

The RF Line NPN Silicon RF Power Transistor

... designed primarily for wideband large-signal driver and predriver amplifier stages in the 200–500 MHz frequency range.

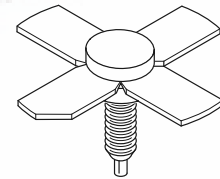
- Guaranteed Performance at 400 MHz, 28 V
 - Output Power = 20 Watts
 - Power Gain = 10 dB Min
 - Efficiency = 50% Min
- 100% Tested for Load Mismatch at all Phase Angles with 30:1 VSWR
- Gold Metallization System for High Reliability
- Computer-Controlled Wirebonding Gives Consistent Input Impedance

MRF323

**20 W, 400 MHz
RF POWER
TRANSISTOR
NPN SILICON**

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 — Peak	I_C	2.2 3.0	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ (1) Derate above 25°C	P_D	55 310	Watts mW/ $^\circ\text{C}$
Storage Temperature Range	T_{stg}	-65 to +150	$^\circ\text{C}$



CASE 244-04, STYLE 1

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	3.2	$^\circ\text{C}/\text{W}$

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

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage ($I_C = 20$ mAdc, $I_B = 0$)	$V_{(BR)CEO}$	33	—	—	Vdc
Collector-Emitter Breakdown Voltage ($I_C = 20$ mAdc, $V_{BE} = 0$)	$V_{(BR)CES}$	60	—	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 20$ mAdc, $I_E = 0$)	$V_{(BR)CBO}$	60	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 2.0$ mAdc, $I_C = 0$)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 30$ Vdc, $I_E = 0$)	I_{CBO}	—	—	2.0	mAdc

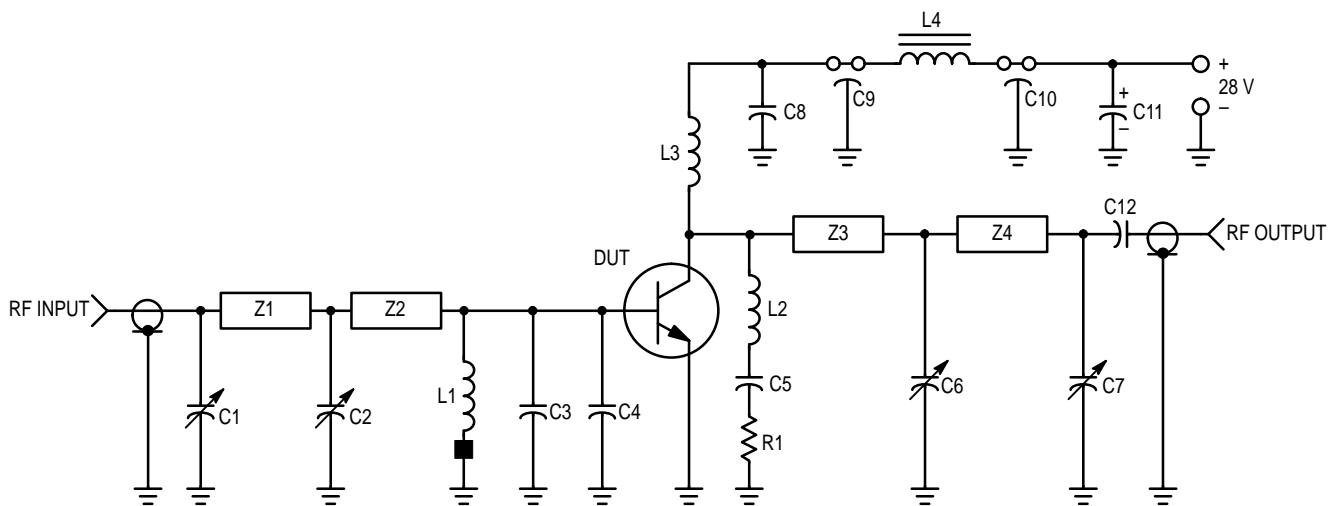
ON CHARACTERISTICS

DC Current Gain ($I_C = 1.0$ Adc, $V_{CE} = 5.0$ Vdc)	h_{FE}	20	—	80	—
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NOTE: (continued)
1. This device is designed for RF operation. The total device dissipation rating applies only when the device is operated as an RF amplifier.

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

Characteristic	Symbol	Min	Typ	Max	Unit
DYNAMIC CHARACTERISTICS					
Output Capacitance ($V_{CB} = 28\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	C_{ob}	—	20	24	pF
FUNCTIONAL TESTS (Figure 1)					
Common-Emitter Amplifier Power Gain ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 20\text{ W}$, $f = 400\text{ MHz}$)	G_{PE}	10	11	—	dB
Collector Efficiency ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 20\text{ W}$, $f = 400\text{ MHz}$)	η	50	60	—	%
Load Mismatch ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 20\text{ W}$, $f = 400\text{ MHz}$, $V_{SWR} = 30:1$ all phase angles)	ψ	No Degradation in Output Power			



- C1, C2, C6 — 1.0–20 pF Johanson Trimmer (JMC 5501)
- C3, C4 — 47 pF ATC Chip Capacitor
- C5, C8 — 0.1 μF Erie Redcap
- C7 — 0.5–10 pF Johanson Trimmer (JMC 5201)
- C9, C10 — 680 pF Feedthru
- C11 — 1.0 μF 50 Volt Tantalum
- C12 — 0.018 μF Vitramon Chip Capacitor
- L1 — 0.33 μH Molded Choke with Ferroxcube Bead
(Ferroxcube 56–590–65/4B) on Ground End

