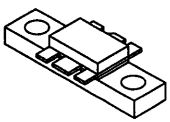
TP3005

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

4.0 W, 960 MHz
UHF POWER
TRANSISTOR
NPN SILICON



CASE 319, STYLE 2

2

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°C Derate above 25°C	P_D	25 0.2	Watts W/°C
Storage Temperature Range	T_{stg}	−65 to +150	°C
Operating Junction Temperature	T_J	200	°C

THERMAL CHARACTERISTICS

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

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

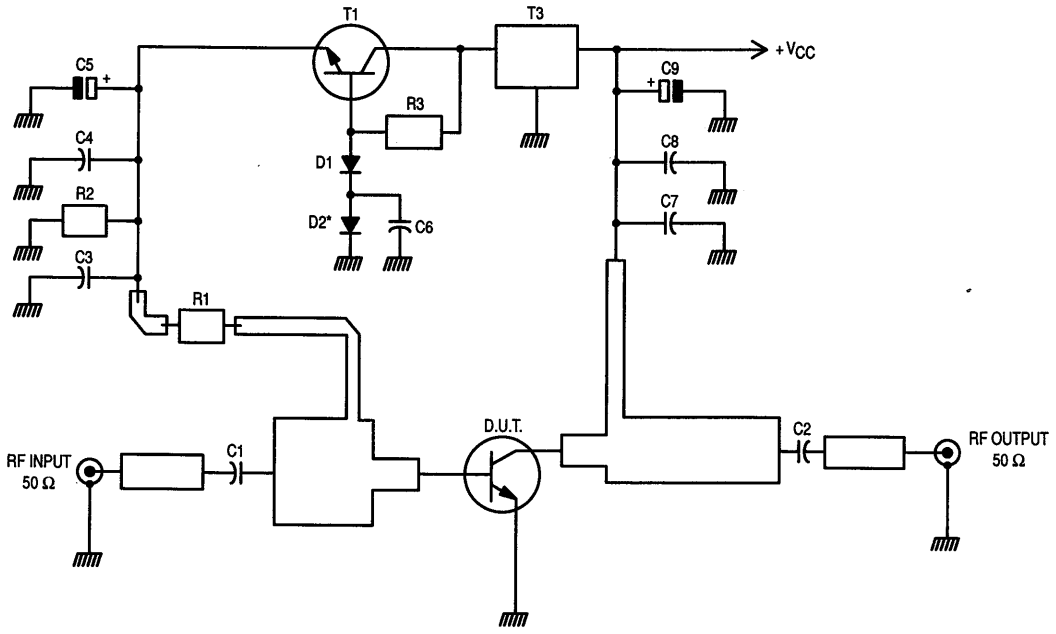
Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 15 mA, R_{BE} = 75 Ω)	$V_{(BR)CER}$	45	—	—	Vdc
Emitter-Base Breakdown Voltage (I_C = 3.0 mAdc)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector-Base Breakdown Voltage (I_E = 15 mAdc)	$V_{(BR)CBO}$	55	—	—	Vdc
Collector-Emitter Leakage (V_{CE} = 26 V, R_{BE} = 75 Ω)	I_{CER}	—	—	3.0	mA
ON CHARACTERISTICS					
DC Current Gain (I_C = 0.5 Adc, V_{CE} = 10 Vdc)	h_{FE}	15	—	100	—

(continued)

NOTE:
1. Thermal resistance is determined under specified RF operating condition.

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 = 1.0 MHz)	C_{ob}	7.5	—	12.5	pF
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain (V_{CC} = 26 V, P_{out} = 4.0 W, I_{CQ} = 60 mA, f = 960 MHz)	G_p	8.5	9.5	—	dB
Load Mismatch (V_{CC} = 26 V, P_{out} = 4.0 W, I_{CQ} = 60 mA, Load VSWR = 5:1, at all phase angles)	ψ	No Degradation in Output Power Before and After Test			
Collector Efficiency (V_{CC} = 26 V, P_{out} = 4.0 W, f = 960 MHz)	η_C	50	55	—	%
Power Saturation P_{in} = 1.0 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 Ω 1206 5%
R2 — Chip Resistor 51 Ω 0805 5%
R3 — Chip Resistor 470 Ω 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 µm Thick

