

MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

T-33-17

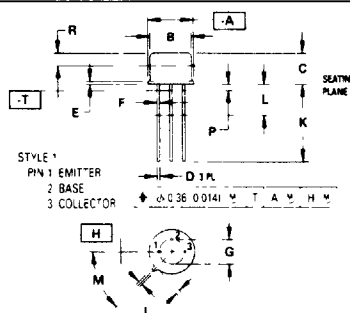
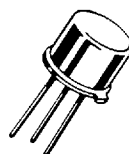
2N5160**The RF Line****PNP SILICON RF POWER TRANSISTOR**

... 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 — $G_{pE} = 8.0 \text{ dB (Min)} @ f = 400 \text{ MHz}$,
14.5 db (Typ) @ 175 MHz — No Emitter Tuning
- Power Output — $P_{out} = 1.0 \text{ Watt (Min)} @ f = 400 \text{ MHz}$
= 1.5 Watt (Typ) @ $f = 175 \text{ MHz}$
- Resists Burnout When Load is Shorted or Opened
- Designed for Use in Complementary Circuits with 2N3866
- MIL-S-19500 Processed Versions Available as MRF5160HX, MRF5160HXV

 $I_C = -400 \text{ mA}$
POWER TRANSISTOR

PNP SILICON

**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

DIM	MILLIMETERS		INCHES	
	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	

CASE 79-04
TO-205AD
(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 ($\alpha T_C = 25^\circ\text{C}$ 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

