MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

MRF410
MRF410A

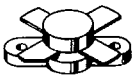
2

10 W–30 MHz
RF POWER
TRANSISTORS
NPN SILICON

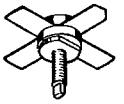
The RF Line
NPN Silicon RF Power Transistors

. . . designed for high gain driver and output linear amplifier stages in 1.5 to 30 MHz HF/SSB equipment.

- Specified 28 Volt, 30 MHz Characteristics —
  Output Power = 10 W
  Minimum Gain = 13 dB
  Efficiency = 40%
- Intermodulation Distortion @ 10 W (PEP) —
  IMD = −30 dB (Max)
- 100% Tested for Load Mismatch at All Phase Angles With 30:1 VSWR
- Direct Replacement for 2N6370



MRF410
CASE 211-07



MRF410A
CASE 145A-09

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	Vdc
Collector Current — Continuous	I_C	1.5	Adc
Total Device Dissipation @ T_C = 25°C (1) Derate above 25°C	P_D	40 0.23	Watts W/°C
Storage Temperature Range	T_{stg}	−65 to +150	°C
Operating Junction Temperature	T_J	200	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	4.35	°C/W

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-Base Breakdown Voltage (I_C = 50 mAdc, I_E = 0)	$V_{(BR)CES}$	65	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 mAdc, I_C = 0)	$V_{(BR)EBO}$	4	—	—	Vdc
Collector Cutoff Current (V_{CE} = 28 Vdc, V_{BE} = 0)	I_{CES}	—	—	5	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 1 Adc, V_{CE} = 5 Vdc)	h_{FE}	10	35	100	—
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 28 Vdc, I_E = 0, f = 1 MHz)	C_{ob}	—	85	100	pF

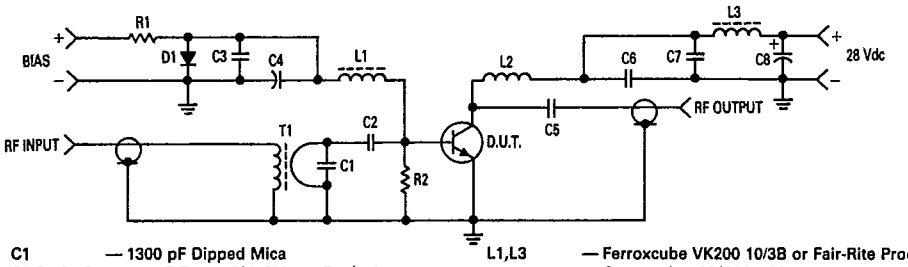
(1) These devices are designed for RF operation. The total device dissipation rating applies only when the devices are operated as RF amplifiers.

(continued)

ELECTRICAL CHARACTERISTICS — continued (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
FUNCTIONAL TESTS (SSB)					
Common-Emitter Amplifier Gain (V_{CC} = 28 Vdc, P_{out} = 10 W (PEP), f1 = 30 MHz, f2 = 30.001 MHz, I_{CQ} = 25 mA)	G_{PE}	13	16	—	dB
Collector Efficiency (V_{CC} = 28 Vdc, P_{out} = 10 W (PEP), f1 = 30 MHz, f2 = 30.001 MHz, I_{CQ} = 25 mA)	η	40	—	—	%
Intermodulation Distortion (1) (V_{CC} = 28 Vdc, P_{out} = 10 W (PEP), f1 = 30 MHz, f2 = 30.001 MHz, I_{CQ} = 25 mA)	$IMD_{(d3)}$	—	−35	−30	dB
Load Mismatch (V_{CC} = 28 Vdc, P_{out} = 10 W (PEP), f1 = 30 MHz, f2 = 30.001 MHz, I_{CQ} = 25 mA, VSWR 30:1 at All Phase Angles)		No Degradation in Output Power			
CLASS A PERFORMANCE					
Power Gain and Intermodulation Distortion (1) (V_{CC} = 28 Vdc, P_{out} = 4 W (PEP), I_{CQ} = 500 mA, f1 = 30 MHz, f2 = 30.001 MHz)	G_{PE}	—	17	—	dB
	$IMD_{(d3)}$	—	40	—	dB
	$IMD_{(d5)}$	—	65	—	dB

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



C1 — 1300 pF Dipped Mica
C2,C3,C5,C6 — 0.1 μF Type 1812 Chip or Equivalent
C4 — 100 μF/16 V Electrolytic
C7 — 0.01 μF Type 1812 Chip or Equivalent
C8 — 10 μF/35 V Electrolytic
R1 — 5 Ohms/5 W
R2 — 10 Ohms/½ W Carbon
D1 — MR820–826 or Equivalent
L1,L3 — Ferroxcube VK200 10/3B or Fair-Rite Products Corporation 2843003102
L2 — 15 Turns #22 AWG Enameled Wire, Close Wound, ¼" ID
T1 — RF Transformer 9:1 Impedance Ratio. See Motorola Application Note AN749, Figure 4 for Details. Ferrite Material: 2 each Fair-Rite Products Corporation 2643006801

