MOTOROLA

MRF486

The RF Line

3

40 W (PEP) – 30 MHz

RF POWER TRANSISTOR

NPN SILICON

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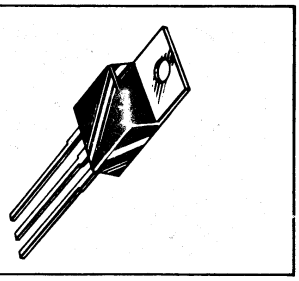
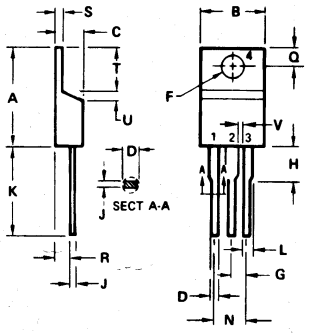
. . . designed primarily for application as a high-power linear amplifier from 1.5 to 30 MHz, in single sideband mobile, marine and base station equipment.

- Low-Cost, Common-Emitter TO-220 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





STYLE 2:
PIN 1. BASE
2. EMITTER
3. COLLECTOR
4. EMITTER

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	15.11	15.75	0.595	0.620
B	9.65	10.29	0.380	0.405
C	4.06	4.82	0.160	0.190
D	0.64	0.89	0.025	0.035
F	3.61	3.73	0.142	0.147
G	2.41	2.67	0.095	0.105
H	2.79	3.30	0.110	0.130
J	0.36	0.56	0.014	0.022
K	12.70	14.27	0.500	0.562
L	1.14	1.27	0.045	0.050
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	1.14	1.39	0.045	0.055
T	5.97	6.48	0.235	0.255
U	0.76	1.27	0.030	0.050
V	1.14	-	0.045	-

CASE 221A-02
TO-220AB

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 @ $T_C = 25^oC$ (1) Derate above 25^oC	P_D	87.5 0.5	Watts $W/^oC$
Storage Temperature Range	T_{stg}	–65 to +150	^oC

THERMAL CHARACTERISTICS

Characteristics	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	2.0	$^oC/W$

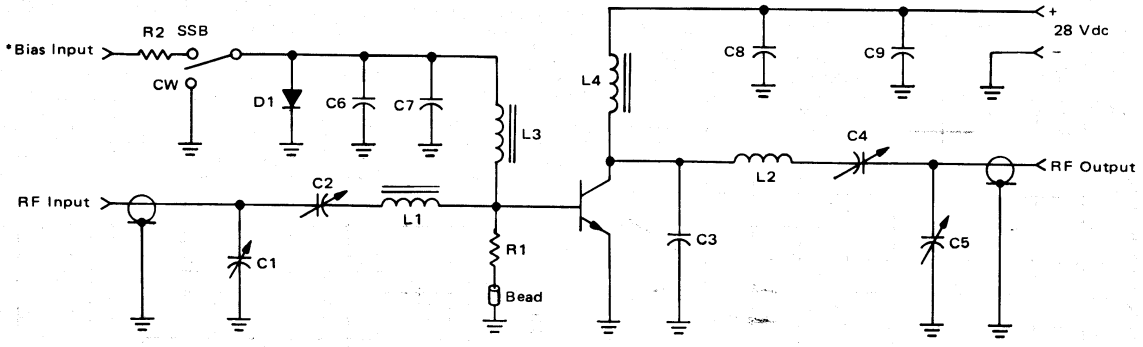
(1) These devices are designed for RF operation. The total device dissipation rating applies only when the devices are operated as RF amplifiers.

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)	BV_{CEO}	35	–	–	Vdc
Collector-Emitter Breakdown Voltage (I_C = 50 mAdc, V_{BE} = 0)	BV_{CES}	65	–	–	Vdc
Collector-Base Breakdown Voltage (I_C = 50 mAdc, I_E = 0)	BV_{CBO}	65	–	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 5.0 mAdc, I_C = 0)	BV_{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 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 Vdc Electrolytic
C8 – 50 μF, 50 Vdc Electrolytic

R1 – 10 Ω, 1.0 Watt Resistor
R2 – 5 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.

