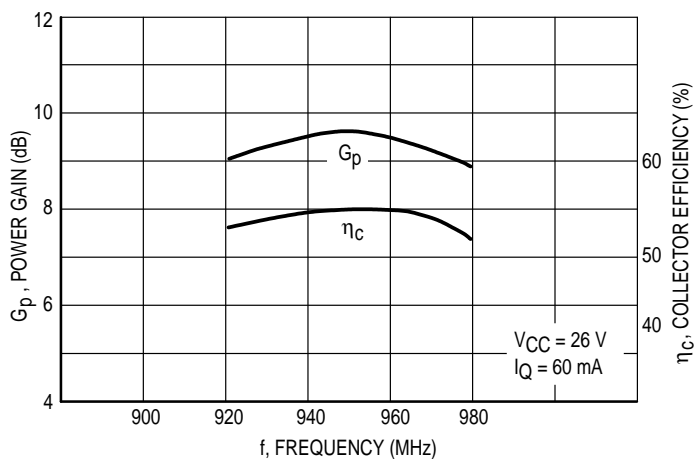


Figure 5. Typical Broadband Circuit Performance

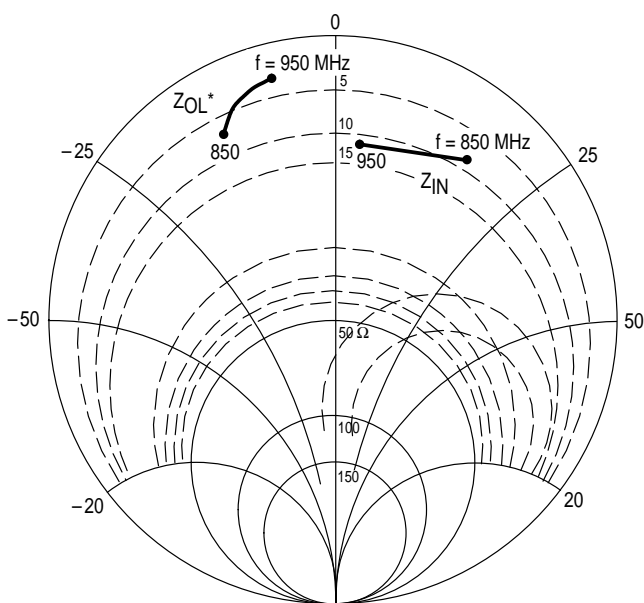


Figure 6. Series Equivalent Input/Output Impedances

$P_{out} = 4.0 \text{ W}$   $V_{CE} = 26 \text{ V}$

f MHz	$Z_{IN}$ OHMS	$Z_{OL}^*$ OHMS
850	$8.1 + j17$	$6.7 - j11$
900	$9.1 + j12.7$	$4.0 - j10$
950	$13.9 + j4.4$	$3.2 - j6.1$

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

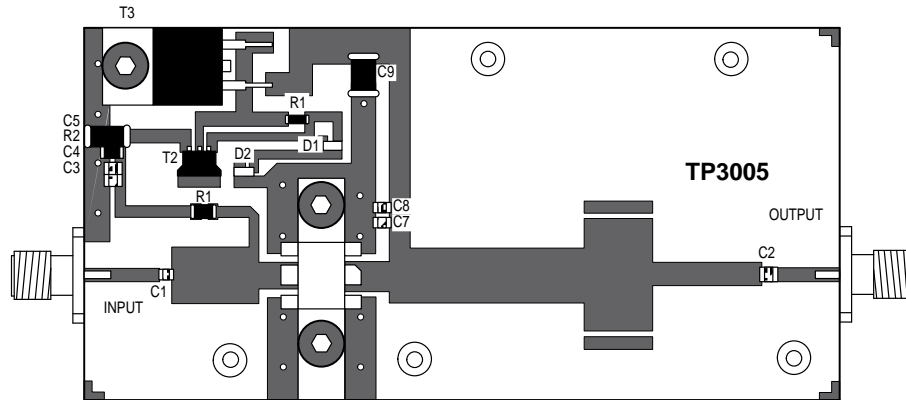
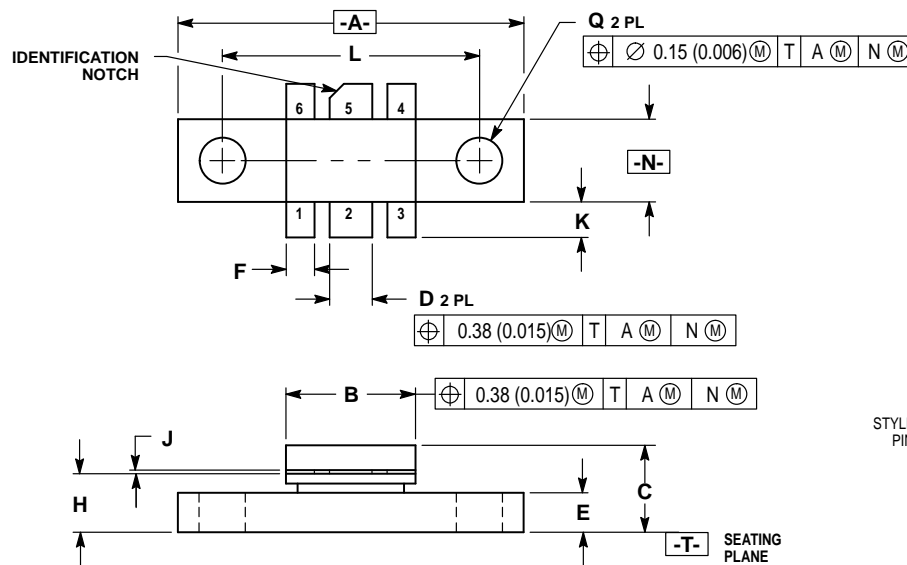


Figure 7. Test Circuit — Component Locations

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

## CASE 319-07 ISSUE M

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