Figure 1. 960 MHz Test Circuit

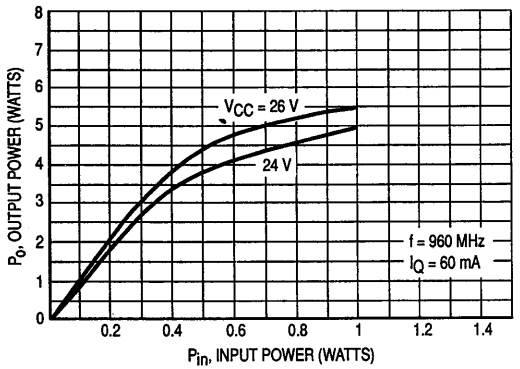


Figure 2. Output Power versus Input Power

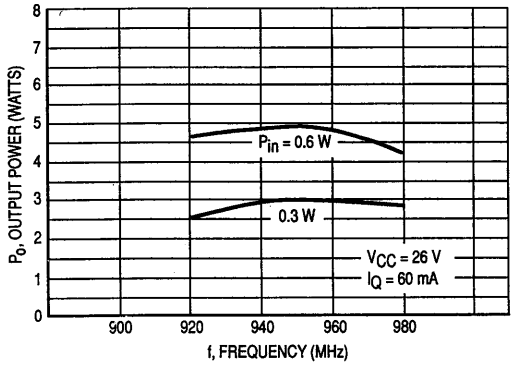


Figure 3. Output Power versus Frequency

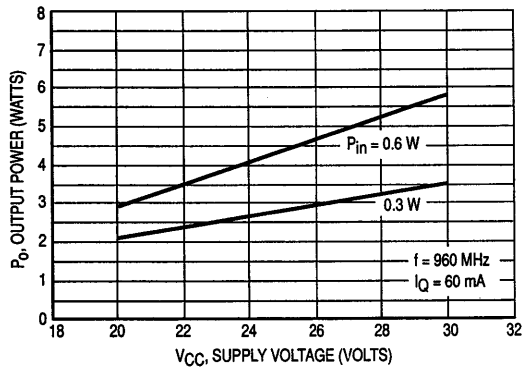


Figure 4. Output Power versus Supply Voltage

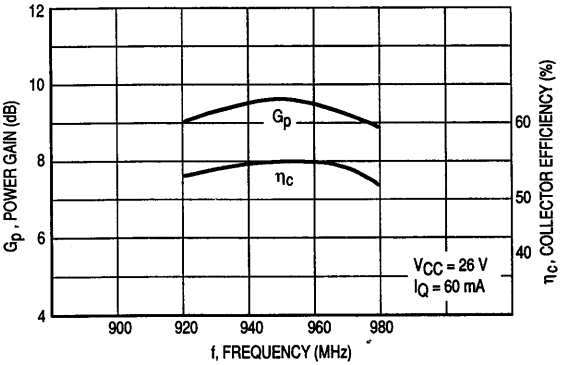
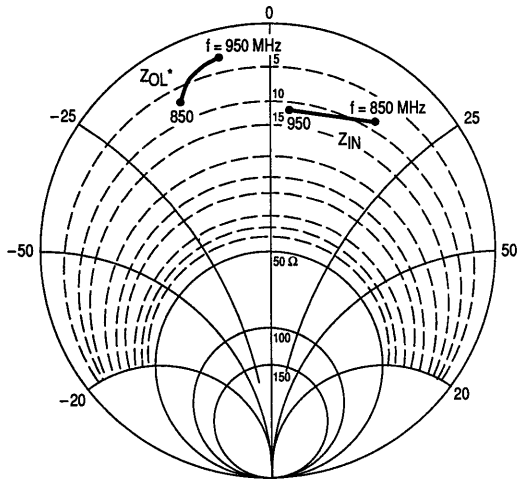


Figure 5. Typical Broadband Circuit Performance



P_{out} = 4.0 W V_{CE} = 26 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 6. Series Equivalent Input/Output Impedances

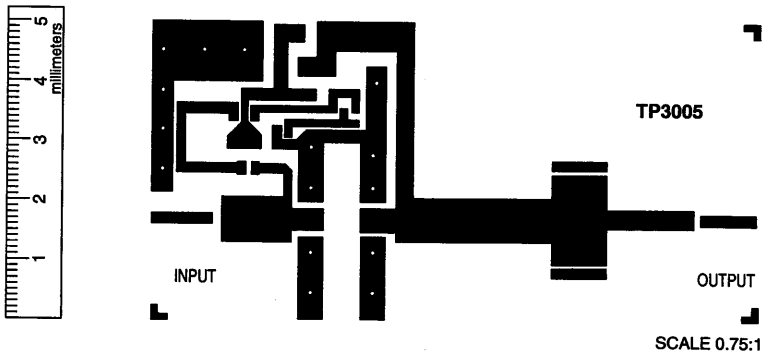


Figure 7. Test Circuit — Photomaster

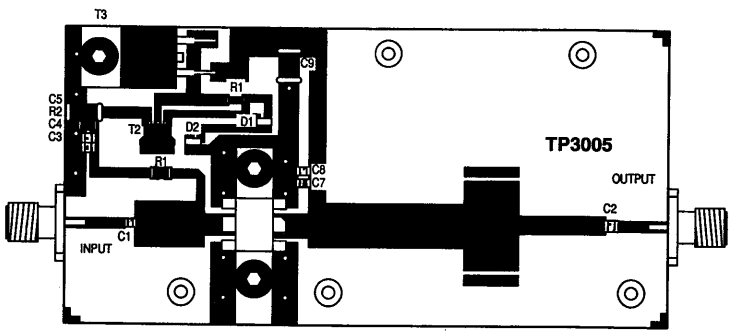


Figure 8. Test Circuit — Component Locations

2

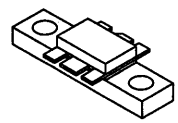
TP3006

The RF Line
NPN Silicon RF Power Transistor

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

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



CASE 319, 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.)

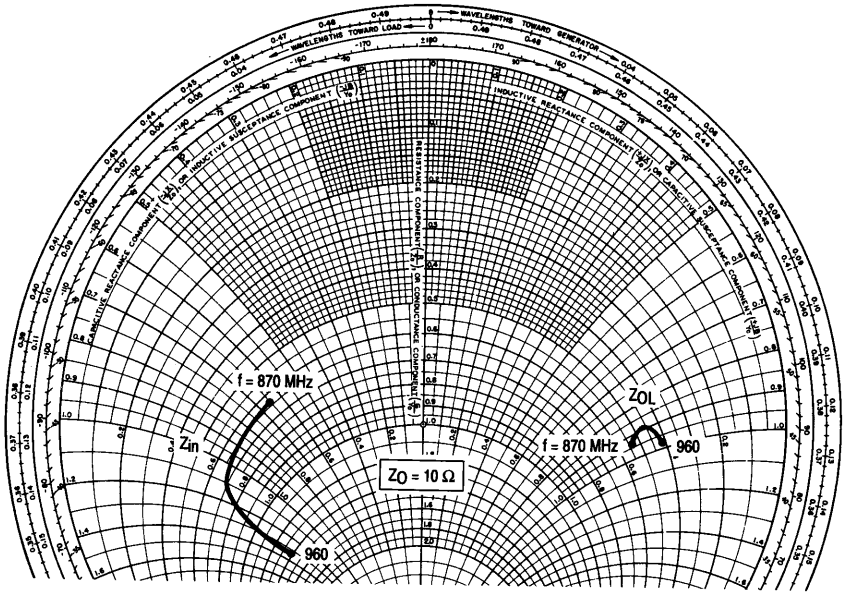
Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 15 mA, R_{BE} = 75 Ω)	$V_{(BR)CER}$	45	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 4 mAdc)	$V_{(BR)EBO}$	3.5	—	—	Vdc
Collector-Base Breakdown Voltage (I_C = 15 mAdc)	$V_{(BR)CBO}$	55	—	—	Vdc
Collector-Emitter 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	—

(continued)

NOTE:
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.)

