

The RF Line NPN Silicon RF Power Transistor

... designed primarily for wideband large-signal output amplifier stages in the 30–200 MHz frequency range.

- Guaranteed Performance at 150 MHz, 28 Vdc
Output Power = 80 Watts
Minimum Gain = 10 dB
- Built-In Matching Network for Broadband Operation
- 100% Tested for Load Mismatch at all Phase Angles with 30:1 VSWR
- Gold Metallization System for High Reliability Applications

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 Peak	I_C	9.0 13.5	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ (1) Derate above 25°C	P_D	220 1.26	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	$R_{\theta JC}$	0.8	$^\circ\text{C/W}$

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 ($I_C = 50$ mAdc, $I_B = 0$)	$V_{(BR)CEO}$	35	—	—	Vdc
Collector–Emitter Breakdown Voltage ($I_C = 50$ mAdc, $V_{BE} = 0$)	$V_{(BR)CES}$	65	—	—	Vdc
Collector–Base Breakdown Voltage ($I_C = 50$ mAdc, $I_E = 0$)	$V_{(BR)CBO}$	65	—	—	Vdc
Emitter–Base Breakdown Voltage ($I_E = 5.0$ mAdc, $I_C = 0$)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 30$ Vdc, $I_E = 0$)	I_{CBO}	—	—	5.0	mAdc

ON CHARACTERISTICS

DC Current Gain ($I_C = 4.0$ Adc, $V_{CE} = 5.0$ Vdc)	h_{FE}	10	—	80	—
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DYNAMIC CHARACTERISTICS

Output Capacitance ($V_{CB} = 28$ Vdc, $I_E = 0$, $f = 1.0$ MHz)	C_{ob}	—	100	130	pF
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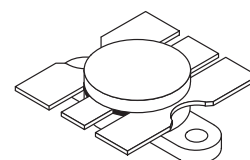
NOTE:

(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.

MRF316

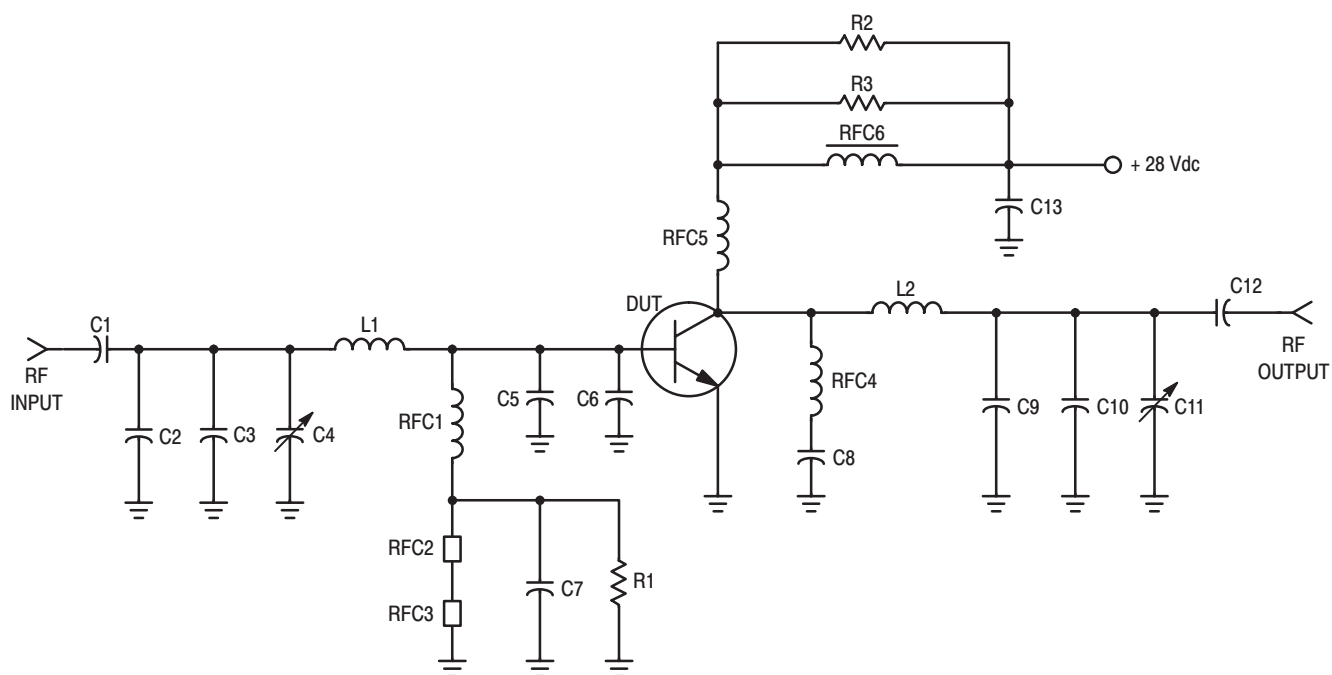
**80 W, 3.0–200 MHz
CONTROLLED “Q”
BROADBAND RF POWER
TRANSISTOR
NPN SILICON**



