MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

MRF458

The RF Line

80 W—30 MHz

RF POWER TRANSISTOR

NPN SILICON

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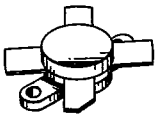
NPN SILICON RF POWER TRANSISTOR

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

- Specified 12.5 Volt, 30 MHz Characteristics —
  Output Power = 80 Watts
  Minimum Gain = 12 dB
  Efficiency = 50%
- Capable of Withstanding 30:1 Load VSWR @ Rated P_{out} and V_{CC}



MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	18	Vdc
Collector-Base Voltage	V_{CBO}	36	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector Current — Continuous	I_C	10	Adc
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	175 1.0	Watts W/°C
Storage Temperature Range	T_{stg}	−65 to +150	°C

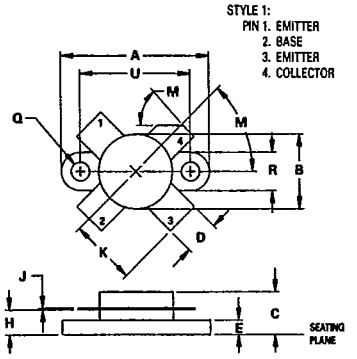
THERMAL CHARACTERISTICS

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

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.



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

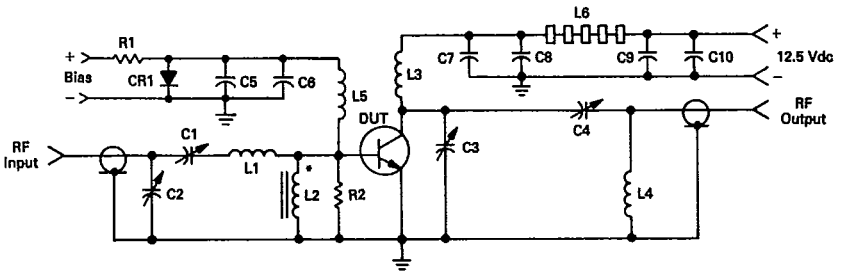
DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	24.39	25.14	0.960	0.990
B	11.82	12.95	0.465	0.510
C	5.82	6.98	0.229	0.275
D	5.49	5.96	0.216	0.235
E	2.14	2.79	0.084	0.110
H	3.66	4.52	0.144	0.178
J	0.08	0.17	0.003	0.007
K	11.05	—	0.435	—
M	45° NOM		45° NOM	
Q	2.93	3.30	0.115	0.130
R	6.25	6.47	0.246	0.255
U	18.29	18.54	0.720	0.730

CASE 211-11

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristics	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 100 mAdc, I_B = 0)	$V_{(BR)CEO}$	18	–	–	Vdc
Collector-Base Breakdown Voltage (I_C = 50 mAdc, I_E = 0)	$V_{(BR)CBO}$	36	–	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 mAdc, I_C = 0)	$V_{(BR)EBO}$	4.0	–	–	Vdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 5.0 Adc, V_{CE} = 5.0 Vdc)	h_{FE}	10	–	150	–
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 15 Vdc, I_E = 0, f = 1.0 MHz)	C_{ob}	–	–	300	pF
FUNCTIONAL TESTS (Figure 1)					
Common-Emitter Amplifier Power Gain (V_{CC} = 12.5 Vdc, P_{out} = 80 W, f = 30 MHz)	G_{PE}	12	–	–	dB
Collector Efficiency (V_{CC} = 12.5 Vdc, P_{out} = 80 W, f = 30 MHz)	η	50	–	–	%
Intermodulation Distortion (V_{CC} = 12.5 Vdc, P_{out} = 70 W PEP, f = 30, 30.001 MHz	IMD_3 IMD_5	– –	–32 –35	– –	dB

FIGURE 1 — 30 MHz TEST CIRCUIT SCHEMATIC



C1, C2, C4 — ARCO 469
C3 — ARCO 466
C5 — ERIE 0.1 μF, 100 V
C6 — 500 μF, 15 V Electrolytic
C7 — 1000 pF, UNELCO
C8, C9 — 0.1 μF Disk Ceramic
C10 — 100 μF, 15 V Electrolytic
CR1 — 1N4997
R1 — 10 Ω, 25 Watt Wirewound
R2 — 10 Ohm, 1 Watt, Carbon

L1 — 3 Turns #18 AWG, 5/16" I.D., 5/16" Long
L2, L5 — 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
L6 — 7 FERRITE Beads, FERROXCUBE #56-590-65/3B

*NOTE: For Class C operation bias network (R1, R2, CR1, C5, C6, L5) is not used.
For Class AB operation L2 is not used.

