MRF5175

The RF Line

2

5 W – 400 MHz

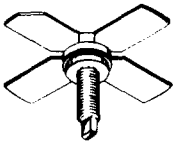
RF POWER TRANSISTOR

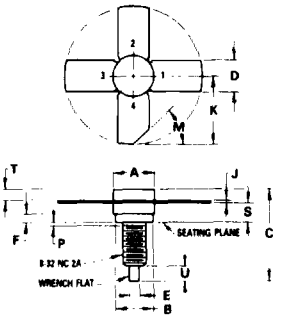
NPN SILICON

NPN SILICON RF POWER TRANSISTOR

. . . designed primarily for wideband large-signal driver and predriver amplifier stages in the 200-600 MHz frequency range.

- Specified 28-Volt, 400-MHz Characteristics –
  Output Power = 5.0 Watts
  Minimum Gain = 11 dB
  Efficiency = 50%
- Characterized from 200 to 600 MHz
- Includes Series Equivalent Impedances





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

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	7.06	7.26	0.278	0.286
B	6.20	6.50	0.244	0.256
C	14.99	16.51	0.590	0.650
D	5.46	5.96	0.215	0.235
E	1.40	1.65	0.055	0.065
F	1.52	—	0.060	—
J	0.08	0.17	0.003	0.007
K	11.05	—	0.435	—
M	45° NOM		45° NOM	
P	—	1.27	—	0.050
S	3.00	3.25	0.118	0.128
T	1.40	1.77	0.055	0.070
U	2.92	3.68	0.115	0.145

CASE 244-04

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	33	Vdc
Collector-Base Voltage	V_{CBO}	60	Vdc
Emitter-Base Voltage	V_{EBO}	4.0	Vdc
Collector Current – Continuous	I_C	1.0	Adc
Total Device Dissipation @ T_A = 25°C (1) Derate above 25°C	P_D	12 69	Watts mW/°C
Storage Temperature Range	T_{stg}	-65 to +200	°C

(1) This device is designed for RF operation. The total device dissipation rating applies only when the device is operated as an RF amplifier.

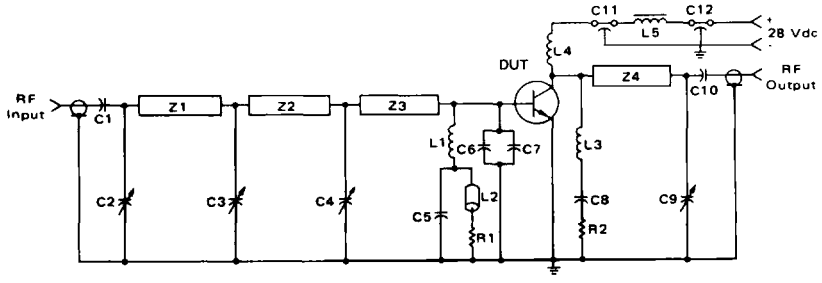
THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	12	°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 = 30 mAdc, I_B = 0)	$V_{(BR)CEO}$	33	–	–	Vdc
Collector-Emitter Breakdown Voltage (I_C = 30 mAdc, V_{BE} = 0)	$V_{(BR)CES}$	60	–	–	Vdc
Emitter-Base Breakdown Voltage (I_E = 1.0 mAdc, I_C = 0)	$V_{(BR)EBO}$	4.0	–	–	Vdc
Collector Cutoff Current (V_{CB} = 30 Vdc, I_E = 0)	I_{CBO}	–	–	0.5	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 250 mAdc, V_{CE} = 5.0 Vdc)	h_{FE}	10	–	100	–
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 30 Vdc, I_E = 0, f = 1.0 MHz)	C_{ob}	–	–	15	pF
FUNCTIONAL TESTS (Figure 1)					
Common-Emitter Amplifier Power Gain (V_{CC} = 28 Vdc, P_{out} = 5.0 W, f = 400 MHz)	G_{PE}	11	–	–	dB
Collector Efficiency (V_{CC} = 28 Vdc, P_{out} = 5.0 W, f = 400 MHz)	η	50	–	–	%

