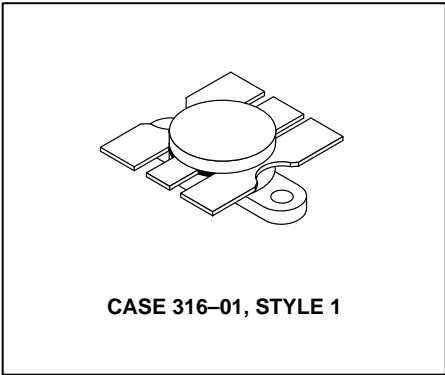


The RF Line  
**NPN Silicon**  
**RF Power Transistor**



**60 W, 225 to 400 MHz**  
**CONTROLLED "Q"**  
**BROADBAND RF POWER**  
**TRANSISTOR**  
**NPN SILICON**



... designed primarily for wideband large-signal output amplifier stages in the 225 to 400 MHz frequency range.

- Guaranteed Performance in 225 to 400 MHz Broadband Amplifier @ 28 Vdc  
Output Power = 60 Watts over 225 to 400 MHz Band  
Minimum Gain = 7.8 dB @ 400 MHz
- Built-In Matching Network for Broadband Operation Using Double Match Technique
- 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 <sub>CEO</sub>	33	Vdc
Collector-Base Voltage	V <sub>CBO</sub>	60	Vdc
Emitter-Base Voltage	V <sub>EBO</sub>	4.0	Vdc
Total Device Dissipation @ T <sub>C</sub> = 25°C (1) Derate above 25°C	P <sub>D</sub>	146 0.83	Watts W/°C
Storage Temperature Range	T <sub>stg</sub>	-65 to +200	°C

**THERMAL CHARACTERISTICS**

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	R <sub>θJC</sub>	1.2	°C/W

**ELECTRICAL CHARACTERISTICS\*** (T<sub>C</sub> = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
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**OFF CHARACTERISTICS**

Collector-Emitter Breakdown Voltage (I <sub>C</sub> = 50 mA <sub>dc</sub> , I <sub>B</sub> = 0)	V <sub>(BR)CEO</sub>	33	—	—	Vdc
Collector-Emitter Breakdown Voltage (I <sub>C</sub> = 50 mA <sub>dc</sub> , V <sub>BE</sub> = 0)	V <sub>(BR)CES</sub>	60	—	—	Vdc
Emitter-Base Breakdown Voltage (I <sub>E</sub> = 5.0 mA <sub>dc</sub> , I <sub>C</sub> = 0)	V <sub>(BR)EBO</sub>	4.0	—	—	Vdc
Collector Cutoff Current (V <sub>CB</sub> = 30 Vdc, I <sub>E</sub> = 0)	I <sub>CBO</sub>	—	—	2.0	mA <sub>dc</sub>

NOTE:

(continued)

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

\* Indicates JEDEC Registered Data.

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

Characteristic	Symbol	Min	Typ	Max	Unit
<b>ON CHARACTERISTICS</b>					
DC Current Gain ( $I_C = 1.0 \text{ Adc}$ , $V_{CE} = 5.0 \text{ Vdc}$ )	$h_{FE}$	10	—	100	—

