MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

T-33-07

MRF485

The RF Line

NPN SILICON RF POWER TRANSISTOR

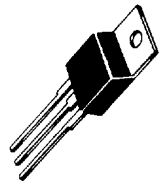
. . . designed primarily for use in single sideband linear amplifier output applications and other communications equipment operating to 30 MHz.

- Characterized for Single Sideband and Large-Signal Amplifier Applications Utilizing Low-Level Modulation
- Specified 28 V, 30 MHz Characteristics —
  Output Power = 15 W (PEP)
  Minimum Efficiency = 40% (SSB)
  Minimum Power Gain = 10 dB (PEP & CW)
- Common-Collector Configuration

15 W (PEP) – 15 W (CW) – 30 MHz

RF POWER
TRANSISTOR

NPN SILICON



MAXIMUM RATINGS

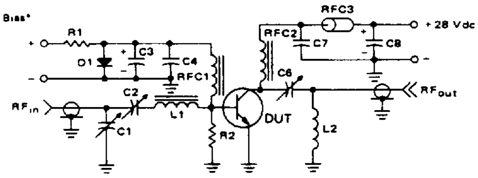
Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	35	Vdc
Collector-Base Voltage	V_{CBO}	65	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector Current — Continuous	I_C	1.0	Adc
Total Device Dissipation @ T_C = 50°C (1) Derate above 50°C	P_D	30 0.3	Watts W/°C
Storage Temperature Range	T_{stg}	−65 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	3.33	°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 — COMMON EMITTER TEST CIRCUIT



*Adjust for I_{CQ} = 20 mA

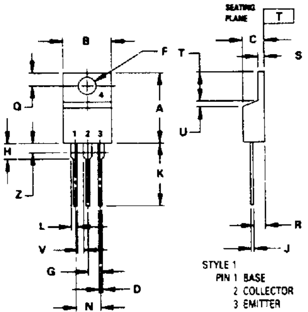
C1 2, 6 – ARCO 466 Trimmer Capacitors
C3 — 1000 μF, 3.0 Vdc Electrolytic
C4, 7 — 0.1 μF, Disc Ceramics
C8 – 100 μF 15 Vdc Electrolytic

R1 – 10 Ω 5.0 Watt Resistor
R2 – 10 Ω 1.0 Watt Resistor

L1 – 2.2 μH Molded Choke
L2 – 7 Turns #18 AWG Wire 3/8" I D

RFC1 – 10 μH Molded Choke
RFC2 – 0.84 μH Molded Choke
RFC3 – 2 Ferroxcube, #56 590-65/3B, Beads on #18 AWG Wire

D1 – 1N4997



STYLE 1
PIN 1 BASE
2 COLLECTOR
3 EMITTER
4 COLLECTOR

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	0.36	0.55	0.014	0.022
K	12.70	14.27	0.500	0.562
L	1.15	1.39	0.045	0.055
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 = 20 mAdc, I_B = 0)	$V_{(BR)CEO}$	35	–	–	Vdc
Collector-Emitter Breakdown Voltage (I_C = 50 mAdc, V_{BE} = 0)	$V_{(BR)CES}$	60	–	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 5.0 mAdc, I_C = 0)	$V_{(BR)EBO}$	4 0	–	–	Vdc
Collector Cutoff Current (V_{CB} = 25 Vdc, I_E = 0)	I_{CBO}	–	–	1.0	mAdc
Collector Cutoff Current (V_{CE} = 28 Vdc, V_{BE} = 0)	I_{CES}	–	–	5 0	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 500 mAdc, V_{CE} = 5 0 Vdc)	h_{FE}	10	30	–	–
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 28 Vdc, I_E = 0, f = 1 0 MHz)	C_{ob}	–	85	100	pF
FUNCTIONAL TESTS (SSB)					
Common Emitter Amplifier Power Gain (V_{CC} = 28 Vdc, P_{out} = 15 W (PEP, f1 = 30 MHz, f2 = 30 001 MHz, I_{CQ} = 20 mA)	G_{PE}	10	13	–	dB
Collector Efficiency (V_{CC} = 28 Vdc, P_{out} = 15 W (PEP), f1 = 30 MHz, f2 = 30 001 MHz, I_{CQ} = 20 mA)	η	40	–	–	%
Intermodulation Distortion (1) (V_{CC} = 28 Vdc, P_{out} = 15 W (PEP), f1 = 30 MHz, f2 = 30 001 MHz, I_{CQ} = 20 mA)	$IMD_{(d3)}$	–	–35	–30	dB
Load Mismatch (V_{CC} = 28 Vdc, P_{out} = 15 W (PEP), f1 = 30 MHz, f2 = 30 001 MHz, VSWR = 30 1 All Angles)	ψ	No Degradation in Output Power			