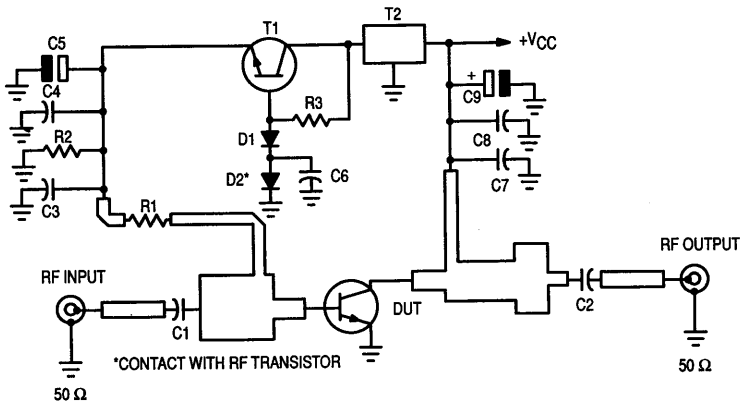
Characteristic	Symbol	Min	Typ	Max	Unit
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 26 V, I_E = 0, f = 1 MHz)	C_{ob}	—	8.5	—	pF
FUNCTIONAL TESTS IN CW					
Common-Emitter Amplifier Power Gain (V_{CC} = 26 V, P_{out} = 5 W, I_{CQ} = 50 mA, f = 960 MHz)	G_p	9	10.5	—	dB
Collector Efficiency (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

2

TYPICAL CHARACTERITICS
CW – WIDEBAND

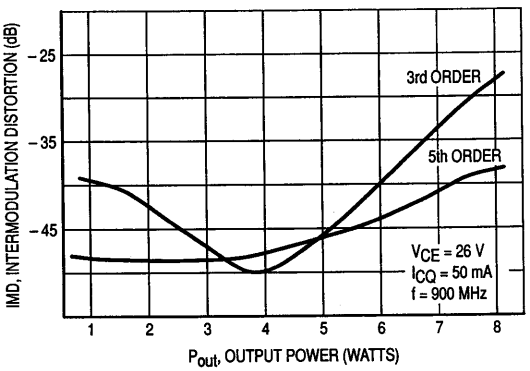


Figure 3. Intermodulation versus Output Power

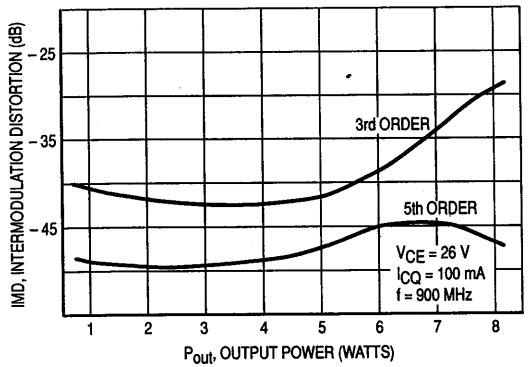
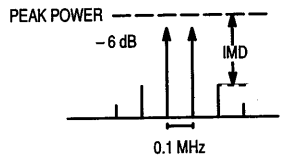


Figure 4. Intermodulation versus Output Power



TYPICAL CHARACTERITICS
CW – WIDEBAND

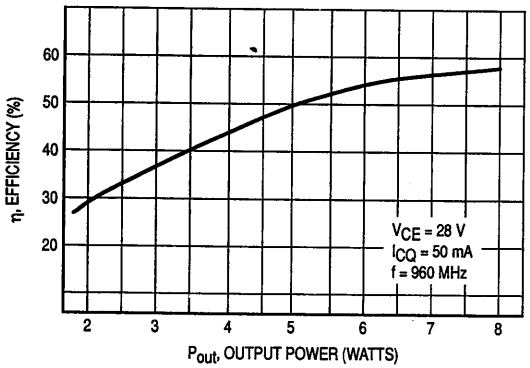


Figure 5. Collector Efficiency versus Output Power

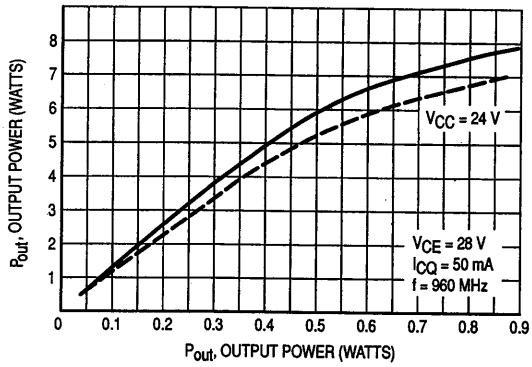


Figure 6. Output Power versus Input Power

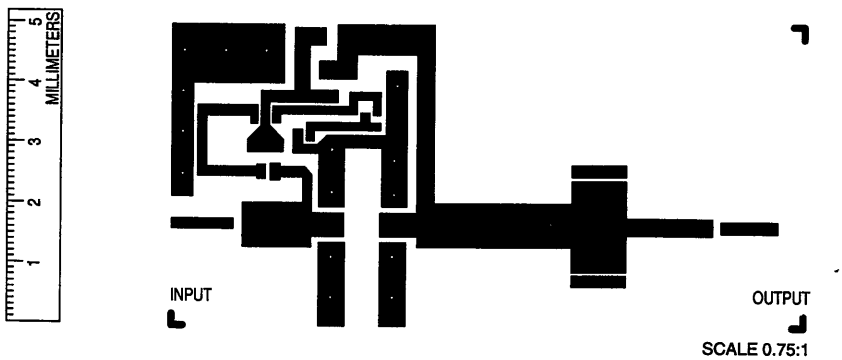
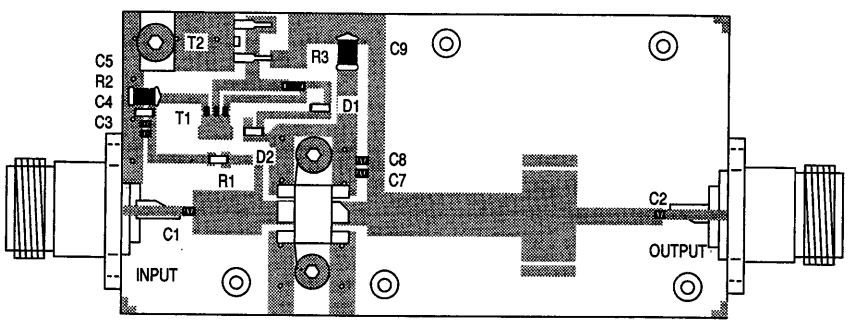


Figure 7. Photomaster



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

Figure 8. 960 MHz Test Circuit Components View

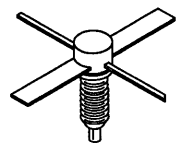
TP3007S

The RF Line
NPN Silicon RF Power Transistor

The TP3007S is designed for 24 volts common emitter base station amplifiers, operating up to 1 GHz bandwidth. It has been specifically designed for use in analog and digital Global System Mobile (GSM) systems. The studless package offers a possibility for surface mounting.