Output Capacitance ( $V_{CB} = 28 \text{ Vdc}$ , $I_E = 0$ , $f = 1.0 \text{ MHz}$ )	$C_{ob}$	—	67	75	pF
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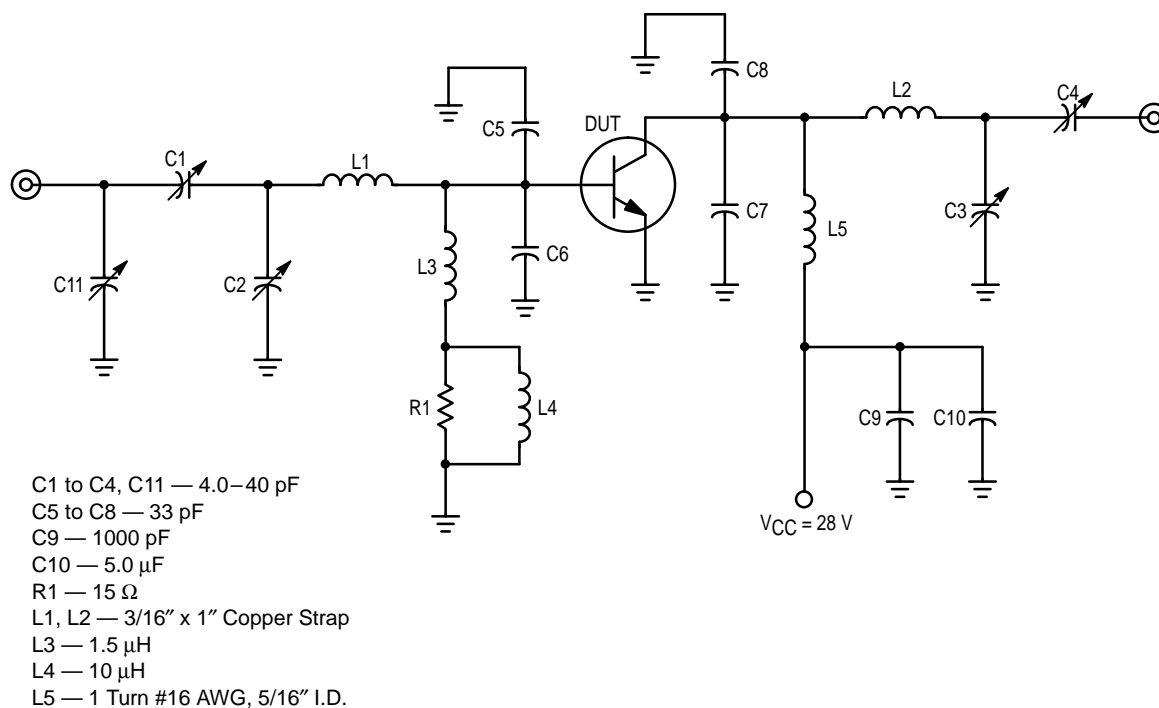
**BROADBAND FUNCTIONAL TESTS** (Figure 6)

Common-Emitter Amplifier Power Gain ( $V_{CC} = 28 \text{ Vdc}$ , $P_{out} = 60 \text{ W}$ , $f = 225\text{--}400 \text{ MHz}$ )	$G_{PE}$	7.8	8.5	—	dB
Electrical Ruggedness ( $P_{out} = 60 \text{ W}$ , $V_{CC} = 28 \text{ Vdc}$ , $f = 400 \text{ MHz}$ , VSWR 30:1 all phase angles)	$\psi$	No Degradation in Output Power			—

**NARROW BAND FUNCTIONAL TESTS** (Figure 1)

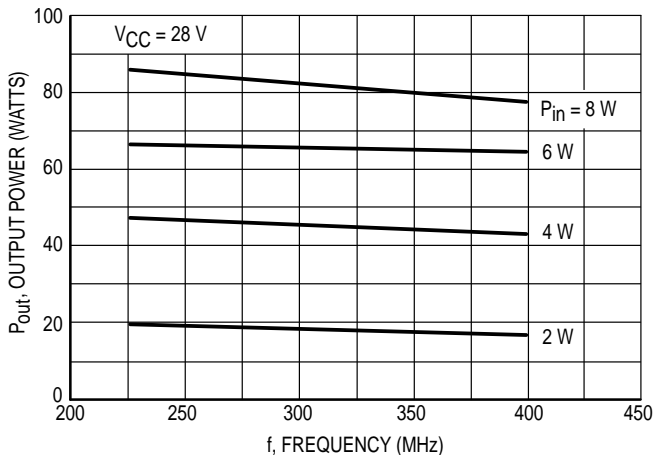
Common-Emitter Amplifier Power Gain ( $V_{CC} = 28 \text{ Vdc}$ , $P_{out} = 60 \text{ W}$ , $f = 400 \text{ MHz}$ )	$G_{PE}$	7.8	10	—	dB
Collector Efficiency ( $V_{CC} = 28 \text{ Vdc}$ , $P_{out} = 60 \text{ W}$ , $f = 400 \text{ MHz}$ )	$\eta$	55	—	—	%

