

T-33-13

**MOTOROLA SEMICONDUCTOR TECHNICAL DATA**

**TP9380**

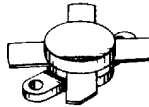
**75 W to 108 MHz VHF POWER TRANSISTOR**

**2**

**The RF Line VHF Power Transistor**

... designed for use in the new generation of VHF-FM broadcast transmitters operating from a 28 V supply in Class A, B or C. Its construction, which now incorporates gold metallization and diffused ballast resistors, ensures a long operational life even when run at its maximum ratings.

- 108 MHz
- 75 W — P<sub>out</sub>
- 28 V — V<sub>CC</sub>
- High Gain — 11 dB, Class C
- Gold Metallization for Improved Reliability
- Diffused Emitter Ballast Resistors for Ruggedness



CASE 211-11, STYLE 1  
(.500 SOE F)

**MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V <sub>CEO</sub>	35	Vdc
Collector-Base Voltage	V <sub>CBO</sub>	65	Vdc
Emitter-Base Voltage	V <sub>EBO</sub>	4	Vdc
Collector Current — Continuous	I <sub>C</sub>	10	Adc
Total Device Dissipation @ T <sub>C</sub> = 25°C Derate above 70°C	P <sub>D</sub>	100 0.67	Watts W/°C
Operating Junction Temperature	T <sub>J</sub>	200	°C
Storage Temperature Range	T <sub>stg</sub>	-65 to +200	°C

**THERMAL CHARACTERISTICS**

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	R <sub>θJC</sub>	1.5	°C/W

**ELECTRICAL CHARACTERISTICS**

Characteristic	Symbol	Min	Typ	Max	Unit
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**OFF CHARACTERISTICS**

Collector-Emitter Breakdown Voltage (I <sub>C</sub> = 50 mA, I <sub>B</sub> = 0)	V <sub>(BR)CEO</sub>	35	—	—	Vdc
Collector-Base Breakdown Voltage (I <sub>C</sub> = 50 mA, I <sub>E</sub> = 0)	V <sub>(BR)CBO</sub>	65	—	—	Vdc
Emitter-Base Breakdown Voltage (I <sub>E</sub> = 10 mA, I <sub>C</sub> = 0)	V <sub>(BR)EBO</sub>	4	—	—	Vdc
Collector-Emitter Breakdown Voltage (I <sub>C</sub> = 50 mA, R <sub>BE</sub> = 10 Ω)	V <sub>(BR)CER</sub>	60	—	—	Vdc

**ON CHARACTERISTICS**

DC Current Gain (I <sub>C</sub> = 1 A, V <sub>CE</sub> = 5 V)	h <sub>FE</sub>	20	—	150	—
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**DYNAMIC CHARACTERISTICS**

Output Capacitance (V <sub>CB</sub> = 30 V, I <sub>E</sub> = 0, f = 1 MHz)	C <sub>ob</sub>	—	—	85	pF
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(continued)

MOTOROLA RF DEVICE DATA

2-1241

ELECTRICAL CHARACTERISTICS — continued

Characteristic	Symbol	Min	Typ	Max	Unit
<b>FUNCTIONAL TESTS</b>					
Common-Emitter Amplifier Power Gain ( $V_{CE} = 28 \text{ V}$ , $P_{out} = 75 \text{ W}$ , $f = 108 \text{ MHz}$ )	GPE	10.3	—	—	dB
Collector Efficiency ( $V_{CE} = 28 \text{ V}$ , $P_{out} = 75 \text{ W}$ , $f = 108 \text{ MHz}$ )	$\eta_c$	70	75	—	%
Load Mismatch ( $V_{CE} = 28 \text{ V}$ , $P_{out} = 75 \text{ W}$ , $f = 108 \text{ MHz}$ , Load VSWR = 4:1, All Phase Angles)	$\psi$	No Degradation in Output Power			

