

# MOTOROLA SEMICONDUCTOR TECHNICAL DATA

T-33-07  
MRF485

## The RF Line

### NPN SILICON RF POWER TRANSISTOR

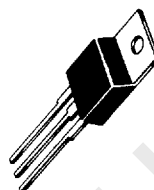
... designed primarily for use in single sideband linear amplifier output applications and other communications equipment operating to 30 MHz.

- 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

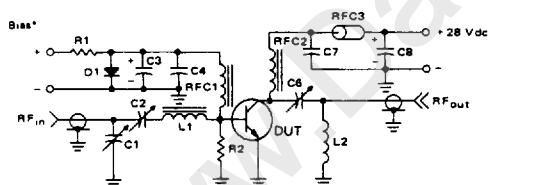
Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	35	Vdc
Collector-Base Voltage	$V_{CBO}$	65	Vdc
Emitter-Base Voltage	$V_{EBO}$	4.0	Vdc
Collector Current — Continuous	$I_C$	1.0	Adc
Total Device Dissipation @ $T_C = 50^\circ\text{C}$ (1) Derate above $50^\circ\text{C}$	$P_D$	30 0.3	Watts W/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

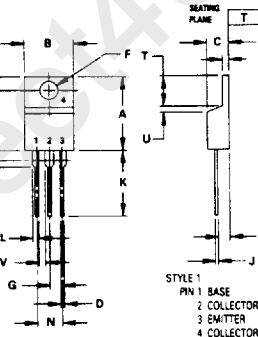
FIGURE 1 — COMMON EMITTER TEST CIRCUIT



\*Adjust for  $I_{CQ} = 20\text{ mA}$

- C1, 2, 6 — ARCO 466 Trimmer Capacitors
- C3 — 1000  $\mu\text{F}$ , 3.0 Vdc Electrolytic
- C4, 7 — 0.1  $\mu\text{F}$ , Disc Ceramics
- C8 — 100  $\mu\text{F}$ , 15 Vdc Electrolytic
- R1 — 10  $\Omega$ , 5.0 Watt Resistor
- R2 — 10  $\Omega$ , 1.0 Watt Resistor

- L1 — 2.2  $\mu\text{H}$  Molded Choke
- L2 — 7 Turns #18 AWG Wire 3/8" I.D.
- RFC1 — 10  $\mu\text{H}$  Molded Choke
- RFC2 — 0.84  $\mu\text{H}$  Molded Choke
- RFC3 — 2 Ferroxcube, #56 590-65/3B,  
Beads on #18 AWG Wire
- D1 — 1N4997



- NOTES
- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M-1982
  - CONTROLLING DIMENSION: INCH
  - 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	0.406
C	4.07	4.82	0.160	0.190
D	0.64	0.98	0.025	0.039
E	3.61	3.73	0.142	0.147
F	2.42	2.66	0.095	0.105
G	2.80	3.30	0.110	0.130
H	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
M	4.83	5.33	0.190	0.210
N	2.54	3.04	0.100	0.120
O	2.04	2.75	0.080	0.110
P	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

T-33-07

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

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
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), $f_1 = 30\text{ MHz}$ , $f_2 = 30.001\text{ MHz}$ , $I_{CQ} = 20\text{ mA}$ )	$\eta$	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), $f_1 = 30\text{ MHz}$ , $f_2 = 30.001\text{ MHz}$ , $VSWR = 30:1$ All Angles)	$\psi$	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

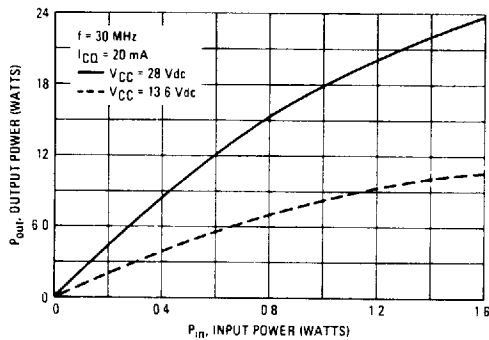
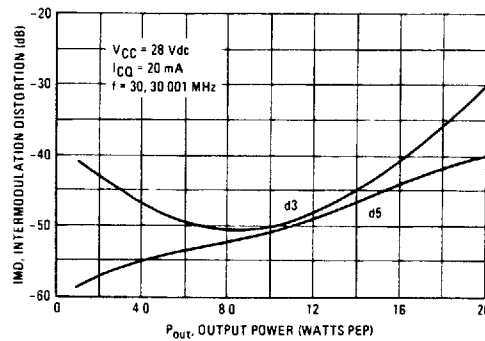


