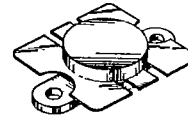


MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA
The RF Line
VHF Power Transistor

... designed primarily for wideband large-signal output amplifier stages in 30-200 MHz frequency range.

- Guaranteed Performance at 175 MHz and 28 Vdc
Output Power = 100 W
Minimum Gain = 7 dB
- Built-In Matching Network for Broadband Operation
- 100% Tested for Load Mismatch at All Phase Angles with 3:1 VSWR
- Gold Metallization System for High Reliability
- High Output Saturation Power — $P_{sat} = 125$ W (Min)
- Diffused Ballast Resistors

J01006
28 VOLTS
30-200 MHz
VHF POWER
TRANSISTOR

.500 J ZERO
CASE 316A-01, STYLE 1
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	35	Vdc
Collector-Base Voltage	V_{CES}	60	Vdc
Emitter-Base Voltage	V_{EBO}	4	Vdc
Collector Current — Continuous	I_C	12	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	150 1.14	Watts W/°C
Operating Junction Temperature	T_J	200	°C
Storage Temperature Range	T_{stg}	-65 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.88	°C/W

ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage ($I_C = 50$ mA, $I_B = 0$)	$V_{(BR)CEO}$	35	—	—	Vdc
Collector-Emitter Breakdown Voltage ($I_C = 100$ mA, $V_{BE} = 0$)	$V_{(BR)CES}$	60	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 5$ mA, $I_C = 0$)	$V_{(BR)EBO}$	4	—	—	Vdc
Collector Cutoff Current ($V_{CE} = 25$ V, $V_{BE} = 0$)	I_{CES}	—	—	10	mA dc

ON CHARACTERISTICS

DC Current Gain ($I_C = 1$ A, $V_{CE} = 10$ V)	h_{FE}	20	—	150	—
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DYNAMIC CHARACTERISTICS

Output Capacitance ($V_{CB} = 28$ V, $I_E = 0$, $f = 1$ MHz)	C_{ob}	—	—	200	pF
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(continued)

2

ELECTRICAL CHARACTERISTICS — continued

Characteristic	Symbol	Min	Typ	Max	Unit
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain ($V_{CE} = 28\text{ V}$, $P_{out} = 100\text{ W}$, $f = 175\text{ MHz}$)	GPE	7	—	—	dB
Collector Efficiency ($V_{CE} = 28\text{ V}$, $P_{out} = 100\text{ W}$, $f = 175\text{ MHz}$)	η_c	—	60	—	%
Load Mismatch ($V_{CE} = 28\text{ V}$, $P_{out} = 100\text{ W}$, $f = 175\text{ MHz}$, Load VSWR = 3:1, All Phase Angles)	ψ	No Degradation in Output Power			
Saturated Output Power ($V_{CE} = 28\text{ V}$, $f = 175\text{ MHz}$)	P_{sat}	125	—	—	W

TYPICAL CHARACTERISTICS

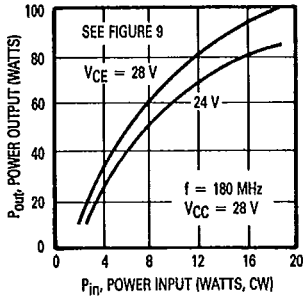


Figure 1. Power Input versus Power Output (Class C Narrowband)

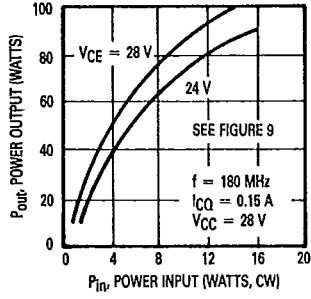


Figure 2. Power Input versus Power Output (Class B Narrowband)

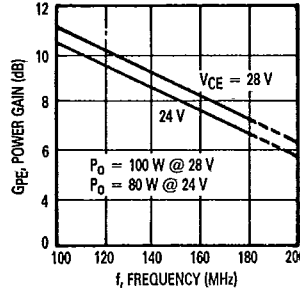


Figure 3. Power Gain versus Frequency (Class C Narrowband)

