MOTOROLA

MRF401

The RF Line

25 W PEP – 30 MHz
RF POWER
TRANSISTOR
NPN SILICON

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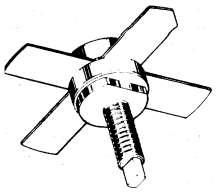
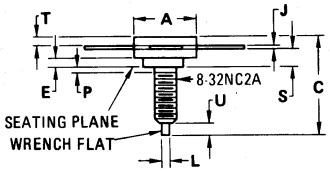
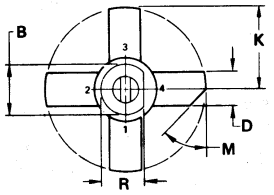
NPN SILICON RF POWER TRANSISTORS



. . . designed primarily for applications as a high-power linear amplifier from 2.0 to 75 MHz.

- Specified 28 Volt, 30 MHz Characteristics –
  Output Power = 25 W (PEP)
  Minimum Gain = 13 dB
  Efficiency = 40%
- Intermodulation Distortion at 25 W (PEP)
  IMD = -32 dB (Max)
- Isothermal-Resistor Design Results in Rugged Device





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

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	30	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector Current – Continuous	I_C	3.3	Adc
Total Device Dissipation @ $T_C = 25^oC$(1) Derate above 25^oC	P_D	50 28.6	Watts $W/^oC$
Storage Temperature Range	T_{stg}	-65 to +200	^oC

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

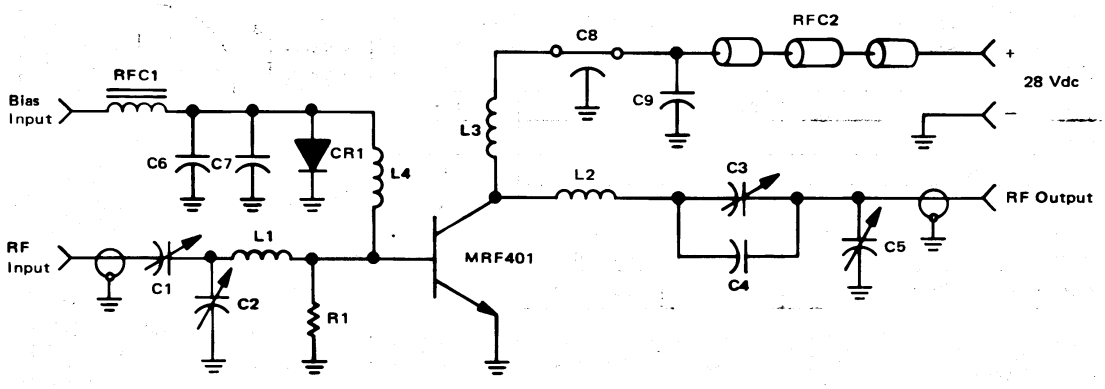
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	9.40	9.78	0.370	0.385
B	8.13	8.38	0.320	0.330
C	17.02	20.07	0.670	0.790
D	5.46	5.97	0.215	0.235
E	1.78	–	0.070	–
J	0.08	0.18	0.003	0.007
K	12.45	–	0.490	–
L	1.40	1.78	0.055	0.070
M	45° NOM		45° NOM	
P	–	1.27	–	0.050
R	7.59	7.80	0.299	0.307
S	4.01	4.52	0.158	0.178
T	2.11	2.54	0.083	0.100
U	2.49	3.35	0.098	0.132

145A-09

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 50 mAdc, I_B = 0)	BV_{CEO}	30	–	–	Vdc
Collector-Emitter Breakdown Voltage (I_C = 10 mAdc, V_{BE} = 0)	BV_{CES}	60	–	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 mAdc, I_C = 0)	BV_{EBO}	4.0	–	–	Vdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 1.0 Adc, V_{CE} = 5.0 Vdc)	h_{FE}	10	20	–	–
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 30 Vdc, I_E = 0, f = 1.0 MHz)	C_{ob}	–	65	85	pF
FUNCTIONAL TEST (Figure 1)					
Common-Emitter Amplifier Power Gain (P_{out} = 25 Watts PEP, I_C (max) = 1.12 Adc, V_{CC} = 28 Vdc, f = 30 MHz)	G_{PE}	13	–	–	dB
Collector Efficienty (P_{out} = 25 Watts PEP, I_C (max) = 1.12 Adc, V_{CC} = 28 Vdc, f = 30 MHz)	η	40	–	–	%
Intermodulation Distortion (P_{out} = 25 Watts PEP, I_C = 1.12 Adc, V_{CC} = 28 Vdc, f_1 = 30 MHz, f_2 = 30.001 MHz)	IM	–	–	-32	dB