FIGURE 2 – OUTPUT POWER versus INPUT POWER

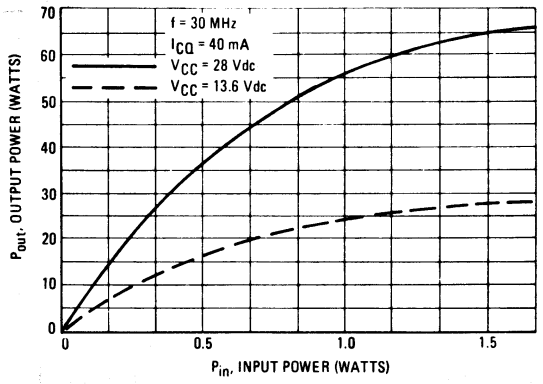


FIGURE 3 – OUTPUT POWER versus SUPPLY VOLTAGE

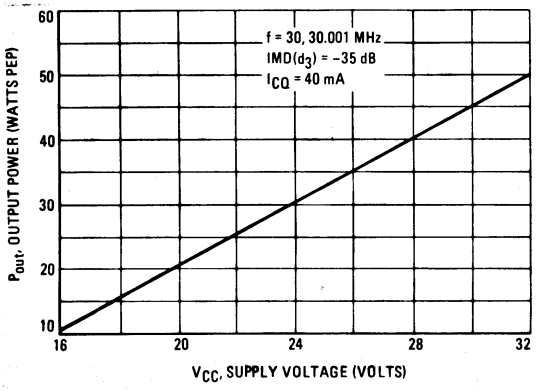


FIGURE 4 – POWER GAIN versus FREQUENCY

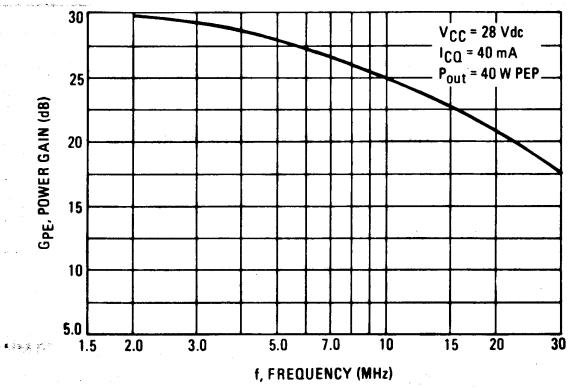


FIGURE 5 – INTERMODULATION DISTORTION versus OUTPUT POWER