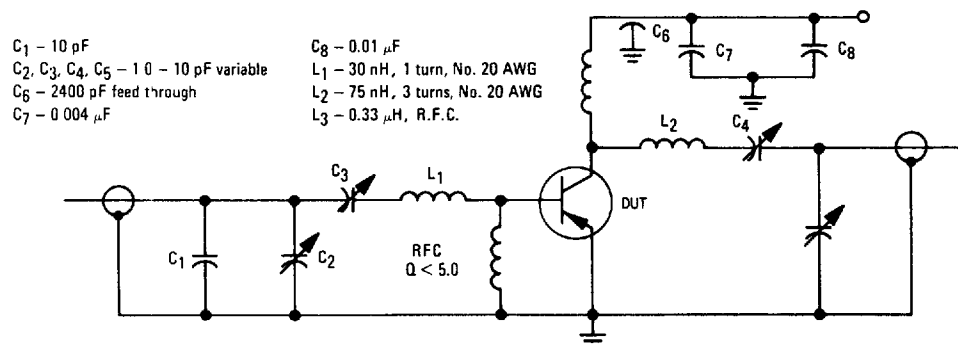
*Indicates JEDEC Registered Data

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

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

*Indicates JEDEC Registered Data

FIGURE 1 — 400-MHz TEST CIRCUIT

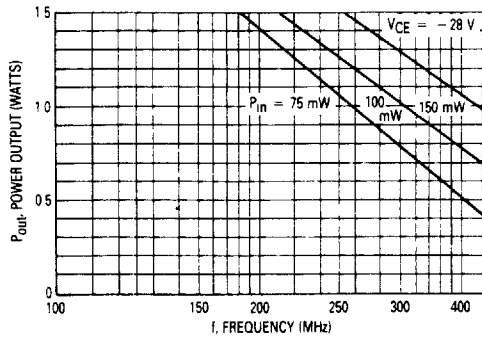
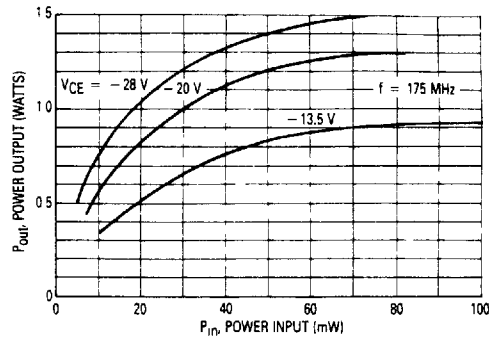
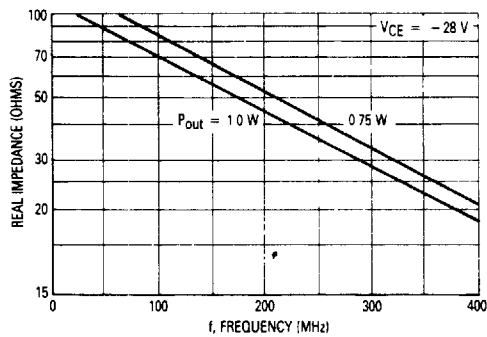
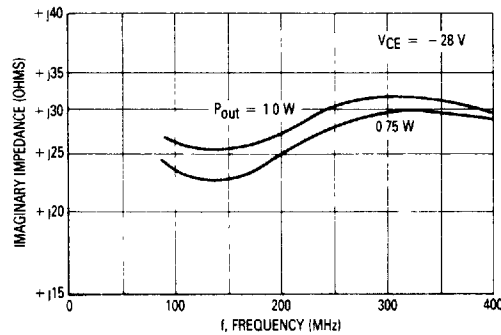
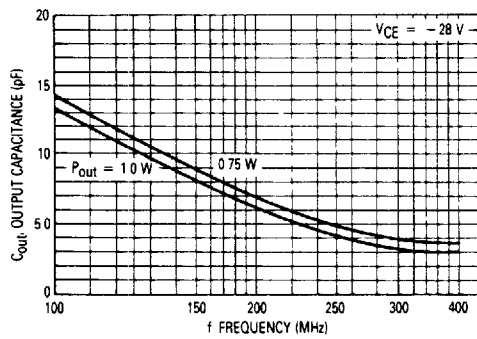
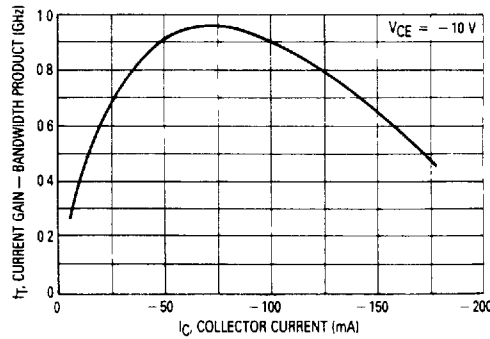


2N5160

MOTOROLA SC (XSTRS/R F)

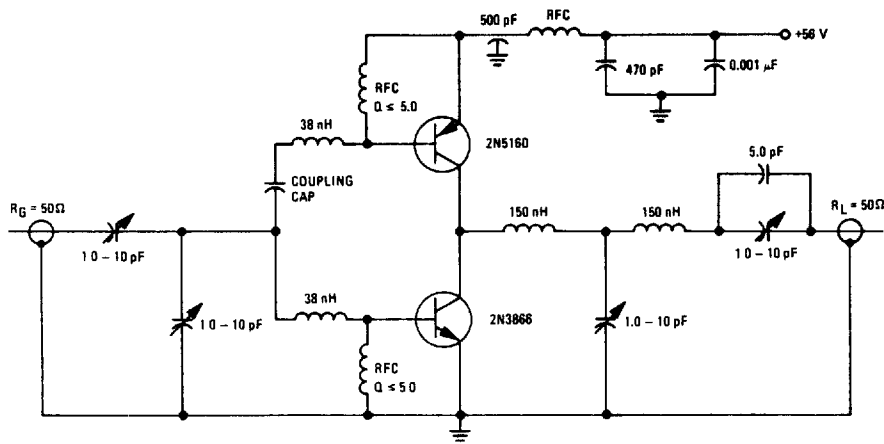
46E D

6367254 0094074 0 MOT6

FIGURE 2 — POWER OUTPUT
versus FREQUENCYFIGURE 3 — POWER OUTPUT
versus POWER INPUTFIGURE 4 — PARALLEL INPUT
IMPEDANCE versus FREQUENCYFIGURE 5 — PARALLEL INPUT
IMPEDANCE versus FREQUENCYFIGURE 6 — PARALLEL OUTPUT
CAPACITANCE versus FREQUENCYFIGURE 7 — CURRENT-GAIN — BANDWIDTH
PRODUCT versus COLLECTOR CURRENT

MOTOROLA SC (XSTRS/R F) 46E D ■ 6367254 0094075 2 ■ MOT6

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



2

FIGURE 9 — COMPLEMENTARY CIRCUIT — POWER OUTPUT versus POWER INPUT