- Specified 24 Volts, 960 MHz Characteristics
  - Output Power — 2 Watts
  - Gain — 9 dB min
  - Efficiency — 50% min, 2 Watts
- Characterized with Series Equivalent Large-Signal Parameters from 920–960 MHz
- Silicon Nitride Passivated
- Gold Metallized, Emitter Ballasted for Long Life and Resistance to Metal Migration
- Class AB Operation

2 W, 960 MHz
RF POWER TRANSISTOR
NPN SILICON



SOE200 STUDLESS
CASE 305B, STYLE 1

2

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CER}	45	Vdc
Collector-Base Voltage	V_{CBO}	50	Vdc
Emitter-Base Voltage	V_{EBO}	4	Vdc
Collector-Current — Continuous	I_C	1	Adc
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	8.3 0.048	Watts W/°C
Storage Temperature Range	T_{stg}	– 65 to +150	°C
Operating Junction Temperature	T_J	200	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case (1) (Studless)	$R_{\theta JC}$	21	°C/W

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

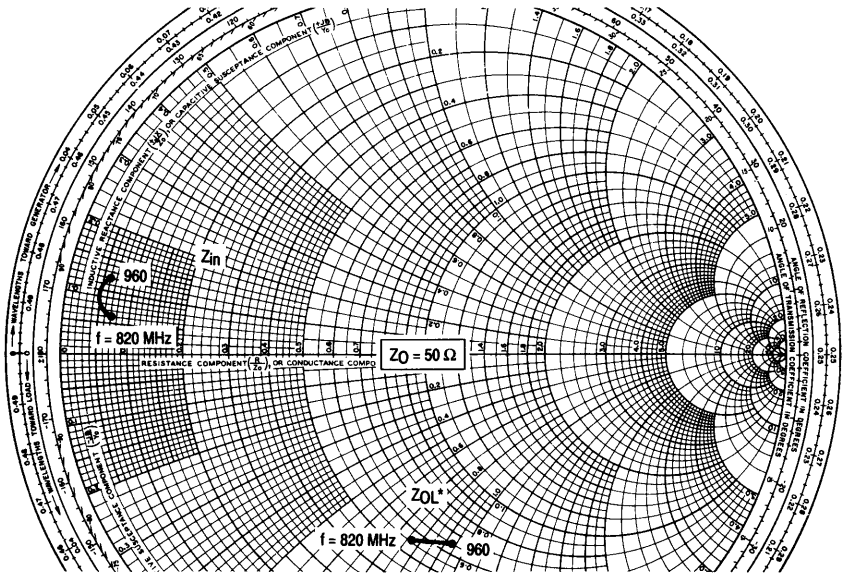
Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 5 mAdc, R_{BE} = 75 Ω)	$V_{(BR)CER}$	45	—	—	Vdc
Collector-Base Breakdown Voltage (I_C = 5 mAdc, I_E = 0)	$V_{(BR)CBO}$	50	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 1 mAdc, I_C = 0)	$V_{(BR)EBO}$	3.5	—	—	Vdc

(continued)

NOTE:
1. Thermal resistance is determined under specified RF operating condition.

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

Characteristic	Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS					
DC Current Gain (I_{CE} = 0.1 Adc, V_{CE} = 5 Vdc)	h_{FE}	10	—	150	—
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 26 Vdc, I_E = 0, f = 1 MHz)	C_{ob}	—	2	—	pF
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain *(V_{CC} = 24 Vdc, P_{out} = 2 W, I_{CQ} = 30 mA, f = 960 MHz)*	G_p	*9*	*10*	—	*dB*
Collector Efficiency (V_{CC} = 24 Vdc, P_{out} = 2 W, I_{CQ} = 30 mA, f = 960 MHz)	h	50	56	—	%
Output Mismatch Stress (V_{CC} = 24 Vdc, P_{out} = 2 W, I_{CQ} = 30 mA, f = 960 MHz, Load VSWR = 10:1, all phase angles at frequency of test)	Ψ	No Degradation in Output Power			

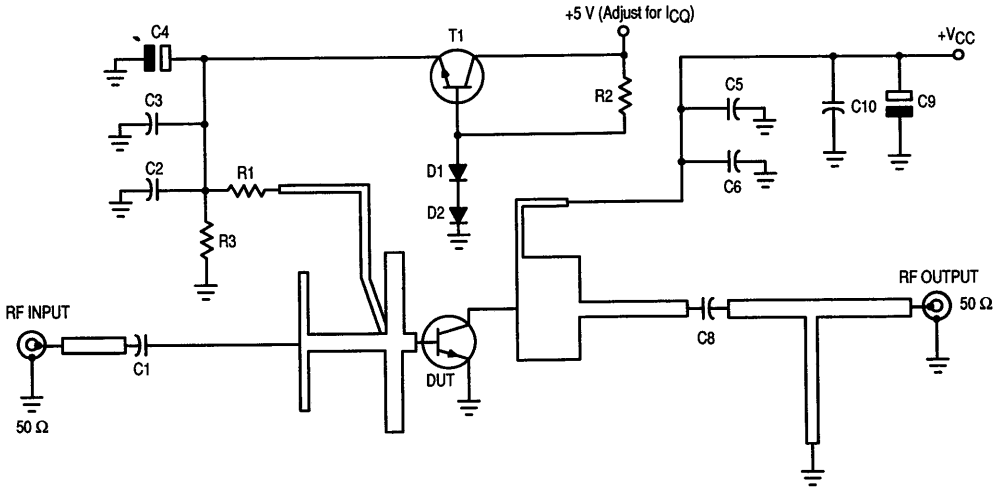


Output Impedances with circuit tuned for maximum gain
@ V_{CC} = 24 V, P_{out} = 2 W

f (MHz)	Z_{in} (Ω)	Z_{OL}^* (Ω)
820	4 + j3.8	29 – j41
860	3.4 + j4.4	30 – j43
900	3.1 + j5.1	31 – j44
960	3.5 + j5.5	35 – j45

