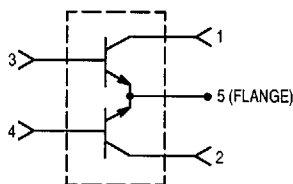


MOTOROLA SEMICONDUCTOR TECHNICAL DATA

The RF Line NPN Silicon Push-Pull RF Power Transistor

... designed primarily for wideband large-signal output and driver amplifier stages in the 30 to 400 MHz frequency range.

- Specified 28 Volt, 400 MHz Characteristics —
 - Output Power = 125 W
 - Typical Gain = 10 dB (Class C), 11 dB (Class AB)
 - Efficiency = 55% (Typ)
- Hermetic Package to Meet Stringent Environmental Requirements
- Built-In Input Impedance Matching Networks for Broadband Operation
- Push-Pull Configuration Reduces Even Numbered Harmonics
- Gold Metallization System for High Reliability
- 100% Tested for Load Mismatch



The 2N6985 is two transistors in a single package with separate base and collector leads and emitters common. This arrangement provides the designer with a space saving device capable of operation in a push-pull configuration.

MAXIMUM RATINGS*

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	30	Vdc
Collector-Base Voltage	V_{CBO}	60	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector Current — Continuous	I_C	16	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ (1) Derate above 25°C	P_D	270 1.54	Watts W/ $^\circ\text{C}$
Storage Temperature Range	T_{stg}	-65 to +150	$^\circ\text{C}$
Junction Temperature	T_J	200	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.65	$^\circ\text{C/W}$

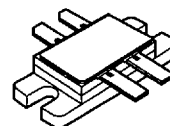
NOTE:

- These devices are designed for RF operation. The total device dissipation rating applies only when the devices are operated as RF push-pull amplifiers.

* Indicates JEDEC Registered Data.

2N6985

125 W, 30 to 400 MHz
CONTROLLED "Q"
BROADBAND PUSH-PULL
RF POWER TRANSISTOR
NPN SILICON



CASE 382, STYLE 1

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS (1)					
Collector-Emitter Breakdown Voltage ($I_C = 50\text{ mAdc}$, $I_B = 0$)	$V_{(BR)CEO}$	30	—	—	Vdc
Collector-Emitter Breakdown Voltage ($I_C = 50\text{ mAdc}$, $V_{BE} = 0$)	$V_{(BR)CES}$	60	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 5.0\text{ mAdc}$, $I_C = 0$)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 30\text{ Vdc}$, $I_E = 0$)	I_{CBO}	—	—	5.0	mAdc

ON CHARACTERISTICS (1)

DC Current Gain ($I_C = 1.0\text{ Adc}$, $V_{CE} = 5.0\text{ Vdc}$)	h_{FE}	20	—	100	—
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DYNAMIC CHARACTERISTICS (1)

Output Capacitance ($V_{CB} = 28\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	C_{ob}	—	75	115	pF
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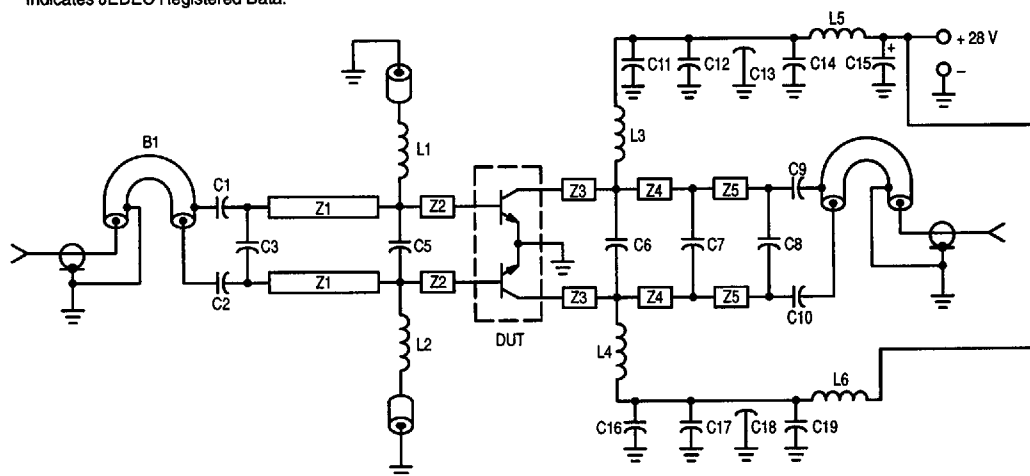
FUNCTIONAL TESTS (2) — See Figure 1

Common-Emitter Amplifier Power Gain ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 125\text{ W}$, $f = 400\text{ MHz}$)	G_{pe}	8.0	10	—	dB
Collector Efficiency ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 125\text{ W}$, $f = 400\text{ MHz}$)	η	50	55	—	%
Load Mismatch ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 125\text{ W}$, $f = 400\text{ MHz}$, $VSWR = 30:1$, all phase angles)	ψ	No Degradation in Output Power			

NOTES:

- Each transistor chip measured separately.
- Both transistor chips operating in push-pull amplifier.

