The RF Line

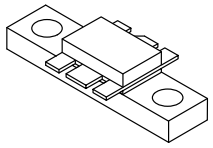
NPN Silicon RF Power Transistor

TP3006

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.

5 W, 870–960 MHz
RF POWER TRANSISTOR
NPN SILICON



CASE 319–07, STYLE 2

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°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°C unless otherwise noted.)

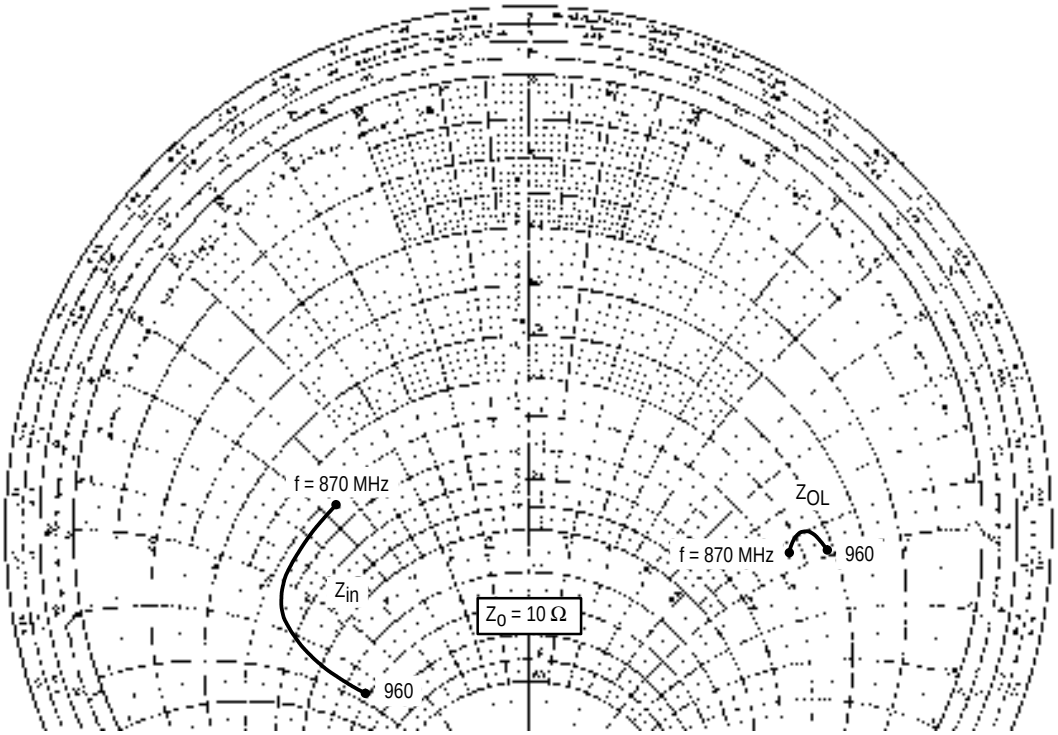
Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Breakdown Voltage (I_C = 15 mA, R_{BE} = 75 Ω)	$V_{(BR)CER}$	45	—	—	Vdc
Emitter–Base Breakdown Voltage (I_E = 4 mAdc)	$V_{(BR)EBO}$	3.5	—	—	Vdc
Collector–Base Breakdown Voltage (I_C = 15 mAdc)	$V_{(BR)CBO}$	55	—	—	Vdc
Collector–Emitter Leakage (V_{CE} = 26 V, R_{BE} = 75 Ω)	I_{CER}	—	—	4	mA
ON CHARACTERISTICS					
DC Current Gain (I_C = 0.5 Adc, V_{CE} = 10 Vdc)	h_{FE}	15	—	100	—

NOTE: (continued)

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

ELECTRICAL CHARACTERISTICS — continued (T_C = 25°C unless otherwise noted.)

