

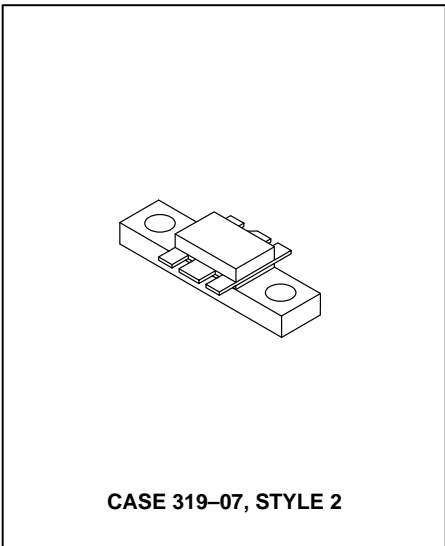
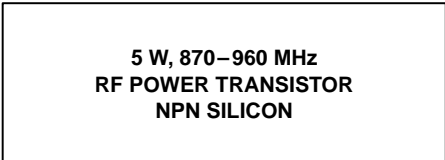
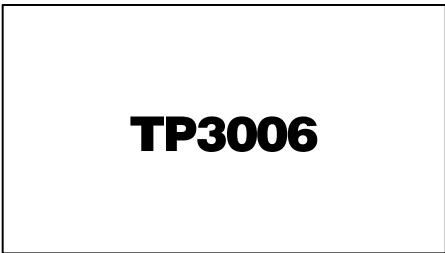
# The RF Line

## NPN Silicon

### RF Power Transistor

The TP3006 is designed for cellular radio base station amplifiers up to 960 MHz. It incorporates high value emitter ballast resistors, gold metallizations and offers a high degree of reliability and ruggedness. The TP3006 also features input and output matching networks and high impedances. It can easily operate in a full 870–960 MHz bandwidth in a simple circuit.

- Class AB Operation
- Specified 26 Volts, 960 MHz Characteristics
  - Output Power — 5 Watts
  - Gain — 9 dB min
  - Efficiency — 45% min
- Circuit board photomaster available upon request by contacting RF Tactical Marketing in Phoenix, AZ.



#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	$V_{CER}$	45	Vdc
Collector–Base Voltage	$V_{CBO}$	55	Vdc
Emitter–Base Voltage	$V_{EBO}$	3.5	Vdc
Collector–Current — Continuous	$I_C$	2	Adc
Storage Temperature Range	$T_{stg}$	– 40 to +100	°C
Operating Junction Temperature	$T_J$	200	°C
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	$P_D$	25 0.14	Watts W/°C

#### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case (1)	$R_{\theta JC}$	7	°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 ( $I_C = 15\text{ mA}$ , $R_{BE} = 75\ \Omega$ )	$V_{(BR)CER}$	45	—	—	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 4\text{ mAdc}$ )	$V_{(BR)EBO}$	3.5	—	—	Vdc
Collector–Base Breakdown Voltage ( $I_C = 15\text{ mAdc}$ )	$V_{(BR)CBO}$	55	—	—	Vdc
Collector–Emitter Leakage ( $V_{CE} = 26\text{ V}$ , $R_{BE} = 75\ \Omega$ )	$I_{CER}$	—	—	4	mA

#### ON CHARACTERISTICS

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

1. Thermal resistance is determined under specified RF operating condition at temperature test point (see drawing of the package).

