AMERICAN MICROSEMICONDUCTOR

2N5160

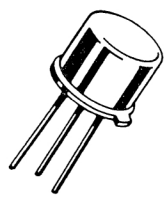
The RF Line

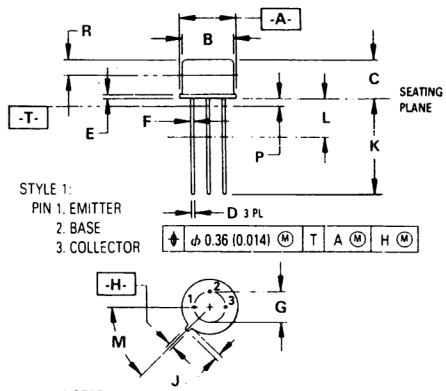
I_C = −400 mA
POWER TRANSISTOR
PNP SILICON

PNP SILICON RF POWER TRANSISTOR

. . . designed for amplifier, frequency multiplier or oscillator applications in military and industrial equipment. Suitable for use as Class A, B, or C output driver, or pre-driver stages in VHF and UHF.

- High Power Gain — G_{PE} = 8.0 dB (Min) @ f = 400 MHz, 14.5 db (Typ) @ 175 MHz — No Emitter Tuning
- Power Output — P_{out} = 1.0 Watt (Min @ f = 400 MHz = 1.5 Watt (Typ) @ f = 175 MHz
- Resists Burnout When Load is Shorted or Opened
- Designed for Use in Complementary Circuits with 2N3866





NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION J MEASURED FROM DIMENSION A MAXIMUM.
4. DIMENSION B SHALL NOT VARY MORE THAN 0.25 (0.010) IN ZONE R. THIS ZONE CONTROLLED FOR AUTOMATIC HANDLING.
5. DIMENSION F APPLIES BETWEEN DIMENSION P AND L. DIMENSION D APPLIES BETWEEN DIMENSION L AND K MINIMUM. LEAD DIAMETER IS UNCONTROLLED IN DIMENSION P AND BEYOND DIMENSION K MINIMUM.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	8.51	9.39	0.335	0.370
B	7.75	8.50	0.305	0.335
C	6.10	6.60	0.240	0.260
D	0.41	0.53	0.016	0.021
E	0.23	1.04	0.009	0.041
F	0.41	0.48	0.016	0.019
G	5.08 BSC		0.200 BSC	
H	0.72	0.86	0.028	0.034
J	0.74	1.14	0.029	0.045
K	12.70	19.05	0.500	0.750
L	6.35	—	0.250	—
M	45° BSC		45° BSC	
P	—	1.27	—	0.050
R	2.54	—	0.100	—

(TO-39)

***MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	−40	Vdc
Collector-Base Voltage	V_{CB}	−60	Vdc
Emitter-Base Voltage	V_{EB}	−4.0	Vdc
Collector Current	I_C	−0.4	Adc
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	5.0 28.6	Watts mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−65 to +200	°C

*Indicates JEDEC Registered Data.

***ELECTRICAL CHARACTERISTICS** (T_A = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Sustaining Voltage (I_C = −5.0 mAdc, I_B = 0)	$V_{CEO(sus)}$	−40	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = −0.1 mAdc, I_C = 0)	$V_{(BR)EBO(sus)}$	−4.0	—	—	Vdc
Collector Cutoff Current (V_{CE} = −28 Vdc, I_B = 0)	I_{CEO}	—	—	−20	μAdc
Collector Cutoff Current (V_{CE} = −60 Vdc, V_{BE} = 0)	I_{CES}	—	—	−0.1	mAdc
Collector Cutoff Current (V_{CB} = −28 Vdc, I_E = 0)	I_{CBO}	—	—	−1.0	μAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = −50 mAdc, V_{CE} = −5.0 Vdc)	h_{FE}	10	—	—	—
DYNAMIC CHARACTERISTICS					
Current-Gain — Bandwidth Product (I_C = −50 mAdc, V_{CE} = −15 Vdc, f = 200 MHz)	f_T	500	900	—	MHz
Collector-Base Capacitance (V_{CB} = −28 Vdc, I_E = 0, f = 0.1 to 1.0 MHz)	C_{cb}	—	2.5	4.0	pF
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain (V_{CE} = −28 Vdc, P_{in} = 0.16 Watt, f = 400 MHz)	G_{PE}	8.0	8.8	—	dB
(V_{CE} = −28 Vdc, P_{in} = 50 mW, f = 175 MHz)		—	14.5	—	
Power Output (V_{CE} = −28 Vdc, P_{in} = 0.16 Watt, f = 400 MHz)	P_{out}	1.0	1.2	—	Watt
(V_{CE} = −28 Vdc, P_{in} = 50 mW, f = 175 MHz)		—	1.4	—	
Collector Efficiency (V_{CE} = −28 Vdc, P_{in} = 0.16 Watt, f = 400 MHz)	η	45	55	—	%

*Indicates JEDEC Registered Data.

