

MOTOROLA SEMICONDUCTOR TECHNICAL DATA

The RF Line UHF Power Transistor

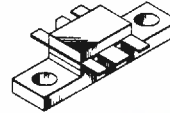
The TP3012 is designed for 900 MHz mobile stations in both analog and digital applications. It incorporates high value emitter ballast resistors, gold metallizations and offers a high degree of reliability and ruggedness.

- Specified 12.5 Volts, 915 MHz Characteristics
 - Output Power = 10 Watts
 - Minimum Gain = 8.0 dB
 - Class AB
 - $I_Q = 60$ mA

TP3012

10 W-915 MHz
UHF POWER
TRANSISTOR
NPN SILICON

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CASE 319-06, STYLE 2

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	17	Vdc
Collector-Base Voltage	V_{CBO}	30	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector-Current — Continuous	I_C	3.0	Adc
Total Device Dissipation ($T_C = 25^\circ\text{C}$ Derate above 25°C)	P_D	40 0.4	Watts $W/^\circ\text{C}$
Storage Temperature Range	T_{stg}	-65 to +150	$^\circ\text{C}$
Operating Junction Temperature	T_J	200	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	4.0	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

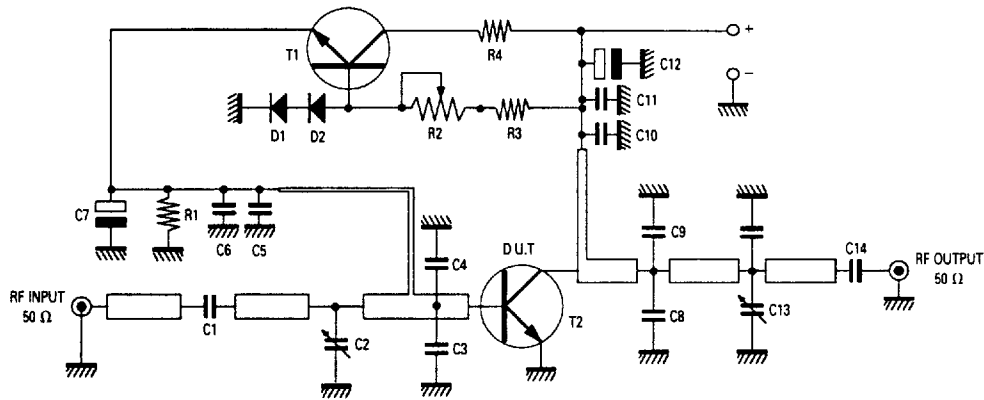
Characteristic	Symbol	Min	Typ	Max	Unit
Collector-Emitter Breakdown Voltage ($I_C = 20$ mA, $I_B = 0$)	$V_{(BR)CEO}$	16	—	—	Vdc
Collector-Emitter Breakdown Voltage ($I_C = 5.0$ mAdc)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector-Base Breakdown Voltage ($I_E = 25$ mAdc)	$V_{(BR)CBO}$	30	—	—	Vdc
Collector-Emitter Leakage ($V_{CE} = 17$ V, $R_{BE} = 75$ Ω)	I_{CE}	—	—	5.0	mA

(continued)

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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} = 12 V, I _E = 0, f = 1.0 MHz)	C _{ob}	—	—	30	pF
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain (V _{CC} = 12.5 V, P _{out} = 10 W, I _{CQ} = 60 mA) (f = 915 MHz)	G _p	8.0	9.0	—	dB
Load Mismatch (V _{CC} = 12.5 V, P _{out} = 10 W, I _{CQ} = 60 mA) (VSWR 10:1 at all Phase Angles)	ψ	No degradation in Output Power			
Collector Efficiency (V _{CC} = 12.5 V, P _{out} = 10 W, f = 915 MHz)	η	50	55	—	%



- C2 — Variable Capacitor 0.4 4.0 pF HQ
- C13 — Variable Capacitor 0.4 4.0 pF HQ
- + Capacitor Chip 3.9 pF HQ
- C3, C4 — Capacitor Chip 5.6 pF HQ
- C8, C9 — Capacitor Chip 6.8 pF HQ
- C1, C5, C10, C14 — Capacitor Chip 0805 330 pF 5%
- C6, C11 — Capacitor Chip 0805 15 nF 5%