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	3.9 pF, ATC Chip Capacitor 100A	C10	15 nF, Chip Capacitor
C2,C6	100 pF, ATC Chip Capacitor 100A	D1,D2	Diode, BAS16
C3,C5	15 nF, Chip Capacitor 0805	R1	2.2 Ω, Chip Resistor 1206
C4	10 µF, 16 V, Capacitor	R2	1.2 kΩ, Chip Resistor 1206
C7	15 nF, Chip Capacitor 0805	R3	68 Ω, Chip Resistor 1206
C8	47 pF, Chip Capacitor 100A	T1	Transistor, MJD31C
C9	4.7 µF, 50 V, Capacitor		

Figure 2. 960 MHz Electrical Schematic

TYPICAL CHARACTERISTICS

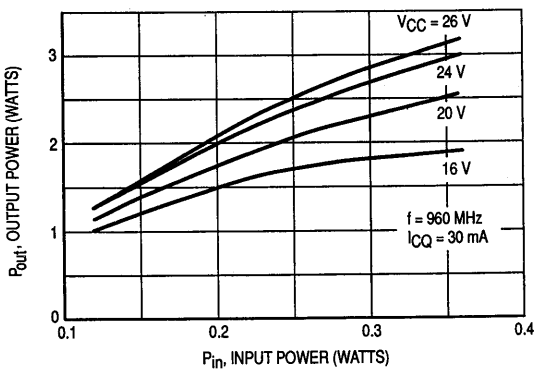


Figure 3. Output Power versus Input Power

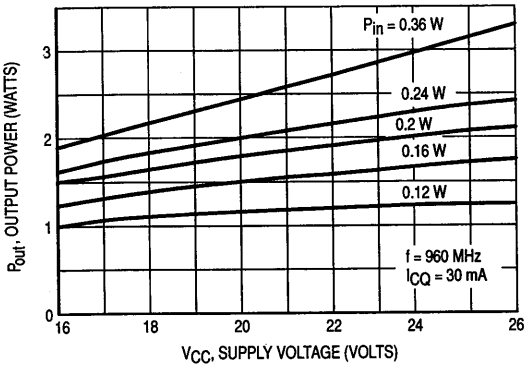


Figure 4. Output Power versus Supply Voltage

TYPICAL CHARACTERISTICS

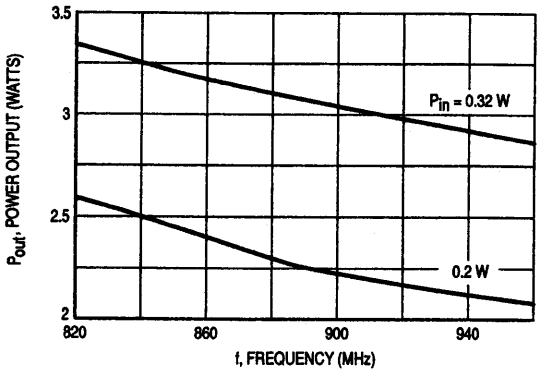
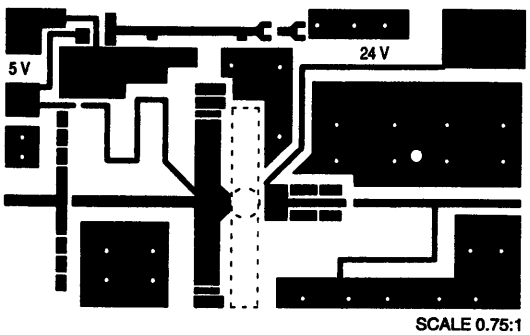


Figure 5. Output Power versus Frequency



TEFLON® GLASS 0.508 mm 2 SIDES 35 µm Cu

Figure 6. PC Board Photomaster

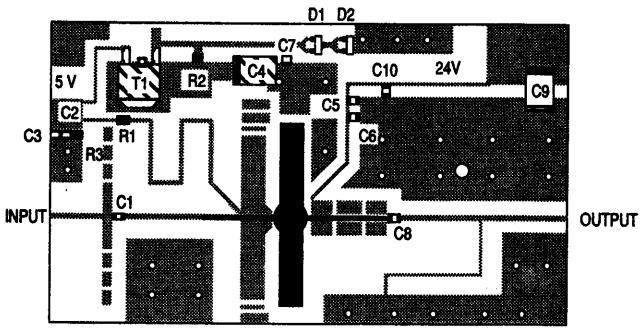


Figure 7. 960 MHz Test Circuit Components View

TP3008

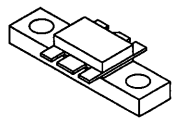
4 W, 960 MHz
RF POWER TRANSISTOR
NPN SILICON

The RF Line

RF Power Transistor

The TP3008 is designed for 960 MHz cellular radio 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 24 Volts, 960 MHz Characteristics
  - Output Power — 4 Watts
  - Gain — 11.5 dB min
  - Efficiency — 45% min
- Class AB Operation



CASE 319, STYLE 2

2

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CER}	40	Vdc
Collector-Base Voltage	V_{CBO}	50	Vdc
Emitter-Base Voltage	V_{EBO}	4	Vdc
Collector-Current — Continuous	I_C	1	Adc
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	35 0.2	Watts W/°C
Storage Temperature Range	T_{stg}	−65 to +150	°C
Operating Junction Temperature	T_J	200	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	5	°C/W

