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MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

T-33-05

TP3010
TP3010S

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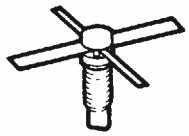
The RF Line
UHF Power Transistors

The TP3010/S are designed for 12.5 V, 900 MHz common-emitter amplifiers operating in the 820–960 MHz frequency region.

- 900 MHz
- 1.5 W — P_{out}
- 12.5 V — V_{CC}
- 7 dB Min Gain

1.5 W to 900 MHz UHF POWER TRANSISTORS NPN SILICON



CASE 305B-01, STYLE 1
(.200 SOE)
TP3010

CASE 305C-01, STYLE 1
(.200 SOE S)
TP3010S

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	16	Vdc
Collector-Base Voltage	V_{CBO}	30	Vdc
Emitter-Base Voltage	V_{EBO}	3	Vdc
Collector Current — Continuous	I_C	2	Adc
Operating Junction Temperature	T_J	200	°C
Storage Temperature Range	T_{stg}	−50 to +200	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to 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 = 25 mA, I_B = 0)	$V_{(BR)CEO}$	16	—	—	Vdc
Collector-Base Breakdown Voltage (I_C = 4 mA, I_E = 0)	$V_{(BR)CBO}$	30	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 1 mA, I_C = 0)	$V_{(BR)EBO}$	3	—	—	Vdc
Collector Cutoff Current (V_{CB} = 15 V, I_E = 0)	I_{CBO}	—	—	0.4	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 320 mA, V_{CE} = 10 V)	h_{FE}	25	—	—	—
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 12.5 V, I_E = 0, f = 1 MHz)	C_{ob}	—	—	8	pF
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain (V_{CE} = 12.5 V, P_{out} = 1.5 W, f = 900 MHz)	G_{PE}	7	—	—	dB
Collector Efficiency (V_{CE} = 12.5 V, P_{out} = 1.5 W, f = 900 MHz)	η_c	55	—	—	%
Load Mismatch (V_{CE} = 16 V, P_{out} = 1.5 W, f = 900 MHz, Load VSWR = ∞:1, All Phase Angles)	ψ	No Degradation in Output Power			

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TYPICAL CHARACTERISTICS

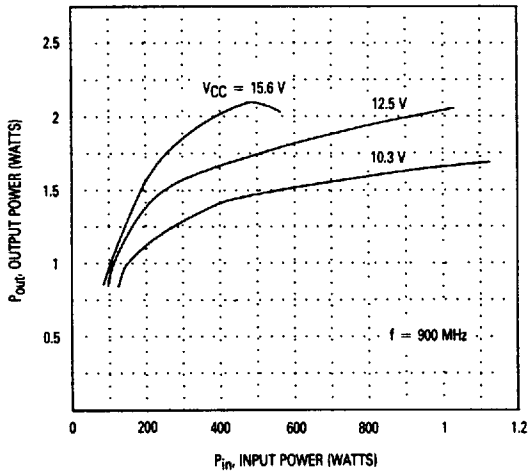
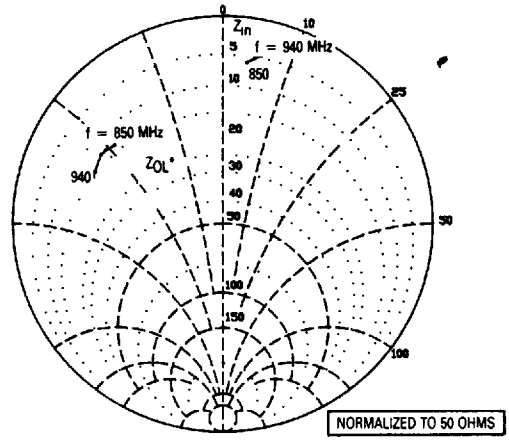