* Indicates JEDEC Registered Data.



C1, C2 — 240 pF, 100 Mil Chip Cap (ATC) or Equivalent
 C3 — 4.7 pF, 100 Mil Chip Cap (ATC) or Equivalent
 C8 — 12 pF, 100 Mil Chip Cap (ATC) or Equivalent
 C5 — 27 pF, 100 Mil Chip Cap (ATC) or Equivalent
 C6 — 20 pF, 100 Mil Chip Cap (ATC) or Equivalent
 C7 — 12 pF, 100 Mil Chip Cap (ATC) or Equivalent
 C9, C10 — 270 pF, 100 Mil Chip Cap (ATC) or Equivalent
 C11, C12, C16, C17 — 470 pF 100 Mil Chip Cap (ATC) or Equivalent
 C13, C18 — 680 pF Feedthru
 C14, C19 — 0.1 μF Erie Redcap or Equivalent
 C15 — 20 μF , 50 V

L1, L2 — 0.15 μH Molded Choke With Ferrite Bead
 L3, L4 — 2-1/2 Turns #20 AWG, 0.200 ID
 L5, L6 — 3-1/2 Turns #18 AWG, 0.200 ID

B1 — Balun, 50 Ω Semi-Rigid Coaxial Cable 86 Mil OD, 2" L
 B2 — Balun, 50 Ω Semi-Rigid Coaxial Cable 86 Mil OD, 2" L
 Z1 — Microstrip Line 650 Mil L x 125 Mil W
 Z2 — Microstrip Line 220 Mil L x 125 Mil W
 Z3 — Microstrip Line 280 Mil L x 125 Mil W
 Z4 — Microstrip Line 300 Mil L x 125 Mil W
 Z5 — Microstrip Line 450 Mil L x 125 Mil W

Board Material — 0.06" Teflon-Fiberglass, $\epsilon_r = 2.55$,
 2 oz. Cu. CLAD, Double Sided

