

**MOTOROLA SEMICONDUCTOR TECHNICAL DATA**

T-33-11  
**MRF486**

**The RF Line**

**NPN SILICON RF POWER TRANSISTOR**

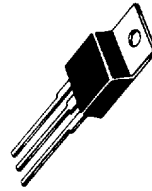
... designed primarily for application as a high-power linear amplifier from 1.5 to 30 MHz, in single sideband mobile, marine and base station equipment.

- Low-Cost, Common-Emitter TO-220AB Package
- Specified 28 Volt, 30 MHz Performance —  
Output Power = 40 W (PEP)  
Power Gain = 15 dB Min  
Efficiency = 40% Min
- Intermodulation Distortion @ 40 W (PEP) —  
IMD = -30 dB (Max)
- 30:1 VSWR Load Mismatch Capability at Rated Output Power and Supply Voltage

40 W (PEP) — 30 MHz

**RF POWER TRANSISTOR**  
NPN SILICON

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**MAXIMUM RATINGS**

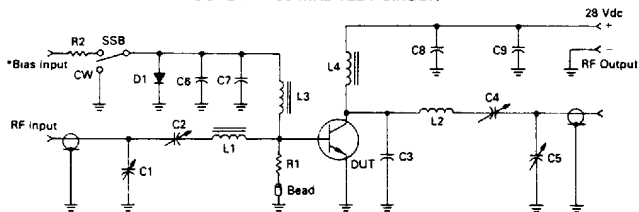
Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V <sub>CEO</sub>	35	Vdc
Collector-Base Voltage	V <sub>CBO</sub>	65	Vdc
Emitter-Base Voltage	V <sub>EBO</sub>	4.0	Vdc
Collector Current — Continuous	I <sub>C</sub>	3.0	Adc
Withstand Current (t = 5.0 s)		6.0	Adc
Total Device Dissipation @ T <sub>C</sub> = 25°C (1) Derate above 25°C	P <sub>D</sub>	87.5 0.5	Watts W/°C
Storage Temperature Range	T <sub>stg</sub>	-65 to +150	°C

**THERMAL CHARACTERISTICS**

Characteristics	Symbol	Max	Unit
Thermal Resistance Junction to Case	R <sub>θJC</sub>	2.0	°C/W

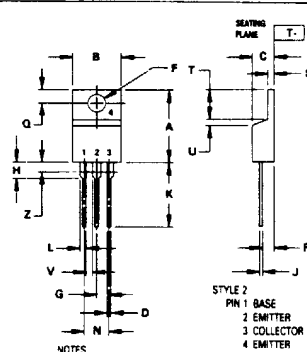
(1) This device is designed for RF operation. The total device dissipation rating applies only when the device is operated as an RF amplifier.

**FIGURE 1 — 30 MHz TEST CIRCUIT**



- C1, C2 — Arco 488 190-780 pF
- C3 — 150 pF ELMECO\*\*
- C4, C5 — Arco 429 90-400 pF
- C6, C7 — 0.001 μF Disc Ceramics
- C8 — 500 μF 3.0 Vdc Electrolytic
- C9 — 50 μF 50 Vdc Electrolytic
- R1 — 10 Ω, 1.0 Watt Resistor
- R2 — 5.0 Ω, 5.0 Watt Resistor
- L1 — 0.15 μH Molded Choke
- L2 — 7 Turns #16 AWG Enameled Close Wound 1 1/2" ID
- L3 — 10 μH Molded Choke
- L4 — 1.9 μH Molded Choke
- One Bead — #56-590-65 38 (Ferroxcube or equiv)
- D1 — 1N4997

\*Adjust Bias (Base) Voltage for I<sub>CQ</sub> = 40 mA with no RF applied  
\*\*Type MCM01 010 or UNELCO 3 HS 0006



- NOTES:  
1 DIMENSIONING AND TOLERANCING PER ANS. Y14.5M 1982  
2 CONTROLLING DIMENSION INCH  
3 DIM Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED

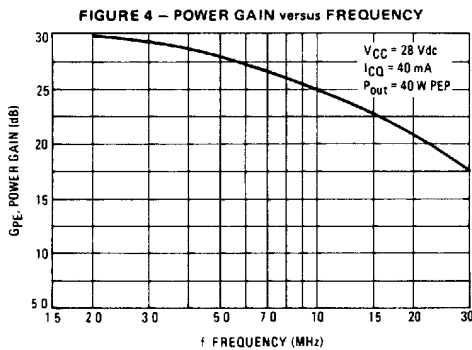
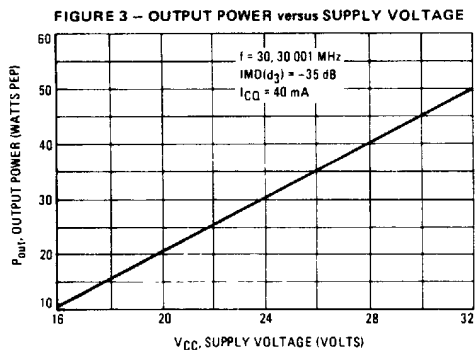
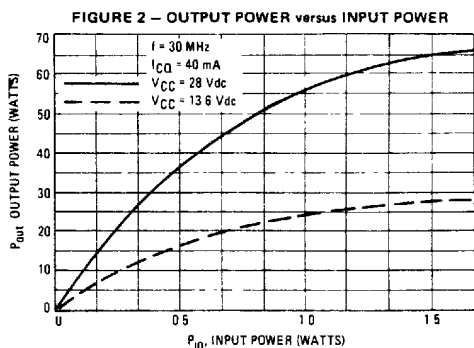
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	14.48	15.75	0.570	0.620
B	9.65	10.29	0.380	0.405
C	4.07	4.82	0.160	0.190
D	0.64	0.98	0.025	0.038
F	3.61	3.73	0.142	0.147
G	2.42	2.68	0.095	0.105
H	2.80	3.93	0.110	0.155
J	0.36	0.55	0.014	0.022
K	12.70	14.27	0.500	0.562
L	1.15	1.29	0.045	0.051
N	4.83	5.33	0.190	0.210
Q	2.54	3.04	0.100	0.120
R	2.04	2.79	0.080	0.110
S	1.15	1.39	0.045	0.055
T	5.97	8.87	0.235	0.348
U	0.00	1.27	0.000	0.050
V	1.15	—	0.045	—
Z	—	2.04	—	0.080

**CASE 221A-04 TO-220AB**

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

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Collector-Emitter Breakdown Voltage ( $I_C = 50\text{ mA dc}, I_B = 0$ )	$V_{(BR)CEO}$	35	-	-	Vdc
Collector-Emitter Breakdown Voltage ( $I_C = 50\text{ mA dc}, V_{BE} = 0$ )	$V_{(BR)CES}$	65	-	-	Vdc
Collector-Base Breakdown Voltage ( $I_C = 50\text{ mA dc}, I_E = 0$ )	$V_{(BR)CBO}$	65	-	-	Vdc
Emitter-Base Breakdown Voltage ( $I_E = 5.0\text{ mA dc}, I_C = 0$ )	$V_{(BR)EBO}$	40	-	-	Vdc
Collector Cutoff Current ( $V_{CE} = 28\text{ Vdc}, V_{BE} = 0, T_C = 25^\circ\text{C}$ )	$I_{CES}$	-	-	10	mA dc
<b>ON CHARACTERISTICS</b>					
DC Current Gain ( $I_C = 20\text{ mA dc}, V_{CE} = 50\text{ Vdc}$ )	$h_{FE}$	10	40	-	-
<b>DYNAMIC CHARACTERISTICS</b>					
Output Capacitance ( $V_{CB} = 27\text{ Vdc}, I_E = 0, f = 10\text{ MHz}$ )	$C_{ob}$	-	130	200	pF
<b>FUNCTIONAL TESTS</b>					
Common-Emitter Amplifier Power Gain ( $V_{CC} = 28\text{ Vdc}, P_{out} = 40\text{ W (PEP)}, f_1 = 30\text{ MHz},$ $f_2 = 30.001\text{ MHz}, I_{CQ} = 40\text{ mA dc}$ )	$G_{PE}$	15	17.5	-	dB
Collector Efficiency ( $V_{CC} = 28\text{ Vdc}, P_{out} = 40\text{ W (PEP)}, f_1 = 30\text{ MHz},$ $f_2 = 30.001\text{ MHz}, I_{CQ} = 40\text{ mA dc}$ )	$\eta$	40	45	-	%
Intermodulation Distortion (1) ( $V_{CC} = 28\text{ Vdc}, P_{out} = 40\text{ W (PEP)}, f_1 = 30\text{ MHz},$ $f_2 = 30.001\text{ MHz}, I_{CQ} = 40\text{ mA dc}$ )	IMD(d3)	-	-35	-30	dB