- R2 — Trimmer Resistor 1 0 kΩ
- R3 — Chip Resistor 470 Ω 0805 5%
- R4 — Power Resistor 51 Ω 1/3 0 W
- C7, C12 — Capacitor Chip 6.8 μF 35 V
- R1 — Chip Resistor 0805 51 Ω 5%
- T1 — BD135
- T2 — TP3012
- D1, D2 — 1N4148 Diode
- Board Material — 0.5 mm, Teflon Glass, Cu Clad 2 Sides,
35 μm Thick

Figure 1. Test Circuit

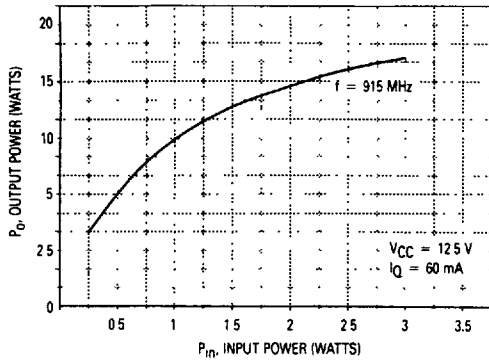
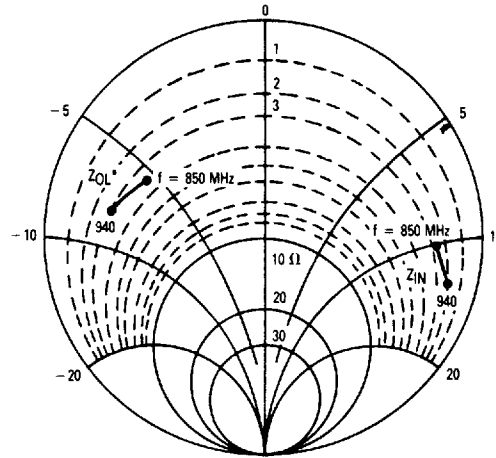


Figure 2. Output Power versus Input Power



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$P_{out} = 10 \text{ W}$ $V_{CE} = 12.5 \text{ V}$

f MHz	Z_{IN} OHMS	Z_{OL}^* OHMS
850	$2.6 + j10$	$3.4 - j5.2$
880	$2.4 + j10.6$	$3.3 - j6.1$
900	$2.3 + j11.5$	$3.1 - j6.4$
940	$1.8 + j12.9$	$3.0 - j7.8$

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

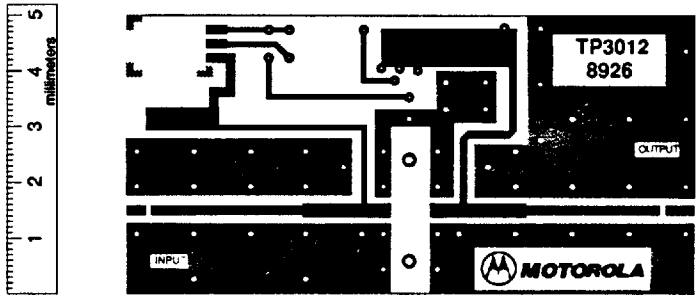


Figure 4. Photomaster of Test Fixture SCALE 1:1

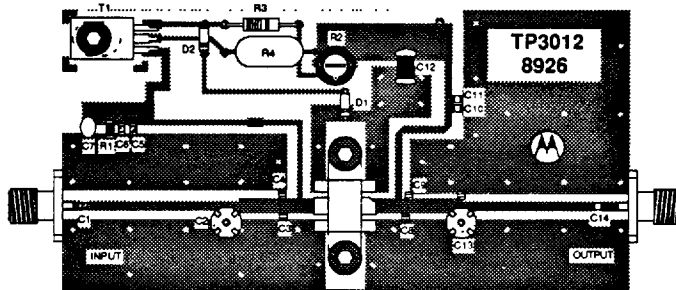


Figure 5. Test Fixture — Components Layout