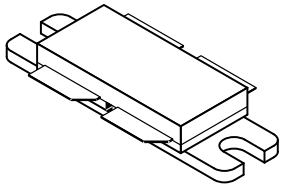
The RF Line
RF Power Transistor

TP3069

The TP3069 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 TP3069 also features input and output matching networks and high impedances. It can easily operate in a full 935–960 MHz bandwidth in a simple circuit.

- Class AB Operation
- Specified 26 Volts, 960 MHz Characteristics
  Output Power — 100 Watts
  Gain — 7.5 dB min
- Circuit board photomaster available upon request by contacting RF Tactical Marketing in Phoenix, AZ.

100 W, 960 MHz
RF POWER TRANSISTOR
NPN SILICON



CASE 375A–01, STYLE 1

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CEO}	30	Vdc
Collector–Base Voltage	V_{CBO}	65	Vdc
Emitter–Base Voltage	V_{EBO}	4	Vdc
Collector Current — Continuous	I_C	20	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	245 1.4	Watts W/°C
Quiescent Current	I_{CQ}	2 x 500	mA

THERMAL CHARACTERISTICS

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case (1)	$R_{\theta JC}$	0.7	°C/W

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

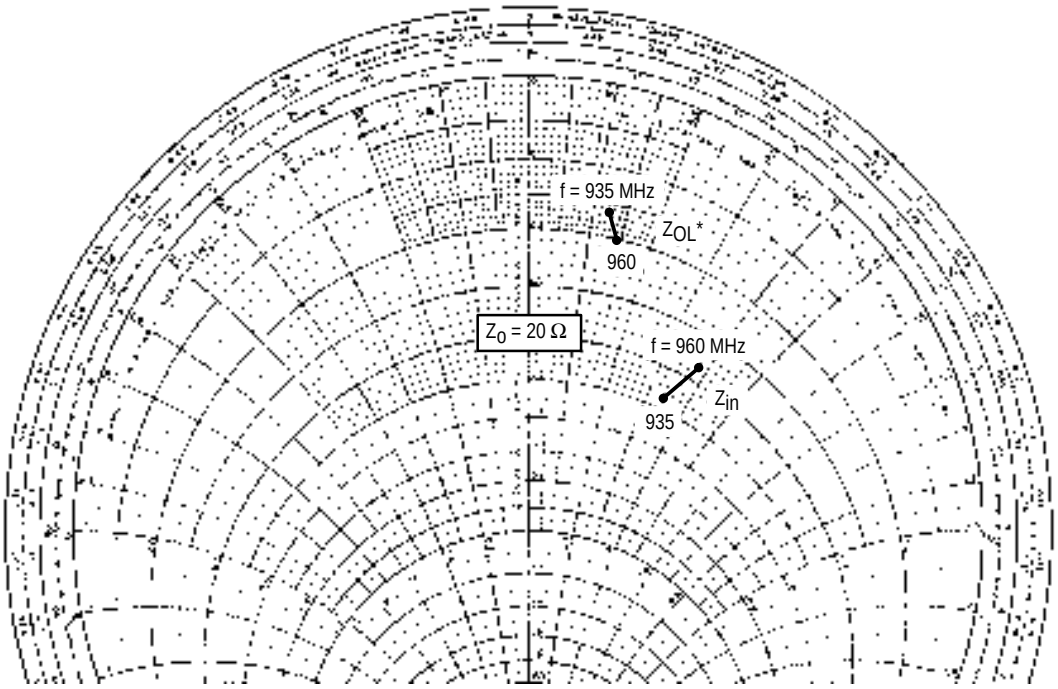
Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Breakdown Voltage (I_C = 20 mA)	$V_{(BR)CEO}$	30	—	—	Vdc
Emitter–Base Breakdown Voltage (I_E = 20 mAdc)	$V_{(BR)EBO}$	4	—	—	Vdc
Collector–Base Breakdown Voltage (I_C = 35 mAdc)	$V_{(BR)CBO}$	65	—	—	Vdc
Collector–Emitter Leakage (V_{CE} = 28 V, R_{BE} = 75 Ω)	I_{CER}	—	—	15	mA
ON CHARACTERISTICS					
DC Current Gain (I_C = 2 Adc, V_{CE} = 10 V)	h_{FE}	30	—	120	—
DYNAMIC CHARACTERISTICS (V_{CB} = 28 V, I_E = 0, f = 1 MHz)					
Output Capacitance (each side) (2)	C_{ob}	—	75	—	pF

NOTES:
1. Thermal resistance is determined under specified RF operating condition.
2. Value of "C_{ob}" is that of die only. It is not measurable in TP3069 because of internal matching network.

