MOTOROLA

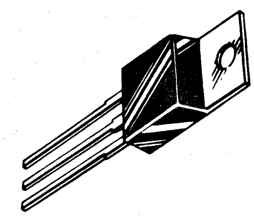
MRF485

The RF Line

15 W (PEP) – 15 W (CW) – 30 MHz

RF POWER TRANSISTOR

NPN SILICON



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)

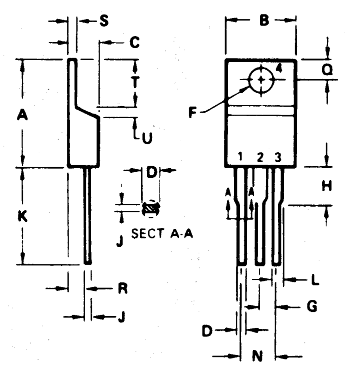
MAXIMUM RATINGS

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



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

NOTE:
1. DIM. L & H APPLIES TO ALL LEADS.

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	15.11	15.75	0.595	0.620
B	9.78	10.03	0.385	0.395
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

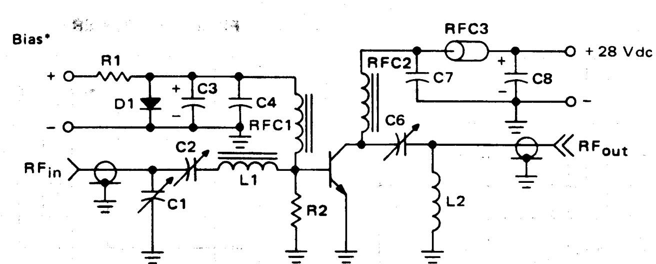
CASE 221A-02
TO-220AB

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)	BV_{CEO}	35	–	–	Vdc
Collector-Emitter Breakdown Voltage (I_C = 50 mAdc, V_{BE} = 0)	BV_{CES}	60	–	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 5.0 mAdc, I_C = 0)	BV_{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	%
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 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

