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.

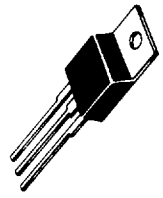
- Low-Cost, Common-Emitter TO-220AB Package
- Specified 28 Volt, 30 MHz Performance —
  Output Power = 40 W (PEP)
  Power Gain = 15 dB Min
  Efficiency = 40% Min
- Intermodulation Distortion @ 40 W (PEP) —
  IMD = −30 dB (Max)
- 30:1 VSWR Load Mismatch Capability at Rated Output Power and Supply Voltage

40 W (PEP) – 30 MHz

RF POWER TRANSISTOR

NPN SILICON

2



MAXIMUM RATINGS

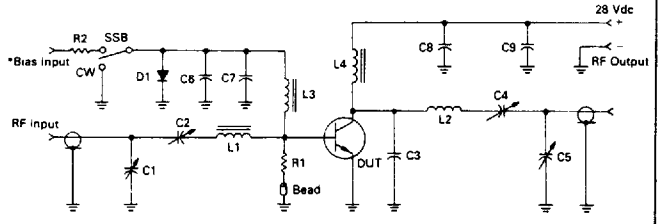
Rating	Symbol	Value	Unit
Collector Emitter Voltage	V_{CEO}	35	Vdc
Collector-Base Voltage	V_{CBO}	65	Vdc
Emitter Base Voltage	V_{EBO}	4 0	Vdc
Collector Current — Continuous	I_C	3 0	Adc
Withstand Current (t = 5 0 s)	–	6 0	Adc
Total Device Dissipation @ T_C = 25°C (1) Derate above 25°C	P_D	87 5 0 5	Watts W/°C
Storage Temperature Range	T_{stg}	−65 to +150	°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Max	Unit
Thermal Resistance Junction to Case	$R_{\theta JC}$	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

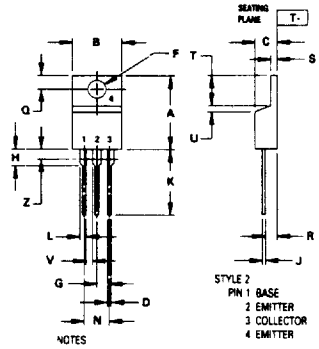
FIGURE 1 — 30 MHz TEST CIRCUIT



C1, C2 — Arco 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 — 1N4997

*Adjust Bias (Base) Voltage for I_{CQ} = 40 mA with no RF applied
**Type MCM01 010 or UNELCO 3 HS 0006



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 MIN	MILLIMETERS MAX	INCHES MIN	INCHES 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	0.35	0.55	0.014	0.022
K	12.70	14.27	0.500	0.562
L	1.15	1.39	0.045	0.055
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	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

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 50 mAdc, I_B = 0)	$V_{(BR)CEO}$	35	–	–	Vdc
Collector-Emitter Breakdown Voltage (I_C = 50 mAdc, V_{BE} = 0)	$V_{(BR)CES}$	65	–	–	Vdc
Collector-Base Breakdown Voltage (I_C = 50 mAdc, I_E = 0)	$V_{(BR)CBO}$	65	–	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 5.0 mAdc, I_C = 0)	$V_{(BR)EBO}$	4 0	–	–	Vdc
Collector Cutoff Current (V_{CE} = 28 Vdc, V_{BE} = 0, T_C = 25°C)	I_{CES}	–	–	10	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 2 0 Adc, V_{CE} = 5 0 Vdc)	h_{FE}	10	40	–	–
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 27 Vdc, I_E = 0, f = 1 0 MHz)	C_{ob}	–	130	200	pF
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain (V_{CC} = 28 Vdc, P_{out} = 40 W (PEP), f1 = 30 MHz, f2 = 30 001 MHz, I_{CQ} = 40 mAdc)	G_{PE}	15	17 5	–	dB
Collector Efficiency (V_{CC} = 28 Vdc, P_{out} = 40 W (PEP), f1 = 30 MHz, f2 = 30 001 MHz, I_{CQ} = 40 mAdc)	η	40	45	–	%
Intermodulation Distortion (1) (V_{CC} = 28 Vdc, P_{out} = 40 W (PEP), f1 = 30 MHz, f2 = 30 001 MHz, I_{CQ} = 40 mAdc)	$IMD(d_3)$	–	–35	–30	dB