CASE 316–01, STYLE 1

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

Characteristic	Symbol	Min	Typ	Max	Unit
NARROW BAND FUNCTIONAL TESTS (Figure 1)					
Common-Emitter Amplifier Power Gain ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 80\text{ W}$, $f = 150\text{ MHz}$)	G_{PE}	10	13	—	dB
Collector Efficiency ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 80\text{ W}$, $f = 150\text{ MHz}$)	η	55	—	—	%
Load Mismatch ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 80\text{ W CW}$, $f = 150\text{ MHz}$, $VSWR = 30:1$ all phase angles)	ψ	No Degradation in Output Power			



C1 — 22 pF 100 mil ATC
 C2, C3 — 24 pF 100 mil ATC
 C4, C11 — 0.8–20 pF JMC #5501 Johanson
 C5 — 200 pF 100 mil ATC
 C6 — 240 pF 100 mil ATC
 C7 — Dipped Mica 1000 pF
 C8 — 0.1 μF Erie Red Cap
 C9, C10, C12 — 30 pF 100 mil ATC
 C13 — 1.0 μF Tantalum

L1 — 0.8", #20 Wire
 L2 — 1.0", #20 Wire
 RFC1, RFC4 — 0.15 μH Molded Coil
 RFC2, RFC3 — Ferroxcube Bead 56–590–65–3B
 RFC5 — 2.5", #20 Wire, 1.5 Turns
 RFC6 — Ferroxcube VK200–19/4B
 R1 — 10 Ω , 1/2 W
 R2, R3 — 10 Ω , 1.0 W

