

MOTOROLA SEMICONDUCTOR TECHNICAL DATA

T-33-07
MRF485

The RF Line

NPN SILICON RF POWER TRANSISTOR

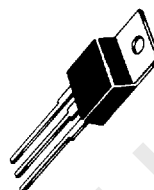
... designed primarily for use in single sideband linear amplifier output applications and other communications equipment operating to 30 MHz.

- 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

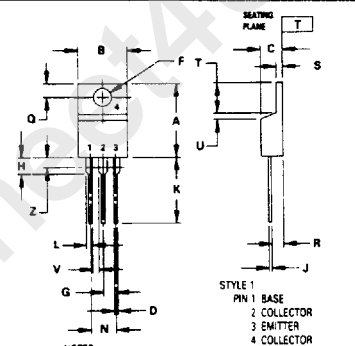
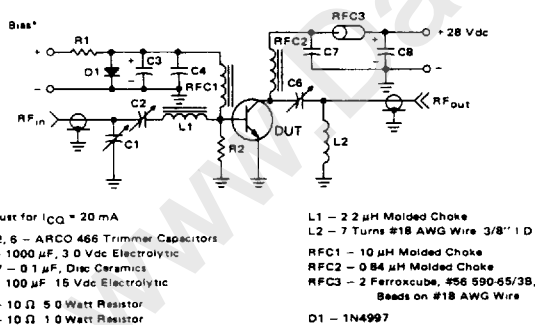
Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	35	Vdc
Collector-Base Voltage	V_{CBO}	65	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector Current – Continuous	I_C	1.0	Adc
Total Device Dissipation @ $T_C = 50^\circ\text{C}$ (1) Derate above 50°C	P_D	30 0.3	Watts W/ $^\circ\text{C}$
Storage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

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	3.33	$^\circ\text{C/W}$

(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



- 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		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	0.98	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	3.30	0.110	0.135
J	0.36	0.56	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	2.75	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

MOTOROLA RF DEVICE DATA

2-678

MRF485

MOTOROLA SC (XSTRS/R F)

46E D 6367254 0094701 1 MOT6

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ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage ($I_C = 20\text{ mA}$, $I_B = 0$)	$V_{(BR)CEO}$	35	—	—	Vdc
Collector-Emitter Breakdown Voltage ($I_C = 50\text{ mA}$, $V_{BE} = 0$)	$V_{(BR)CES}$	60	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 5.0\text{ mA}$, $I_C = 0$)	$V_{(BR)EBO}$	40	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 25\text{ Vdc}$, $I_E = 0$)	I_{CBO}	—	—	1.0	mA
Collector Cutoff Current ($V_{CE} = 28\text{ Vdc}$, $V_{BE} = 0$)	I_{CES}	—	—	5.0	mA

ON CHARACTERISTICS

DC Current Gain ($I_C = 500\text{ mA}$, $V_{CE} = 5.0\text{ Vdc}$)	h_{FE}	10	30	—	—
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DYNAMIC CHARACTERISTICS

Output Capacitance ($V_{CB} = 28\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	C_{ob}	—	85	100	pF
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FUNCTIONAL TESTS (SSB)

Common Emitter Amplifier Power Gain ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 15\text{ W}$ (PEP), $f_1 = 30\text{ MHz}$, $f_2 = 30.001\text{ MHz}$, $I_{CQ} = 20\text{ mA}$)	G_{PE}	10	13	—	dB
Collector Efficiency ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 15\text{ W}$ (PEP), $f_1 = 30\text{ MHz}$, $f_2 = 30.001\text{ MHz}$, $I_{CQ} = 20\text{ mA}$)	η	40	—	—	%
Intermodulation Distortion (1) ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 15\text{ W}$ (PEP), $f_1 = 30\text{ MHz}$, $f_2 = 30.001\text{ MHz}$, $I_{CQ} = 20\text{ mA}$)	$IMD(d3)$	—	-35	-30	dB
Load Mismatch ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 15\text{ W}$ (PEP), $f_1 = 30\text{ MHz}$, $f_2 = 30.001\text{ MHz}$, $V_{SWR} = 30:1$ 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

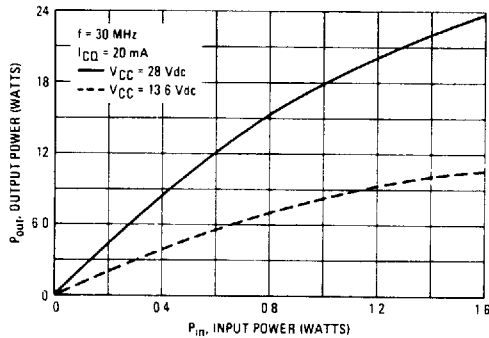
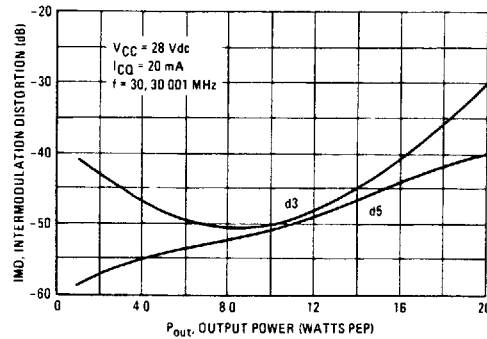


