

MOTOROLA SEMICONDUCTOR TECHNICAL DATA

T-33-11
MRF486

2

The RF Line

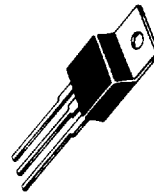
NPN SILICON RF POWER TRANSISTOR

... 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



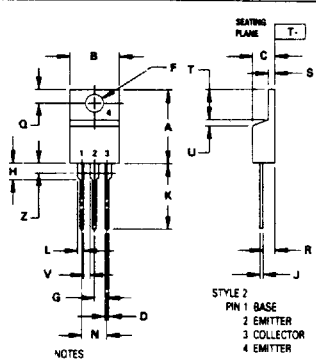
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V _{CEO}	35	Vdc
Collector-Base Voltage	V _{CB0}	65	Vdc
Emitter-Base Voltage	V _{EB0}	4.0	Vdc
Collector Current — Continuous	I _C	3.0	Adc
Withstand Current (t = 5.0 s)	—	6.0	Adc
Total Device Dissipation @ T _C = 25°C (1) Derate above 25°C	P _D	87.5 0.5	Watts W/°C
Storage Temperature Range	T _{stg}	-65 to +150	°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Max	Unit
Thermal Resistance Junction to Case	R _{θJC}	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.

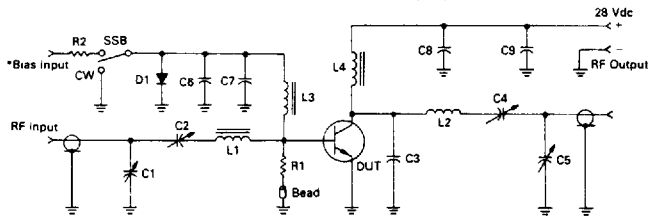


- NOTES
1. DIMENSIONING AND TOLERANCING PER ANS. Y14.5M 1982
2. CONTROLLING DIMENSION INCH
3. DIM Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	14.48	15.75	0.570	0.620
B	9.66	10.28	0.380	0.405
C	4.07	4.82	0.160	0.190
D	0.64	0.88	0.025	0.035
F	3.61	3.73	0.142	0.147
G	2.42	2.66	0.095	0.105
H	2.80	3.93	0.110	0.155
J	0.36	0.95	0.014	0.037
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	3.04	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	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



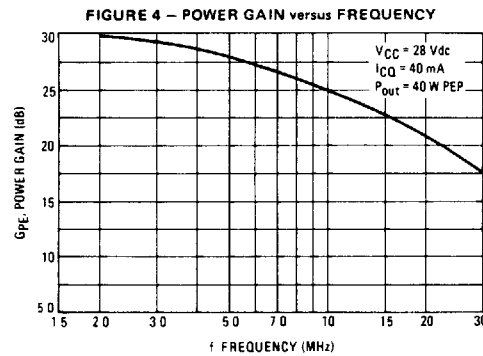
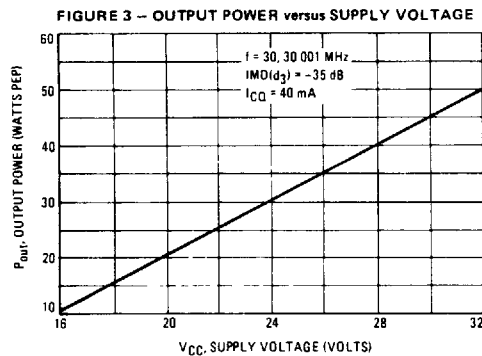
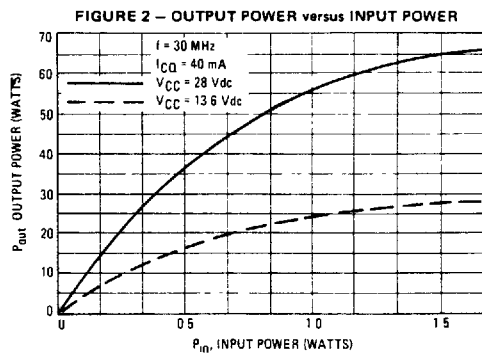
- C1, C2 — Arco 469 190-780 pF
- C3 — 150 pF ELMENCO**
- C4, C5 — Arco 429 90-400 pF
- C6, C9 — 0.001 μF Disc Ceramics
- C7 — 500 μF 3.0 Vdc Electrolytic
- C8 — 50 μF 50 Vdc Electrolytic
- R1 — 10 Ω, 1.0 Watt Resistor
- R2 — 5.0 Ω, 5.0 Watt Resistor
- L1 — 0.15 μH Molded Choke
- L2 — 7 Turns #16 AWG Enameled Close Wound 1/2" ID
- L3 — 10 μH Molded Choke
- L4 — 1.9 μH Molded Choke
- One Bead — #56-590-65 3B (Ferroxcube or equiv)
- D1 — 1N4937