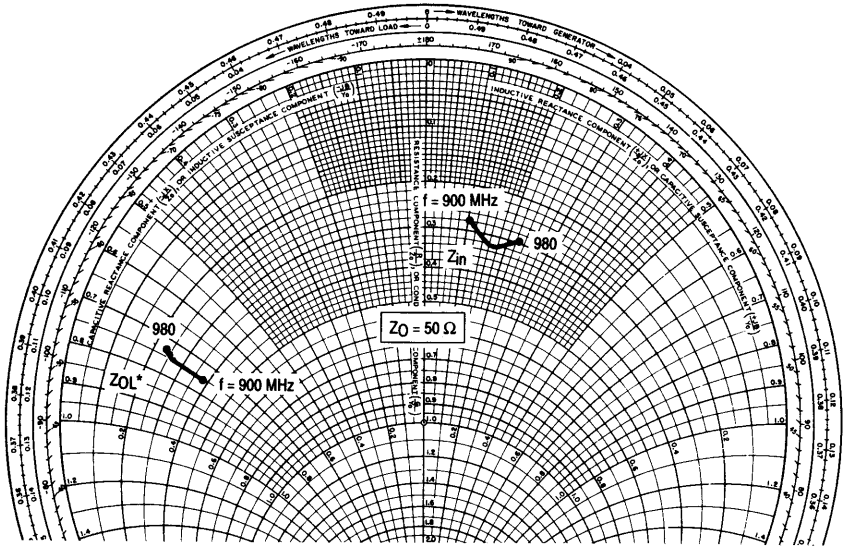
ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 15 mA, R_{BE} = 75 Ω)	$V_{(BR)CER}$	40	—	—	Vdc
Collector-Emitter Breakdown Voltage (I_C = 3 mAdc)	$V_{(BR)CBO}$	45	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 2 mA, I_C = 0)	$V_{(BR)EBO}$	3.5	—	—	Vdc
Collector-Emitter Leakage (V_{CE} = 26 V, R_{BE} = 75 Ω)	I_{CER}	—	—	2	mA
ON CHARACTERISTICS					
DC Current Gain (I_C = 0.2 Adc, V_{CE} = 5 Vdc)	h_{FE}	15	—	120	—
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CE} = 24 V, I_E = 0, f = 1 MHz)	C_{ob}	—	6	—	pF

(continued)

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

Characteristic	Symbol	Min	Typ	Max	Unit
FUNCTIONAL TESTS (V_{CC} = 24 V, f = 960 MHz)					
Common-Emitter Amplifier Gain (P_{out} = 4 W, I_{CQ} = 50 mA)	G_p	11.5	—	—	dB
Collector Efficiency (P_{out} = 4 W, I_{CQ} = 50 mA)	h	45	50	—	%
Load Mismatch (P_{out} = 4 W, I_{CQ} = 50 mA, Load VSWR = 5:1, all phase angles at frequency of test)	Ψ	No Degradation in Output Power			

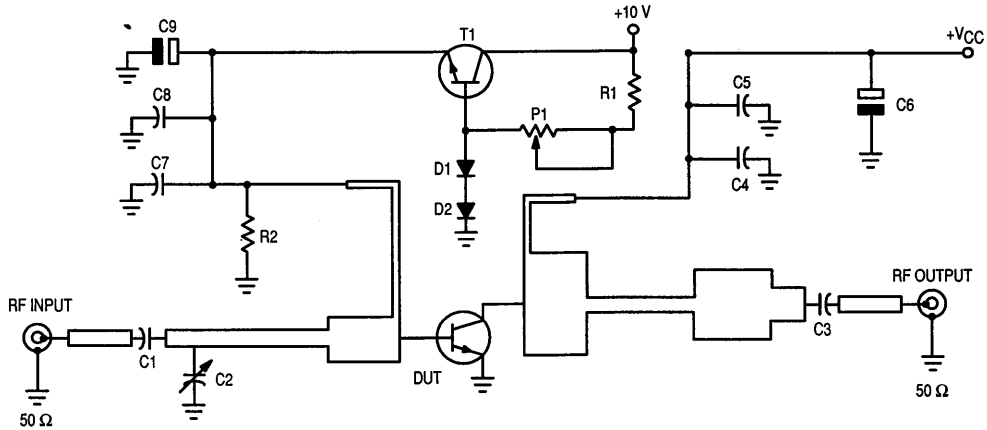


Output impedance with circuit tuned for maximum gain
@ P_{out} = 4 W, V_{CE} = 24 V

f (MHz)	Z_{in} (Ω)	Z_{OL}^* (Ω)
900	6 + j5	7.6 – j15
935	6.2 + j4.7	5.5 – j13.5
960	6.8 + j3.6	5.5 – j13.5
980	7.2 + j2	5.3 – j13.5

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 Impedance



2

Components List

C1,C3	100 pF, ATC Chip Capacitor 100A	D1,D2	Diode, BAS16
C2	1 to 5 pF, Trimmer Capacitor	P1	1 kΩ, Trimmer
C4,C7	330 pF, Chip Capacitor 0805	R1	1 kΩ, Resistor
C5,C8	10 nF, Chip Capacitor 0805	R2	56 Ω, 0805 Resistor
C6	15 µF, 63 V, Capacitor	T1	Transistor, NPN Type, MJD31C
C9	100 µF, 16 V, Capacitor		