(1) To MIL-STD-1311 Version A, Test Method 2204B, Two Tone, Reference Each Tone



MRF486

MOTOROLA SC (XSTRS/R F) 46E D 6367254 0094705 9 MOT6

FIGURE 5 - INTERMODULATION DISTORTION versus OUTPUT POWER

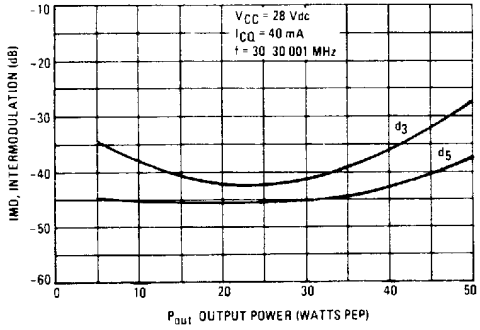
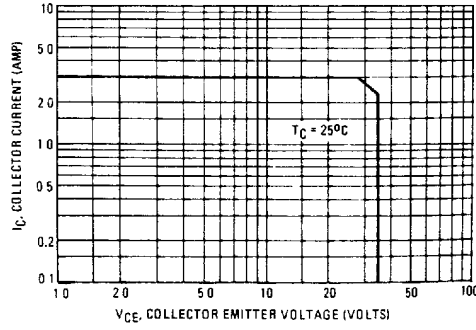


FIGURE 6 - SAFE OPERATING AREA



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FIGURE 7 - SERIES EQUIVALENT INPUT IMPEDANCE

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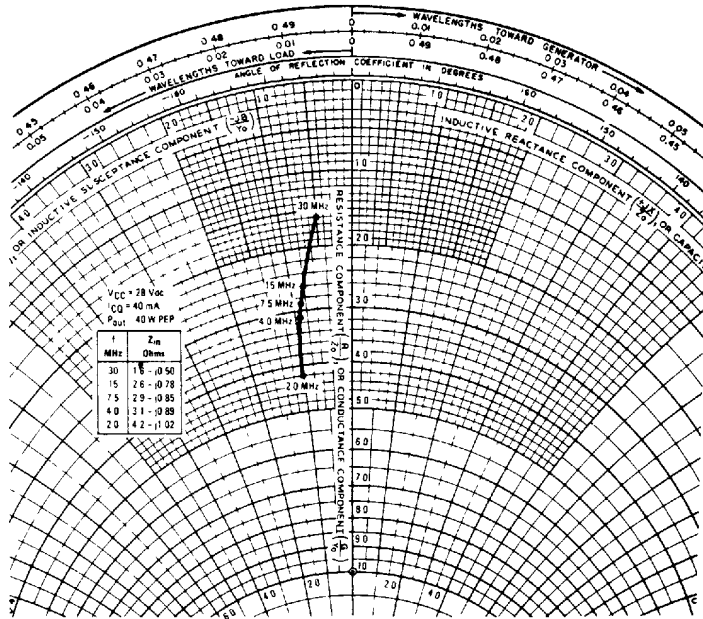


FIGURE 8 - OUTPUT CAPACITANCE versus FREQUENCY

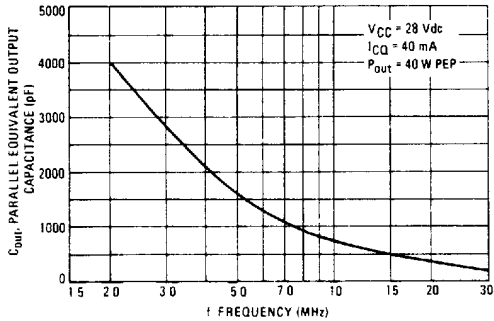
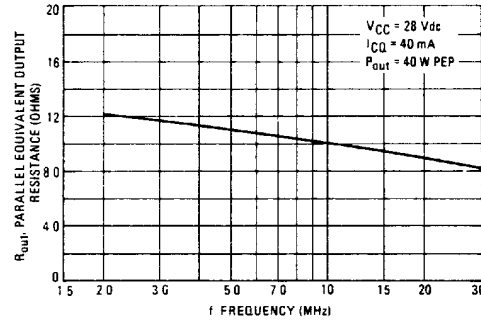


FIGURE 9 - OUTPUT RESISTANCE versus FREQUENCY



MOTOROLA RF DEVICE DATA

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