

# The RF Line

## NPN Silicon

### RF Power Transistor

... designed for power amplifier applications in industrial, commercial and amateur radio equipment to 30 MHz.

- Specified 12.5 Volt, 30 MHz Characteristics —
  - Output Power = 60 Watts
  - Minimum Gain = 13 dB
  - Efficiency = 55%

#### MATCHING PROCEDURE

In the push-pull circuit configuration it is preferred that the transistors are used as matched pairs to obtain optimum performance.

The matching procedure used by Motorola consists of measuring  $h_{FE}$  at the data sheet conditions and color coding the device to predetermined  $h_{FE}$  ranges within the normal  $h_{FE}$  limits. A color dot is added to the marking on top of the cap. Any two devices with the same color dot can be paired together to form a matched set of units.

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	18	Vdc
Collector-Emitter Voltage	$V_{CES}$	36	Vdc
Emitter-Base Voltage	$V_{EBO}$	4.0	Vdc
Collector Current — Continuous	$I_C$	15	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	175 1.0	Watts W/ $^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-65 to +150	$^\circ\text{C}$

#### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.0	$^\circ\text{C}/\text{W}$

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

Characteristic	Symbol	Min	Typ	Max	Unit
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#### OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage ( $I_C = 100 \text{ mAdc}$ , $I_B = 0$ )	$V_{(BR)CEO}$	18	—	—	Vdc
Collector-Emitter Breakdown Voltage ( $I_C = 50 \text{ mAdc}$ , $V_{BE} = 0$ )	$V_{(BR)CES}$	36	—	—	Vdc
Emitter-Base Breakdown Voltage ( $I_E = 10 \text{ mAdc}$ , $I_C = 0$ )	$V_{(BR)EBO}$	4.0	—	—	Vdc

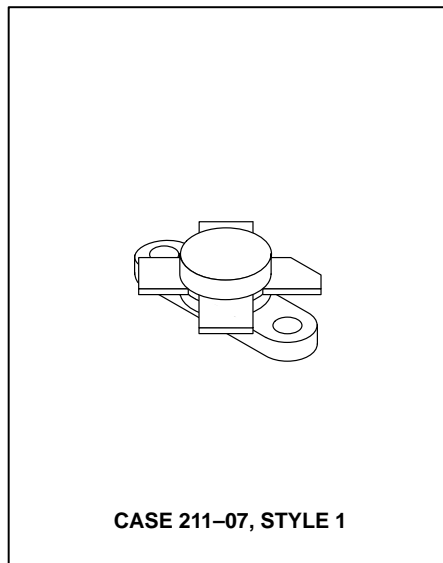
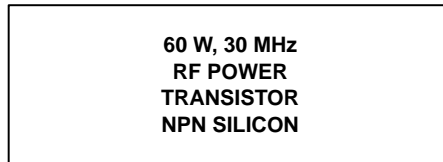
#### ON CHARACTERISTICS

DC Current Gain ( $I_C = 5.0 \text{ Adc}$ , $V_{CE} = 5.0 \text{ Vdc}$ )	$h_{FE}$	10	—	150	—
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#### DYNAMIC CHARACTERISTICS