FIGURE 2 — OUTPUT POWER versus INPUT POWER

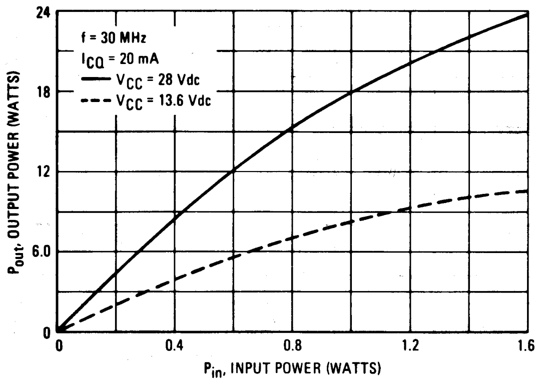


FIGURE 3 — INTERMODULATION DISTORTION versus OUTPUT POWER

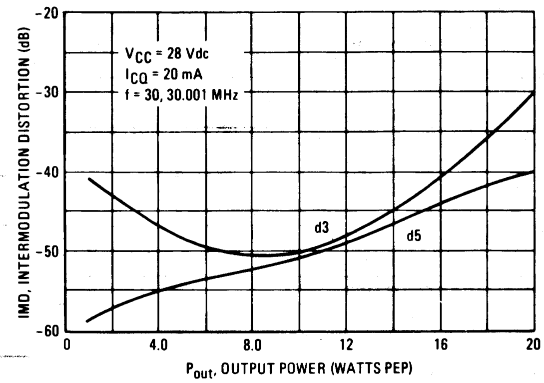


FIGURE 4 — OUTPUT POWER versus SUPPLY VOLTAGE

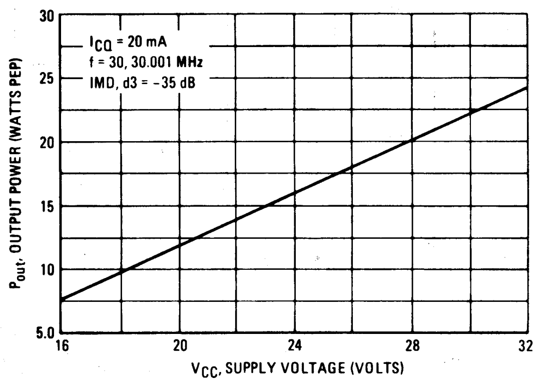


FIGURE 5 — OUTPUT CAPACITANCE versus FREQUENCY

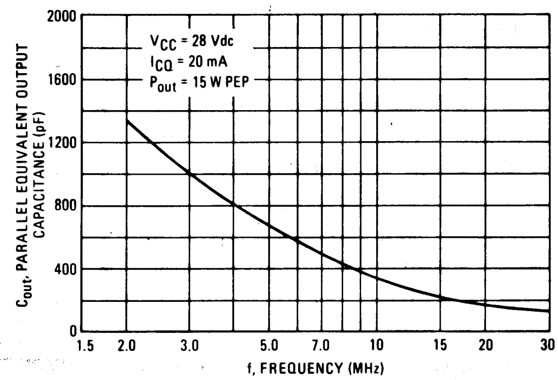


FIGURE 6 — OUTPUT RESISTANCE versus FREQUENCY

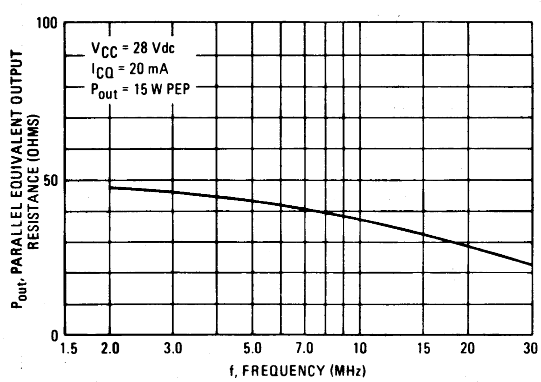


FIGURE 7 — POWER GAIN versus FREQUENCY

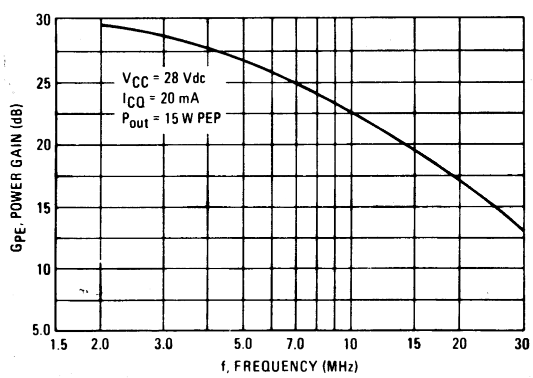
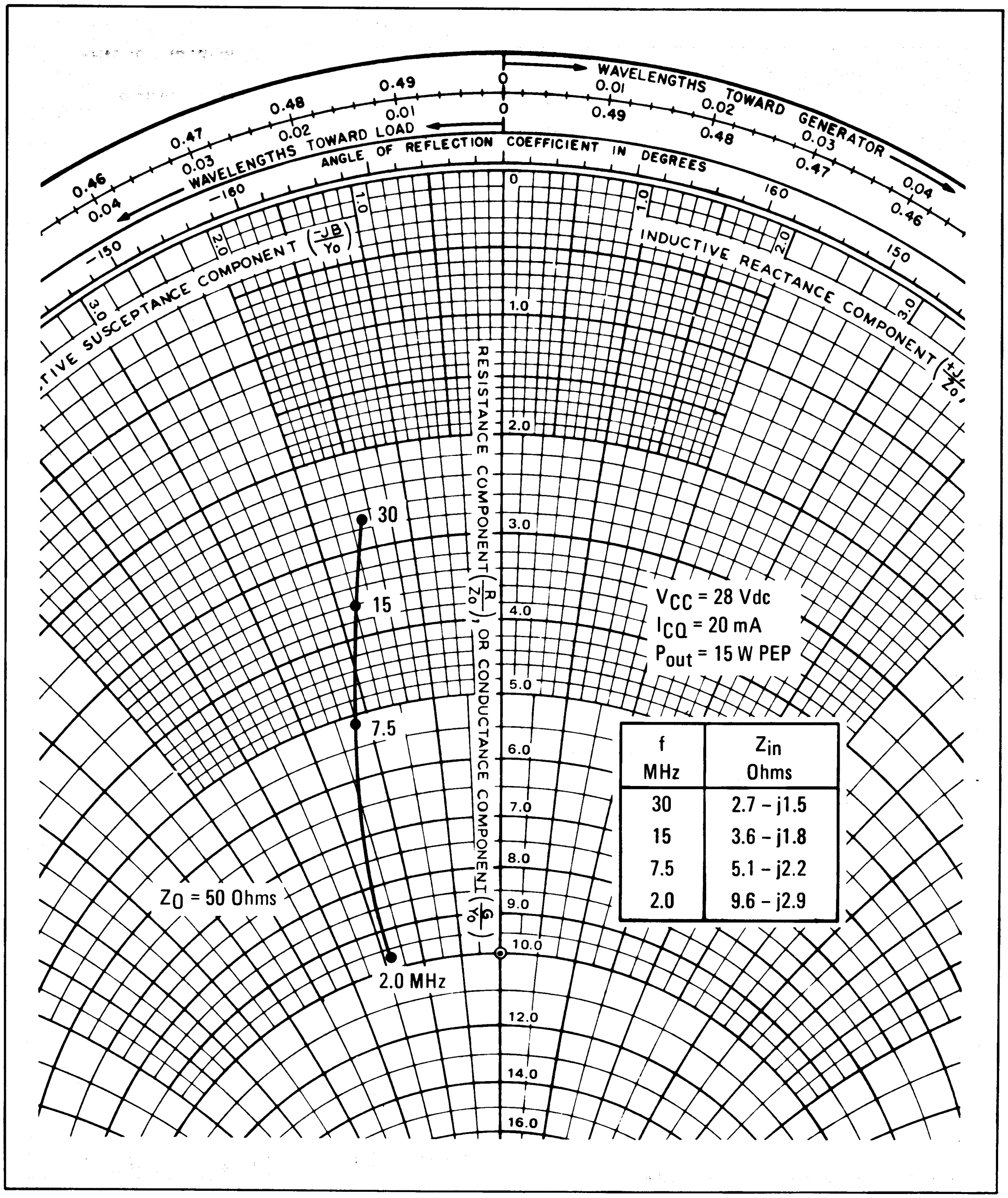


FIGURE 8 – SERIES EQUIVALENT INPUT IMPEDANCE



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