

**MOTOROLA**  
**SEMICONDUCTOR**  
 TECHNICAL DATA

T-33-11  
**MRF486**

2

**The RF Line**

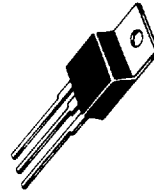
**NPN SILICON RF POWER TRANSISTOR**

... 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



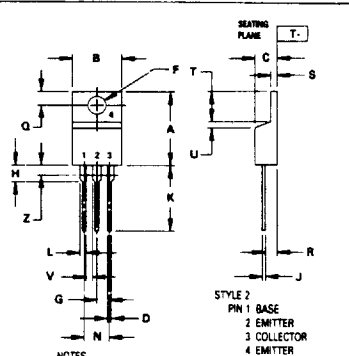
**MAXIMUM RATINGS**

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.

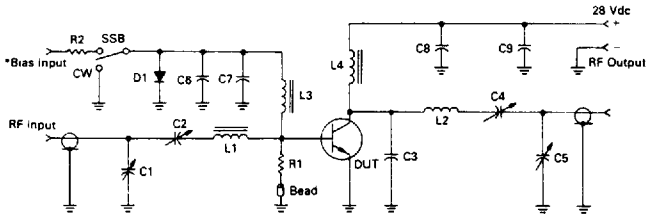


- NOTES  
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M-1982  
 2. CONTROLLING DIMENSION INCH  
 3. DIM Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	14.48	15.75	0.570	0.620
B	9.66	10.28	0.380	0.405
C	4.07	4.82	0.160	0.190
D	0.64	0.98	0.025	0.035
F	3.81	3.73	0.142	0.147
G	2.42	2.66	0.095	0.105
H	2.80	3.93	0.110	0.156
J	0.36	0.55	0.014	0.022
K	12.70	14.27	0.500	0.562
L	1.15	1.39	0.045	0.055
M	4.83	5.32	0.190	0.210
Q	2.54	3.54	0.100	0.140
R	2.04	2.79	0.080	0.110
S	1.15	1.39	0.045	0.055
T	5.97	6.47	0.235	0.255
U	0.00	1.27	0.000	0.050
V	1.15	—	0.045	—
Z	—	2.04	—	0.080

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

**FIGURE 1 — 30 MHz TEST CIRCUIT**



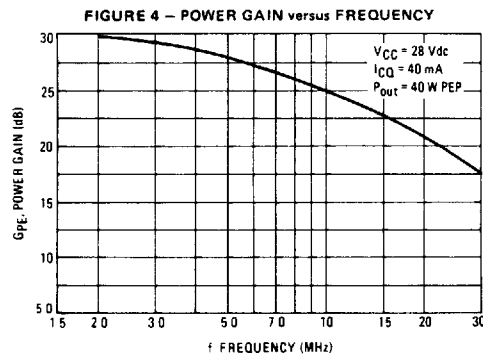
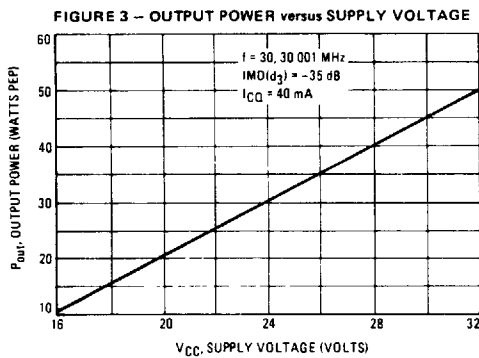
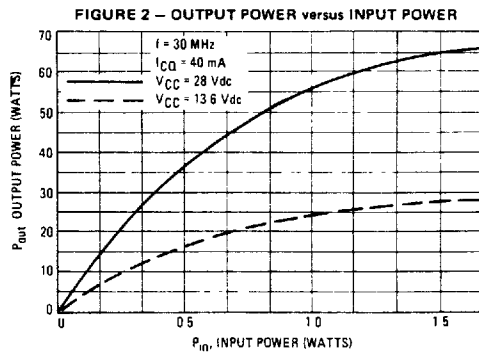
- C1, C2 — Arco 469 190-780 pF  
 C3 — 150 pF ELMENCO\*\*  
 C4, C5 — Arco 429 90-400 pF  
 C6, C9 — 0.001 μF Disc Ceramics  
 C7 — 500 μF 3.0 Vdc Electrolytic  
 C8 — 50 μF 50 Vdc Electrolytic  
 R1 — 10 Ω, 1.0 Watt Resistor  
 R2 — 5.0 Ω, 5.0 Watt Resistor  
 L1 — 0.15 μH Molded Choke  
 L2 — 7 Turns #16 AWG Enameled Close Wound 1 1/2" ID  
 L3 — 10 μH Molded Choke  
 L4 — 19 μH Molded Choke  
 One Bead — #56-590-65 3B (Ferroxcube or equiv)  
 D1 — 1N4997