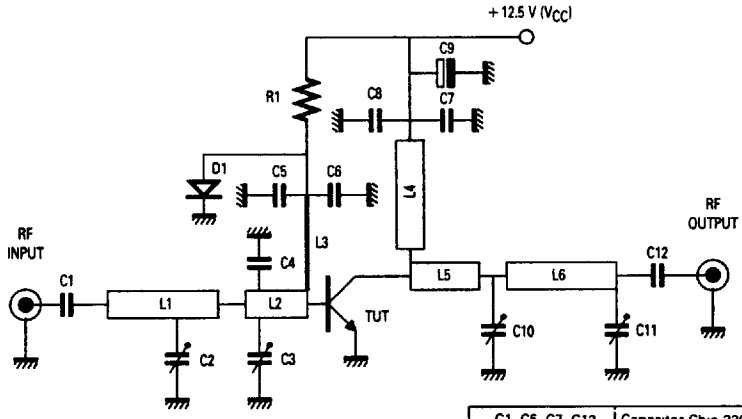
Figure 1. Output Power versus Input Power



f (MHz)	Z_{in} (Ohm)	Z_{OL}* (Ohms)
850	6.6 + j3.4	14 − j24
880	5.9 + j4.7	13.9 − j26
900	5.4 + j5.6	13.8 − j27
940	4.7 + j7.85	15.2 − j32

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

Figure 2. Series Equivalent Input/Output Impedances



Note: Amplifier tunable from 820 to 960 MHz.
Instantaneous Bandwidth — 40 MHz Typ.

C1, C5, C7, C12	Capacitor Chip 330 pF CGO SMT
C2, C3, C10, C11	0.5–5 pF GKU Trimmer Capacitor
C4	Capacitor Chip 3.9 pF
C6, C8	Capacitor Chip 15 nF
C9	Electrolytic Capacitor 10 MF 16 V
R1	Resistor // 2 x 270 Ohms 1/2 W
D1	0.57 for Class B Operation
L1	15 mm Z_o = 50 Ohm
L2, L5	7 mm Z_o = 25 Ohm
L3	27 mm Z_o = 75 Ohm
L4	20 mm Z_o = 50 Ohm
L6	28 mm Z_o = 50 Ohm
Board Material	020 In. ϵ_r = 2.55, Teflon Glass

Figure 3. Broadband Amplifier Circuit

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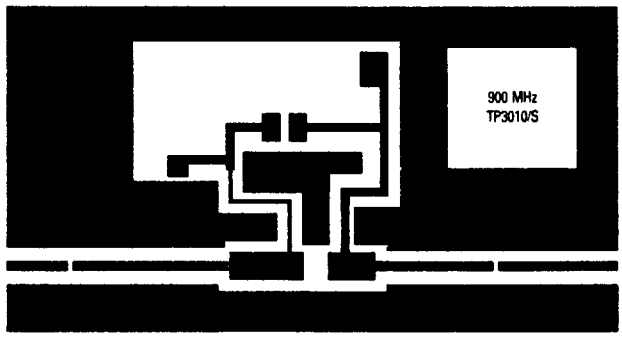

Board Material: .020 In. Glass Teflon ϵ_r = 2.55

Figure 4. Printed Circuit Board Layout (Not to Scale)

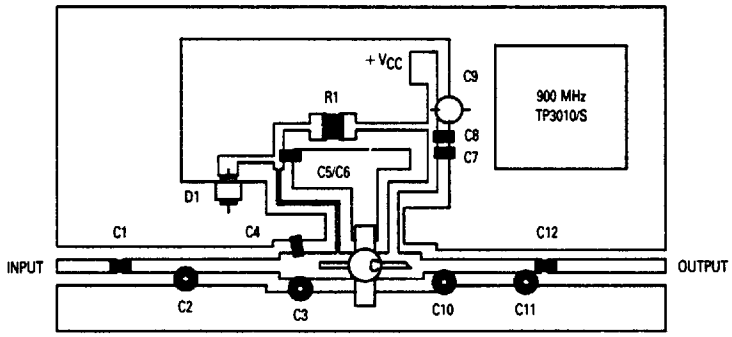

Figure 5. Component Layout