TYPICAL CHARACTERISTICS

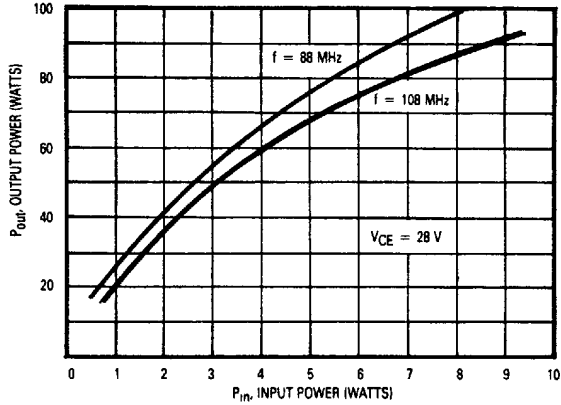


Figure 1. Power Output versus Power Input

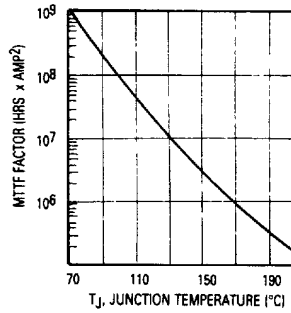


Figure 2. MTTF Factor versus Junction Temperature

Note: Divide by  $I_{C2}^2$  to obtain metal lifetime in hours

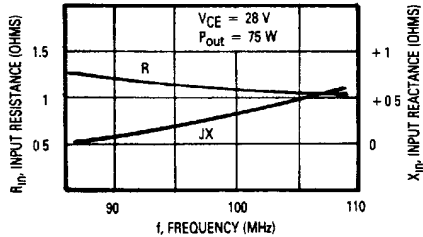


Figure 3. Series Input Impedance versus Frequency

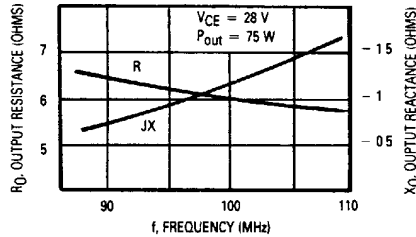


Figure 4. Series Output Impedance versus Frequency

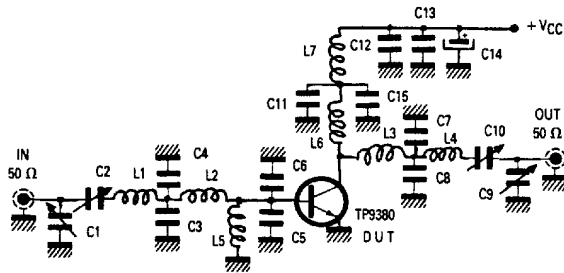


Figure 5. 88-108 MHz Narrowband Test Fixture

- C1 — Arco 425 Variable capacitor (24-200 pF)
- C2 — Arco 425 Variable capacitor (24-200 pF)
- C3 — 60 pF UNELCO
- C4 — 60 pF UNELCO (108 MHz)
- 100 pF UNELCO (88 MHz)
- C5 — 330 pF chip capacitor (closed to the transistor)
- C6 — 330 pF chip capacitor (closed to the transistor)
- C7 — 40 pF UNELCO
- C8 — 40 pF UNELCO (108 MHz)
- 90 pF UNELCO (88 MHz)
- C9 — Arco 423 Variable capacitor (7-100 pF)
- C10 — Arco 425 Variable capacitor (24-200 pF)
- C11 — 1000 pF UNELCO
- C12 — 1000 pF UNELCO
- C13 — 0.1  $\mu$ F disc capacitor
- C14 — 100  $\mu$ F/40 V capacitor
- C15 — 10 nF disc capacitor
- L1 — 3 turns ID = 6 mm 1 mm wire
- L2 — Hair pin = made with a 1.4 mm wire L = 15 mm
- L3 — Hair pin = made with a 2 mm wire L = 20 mm for 108 MHz
- L = 30 mm for 88 MHz
- L4 — 3 turns ID = 8 mm 1.4 mm wire
- L5 — 0.7  $\mu$ H choke
- L6 — 6 turns ID = 6 mm 1.2 mm wire L = 15 mm
- L7 — 4 turns 1.2 mm wire on ferrite