Figure 2. 960 MHz Electrical Schematic

TYPICAL CHARACTERISTICS

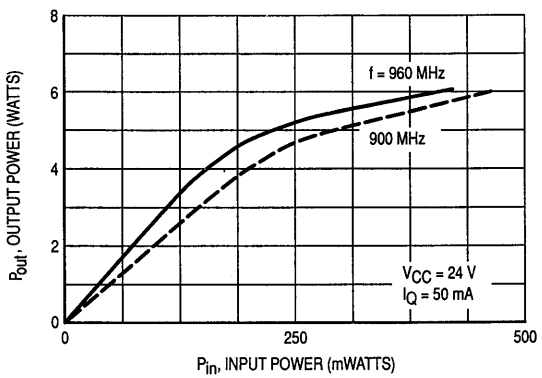


Figure 3. Output Power versus Input Power

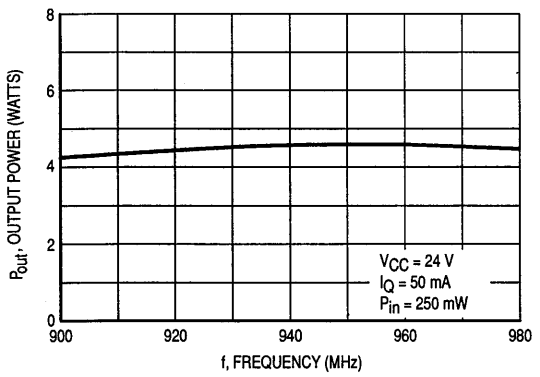


Figure 4. Output Power versus Frequency

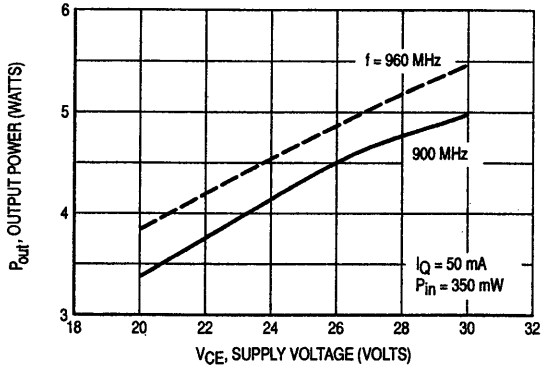


Figure 5. Output Power versus Supply Voltage

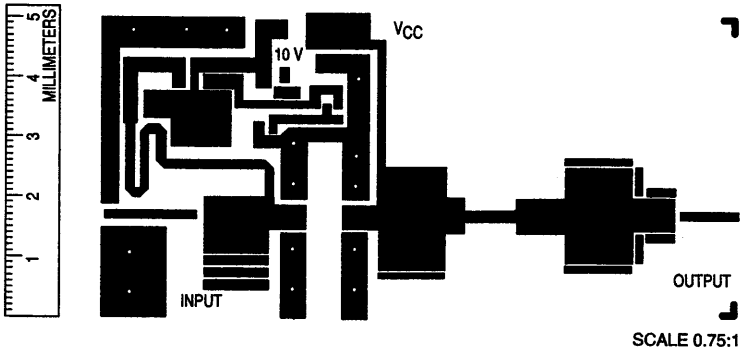


Figure 6. Photomaster

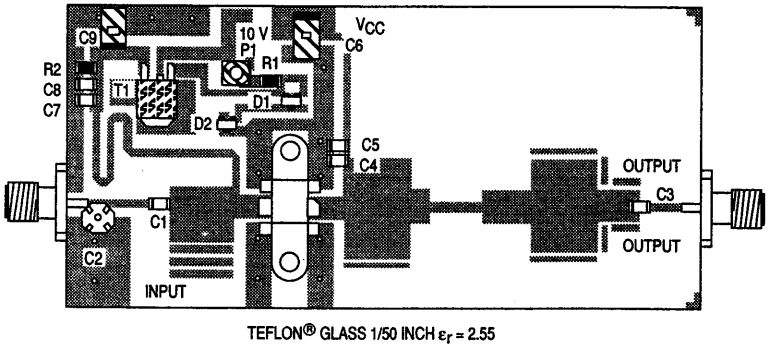


Figure 7. 960 MHz Test Circuit Components View

TP3019S

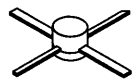
The RF Line

UHF Power Transistor

The TP3019S is designed for 24 V common emitter base station amplifiers. Operating in the 820–960 MHz bandwidth, the device has been specifically designed for use in analog and digital (GSM) systems.

- Specified 24 Volts, 960 MHz Characteristics
  - Output Power = 2.0 Watts
  - Minimum Gain = 9.0 dB
  - Class AB
  - I_Q = 20 mA

2.0 W, 960 MHz
UHF POWER
TRANSISTOR
NPN SILICON



CASE 305A, STYLE 1
TP3019S

2

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CER}	40	Vdc
Collector-Base Voltage	V_{CBO}	50	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector Current — Continuous	I_C	1.0	Adc
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	12.5 0.15	Watts W/°C
Storage Temperature Range	T_{stg}	−65 to +150	°C
Operating Junction Temperature	T_J	200	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case (1) at 70°C Case	$R_{\theta JC}$	14	°C/W

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

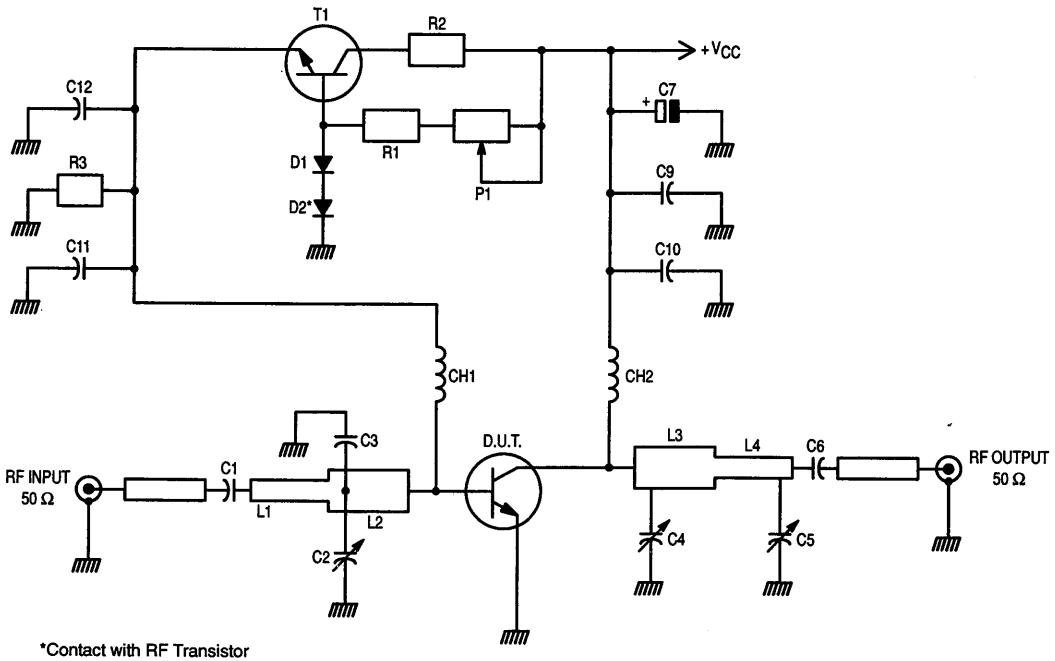
Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 5.0 mA, I_B = 0)	$V_{(BR)CER}$	28	—	—	Vdc
Emitter-Base Breakdown Voltage (I_C = 1.0 mAdc)	$V_{(BR)EBO}$	3.5	—	—	Vdc
Collector-Base Breakdown Voltage (I_E = 5.0 mAdc)	$V_{(BR)CBO}$	50	—	—	Vdc
Collector-Emitter Leakage (V_{CE} = 20 V)	I_{CES}	—	—	2.0	mA
ON CHARACTERISTICS					
DC Current Gain (I_C = 1.0 Adc, V_{CE} = 5.0 Vdc)	h_{FE}	15	—	150	—
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 25 V, I_E = 0, f = 1.0 MHz)	C_{ob}	—	—	4.0	pF

NOTE:
1. Thermal resistance is determined under specified RF operating condition.