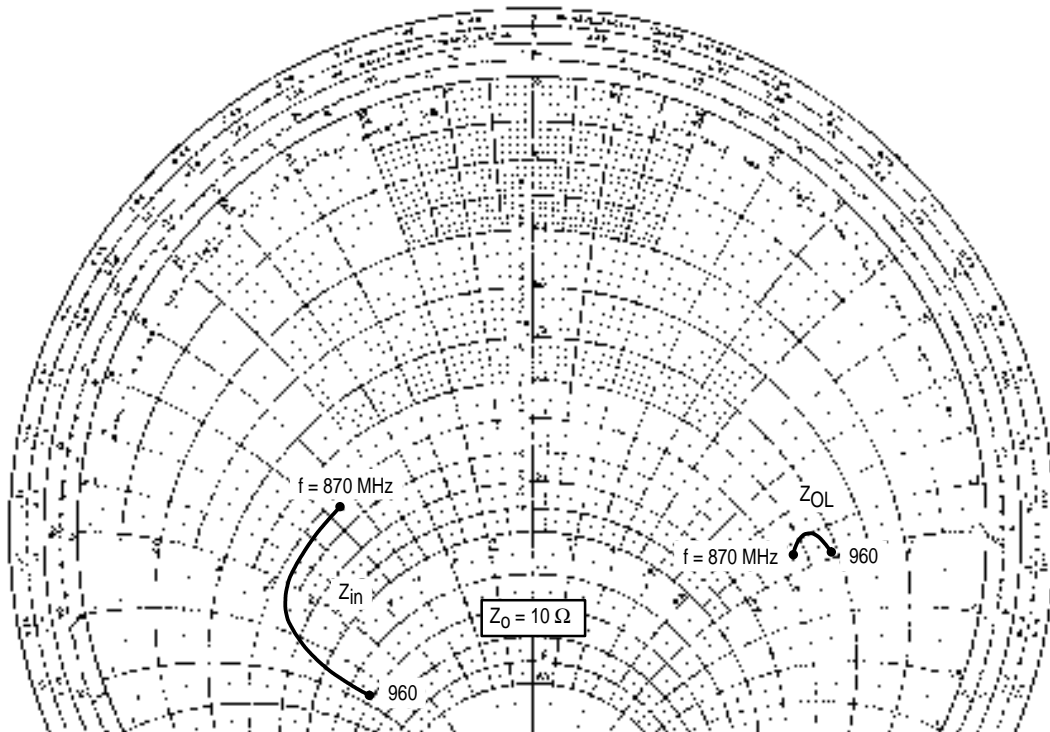
(continued)

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

Characteristic	Symbol	Min	Typ	Max	Unit
<b>DYNAMIC CHARACTERISTICS</b>					
Output Capacitance ( $V_{CB} = 26\text{ V}$ , $I_E = 0$ , $f = 1\text{ MHz}$ )	$C_{ob}$	—	8.5	—	pF

<b>FUNCTIONAL TESTS IN CW</b>					
Common-Emitter Amplifier Power Gain ( $V_{CC} = 26\text{ V}$ , $P_{out} = 5\text{ W}$ , $I_{CQ} = 50\text{ mA}$ , $f = 960\text{ MHz}$ )	$G_p$	9	10.5	—	dB
Collector Efficiency ( $V_{CC} = 26\text{ V}$ , $P_{out} = 5\text{ W}$ , $I_Q = 50\text{ mA}$ , $f = 960\text{ MHz}$ )	$h$	45	50	—	%
Input Overdrive (no degradation in $P_{out}$ ) ( $V_{CC} = 26\text{ V}$ , $I_Q = 50\text{ mA}$ , $f = 960\text{ MHz}$ )	$P_{in}$	3	—	—	dB