FIGURE 1 – 30 MHz LINEAR TEST CIRCUIT



C1, C2 – ARCO 469 190-780 pF
C3, C4 – ARCO 464 25-280 pF
C5 – 120 pF Dipped Mica
C6, C7 – 100 µF 15 Vdc
C8 – 680 pF F.T. Allen Bradley
C9 – 1.0 µF 35 V Tantalum

CR1 – IN4997

L1 – 3 Turns #16 0.25" ID
L2 – 6 Turns #16 0.5" ID
L3 – 7 Turns #20 0.38" ID
L4 – 10 µH Molded Choke Delevan

RFC1 – Ferroxcube VK200/20-4B
RFC2 – 3-Ferroxcube 5653065-3B
RF – Input/Output Connectors UG53 A/µ
R1 – 10 Ω 1/2 Watt 10%

Adjust Bias (Base) for I_{CQ} = 20 mA with No RF Applied

FIGURE 2 – PARALLEL EQUIVALENT INPUT RESISTANCE versus FREQUENCY

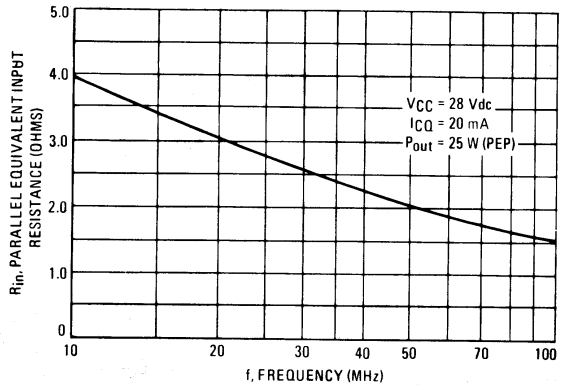


FIGURE 3 – PARALLEL EQUIVALENT INPUT CAPACITANCE versus FREQUENCY

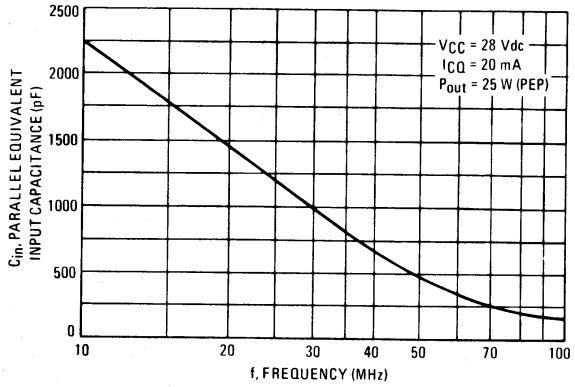


FIGURE 4 – PARALLEL EQUIVALENT OUTPUT CAPACITANCE versus FREQUENCY

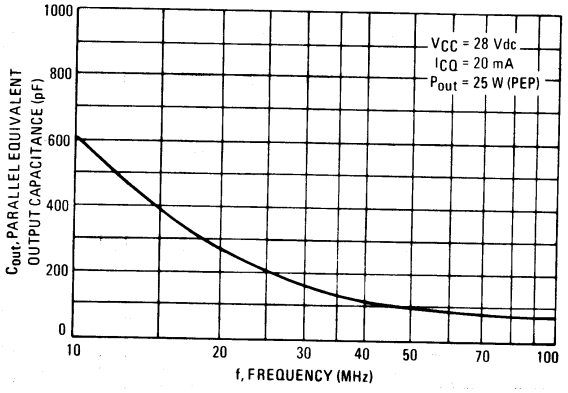


FIGURE 5 – POWER GAIN versus FREQUENCY

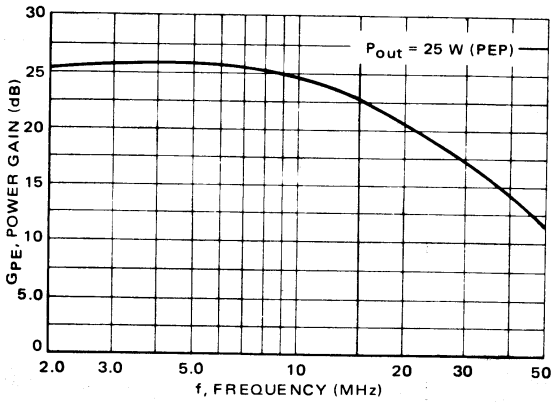


FIGURE 6 – IMD versus POWER OUTPUT