T-33-11

MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

TP5050

50 W — 470 MHz
UHF LINEAR
POWER TRANSISTOR
NPN SILICON

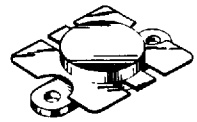
2

The RF Line

UHF Linear Power Transistor

. . . designed for 24 Volt UHF large-signal common emitter amplifier applications in industrial and commercial FM equipment operating in the 440 to 470 MHz frequency range, i.e., cellular radio base stations.

- 440–470 MHz
- 50 W — P_{out}
- 28 V — V_{CC}
- Rugged
- Gold Metallization for Reliability



CASE 316A-01, STYLE 1
(.500 J ZERO)

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	32	Vdc
Collector-Base Voltage	V_{CBO}	65	Vdc
Emitter-Base Voltage	V_{EBO}	4	Vdc
Total Device Dissipation @ T_C = 70°C Derate above 70°C	P_D	65 0.67	Watts W/°C
Operating Junction Temperature	T_J	200	°C
Storage Temperature Range	T_{stg}	−65 to +200	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case (T_C = 70°C)	$R_{\theta JC}$	1.5	°C/W

ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 50 mA, I_B = 0)	$V_{(BR)CEO}$	32	—	—	Vdc
Collector-Base Breakdown Voltage (I_C = 50 mA, I_E = 0)	$V_{(BR)CBO}$	65	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 mA, I_C = 0)	$V_{(BR)EBO}$	4	—	—	Vdc
Collector-Emitter Breakdown Voltage (I_C = 50 mA, R_{BE} = 10 Ω)	$V_{(BR)CER}$	60	—	—	Vdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 5 A, V_{CE} = 5 V)	h_{FE}	20	—	100	—
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 28 V, I_E = 0, f = 1 MHz)	C_{ob}	—	70	—	pF

(continued)

ELECTRICAL CHARACTERISTICS — continued

Characteristic	Symbol	Min	Typ	Max	Unit
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain (V_{CE} = 28 V, P_{out} = 50 W, f = 470 MHz, I_Q = 100 mA)	G_{PE}	6.5	7	—	dB
Collector Efficiency (V_{CE} = 28 V, P_{out} = 50 W, f = 470 MHz, I_Q = 100 mA)	η_C	60	65	—	%
Load Mismatch (V_{CE} = 28 V, I_Q = 100 mA, P_{out} = 50 W, f = 470 MHz, Load VSWR = 20:1, All Phase Angles)	ψ	No Degradation in Output Power			

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TYPICAL CHARACTERISTICS

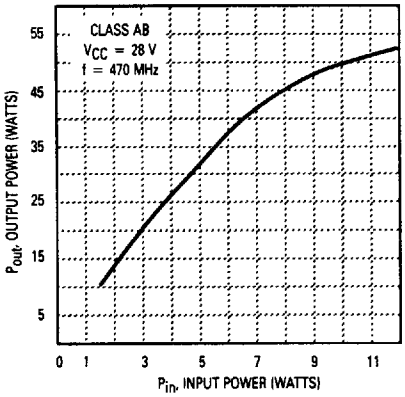

Figure 1. Output Power versus Input Power

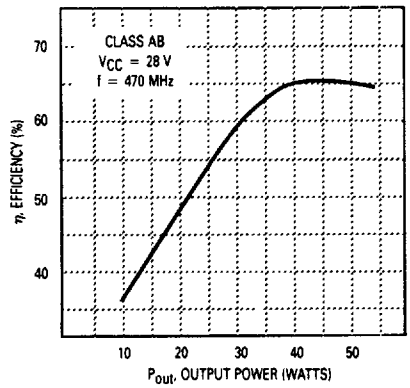

Figure 2. Efficiency versus Power Output

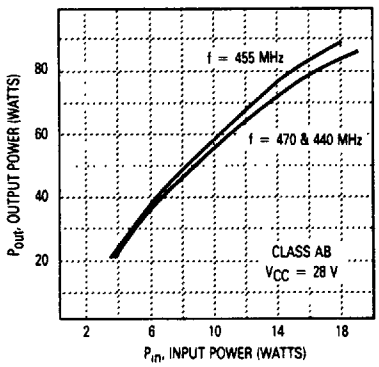

Figure 3. Output Power versus Input Power

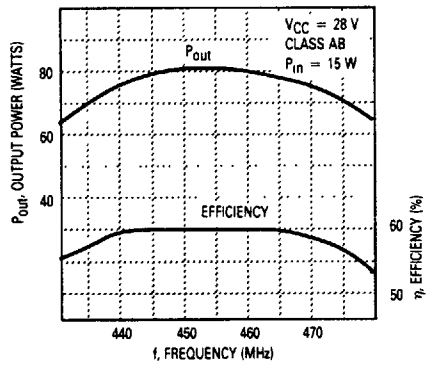

Figure 4. Output Power and Efficiency versus Frequency

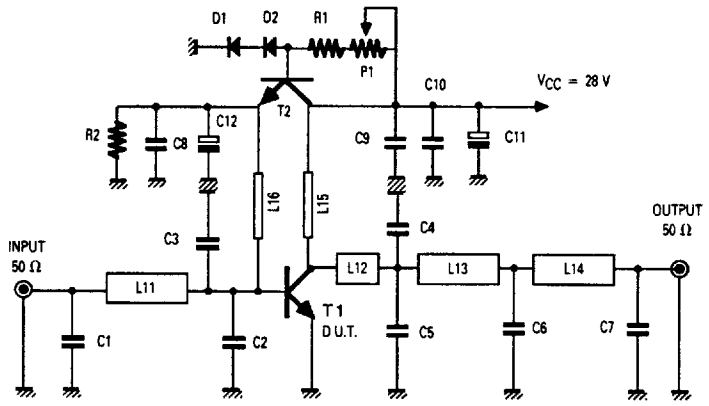

Figure 5. 440–470 MHz Test Circuit

C1 — 6.8 pF ATC100A
C2, C4, C5 — 39 pF ATC100A
C3 — 27 pF ATC100A
C6 — 15 pF ATC100A
C7 — 8.2 pF ATC100A

C8, C9 — 1 nF Sprague
C10 — 100 nF Sprague
C11 — 100 μF 63 V
C12 — 4.7 μF 12 V
R1 — 2.2 kΩ R2 51 Ω
P1 — 1 kΩ

L11 — Microstrip Line W = 3.2 mm L = 12 mm
L12 — Microstrip Line W = 3.2 mm L = 4 mm
L13 — Microstrip Line W = 3.2 mm L = 12 mm
L14 — Microstrip Line W = 3.2 mm L = 22 mm
L15 — Microstrip Line W = 1.8 mm L = 85 mm
L16 — Microstrip Line W = 8 mm L = 70 mm
T2 — BD135

Board Material: 1/16 Inch, Epoxy Glass, ϵ_r = 4.5