Figure 1. 400 MHz Test Fixture

CLASS C

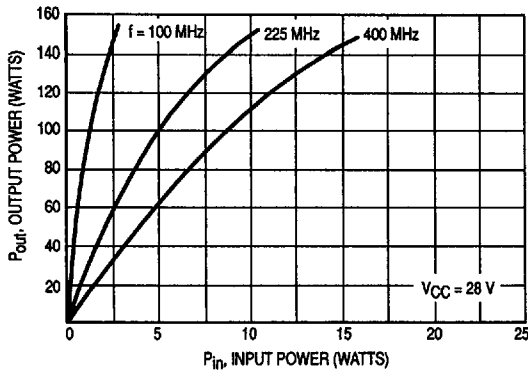


Figure 2. Output Power versus Input Power

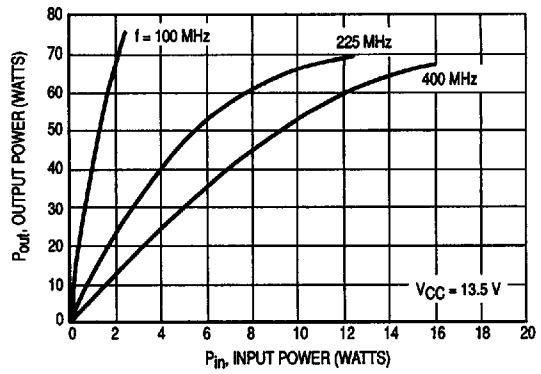


Figure 3. Output Power versus Input Power

CLASS C

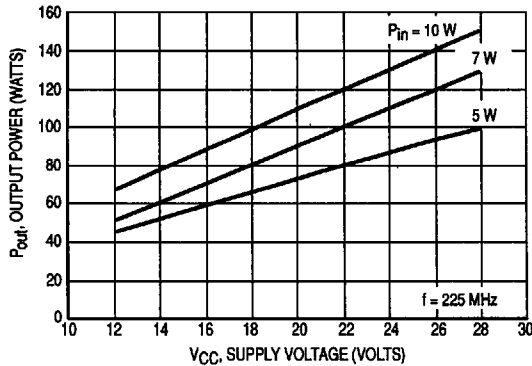


Figure 4. Output Power versus Supply Voltage

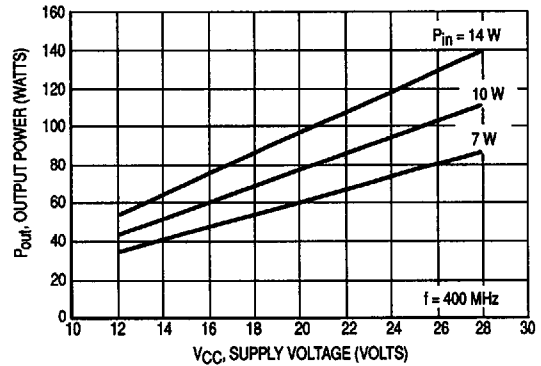


Figure 5. Output Power versus Supply Voltage

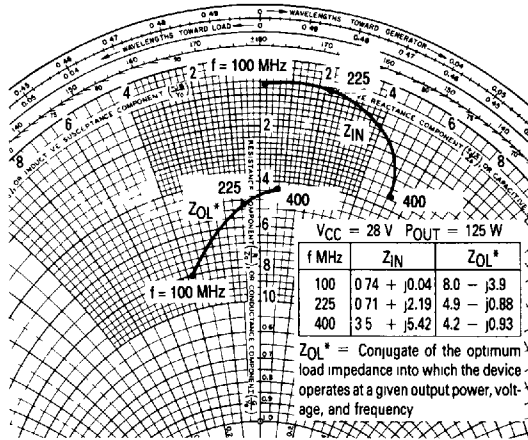


Figure 6. Series Equivalent Input/Output Impedance

Input and output impedances are measured from base to base and collector to collector respectively.

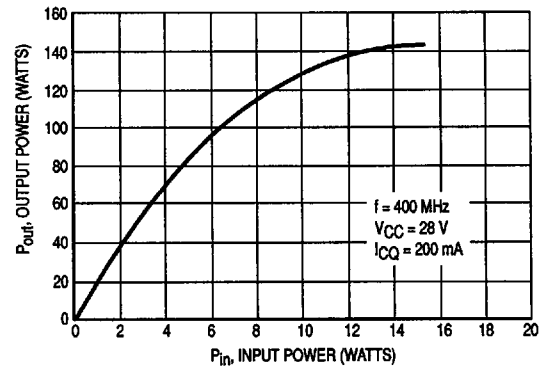
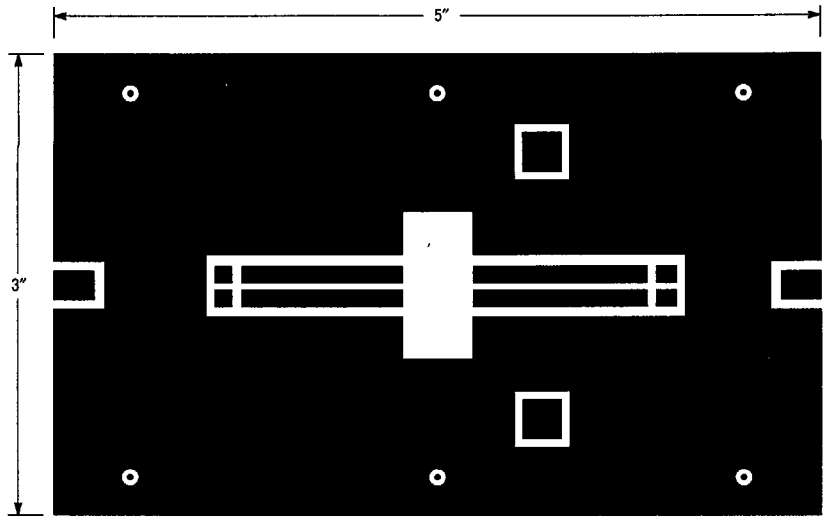


Figure 7. Class AB Output Power versus Input Power

2



SCALE 0.75:1

Figure 8. Test Circuit Photomaster

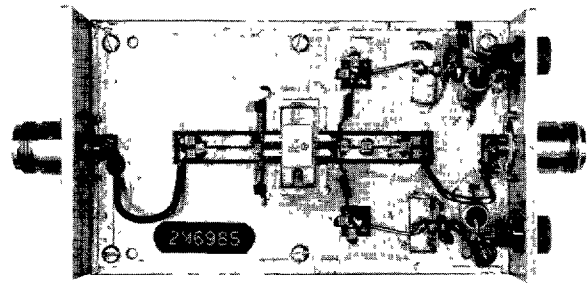


Figure 9. Test Fixture Photo

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