(continued)

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

Characteristic	Symbol	Min	Typ	Max	Unit
FUNCTIONAL TESTS (V_{CC} = 26 V, f = 960 MHz)					
Common–Emitter Amplifier Gain (P_{out} = 100 W, I_{CQ} = 2 x 100 mA)	G_p	7.5	8.8	—	dB
Collector Efficiency (P_{out} = 100 W)	η	45	50	—	%
Over Drive 2 dB Input Power Overdrive	OD	No Degradation in Output Power			
3rd Order Intermodulation (P_{out} = 100 W PEP, I_{CQ} = 2 x 50 mA, Δf = 400 KHz)	IMD3	—	– 32	—	dB

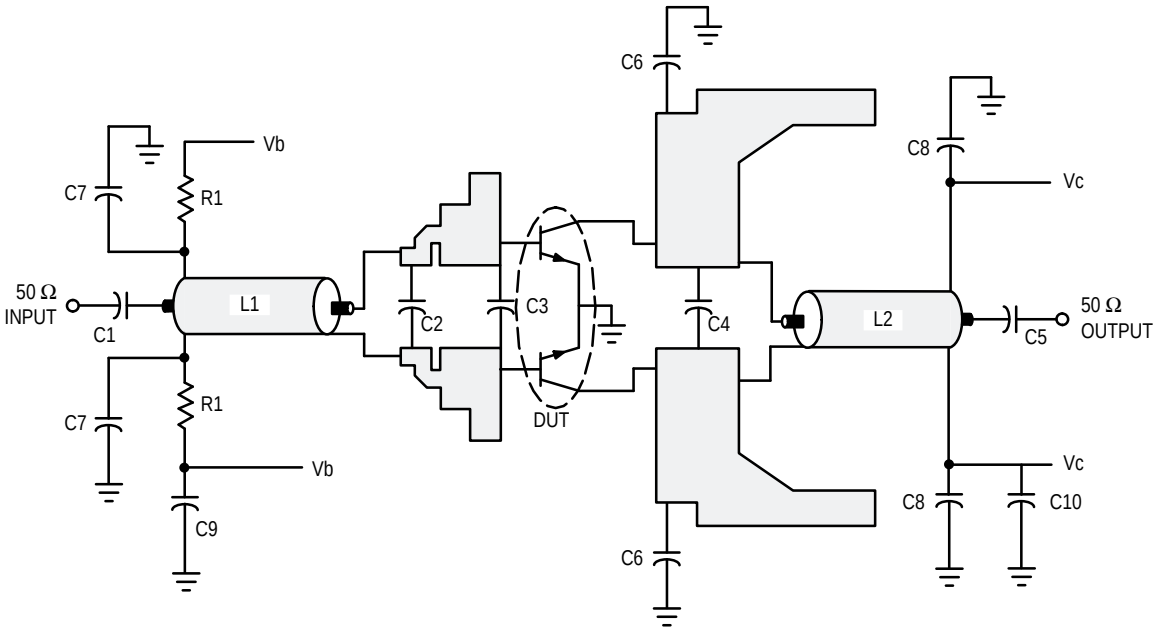


V_{CE} = 26 V P_{out} = 100 W

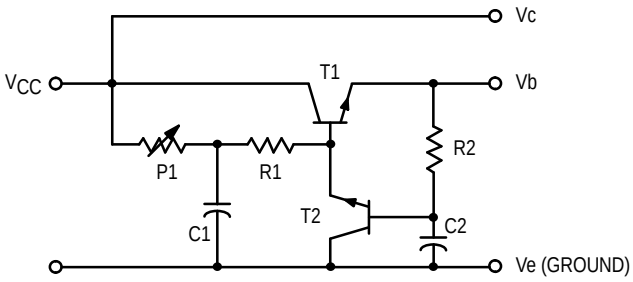
f (MHz)	Z_{in} (Ω)	Z_{OL}* (Ω)
935	9.5 + j7	3.4 + j2.7
960	8.8 + j7.5	3.8 + j2.8