FIGURE 1 – 400 MHz TEST CIRCUIT SCHEMATIC



C1,C10 0.018 µF VITRAMON Chip
C2,C3,C9 1.0-10 pF JOHANSON Type 2951
C4 1.0-20 pF JOHANSON Type 3906
C5 100 pF UNDERWOOD (UNELCO)
C6,C7 5.0 pF ATC Chip
C8 0.1 µF ERIE Disc Ceramic
C11,C12 680 pF ALLEN BRADLEY Feedthru

L1 3.9 µH Molded Choke
L2 Ferrite Bead, FERROXCUBE 56-590-65-3B
L3 4 Turns, #22 AWG, 0.1" ID
L4 6 Turns, #20 AWG, 1/8" ID
L5 Ferrite Choke, FERROXCUBE VK200-20-4B

R1 2.7 Ohm, 1/8 Watt, 10%
R2 5.1 Ohm, 1/8 Watt, 10%

Z1,Z3 Microstrip Line, 0.1" W x 0.5" L
Z2 Microstrip Line, 0.1" W x 0.4" L
Z4 Microstrip Line, 0.075" W x 2.5" L

Board – Glass Teflon, ϵ_R = 2.56, t = 0.062"
Input/Output Connectors – Type N

FIGURE 2 – OUTPUT POWER versus FREQUENCY

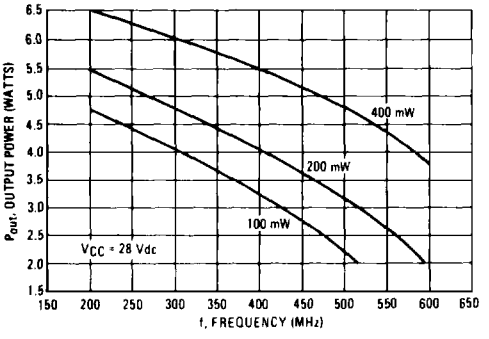


FIGURE 3 – OUTPUT POWER versus INPUT POWER

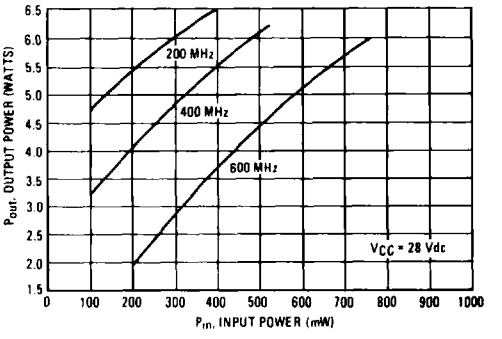


FIGURE 4 – OUTPUT POWER versus SUPPLY VOLTAGE

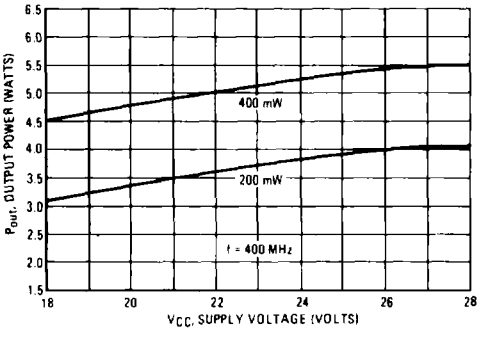
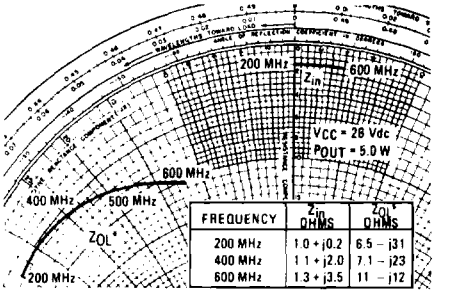


FIGURE 5 – SERIES EQUIVALENT IMPEDANCE



FREQUENCY	Z_{in} OHMS	Z_{OL}* OHMS
200 MHz	1.0 + j0.2	6.5 – j31
400 MHz	1.1 + j2.0	7.1 – j23
600 MHz	1.3 + j3.5	11 – j12

Z_{OL}* = Conjugate of the optimum load impedance into which the device output operates at a given output power, voltage and frequency.

FIGURE 6 – 400 MHz TEST CIRCUIT