

The RF Line UHF Power Transistors

The TP3019 and TP3019S are designed for 24 V common emitter base station amplifiers. Operating in the 820–960 MHz bandwidth, they have been specifically designed for use in analog and digital (GSM) systems. The studless package version offers a good possibility for surface mounting.

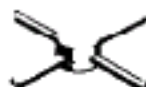
- Specified 24 Volts, 960 MHz Characteristics
 - Output Power = 2.0 Watts
 - Minimum Gain = 9.0 dB
 - Class AB
 - $I_Q = 20 \text{ mA}$

TP3019
TP3019S

2.0 W-960 MHz
UHF POWER
TRANSISTORS
NPN SILICON



CASE 305A-01, STYLE 1
 TP3019S



CASE 305-01, STYLE 1
 TP3019

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CE}	40	Vdc
Collector-Base Voltage	V_{CB}	50	Vdc
Emitter-Base Voltage	V_{EB}	4.0	Vdc
Collector-Current — Continuous	I_C	1.0	Adc
Total Device Dissipation $\mu T_C = 25^\circ\text{C}$ 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 ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage ($I_C = 5.0 \text{ mA}$, $I_B = 0$)	$V_{(BR)CE}$	28	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_C = 1.0 \text{ mA}$, $I_E = 0$)	$V_{(BR)EB}$	3.5	—	—	Vdc
Collector-Base Breakdown Voltage ($I_E = 5.0 \text{ mA}$, $I_C = 0$)	$V_{(BR)CB}$	50	—	—	Vdc
Collector-Emitter Leakage ($V_{CE} = 20 \text{ V}$)	I_{CES}	—	—	2.0	mA

NOTE 1: 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*
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ON CHARACTERISTICS

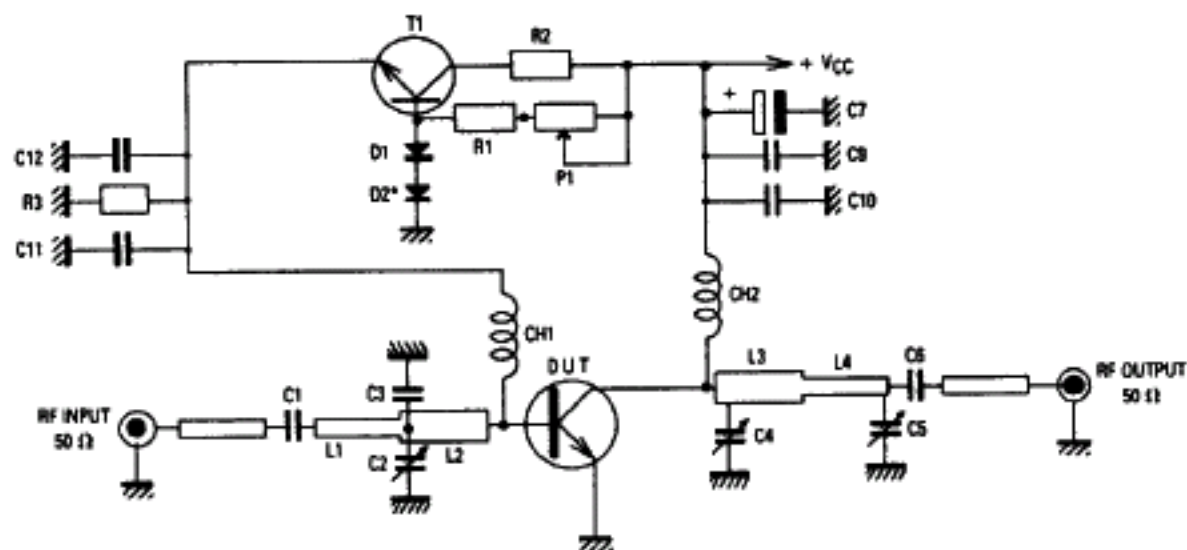
DC Current Gain ($I_C = 1.0 \text{ A dc}$, $V_{CE} = 5.0 \text{ V dc}$)	h_{FE}	15	—	150	—
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DYNAMIC CHARACTERISTICS

Output Capacitance ($V_{CB} = 25 \text{ V}$, $I_E = 0$, $f = 1.0 \text{ MHz}$)	C_{ob}	—	—	4.0	pF
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FUNCTIONAL TESTS

Common-Emitter Amplifier Power Gain ($V_{CC} = 24 \text{ V}$, $P_{out} = 2.0 \text{ W}$, $I_{CQ} = 20 \text{ mA}$) ($f = 960 \text{ MHz}$)	G_p	9.0	—	—	dB
Load Mismatch at all Phase Angles ($V_{CC} = 24 \text{ V}$, $P_{out} = 2.0 \text{ W}$, $I_{CQ} = 20 \text{ mA}$) No degradation in Output Power	ϕ	20:1	—	—	VSWR
Collector Efficiency ($V_{CC} = 24 \text{ V}$, $P_{out} = 2.0 \text{ W}$, $f = 960 \text{ MHz}$)	η_c	50	55	—	%



*Contact with RF Transistor

C2, C4, C5 — Trimmer Capacitor 0.5–4.0 pF
 C1, C6, C10, C11 — Capacitor Chip 0805 330 pF 5%
 C9, C12 — Capacitor Chip 0805 15 nF 5%
 C3 — Capacitor Chip 0805 3.9 pF 5%
 C7 — Capacitor Chip 0805 6.0, 8.0 μF 35 V
 R1 — Resistor 1.0 k Ω 5%
 L1 — Microstrip Line 50 Ω L = 12 mm
 L2 — Microstrip Line 25 Ω L = 6 mm