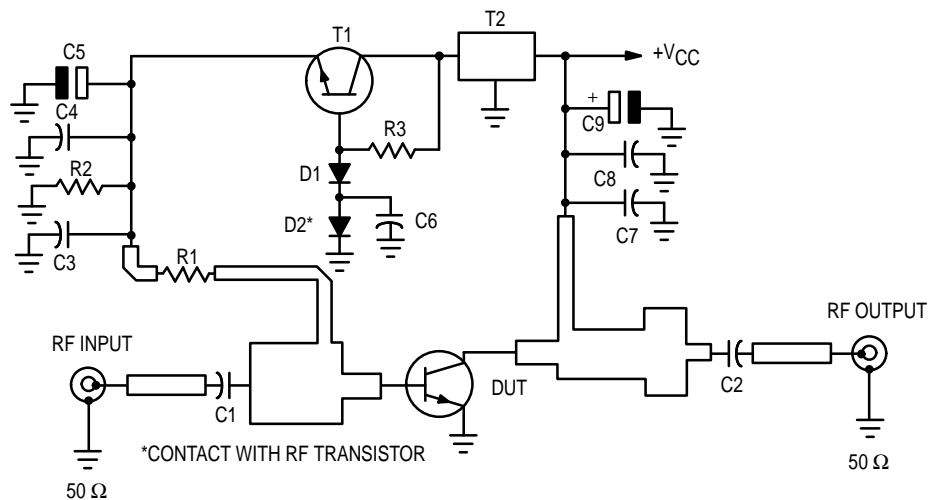
<b>FUNCTIONAL TESTS IN 2 TONES</b>					
3rd Order Intermodulation ( $V_{CC} = 26\text{ V}$ , $P_{peak} = 5\text{ W}$ , $I_{CQ} = 50\text{ mA}$ , $f = 900\text{ MHz}$ )	IMD3	—	-46	—	dB
5th Order Intermodulation ( $V_{CC} = 26\text{ V}$ , $P_{peak} = 5\text{ W}$ , $I_{CQ} = 50\text{ mA}$ , $f = 900\text{ MHz}$ )	IMD5	—	-46	—	dB



$P_{out} = 5\text{ W (CW)}$ ,  $V_{CE} = 26\text{ V}$ ,  $I_{CQ} = 50\text{ mA}$

f (MHz)	$Z_{in}$ ( $\Omega$ )	$Z_{OL}$ ( $\Omega$ )
870	$6.26 - j6.40$	$5.22 + j9.47$
900	$7.40 - j12.3$	$4.17 + j9.02$
960	$14.8 - j12.9$	$4.21 + j9.91$

**Figure 1. Series Equivalent Input and Output Impedances**



C1	22 pF, 5%, Chip Capacitor 0805	R1	2.2 Ω, 5%, Chip Resistor 1206
C2,C3	330 pF, Chip Capacitor 0805	R2	51 Ω, 5%, Chip Resistor 0805
C4,C7	15 nF, 5%, Chip Capacitor 0805	R3	470 Ω, 5%, Chip Resistor 0805 to be adjusted for $I_Q = 50$ mA
C5,C9	6.8 F, 35 V, Chip Capacitor 0805	T1	SMD Transistor, BCX54 or Similar
C6,C8	330 pF, Chip Capacitor 0805	T2	Voltage Regulator 7805
D1,D2	SMD Diode		