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

**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 ( $I_C = 50\text{ mAdc}$ , $I_B = 0$ )	$V_{(BR)CEO}$	35	—	—	Vdc
Collector-Emitter Breakdown Voltage ( $I_C = 50\text{ mAdc}$ , $V_{BE} = 0$ )	$V_{(BR)CES}$	65	—	—	Vdc
Collector-Base Breakdown Voltage ( $I_C = 50\text{ mAdc}$ , $I_E = 0$ )	$V_{(BR)CBO}$	65	—	—	Vdc
Emitter-Base Breakdown Voltage ( $I_E = 5.0\text{ mAdc}$ , $I_C = 0$ )	$V_{(BR)EBO}$	40	—	—	Vdc
Collector Cutoff Current ( $V_{CE} = 28\text{ Vdc}$ , $V_{BE} = 0$ , $T_C = 25^\circ\text{C}$ )	$I_{CES}$	—	—	10	mAdc
<b>ON CHARACTERISTICS</b>					
DC Current Gain ( $I_C = 2.0\text{ Adc}$ , $V_{CE} = 5.0\text{ Vdc}$ )	$h_{FE}$	10	40	—	—
<b>DYNAMIC CHARACTERISTICS</b>					
Output Capacitance ( $V_{CB} = 27\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )	$C_{ob}$	—	130	200	pF
<b>FUNCTIONAL TESTS</b>					
Common-Emitter Amplifier Power Gain ( $V_{CC} = 28\text{ Vdc}$ , $P_{out} = 40\text{ W (PEP)}$ , $f_1 = 30\text{ MHz}$ , $f_2 = 30.001\text{ MHz}$ , $I_{CQ} = 40\text{ mAdc}$ )	$G_{PE}$	15	17.5	—	dB
Collector Efficiency ( $V_{CC} = 28\text{ Vdc}$ , $P_{out} = 40\text{ W (PEP)}$ , $f_1 = 30\text{ MHz}$ , $f_2 = 30.001\text{ MHz}$ , $I_{CQ} = 40\text{ mAdc}$ )	$\eta$	40	45	—	%
Intermodulation Distortion (1) ( $V_{CC} = 28\text{ Vdc}$ , $P_{out} = 40\text{ W (PEP)}$ , $f_1 = 30\text{ MHz}$ , $f_2 = 30.001\text{ MHz}$ , $I_{CQ} = 40\text{ mAdc}$ )	IMD(d <sub>3</sub> )	—	-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 M0T6

