T-33-09

MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

TP3030

2

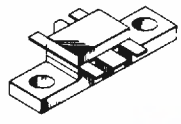
The RF Line

UHF Power Transistor

The TP3030 is designed for 900 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, 900 MHz Characteristics
  - Output Power = 23 Watts
  - Minimum Gain = 8.0 dB
  - Class AB
  - I_Q = 100 mA

23 W–900 MHz UHF POWER TRANSISTOR NPN SILICON



CASE 319-06, STYLE 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	4.0	Adc
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	70 0.6	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	$R_{\theta JC}$	2.5	°C/W

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

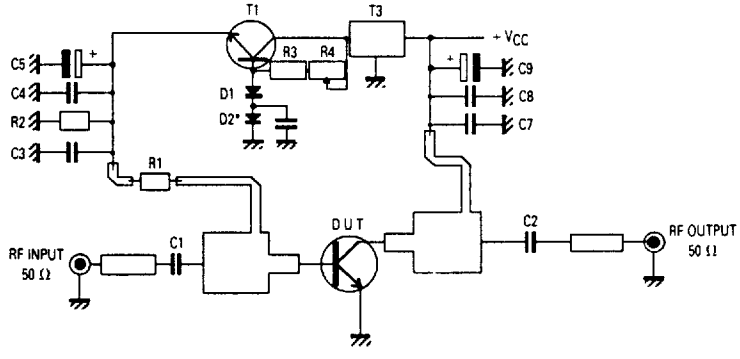
Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 50 mA, R_{BE} = 75 Ω)	$V_{(BR)CER}$	45	—	—	Vdc
Emitter-Base Breakdown Voltage (I_C = 5.0 mAdc)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector-Base Breakdown Voltage (I_E = 50 mAdc)	$V_{(BR)CBO}$	55	—	—	Vdc
Collector-Emitter Leakage (V_{CE} = 26 V, R_{BE} = 75 Ω)	I_{CER}	—	—	10	mA

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
ON CHARACTERISTICS					
DC Current Gain (I_C = 1 0 Adc, V_{CE} = 10 Vdc)	h_{FE}	15	—	100	—
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 26 V, I_E = 0, f = 1 0 MHz)	C_{ob}	30	—	50	pF
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain (V_{CC} = 26 V, P_{out} = 23 W, I_{CQ} = 100 mA) (f = 900 MHz)	G_p	8 0	9 0	—	dB
Load Mismatch at all Phase Angles (V_{CC} = 26 V, P_{out} = 23 W, I_{CQ} = 100 mA) No degradation in Output Power	ψ	5 1	—	—	VSWR
Collector Efficiency (V_{CC} = 26 V, P_{out} = 23 W, f = 900 MHz)	η_C	50	55	—	%
Power Saturation Pin = 7 0 W	P_{sat}	28	—	—	W



C1 — Capacitor Chip 0805 27 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 μF 35 V
R1 — Chip Resistor 2 2 Ω 1206 5%
R2 — Chip Resistor 51 Ω 0805 5%
R3 — Chip Resistor 220 Ω 0805 5%
R4 — Resistor Trimmer 1 0 kΩ
T1 — SMD Transistor BCX54 or Similar
T3 — Voltage Regulator 7805
D1, D2 — SMD Diode
Board Material — 0 8 mm, Epoxy Glass, Cu Clad 2 Sides, 35 μm Thick