FIGURE 3 — INTERMODULATION DISTORTION versus OUTPUT POWER



# MRF485

MOTOROLA SC (XSTRS/R F)

46E D

6367254 0094702 3 M0T6

FIGURE 4 - OUTPUT POWER versus SUPPLY VOLTAGE

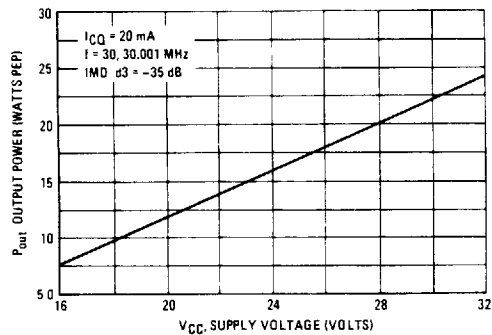
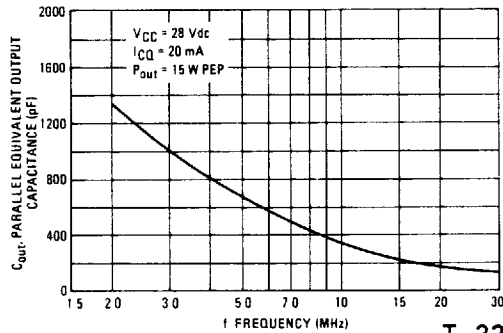


FIGURE 5 - OUTPUT CAPACITANCE versus FREQUENCY



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FIGURE 6 - OUTPUT RESISTANCE versus FREQUENCY

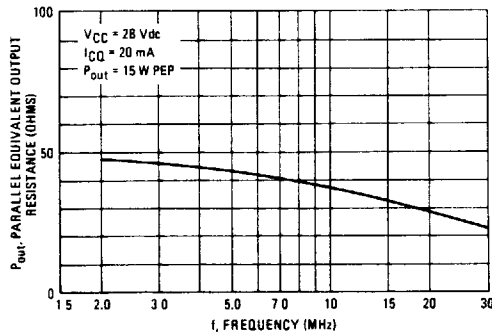


FIGURE 7 - POWER GAIN versus FREQUENCY

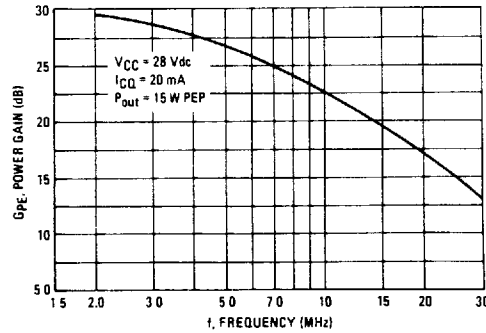
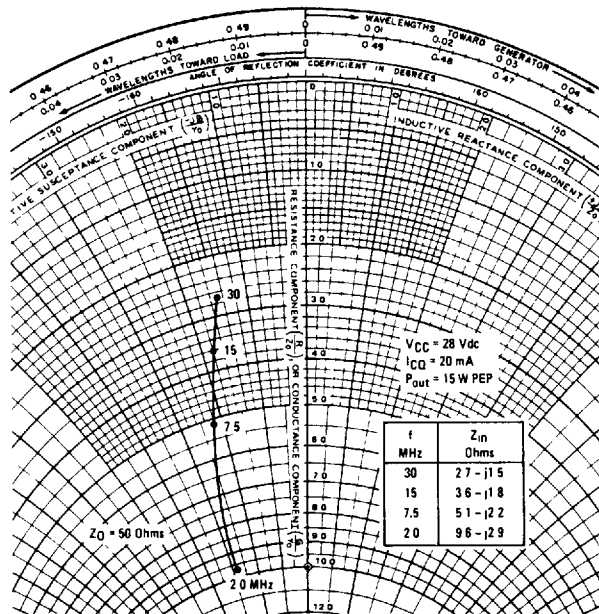


FIGURE 8 - SERIES EQUIVALENT INPUT IMPEDANCE



MOTOROLA RF DEVICE DATA

2-680