Figure 1. 150 MHz Test Amplifier

TYPICAL PERFORMANCE CURVES

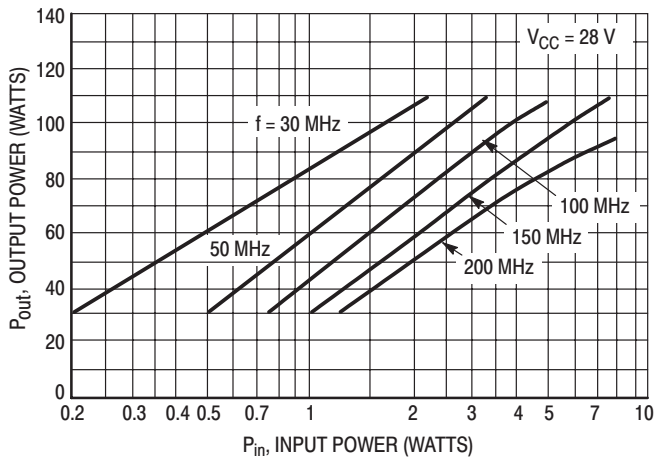


Figure 2. Output Power versus Input Power

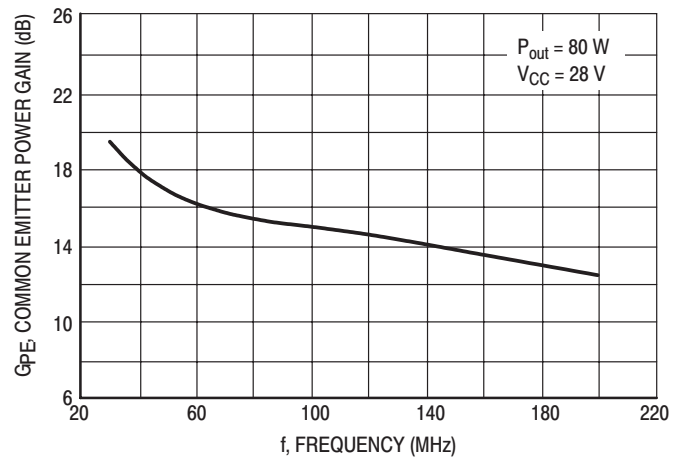


Figure 3. Power Gain versus Frequency

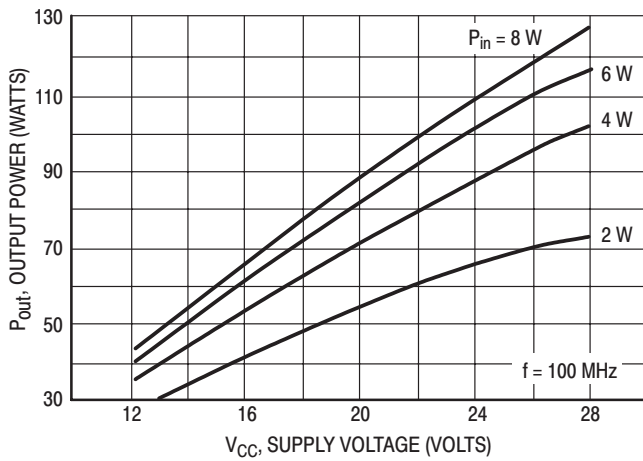


Figure 4. Output Power versus Supply Voltage

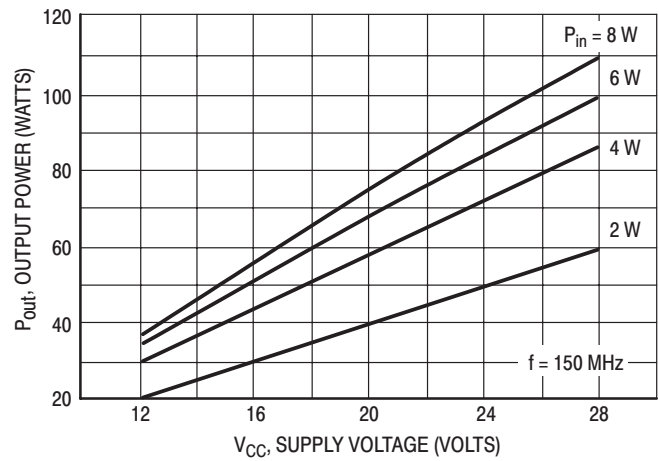


Figure 5. Output Power versus Supply Voltage

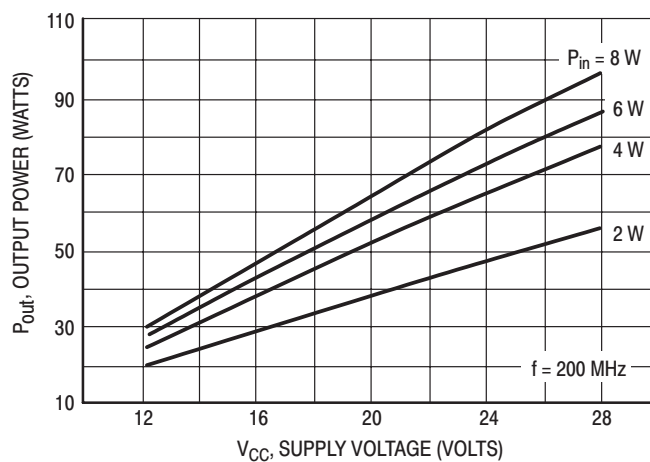
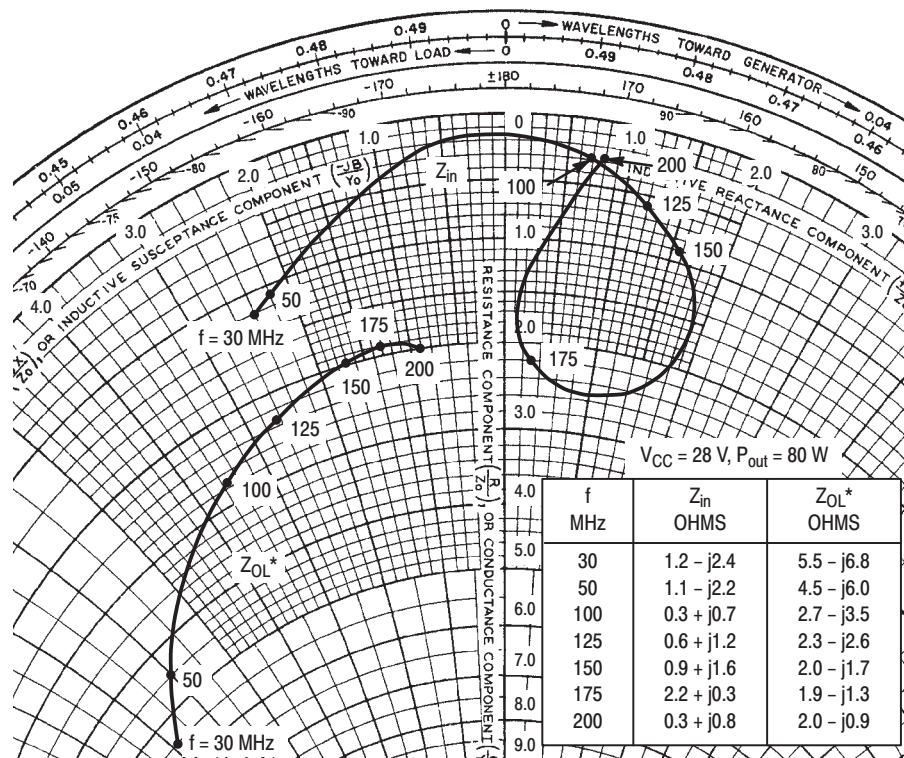


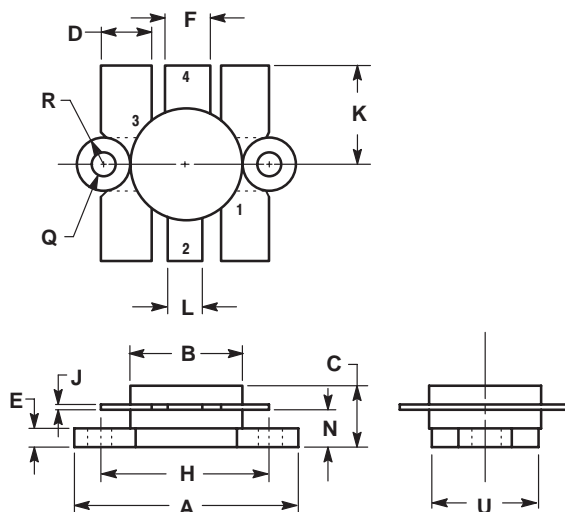
Figure 6. Output Power versus Supply Voltage



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

Figure 7. Series Equivalent Input-Output Impedance

PACKAGE DIMENSIONS



NOTES:

1. FLANGE IS ISOLATED IN ALL STYLES.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	24.38	25.14	0.960	0.990
B	12.45	12.95	0.490	0.510
C	5.97	7.62	0.235	0.300
D	5.33	5.58	0.210	0.220
E	2.16	3.04	0.085	0.120
F	5.08	5.33	0.200	0.210
H	18.29	18.54	0.720	0.730
J	0.10	0.15	0.004	0.006
K	10.29	11.17	0.405	0.440
L	3.81	4.06	0.150	0.160
N	3.81	4.31	0.150	0.170
Q	2.92	3.30	0.115	0.130
R	3.05	3.30	0.120	0.130
U	11.94	12.57	0.470	0.495

STYLE 1:

- PIN 1. EMITTER
2. COLLECTOR
3. EMITTER
4. BASE

**CASE 316-01
ISSUE D**

Specifications subject to change without notice.

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