Figure 2. 960 MHz Electrical Schematic

**TYPICAL CHARACTERISTICS  
CW – WIDEBAND**

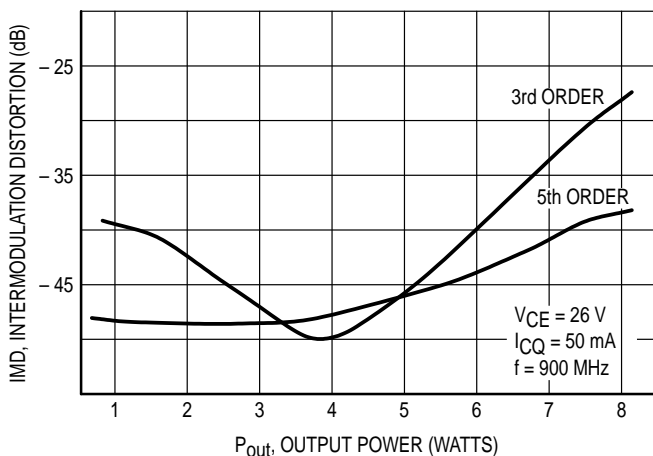


Figure 3. Intermodulation versus Output Power

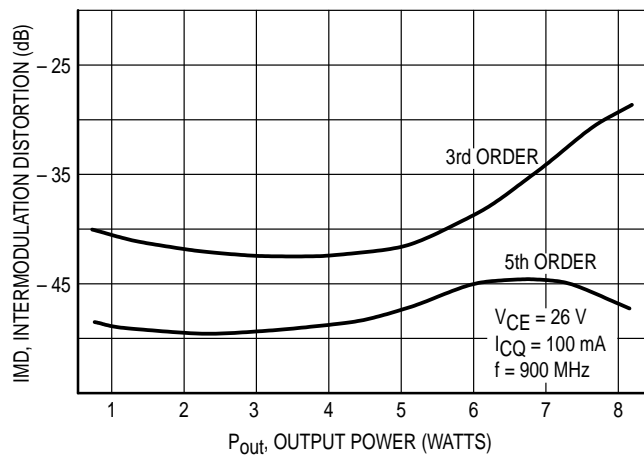
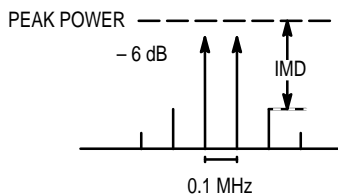
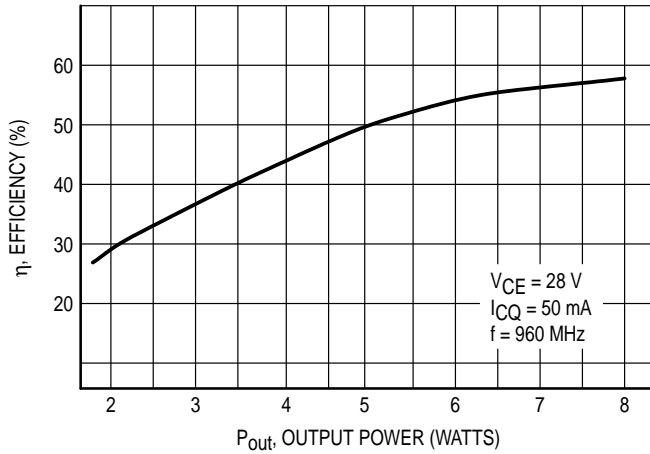


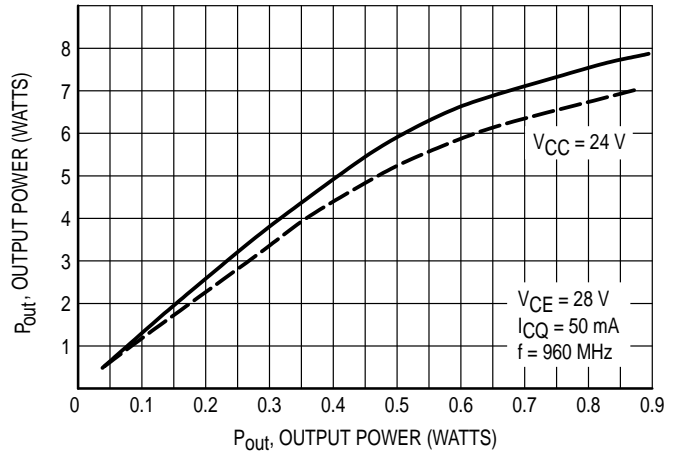
Figure 4. Intermodulation versus Output Power



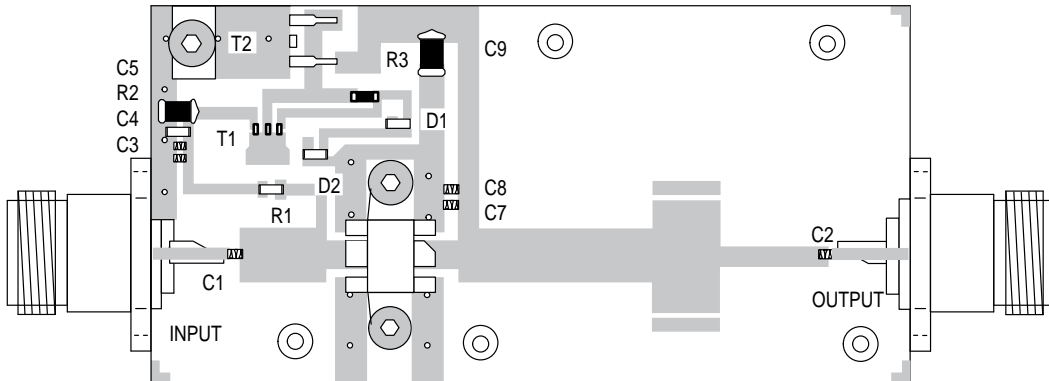
## TYPICAL CHARACTERISTICS CW – WIDEBAND