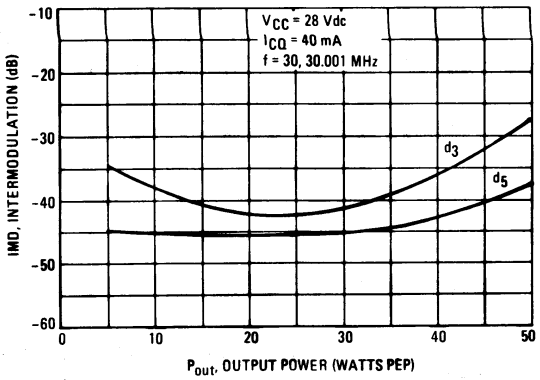


FIGURE 6 – SAFE OPERATING AREA

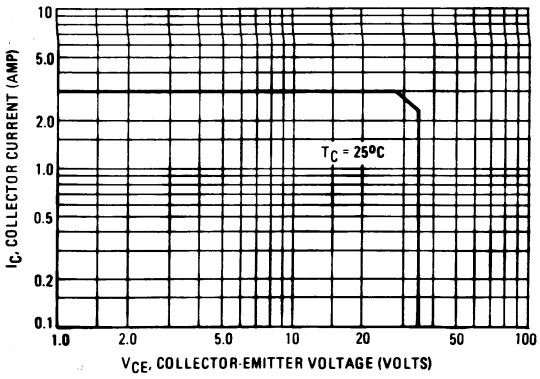


FIGURE 7 – SERIES EQUIVALENT INPUT IMPEDANCE

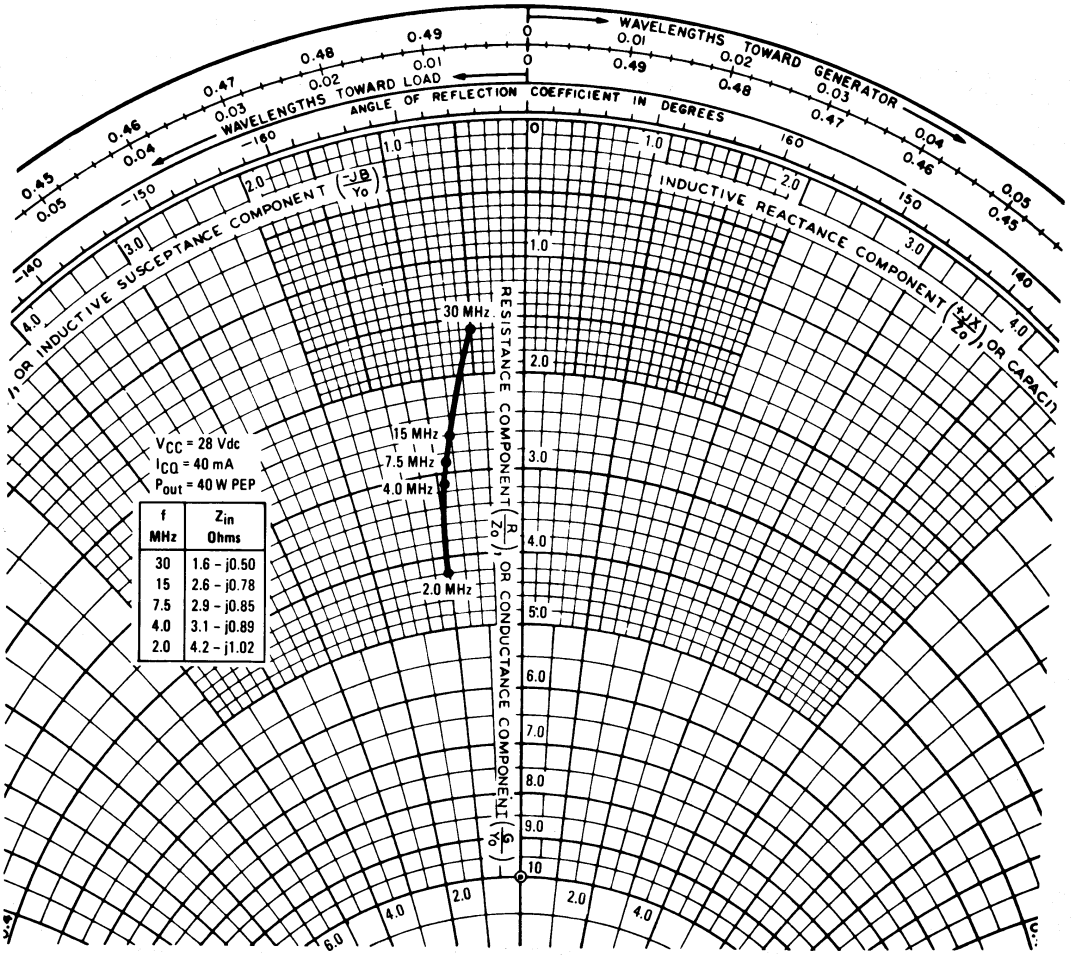


FIGURE 8 – OUTPUT CAPACITANCE versus FREQUENCY

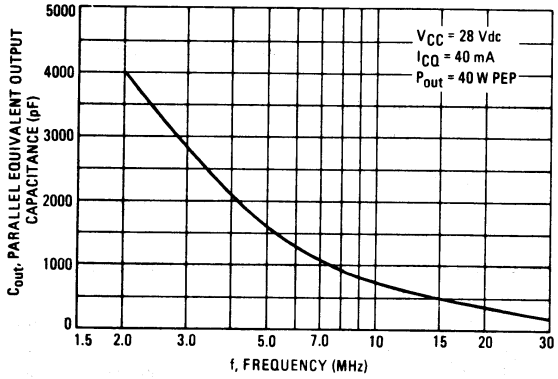


FIGURE 9 – OUTPUT RESISTANCE versus FREQUENCY