(continued)

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

Characteristic	Symbol	Min	Typ	Max	Unit
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain (V_{CC} = 24 V, P_{out} = 2.0 W, I_{CQ} = 20 mA, f = 960 MHz)	G_p	9.0	—	—	dB
Load Mismatch (V_{CC} = 24 V, P_{out} = 2.0 W, I_{CQ} = 20 mA, Load VSWR = 20:1, at all phase angles)	Ψ	No Degradation in Output Power Before and After Test			
Collector Efficiency (V_{CC} = 24 V, P_{out} = 2.0 W, f = 960 MHz)	η_c	50	55	—	%



*Contact with RF Transistor

C1, C6, C10, C11 — Capacitor Chip 0805 330 pF 5%
C2, C4, C5 — Trimmer Capacitor 0.5–4.0 pF
C3 — Capacitor Chip 0805 3.9 pF 5%
C7 — Capacitor Chip 0805 6.0, 8.0 µF 35 V
C9, C12 — Capacitor Chip 0805 15 nF 5%
CH1 — Microstrip Line 80 Ω L = 23 mm
CH2 — 3 Turns Wire 8/10 ID 4 mm
D1, D2 — Diode 1N4148
L1 — Microstrip Line 50 Ω L = 12 mm
L2 — Microstrip Line 25 Ω L = 6 mm
L3 — Microstrip Line 25 Ω L = 6 mm
L4 — Microstrip Line 50 Ω L = 28 mm
P1 — Trimmer 5.0 kΩ
R1 — Resistor 1.0 kΩ 5%
R2 — Resistor 100 Ω 2.0 W
R3 — Chip Resistor 75 Ω 0805 5%
T1 — Transistor BD135 or Similar
Board Material — 1/50″, Teflon Glass, Cu Clad 2 Sides, 35 µm Thick

Figure 1. 960 MHz Test Circuit

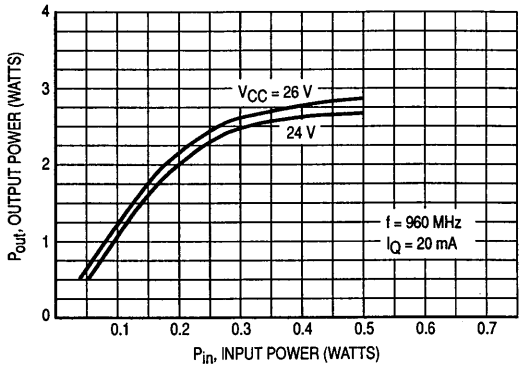
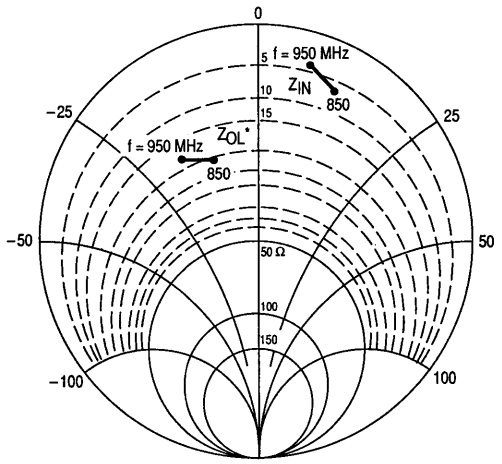


Figure 2. Output Power versus Input Power



P_{out} = 2.0 W V_{CE} = 24 V

f MHz	Z_{IN} OHMS	Z_{OL}* OHMS
850	5.8 + j9.8	21.3 − j10
900	5.4 + j9	21 − j11
950	4.8 + j7.9	20 − j14

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

Figure 3. Series Equivalent Input/Output Impedances

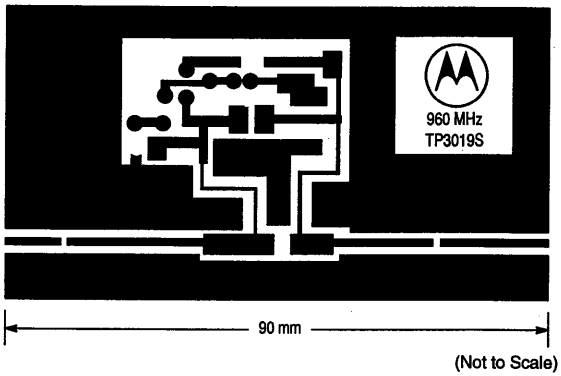


Figure 4. Test Circuit — Photomaster

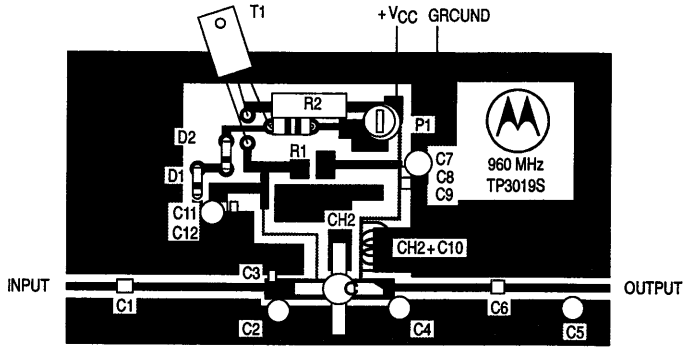


Figure 5. Test Circuit — Component Locations