FIGURE 1 – 400-MHz TEST CIRCUIT

C_1 – 10 pF
C_2, C_3, C_4, C_5 – 1.0 – 10 pF variable
C_6 – 2400 pF feed through
C_7 – 0.004 μF
C_8 – 0.01 μF
L_1 – 30 nH, 1 turn, No. 20 AWG
L_2 – 75 nH, 3 turns, No. 20 AWG
L_3 – 0.33 μH, R.F.C.

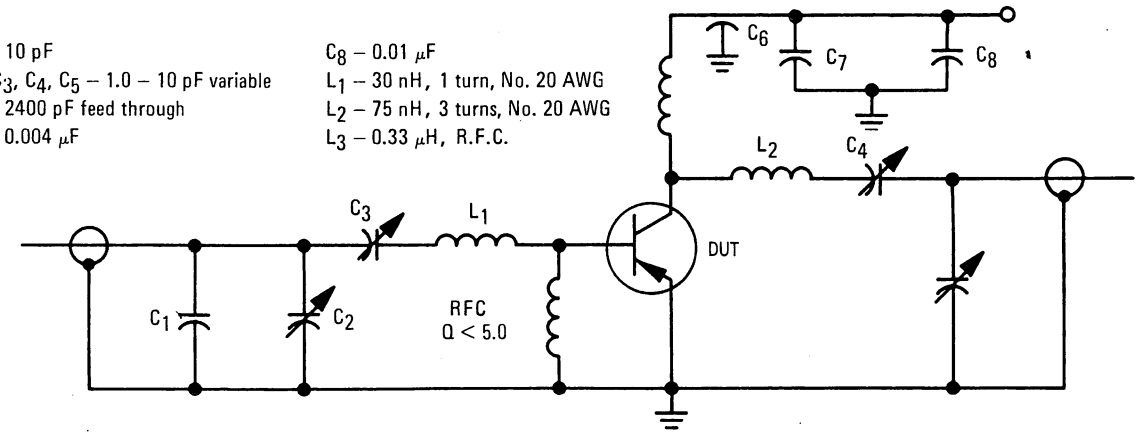


FIGURE 2 — POWER OUTPUT versus FREQUENCY

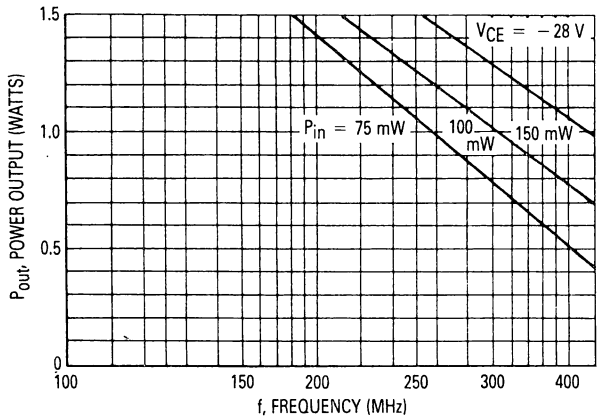


FIGURE 3 — POWER OUTPUT versus POWER INPUT

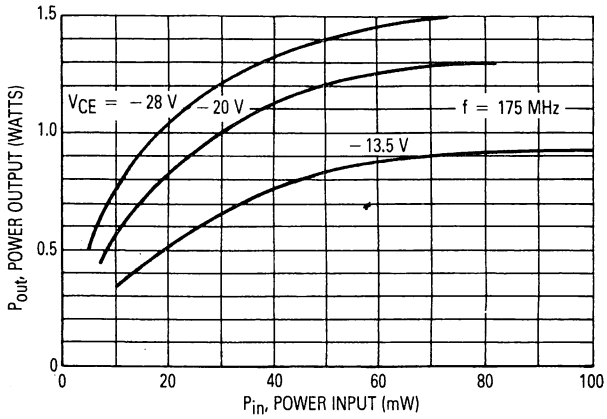


FIGURE 4 — PARALLEL INPUT IMPEDANCE versus FREQUENCY