R2 — Resistor 100 Ω 2.0 W
 R3 — Chip Resistor 75 Ω 0805 5%
 P1 — Trimmer 5.0 k Ω
 T1 — Transistor BD135 or Similar
 CH1 — Microstrip Line 80 Ω L = 23 mm
 CH2 — 3 Turns Wire 8/10 ID 4 mm
 D1, D2 — Diode 1N4148
 L3 — Microstrip Line 25 Ω L = 6 mm
 L4 — Microstrip Line 50 Ω L = 28 mm
 Board Material — 1.50", Teflon Glass, Cu Clad 2 Sides,
 35 μm Thick

Figure 1. 960 MHz Test Circuit

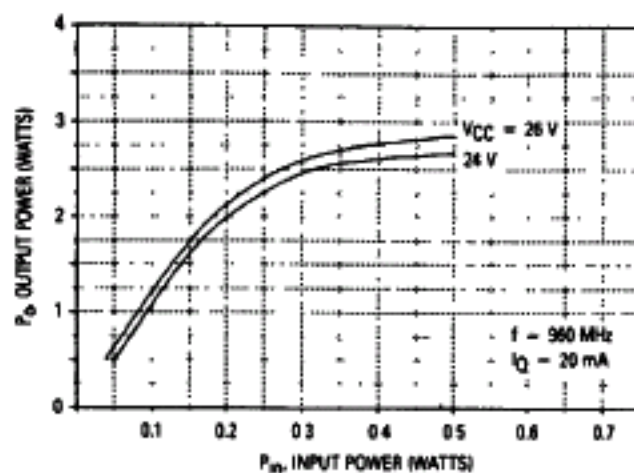
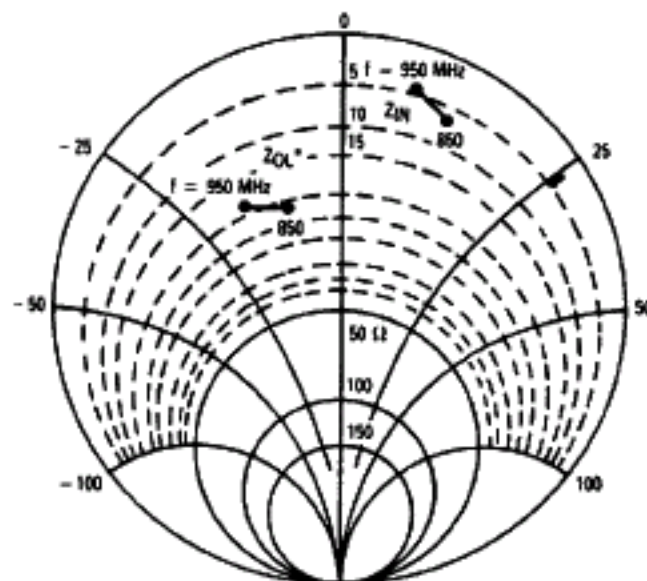


Figure 2. Output Power versus Input Power



$P_{OUT} = 2\text{ W}$ $V_{CE} = 24\text{ V}$

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

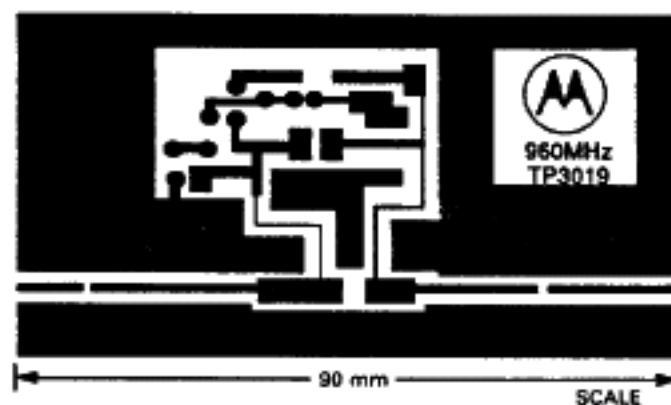


Figure 4. Test Circuit — Photomaster

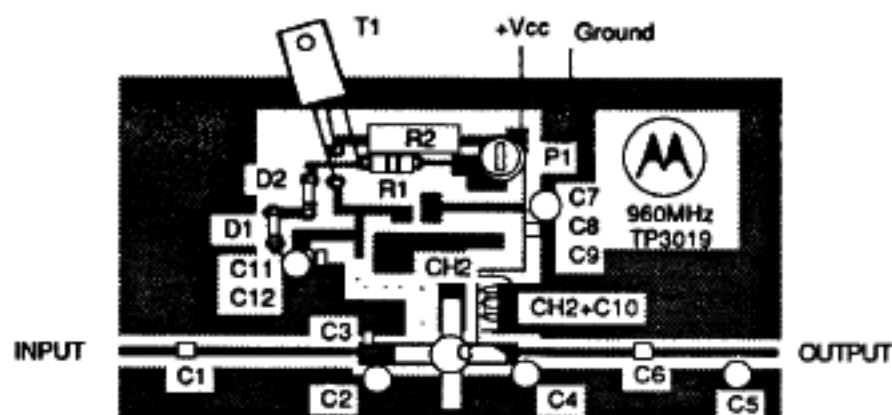


Figure 5. Test Circuit — Component Locations