Figure 1. 30 MHz Test Circuit

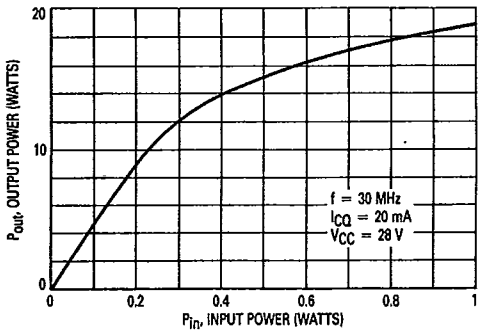


Figure 2. Output Power versus Input Power

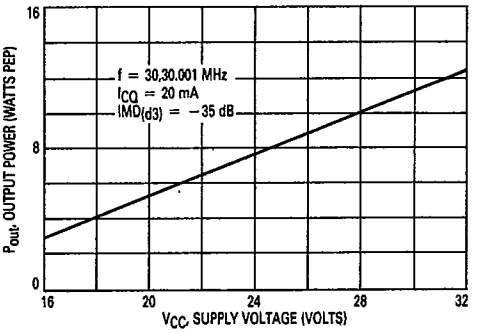


Figure 3. Output Power versus Supply Voltage

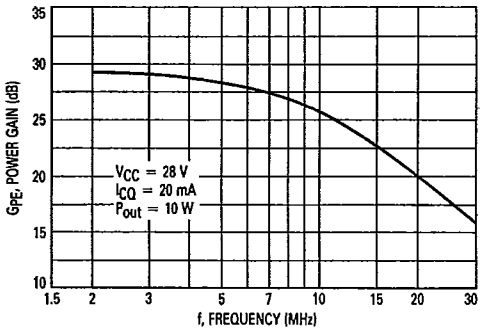


Figure 4. Power Gain versus Frequency

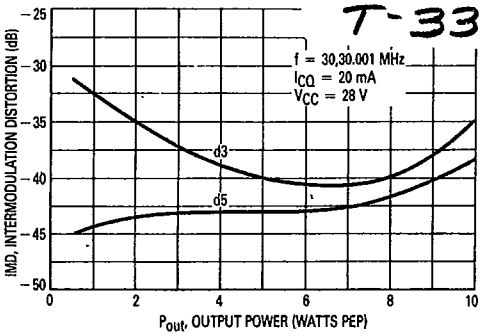


Figure 5. Intermodulation Distortion versus Output Power

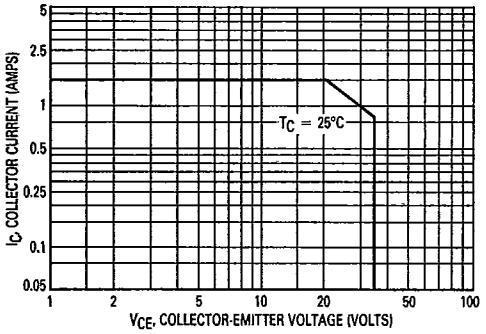


Figure 6. D.C. Safe Operating Area

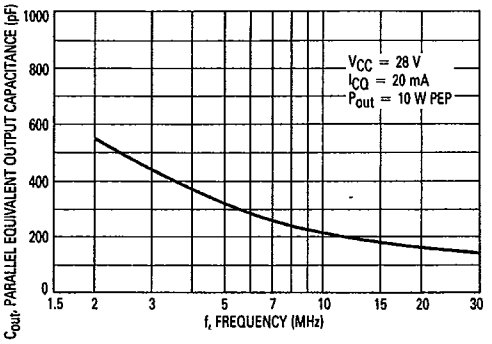


Figure 7. Output Capacitance versus Frequency

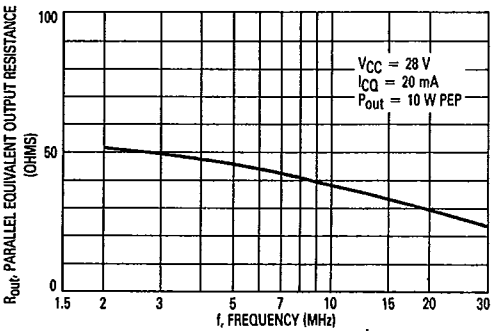


Figure 8. Output Resistance versus Frequency

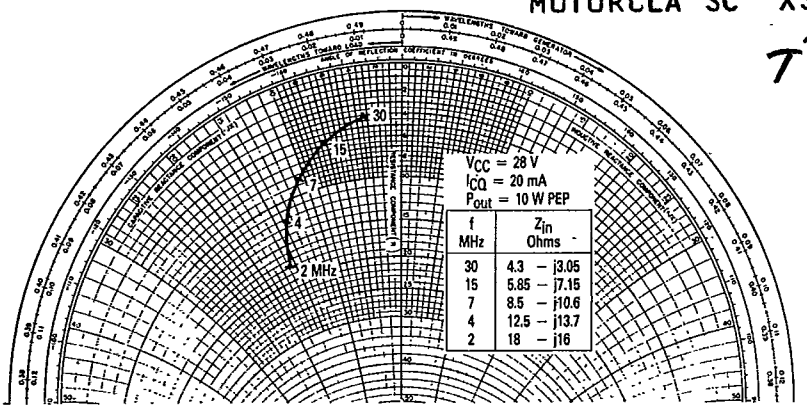


Figure 9. Series Equivalent Input Impedance