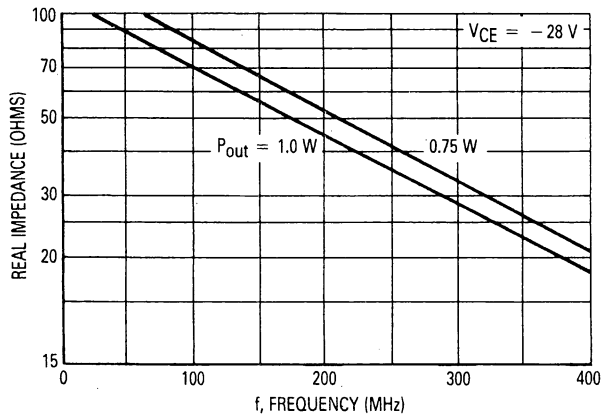


FIGURE 5 — PARALLEL INPUT IMPEDANCE versus FREQUENCY

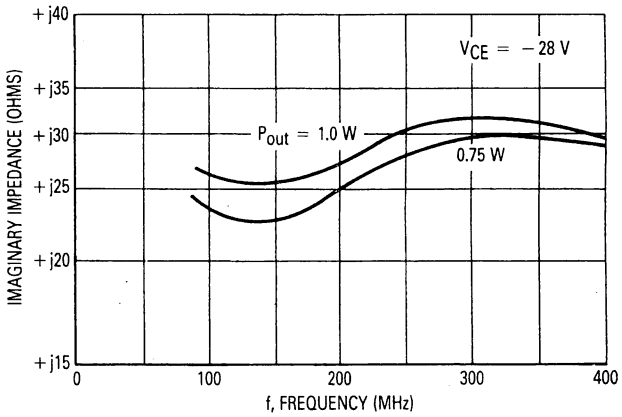


FIGURE 6 — PARALLEL OUTPUT CAPACITANCE versus FREQUENCY

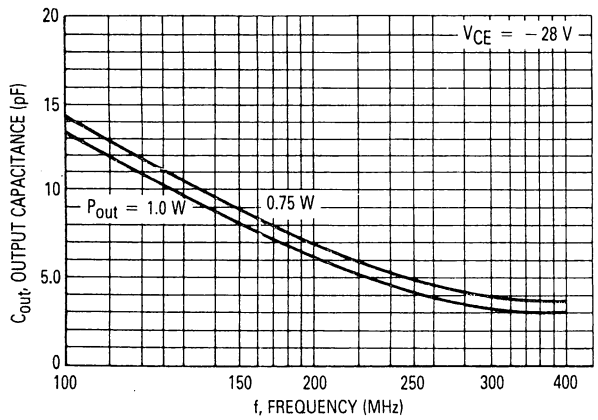


FIGURE 7 — CURRENT-GAIN — BANDWIDTH PRODUCT versus COLLECTOR CURRENT

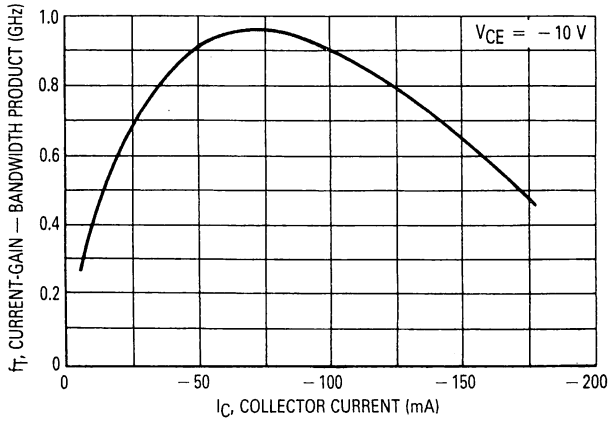


FIGURE 8 – 2N5160 300-MHz COMPLEMENTARY POWER OUTPUT CIRCUIT

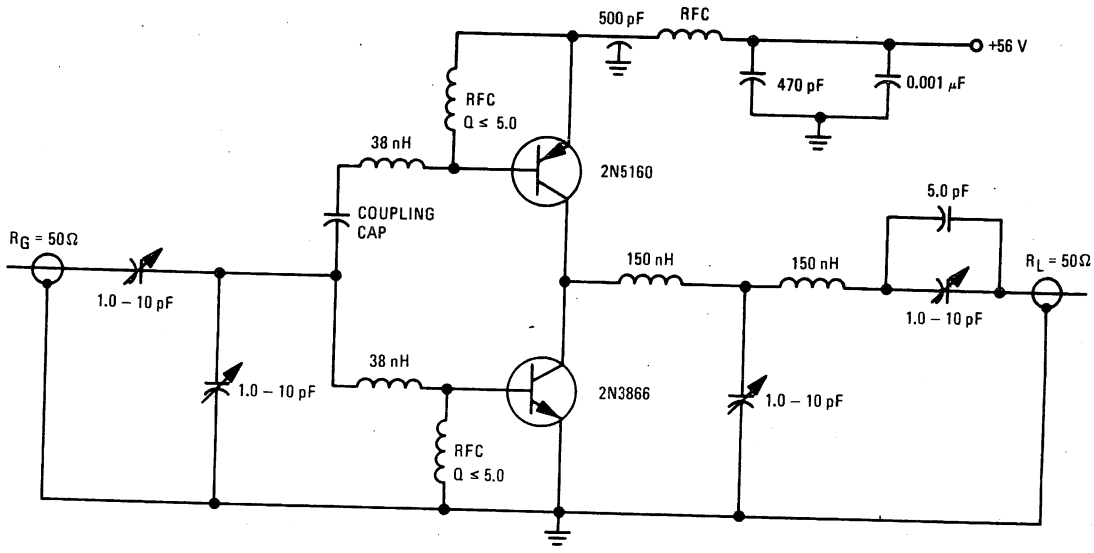


FIGURE 9 – COMPLEMENTARY CIRCUIT – POWER OUTPUT versus POWER INPUT