**Figure 5. Collector Efficiency versus Output Power**



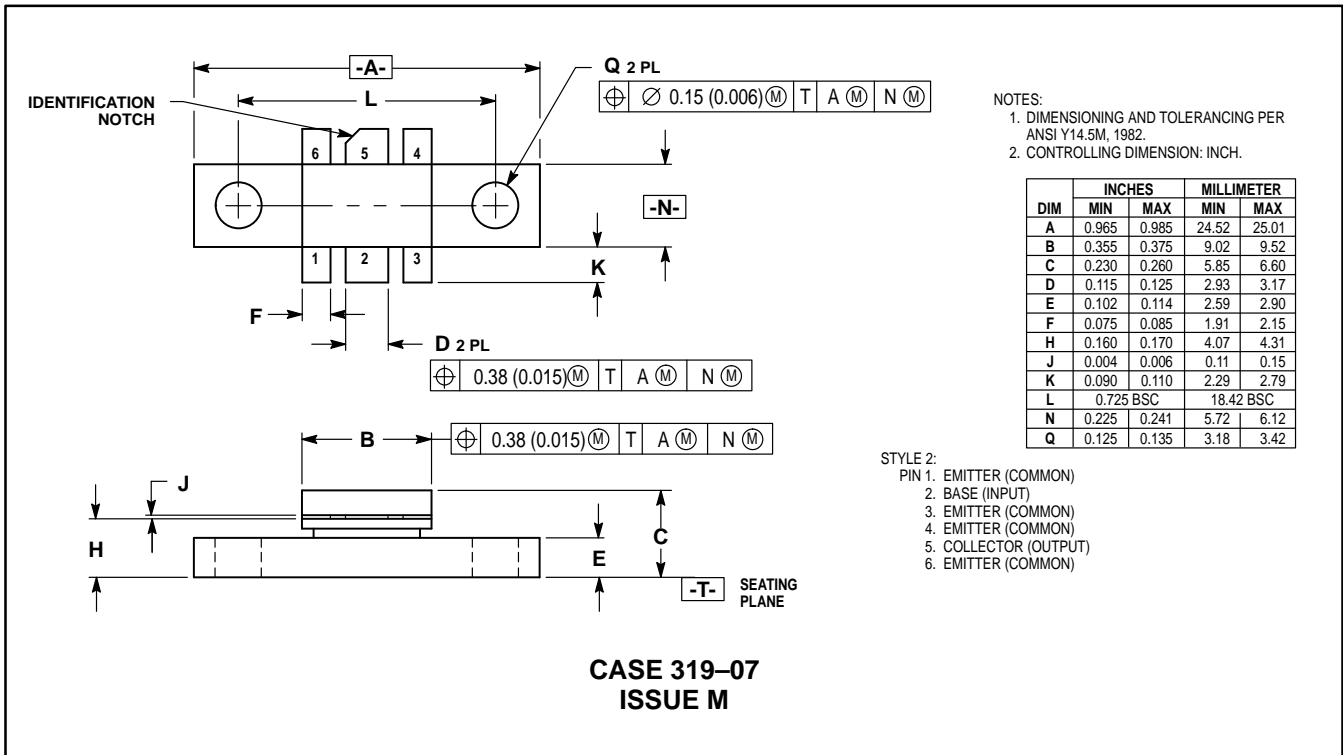
**Figure 6. Output Power versus Input Power**




EPOXY GLASS 0.8 mm GI 180 PERSTORP DOUBLE SIDE 35 μm Cu.

**Figure 7. 960 MHz Test Circuit Components View**

# PACKAGE DIMENSIONS



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