- L2 — 6 Turns #20 Enamel, 1/4" ID, Closewound
- L3 — 4 Turns #20 Enamel, 1/8" ID, Closewound
- L4 — Ferroxcube VK200–19/4B
- R1 — 5.1 Ω 1/4 Watt
- Z1 — Microstrip 0.1" W x 1.35" L
- Z2 — Microstrip 0.1" W x 0.55" L
- Z3 — Microstrip 0.1" W x 0.8" L
- Z4 — Microstrip 0.1" W x 1.75" L
- Board — Glass Teflon $\epsilon_r = 2.56$, $t = 0.062"$
- Input/Output Connectors — Type N

Figure 1. 400 MHz Test Circuit Schematic

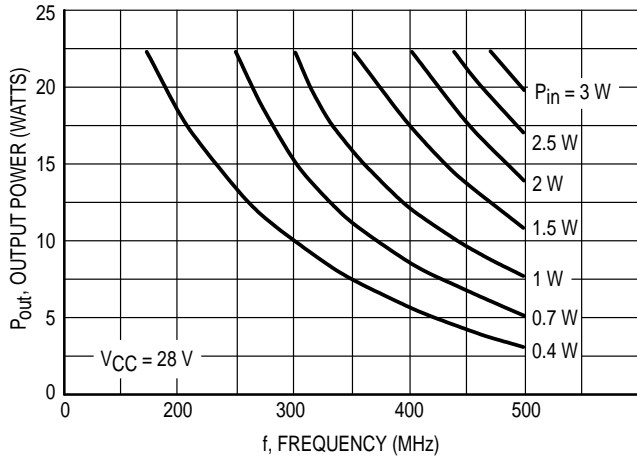


Figure 2. Output Power versus Frequency

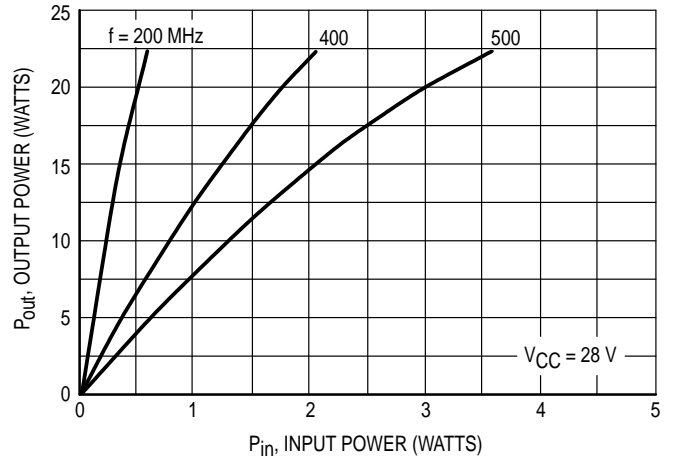


Figure 3. Output Power versus Input Power

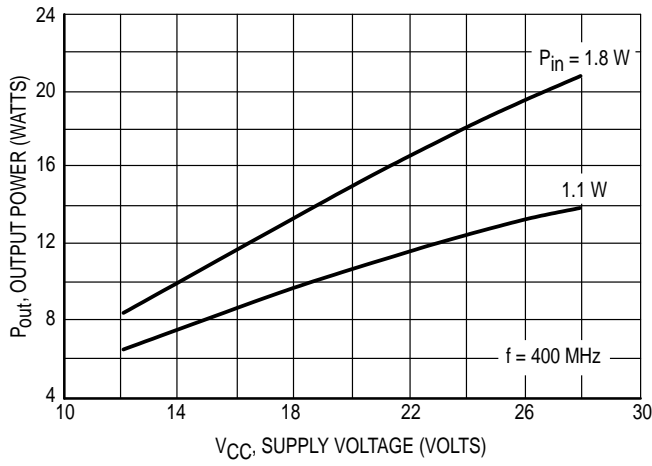


Figure 4. Output Power versus Supply Voltage

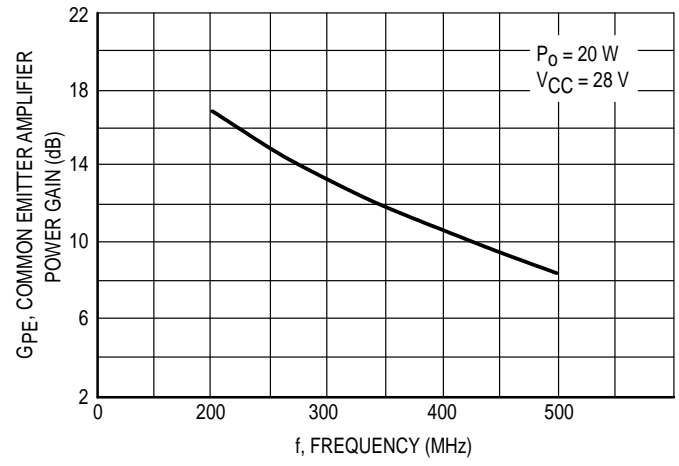
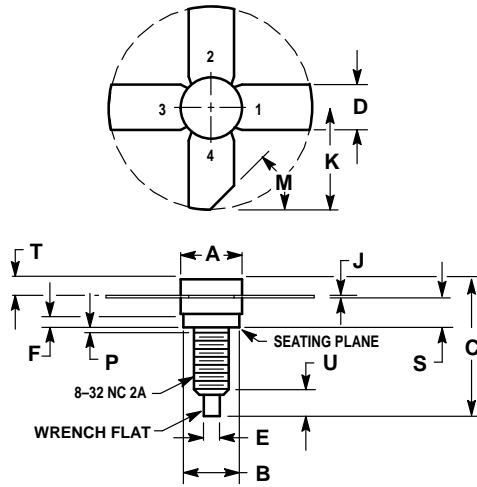


Figure 5. Power Gain versus Frequency


PACKAGE DIMENSIONS



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	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
G	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

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

**CASE 244-04
 ISSUE J**

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