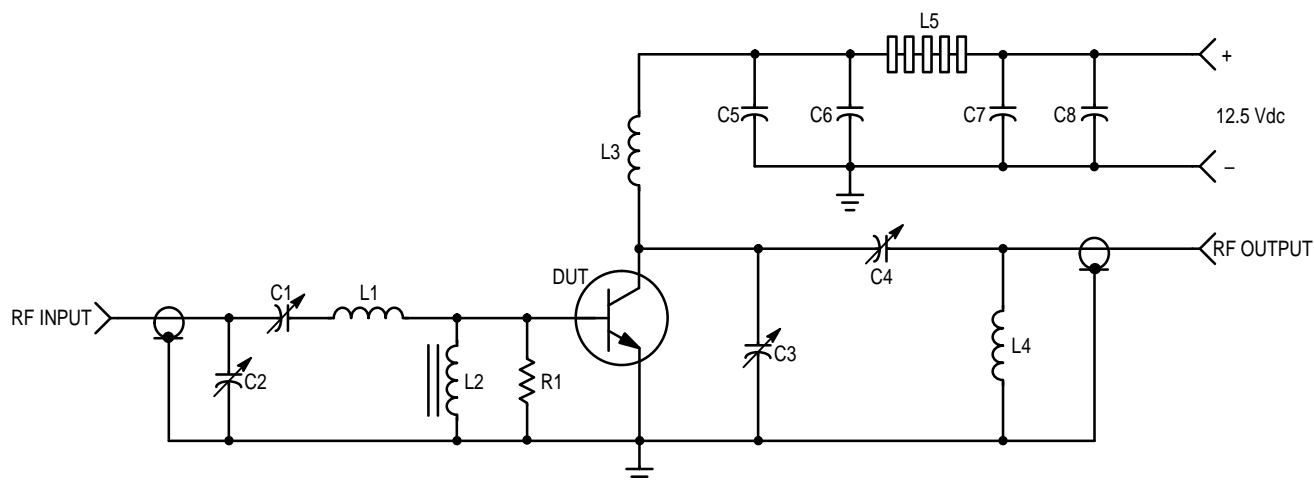
Output Capacitance ( $V_{CB} = 12.5 \text{ Vdc}$ , $I_E = 0$ , $f = 1.0 \text{ MHz}$ )	$C_{ob}$	—	—	250	pF
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(continued)



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

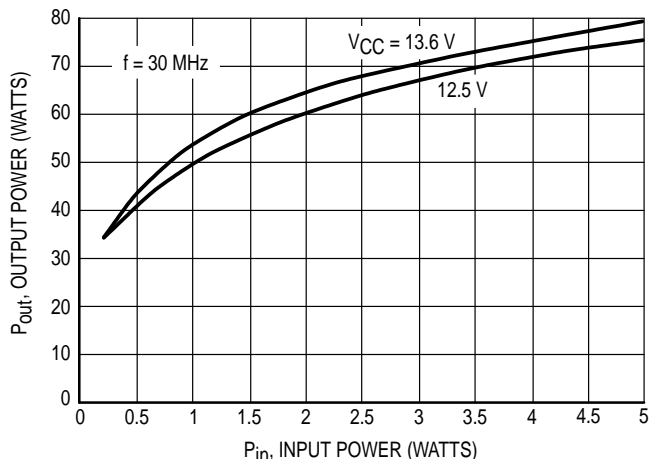
Characteristic	Symbol	Min	Typ	Max	Unit
<b>FUNCTIONAL TESTS</b> (Figure 1)					
Common-Emitter Amplifier Power Gain ( $V_{CC} = 12.5\text{ Vdc}$ , $P_{Out} = 60\text{ W}$ , $f = 30\text{ MHz}$ )	$G_{pe}$	13	—	—	dB
Collector Efficiency ( $V_{CC} = 12.5\text{ Vdc}$ , $P_{Out} = 60\text{ W}$ , $f = 30\text{ MHz}$ )	$\eta$	55	—	—	%
Series Equivalent Input Impedance ( $V_{CC} = 12.5\text{ Vdc}$ , $P_{Out} = 60\text{ W}$ , $f = 30\text{ MHz}$ )	$Z_{in}$	—	1.66-j.844	—	Ohms
Series Equivalent Output Impedance ( $V_{CC} = 12.5\text{ Vdc}$ , $P_{Out} = 60\text{ W}$ , $f = 30\text{ MHz}$ )	$Z_{out}$	—	1.73-j.188	—	Ohms
Parallel Equivalent Input Impedance ( $V_{CC} = 12.5\text{ Vdc}$ , $P_{Out} = 60\text{ W}$ , $f = 30\text{ MHz}$ )	$Z_{in}$	—	2.09/1030	—	$\Omega/\text{pF}$
Parallel Equivalent Output Impedance ( $V_{CC} = 12.5\text{ Vdc}$ , $P_{Out} = 60\text{ W}$ , $f = 30\text{ MHz}$ )	$Z_{out}$	—	1.75/330	—	$\Omega/\text{pF}$