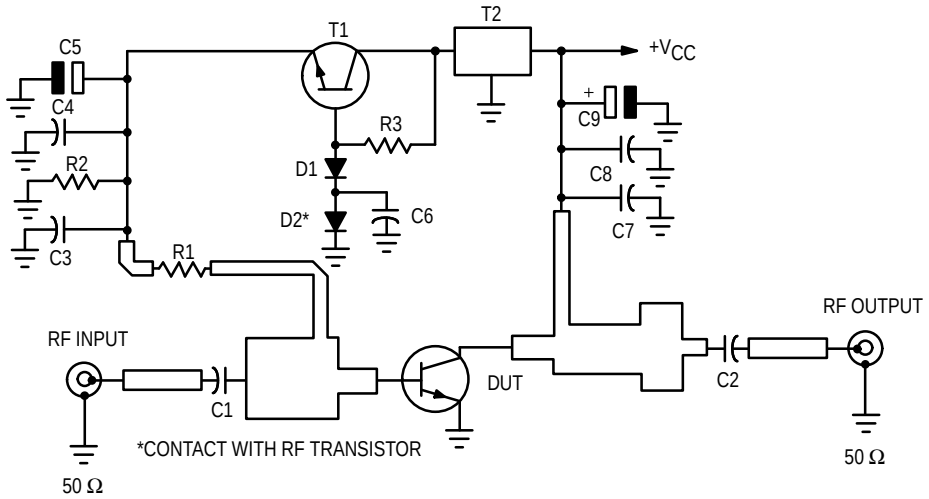
Characteristic	Symbol	Min	Typ	Max	Unit
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 26 V, I_E = 0, f = 1 MHz)	C_{ob}	—	8.5	—	pF
FUNCTIONAL TESTS IN CW					
Common–Emitter Amplifier Power Gain (V_{CC} = 26 V, P_{out} = 5 W, I_{CQ} = 50 mA, f = 960 MHz)	G_p	9	10.5	—	dB
Collector Efficiency (V_{CC} = 26 V, P_{out} = 5 W, I_Q = 50 mA, f = 960 MHz)	h	45	50	—	%
Input Overdrive (no degradation in P_{out}) (V_{CC} = 26 V, I_Q = 50 mA, f = 960 MHz)	P_{in}	3	—	—	dB
FUNCTIONAL TESTS IN 2 TONES					
3rd Order Intermodulation (V_{CC} = 26 V, P_{peak}= 5 W, I_{CQ} = 50 mA, f = 900 MHz)	IMD3	—	– 46	—	dB
5th Order Intermodulation (V_{CC} = 26 V, P_{peak}= 5 W, I_{CQ} = 50 mA, f = 900 MHz)	IMD5	—	– 46	—	dB



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

f (MHz)	Z_{in} (Ω)	Z_{OL} (Ω)
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 CHARACTERITICS
CW – WIDEBAND

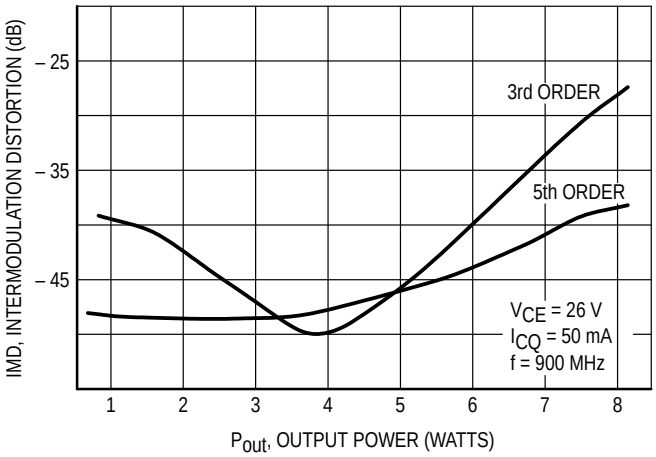


Figure 3. Intermodulation versus Output Power

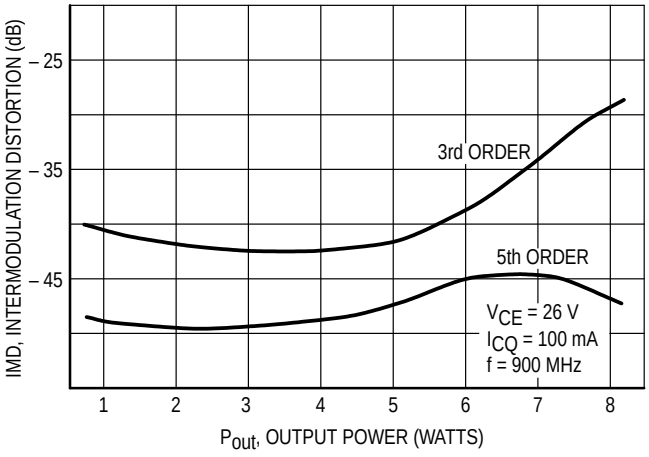
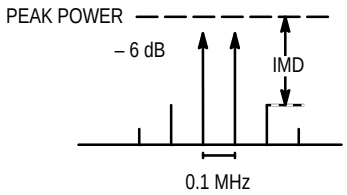