FIGURE 3 — INTERMODULATION DISTORTION versus OUTPUT POWER



MRF485

MOTOROLA SC (XSTRS/R F)

46E D

6367254 0094702 3 M0T6

FIGURE 4 - OUTPUT POWER versus SUPPLY VOLTAGE

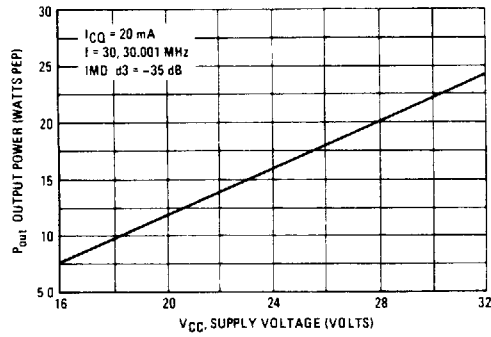
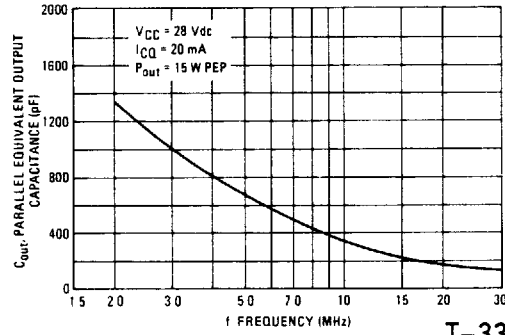


FIGURE 5 - OUTPUT CAPACITANCE versus FREQUENCY



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FIGURE 6 - OUTPUT RESISTANCE versus FREQUENCY

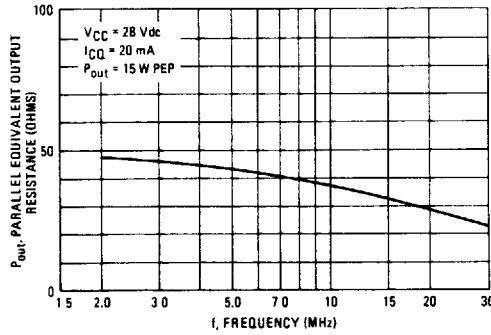


FIGURE 7 - POWER GAIN versus FREQUENCY

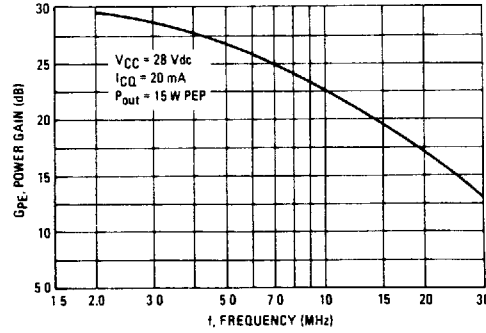
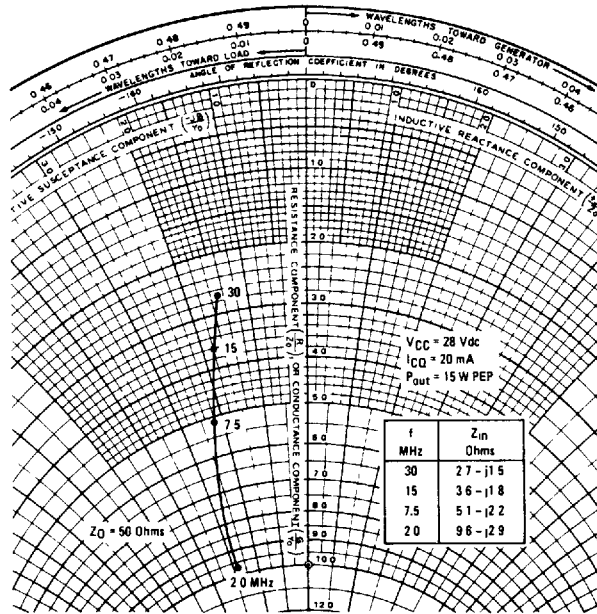


FIGURE 8 - SERIES EQUIVALENT INPUT IMPEDANCE



MOTOROLA RF DEVICE DATA

2-680