*Adjust Bias (Base) Voltage for I_{CC} = 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
OFF CHARACTERISTICS					
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
ON CHARACTERISTICS					
DC Current Gain ($I_C = 2.0 \text{ Adc}, V_{CE} = 5.0 \text{ Vdc}$)	h_{FE}	10	40	-	-
DYNAMIC CHARACTERISTICS					
Output Capacitance ($V_{CB} = 27 \text{ Vdc}, I_E = 0, f = 1.0 \text{ MHz}$)	C_{ob}	-	130	200	pF
FUNCTIONAL TESTS					
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 ($V_{CC} = 28 \text{ Vdc}, P_{out} = 40 \text{ W (PEP)}, f_1 = 30 \text{ MHz}, f_2 = 30.001 \text{ MHz}, I_{CQ} = 40 \text{ mAdc}$)	η	40	45	-	%
Intermodulation Distortion (1) ($V_{CC} = 28 \text{ Vdc}, P_{out} = 40 \text{ W (PEP)}, f_1 = 30 \text{ MHz}, f_2 = 30.001 \text{ MHz}, I_{CQ} = 40 \text{ mAdc}$)	$IMD(d_3)$	-	-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

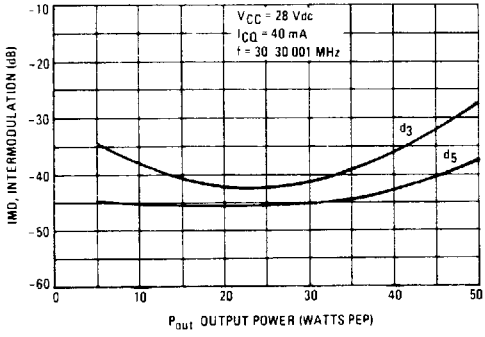


FIGURE 6 - SAFE OPERATING AREA

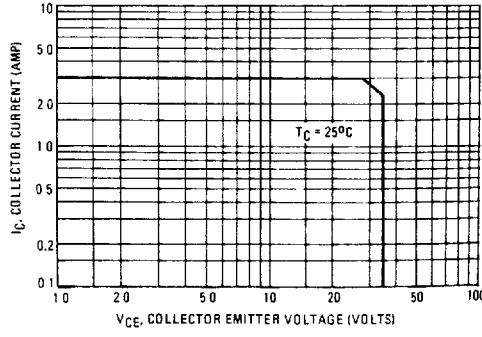


FIGURE 7 - SERIES EQUIVALENT INPUT IMPEDANCE

T-33-11

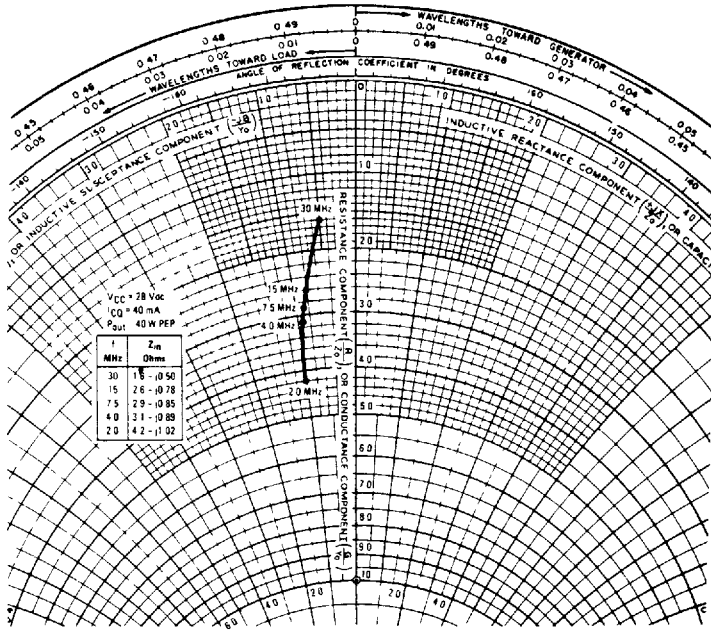


FIGURE 8 - OUTPUT CAPACITANCE versus FREQUENCY

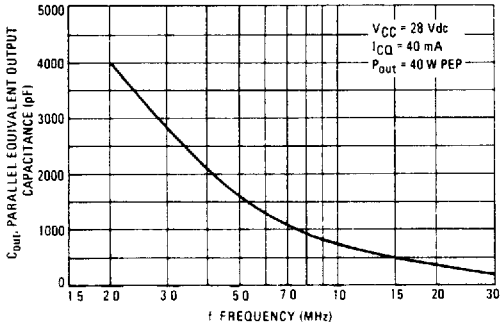
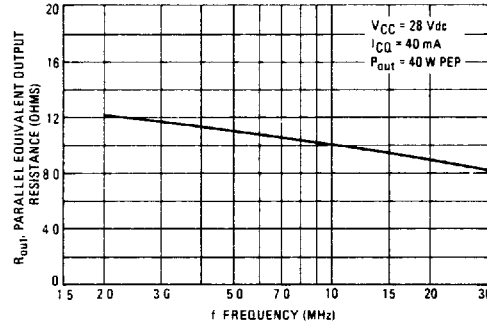


FIGURE 9 - OUTPUT RESISTANCE versus FREQUENCY



2