Figure 1. 900 MHz Test Circuit

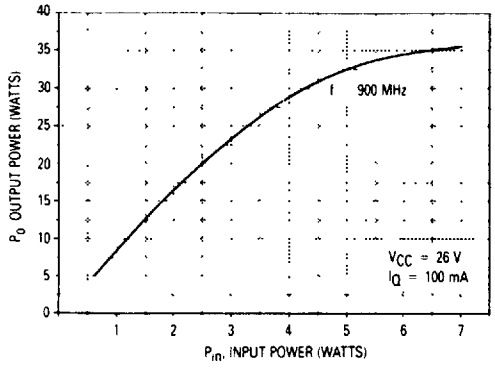


Figure 2. Output Power versus Input Power

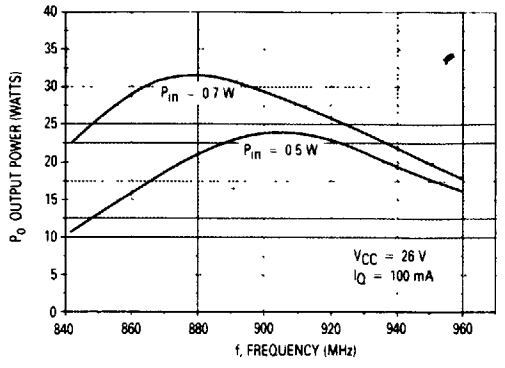


Figure 3. Output Power versus Frequency

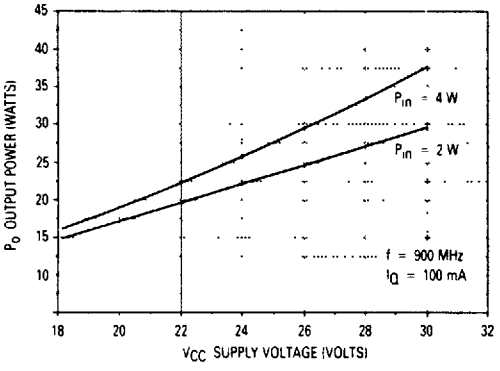


Figure 4. Output Power versus Supply Voltage

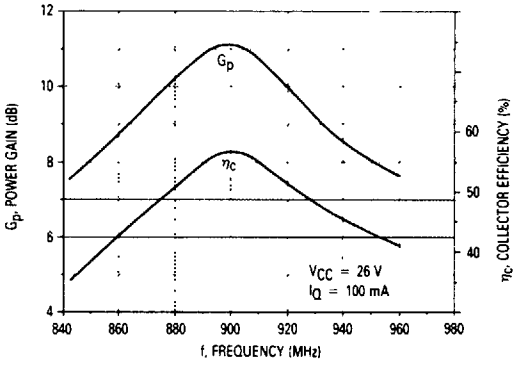
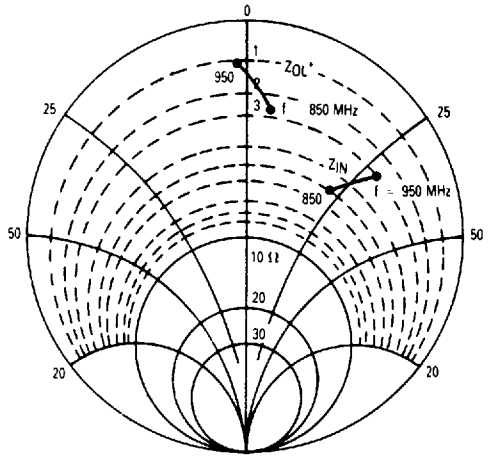


Figure 5. Typical Broadband Circuit Performance



P_{out} = 23 W V_{CE} = 26 V

f MHz	Z_{IN} OHMS	Z_{OL}* OHMS
850	5.28 + j6.9	2.94 + j1.84
900	4.2 + j5.7	2.23 + j1.06
950	2.9 + j4.2	1.19 − j0.28

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

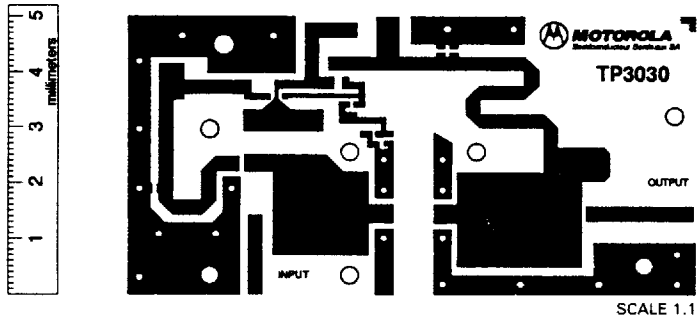


Figure 7. Test Circuit — Photomaster

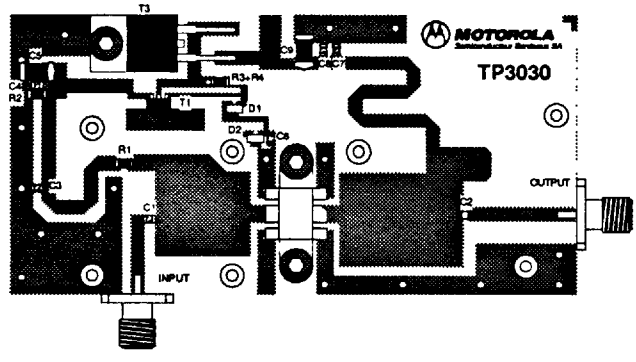


Figure 8. Test Fixture — Component Locations