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

FIGURE 2 – OUTPUT POWER versus INPUT POWER

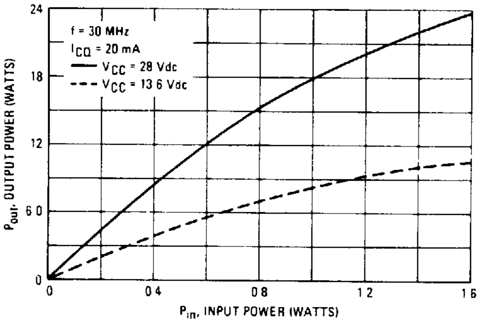


FIGURE 3 – INTERMODULATION DISTORTION versus OUTPUT POWER

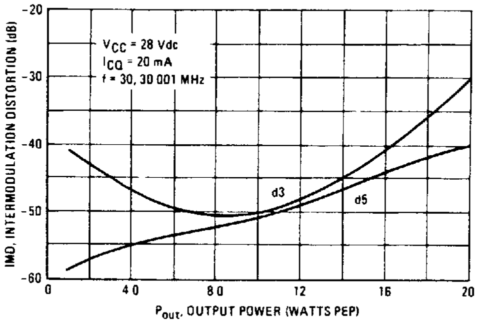


FIGURE 4 – OUTPUT POWER versus SUPPLY VOLTAGE

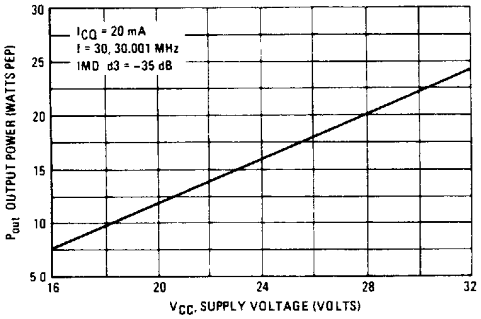


FIGURE 5 – OUTPUT CAPACITANCE versus FREQUENCY

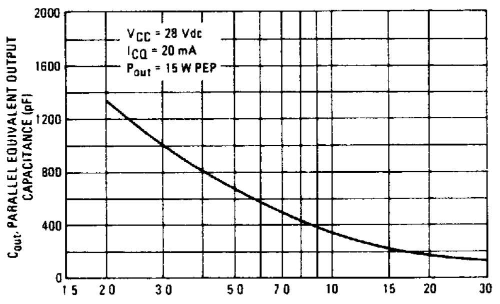


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FIGURE 6 – OUTPUT RESISTANCE versus FREQUENCY

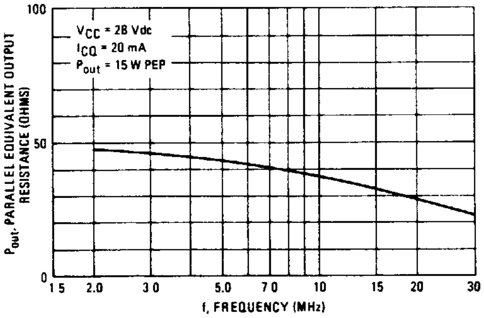


FIGURE 7 – POWER GAIN versus FREQUENCY

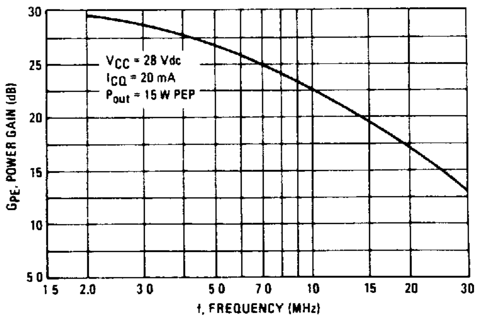
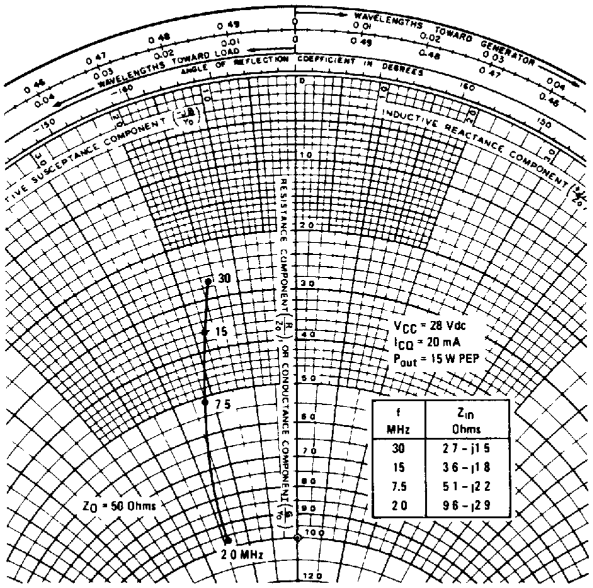


FIGURE 8 – SERIES EQUIVALENT INPUT IMPEDANCE



f MHz	Z_{in} Ohms
30	2 7 - j1 5
15	3 6 - j1 8
7.5	5 1 - j2 2
2 0	9 6 - j2 9