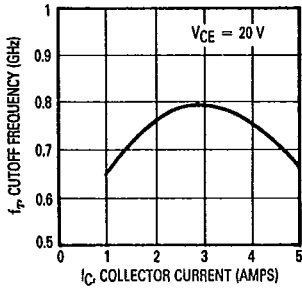


Figure 4. Cutoff Frequency versus Current

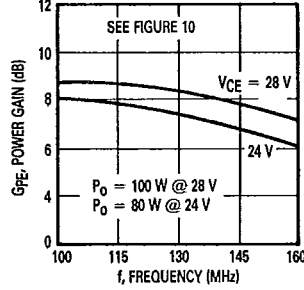


Figure 5. Power Gain versus Frequency (Broadband)

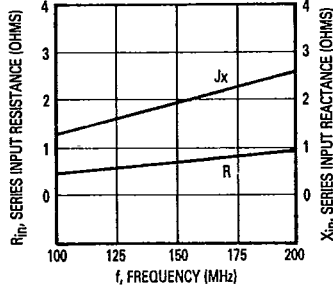


Figure 6. Series Input Impedance versus Frequency

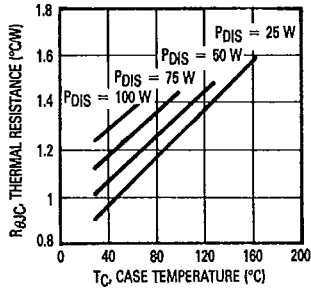


Figure 7. Thermal Resistance versus Case Temperature

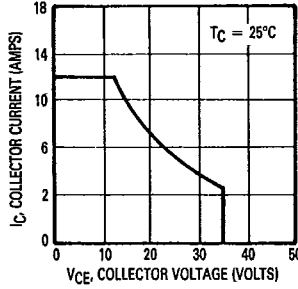
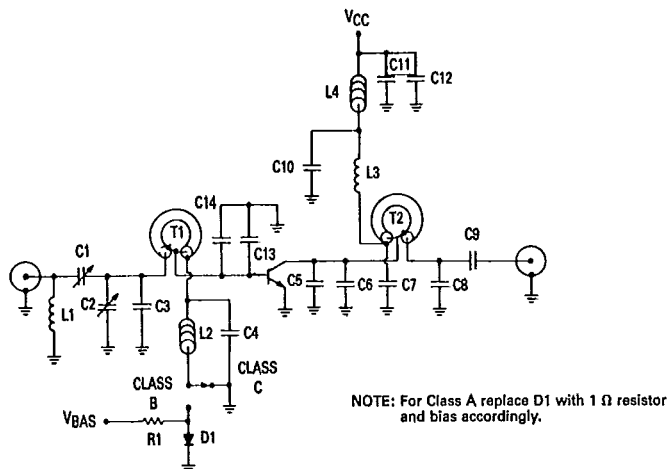


Figure 8. DC Safe Operating Area

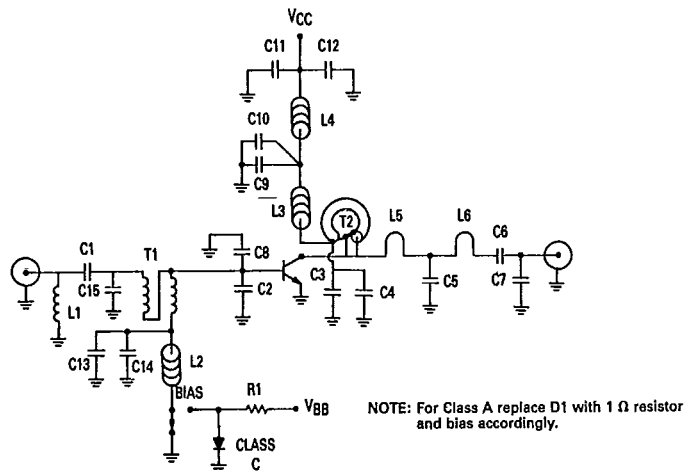
2



- C1 — 8-60 pF ARCO
- C2 — 3-35 pF ARCO
- C3 — 30 pF UNELCO
- C4, C7, C9, C10, C11 — 1000 pF UNELCO
- C5 — 110 pF UNELCO
- C6 — 120 pF UNELCO
- C8 — 40 pF UNELCO
- C12 — 25 μ F Electrolytic

- C13 — 350 pF UNELCO
- C14 — 300 pF UNELCO
- D1 — DSR 5050
- L1 — 5 turns, 0.125" diameter #22 AWG
- L2, L4 — 3 Ferrite beads
- R1 — 12 Ω
- T1 — 0.075" diameter semiridged 10 Ω co-ax
- T2 — 0.075" diameter semiridged 25 Ω co-ax