Figure 4. Intermodulation versus Output Power



TYPICAL CHARACTERITICS
CW – WIDEBAND

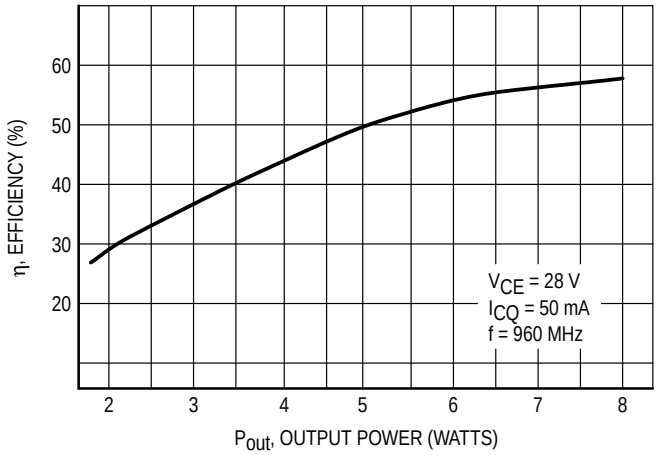


Figure 5. Collector Efficiency versus Output Power

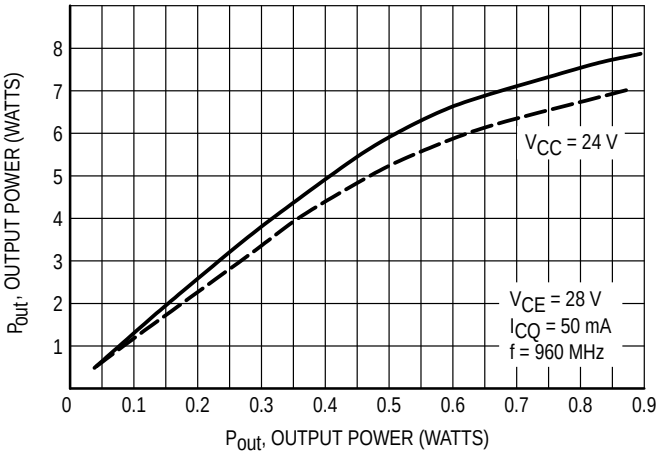
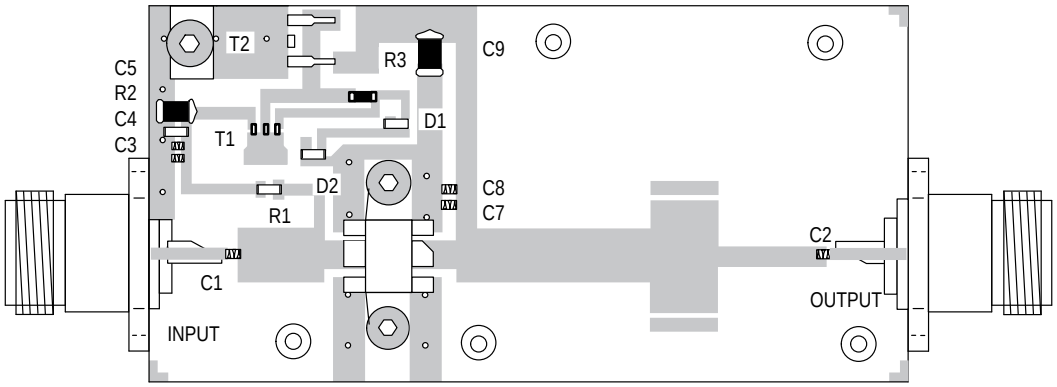


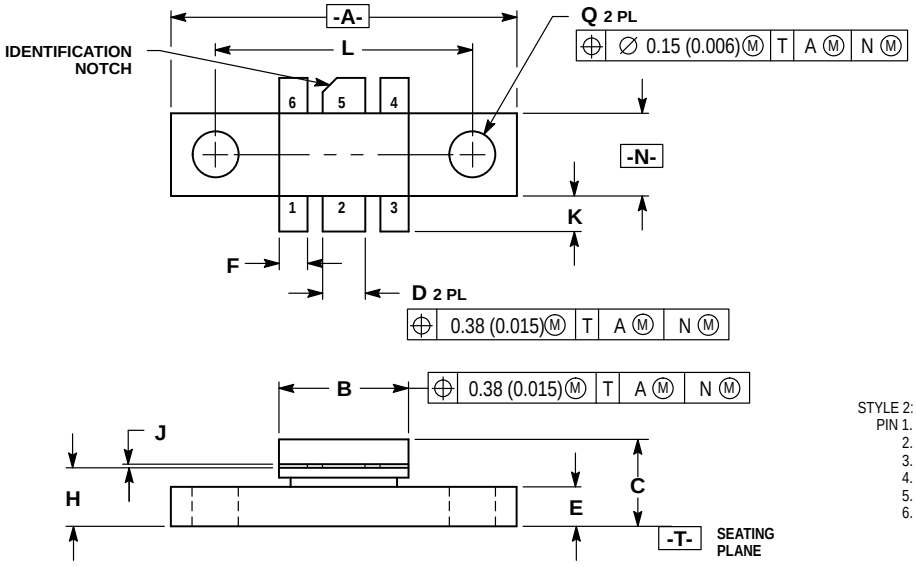
Figure 6. Output Power versus Input Power



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

Figure 7. 960 MHz Test Circuit Components View

PACKAGE DIMENSIONS



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

	INCHES		MILLIMETER	
DIM	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:
PIN 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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