FIGURE 5 - INTERMODULATION DISTORTION versus OUTPUT POWER

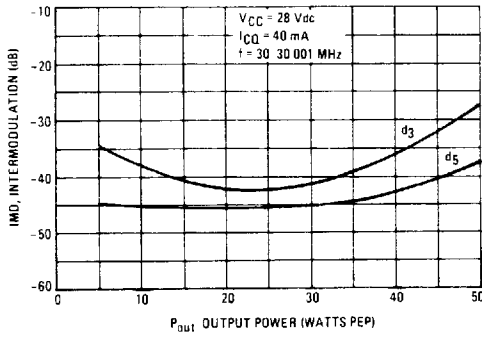
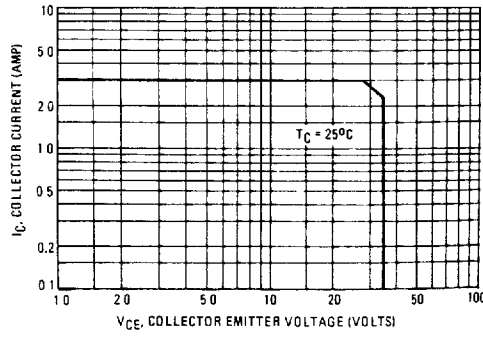


FIGURE 6 - SAFE OPERATING AREA



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FIGURE 7 - SERIES EQUIVALENT INPUT IMPEDANCE

T-33-11

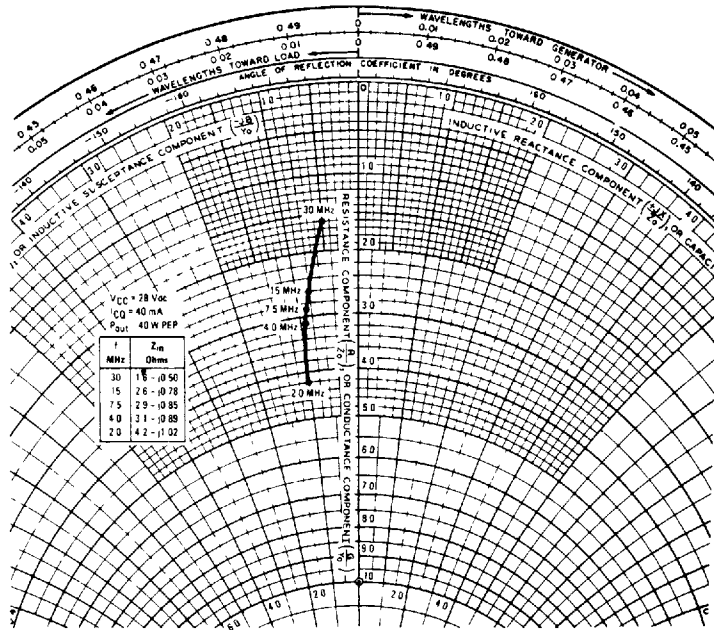


FIGURE 8 - OUTPUT CAPACITANCE versus FREQUENCY

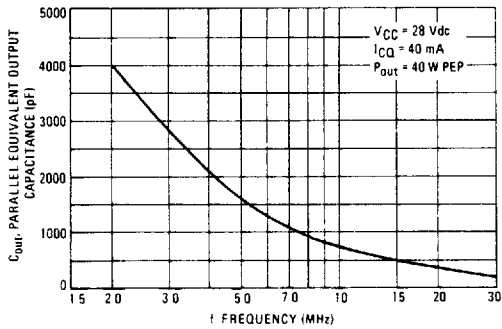
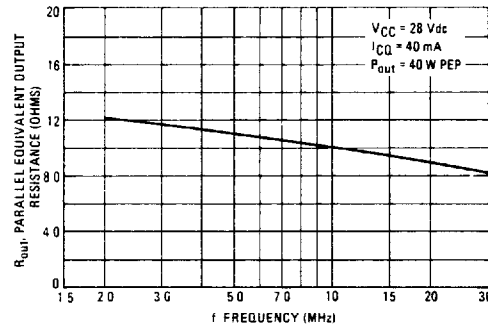


FIGURE 9 - OUTPUT RESISTANCE versus FREQUENCY



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