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

FIGURE 2 – OUTPUT POWER versus INPUT POWER

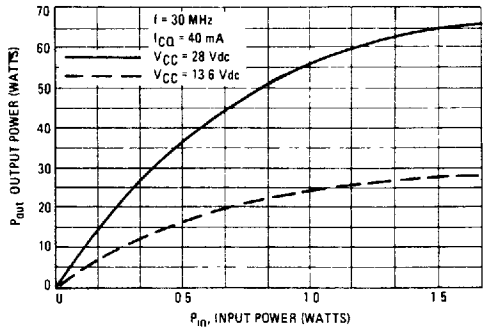


FIGURE 3 – OUTPUT POWER versus SUPPLY VOLTAGE

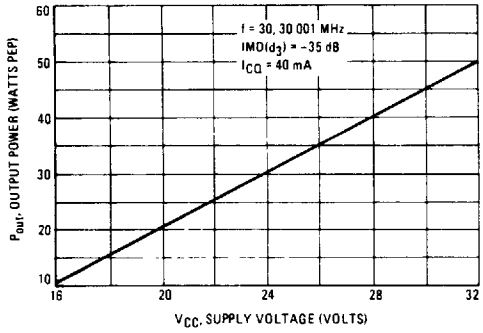


FIGURE 4 – POWER GAIN versus FREQUENCY

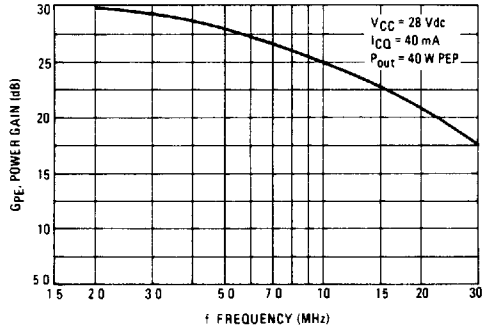


FIGURE 5 – INTERMODULATION DISTORTION versus OUTPUT POWER

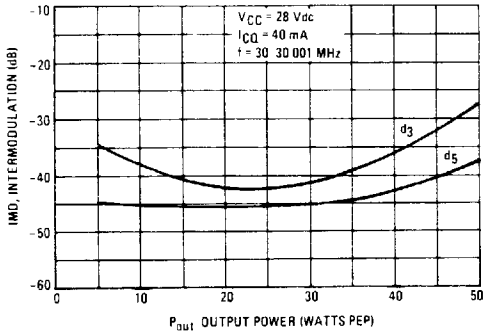
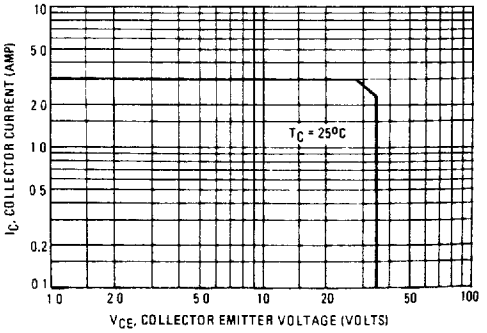


FIGURE 6 – SAFE OPERATING AREA



2

T-33-11

FIGURE 7 – SERIES EQUIVALENT INPUT IMPEDANCE

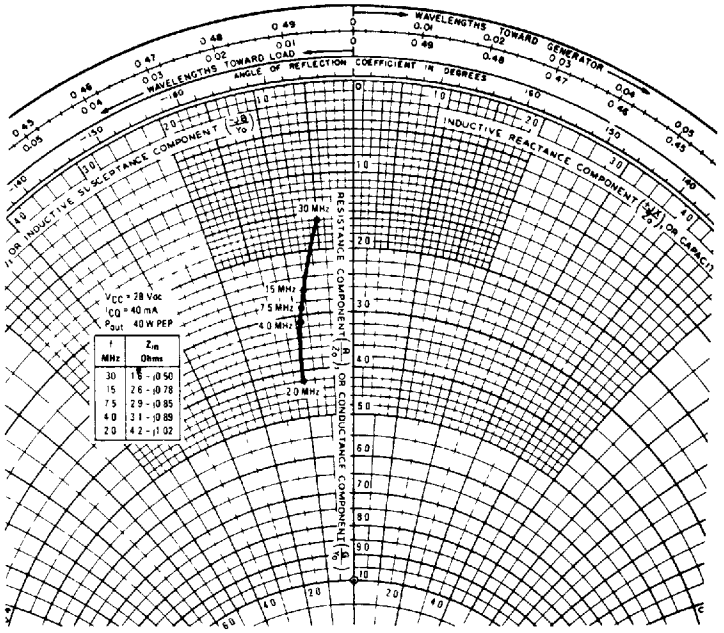


FIGURE 8 – OUTPUT CAPACITANCE versus FREQUENCY

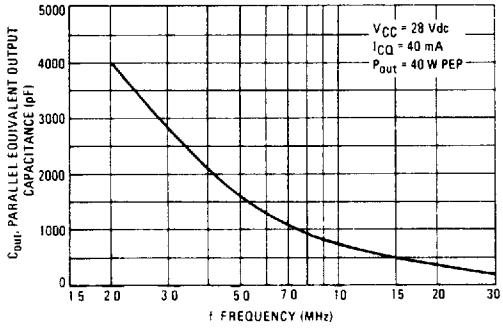


FIGURE 9 – OUTPUT RESISTANCE versus FREQUENCY