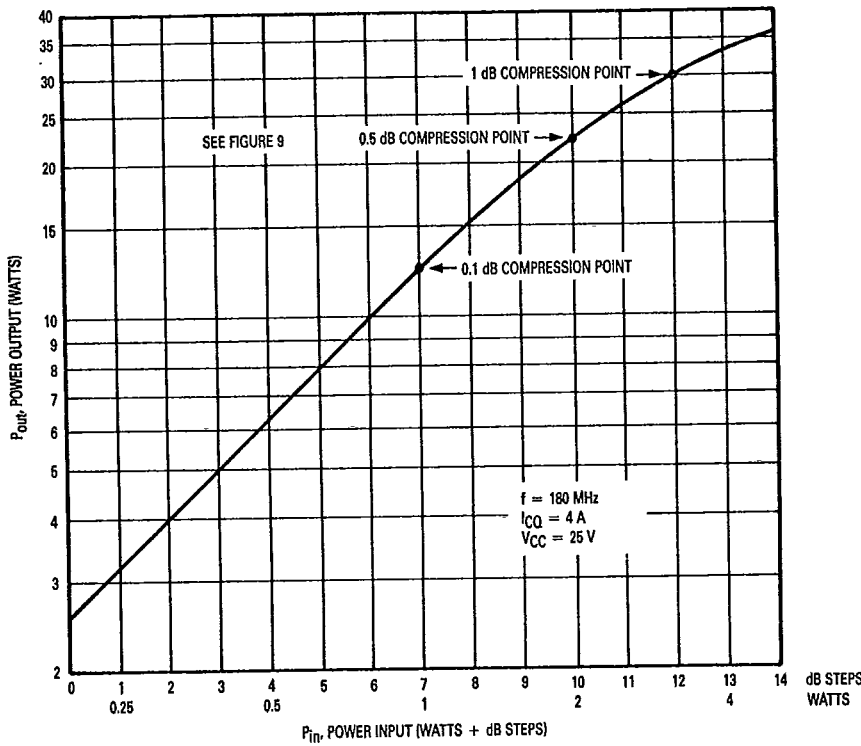
Figure 9. Narrowband Test Circuit (100-180 MHz)



- C1 — 50 pF UNELCO
- C2 — 350 pF UNELCO
- C3, C6, C9, C12, C14 — 1000 pF UNELCO
- C4, C10, C13 — 0.1 μ F disc
- C5, C15 — 30 pF UNELCO
- C7 — 0-18 pF #402 ARCO
- C8 — 300 pF UNELCO
- C11 — 100 μ F Electrolytic
- D1 — DSR 5050

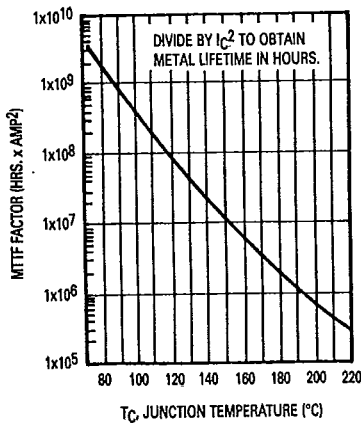
- L1 — 4 turns, 0.125" diameter #22 AWG
- L2, L3, L4 — 3 Ferrite Beads on #22 AWG
- L5 — 0.08" wide ribbon, 0.25" long
- L6 — 0.08" wide ribbon, 0.125" long
- R1 — 50 Ω
- T1 — 1" long twisted pair #22 AWG
- T2 — 0.075" diameter semiridged 25 Ω co-ax, 2" long (Balun transformer)

Figure 10. Broadband Test Circuit (100-160 MHz)



2

Figure 11. Power Input versus Power Output (Class A Narrowband)



Conditions:

- $P_D = 100 \text{ W}$
 - $\eta_c = 60\%$
 - $GT = 7 \text{ dB}$
 - $T_C = 45^\circ\text{C}$
 - $\theta_{JC} = 1.25$
 - $V_{CE} = 28 \text{ V}$
 - $P_{DJS} = 87 \text{ W}$
 - $T_J = 150^\circ\text{C}$
- MTTF Factor = $(1 \times 10^7 \text{ hrs.}) (\text{amp}^2)$
- MTTF (hr) = $\frac{(1 \times 10^7 \text{ hrs}) (\text{amp}^2)}{(5.95 \text{ amp})^2}$
- = $2.8 \times 10^5 \text{ hrs}$
- = 32 yrs

Figure 12. MTTF Factor versus Junction Temperature