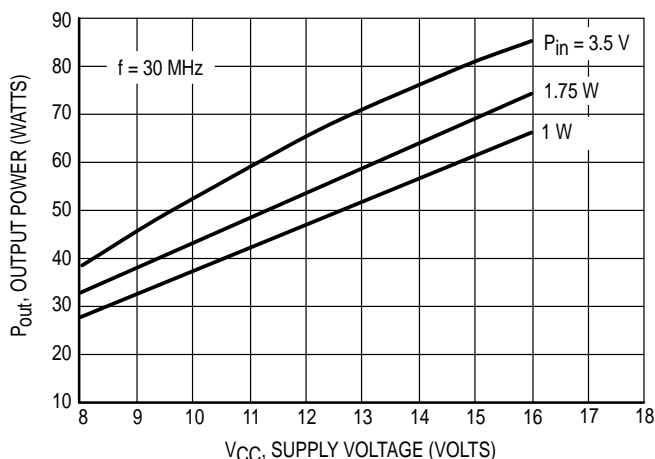
C1, C2, C4 — ARCO 469  
 C3 — ARCO 466  
 C5 — 1000 pF, UNELCO  
 C6, C7 — 0.1  $\mu\text{F}$  Disc Ceramic  
 C8 — 1000  $\mu\text{F}/15\text{ V}$  Electrolytic  
 R1 — 10 Ohm/1.0 Watt, Carbon

L1 — 3 Turns, #18 AWG, 5/16" I.D., 5/16" Long  
 L2 — VK200-20/4B, FERROXCUBE  
 L3 — 12 Turns, #18 AWG Enameled Wire, 1/4" I.D., Close Wound  
 L4 — 3 Turns 1/8" O.D. Copper Tubing, 3/8" I.D., 3/4" Long  
 L5 — 7 FERRITE Beads, FERROXCUBE #56-590-65/3B

**Figure 1. 30 MHz Test Circuit Schematic**

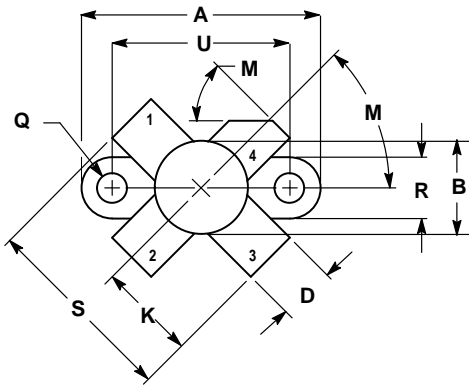


**Figure 2. Output Power versus Input Power**



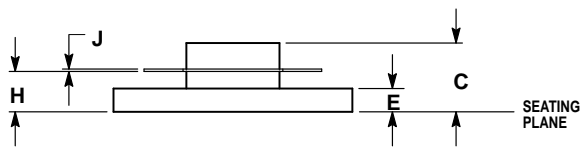
**Figure 3. Output Power versus Supply Voltage**

# PACKAGE DIMENSIONS




- NOTES:  
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
 2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.960	0.990	24.39	25.14
B	0.370	0.390	9.40	9.90
C	0.229	0.281	5.82	7.13
D	0.215	0.235	5.47	5.96
E	0.085	0.105	2.16	2.66
H	0.150	0.108	3.81	4.57
J	0.004	0.006	0.11	0.15
K	0.395	0.405	10.04	10.28
M	40°	50°	40°	50°
Q	0.113	0.130	2.88	3.30
R	0.245	0.255	6.23	6.47
S	0.790	0.810	20.07	20.57
U	0.720	0.730	18.29	18.54



- STYLE 1:  
 PIN 1. EMITTER  
 2. BASE  
 3. EMITTER  
 4. COLLECTOR

**CASE 211-07  
 ISSUE N**

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