TYPICAL PERFORMANCE CURVES

FIGURE 2 – POWER GAIN versus FREQUENCY

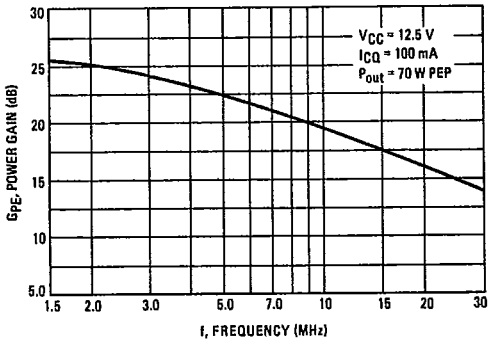


FIGURE 3 – OUTPUT RESISTANCE versus FREQUENCY

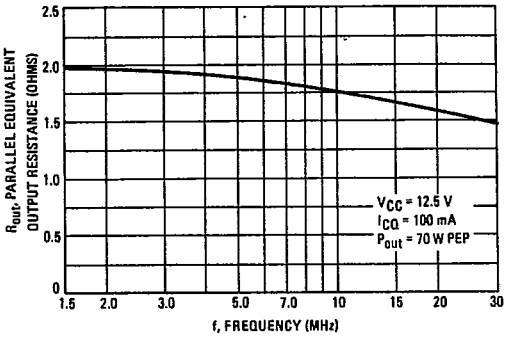


FIGURE 4 – OUTPUT CAPACITANCE versus FREQUENCY

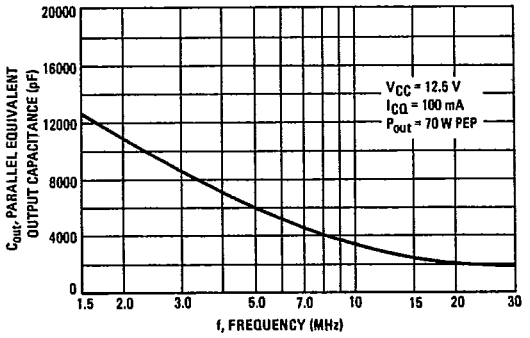
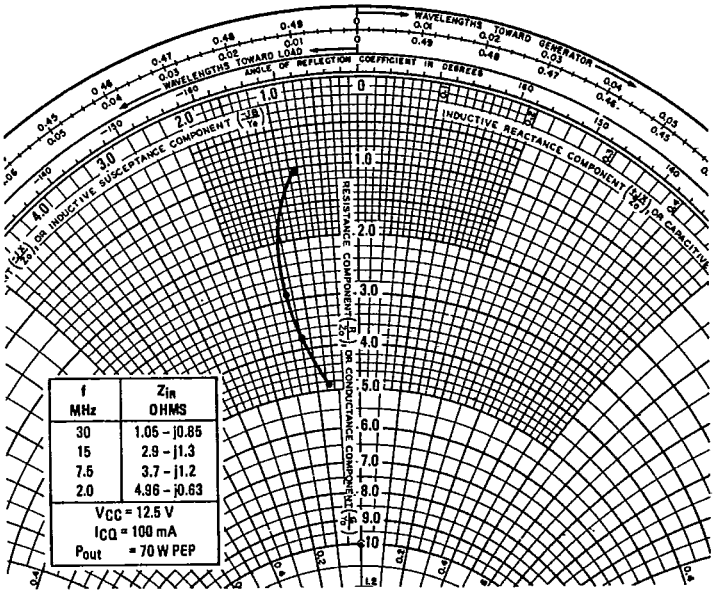


FIGURE 5 – SERIES EQUIVALENT INPUT-OUTPUT IMPEDANCE



f MHz	Z_{in} OHMS
30	1.05 – j0.85
15	2.9 – j1.3
7.5	3.7 – j1.2
2.0	4.96 – j0.63

V_{CC} = 12.5 V
I_{CQ} = 100 mA
P_{out} = 70 W PEP