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

Figure 1. Series Equivalent Input and Output Impedances



C1	10 pF, ATC Chip Capacitor 100A	C8	1 µF, Vitramon
C2	2.2 pF, ATC Chip Capacitor 100A	C9	1 µF, 16 V, Tantalum
C3	12 pF, ATC Chip Capacitor 100A	C10	4.7 µF, 35 V, Tantalum
C4	10 pF, ATC Chip Capacitor 175B	L1	25 Ω/41 mm (Teflon)
C5	47 pF, ATC Chip Capacitor 100A	L2	25 Ω/41 mm (Teflon)
C6	5.6 pF, ATC Chip Capacitor 175B	R1	0.5 Ω, Resistor 0805 (2 x 1 Ω)
C7	1000 pF, Vitramon		



C1	15 nF
C2	15 nF
P1	2.2 kΩ
R1	3.3 kΩ
R2	51 Ω
T1	BD135
T2	BD135

Figure 2. 960 MHz Test Circuit and Bias Circuit

TYPICAL CHARACTERISTICS

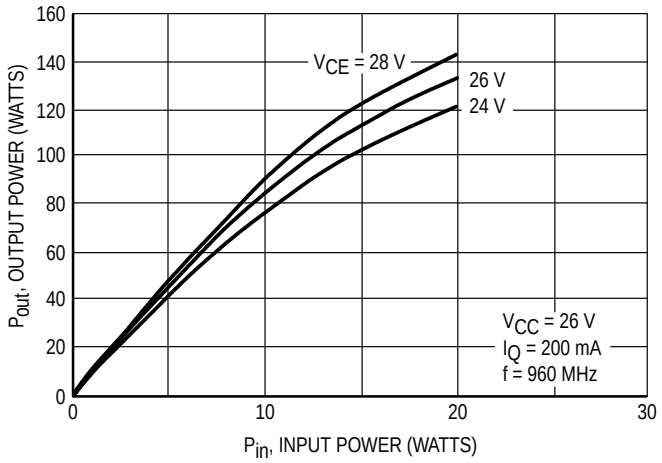


Figure 3. Output Power versus Input Power

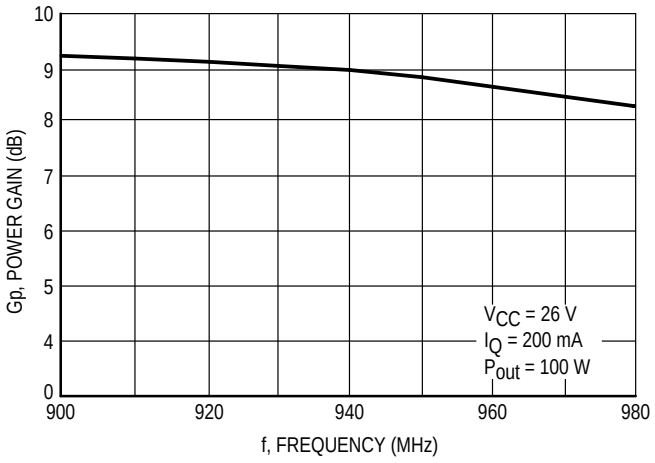


Figure 4. Power Gain versus Frequency

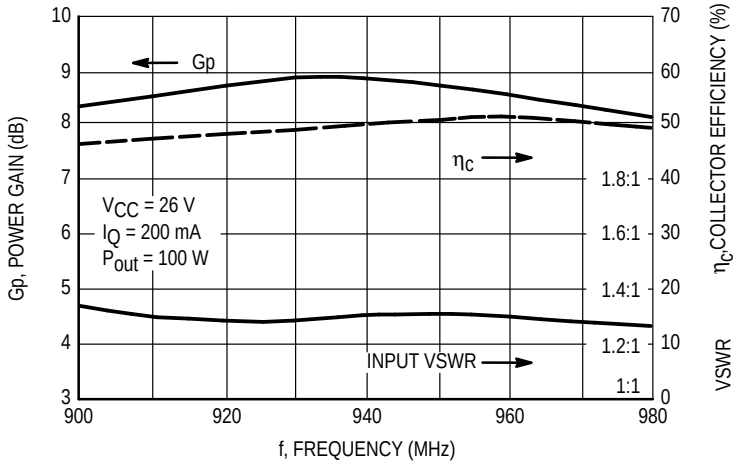


Figure 5. Broadband Amplifier

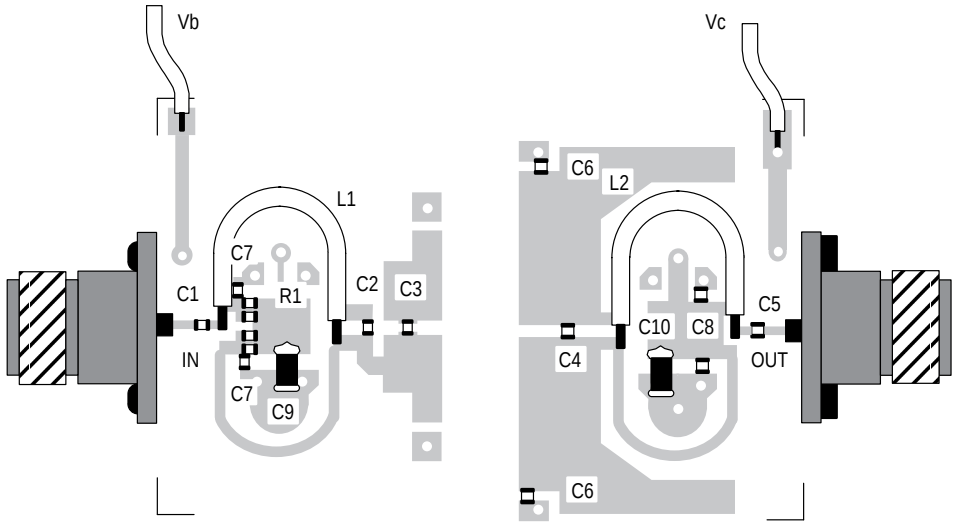


Figure 6. 960 MHz Test Circuit: Printed Circuit Board (PCB) + Components Location (Scale 0.75:1)

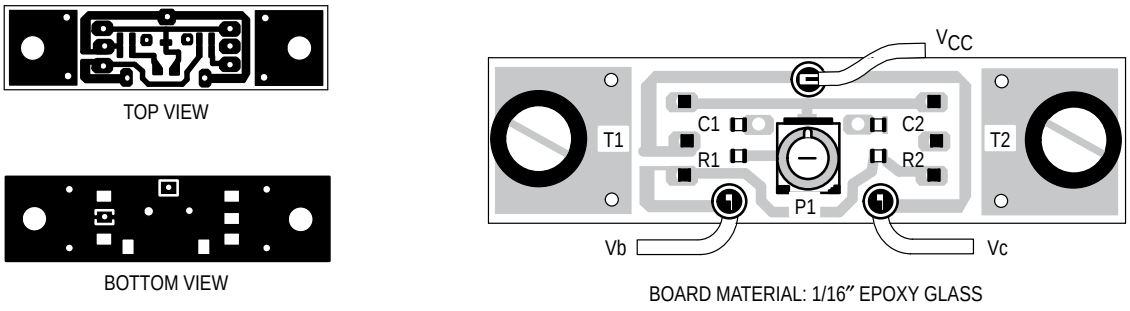
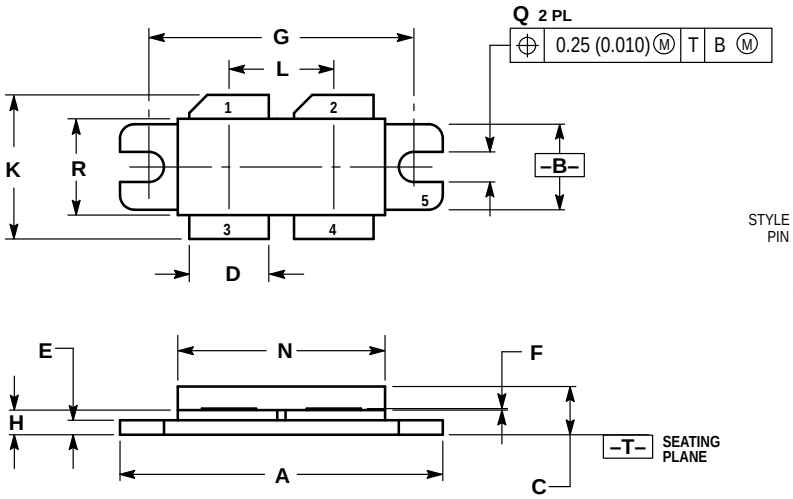


Figure 7. Bias Printed Circuit Board (PCB) (Scale 0.75:1) & Components Location (Not to Scale)

PACKAGE DIMENSIONS



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

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

	INCHES		MILLIMETERS	
DIM	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

CASE 375A–01
ISSUE O

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