\* Indicates JEDEC Registered Data.

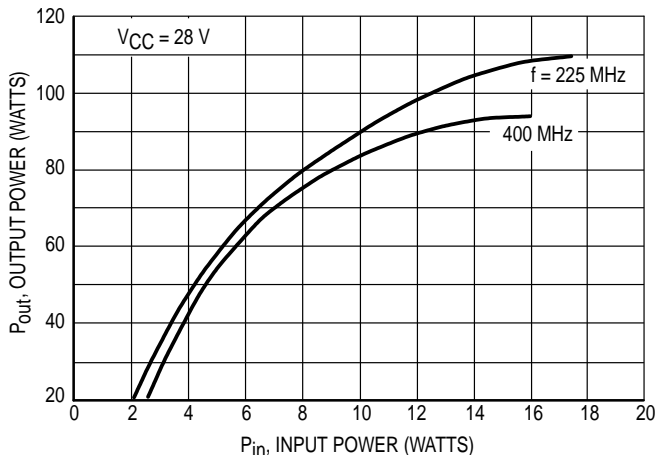


**Figure 1. 400 MHz Test Amplifier (Narrow Band)**

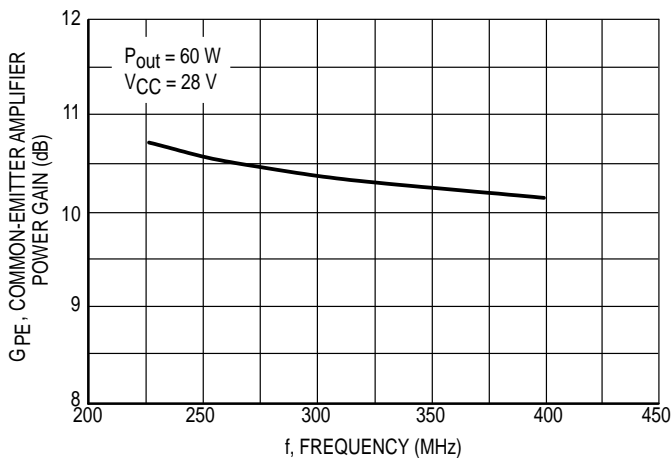
## NARROW BAND DATA



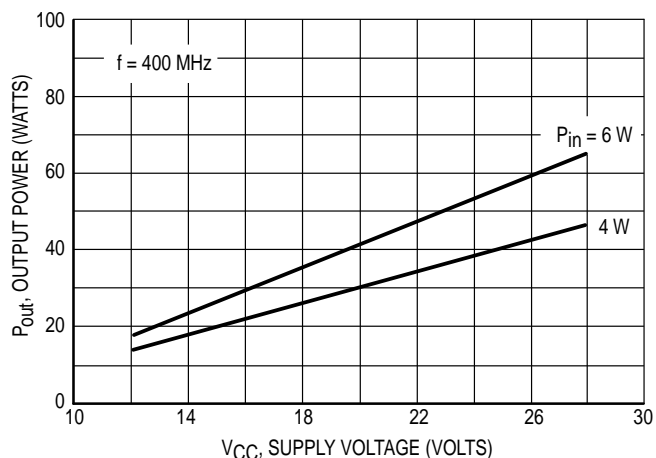
**Figure 2. P<sub>out</sub> versus Frequency**



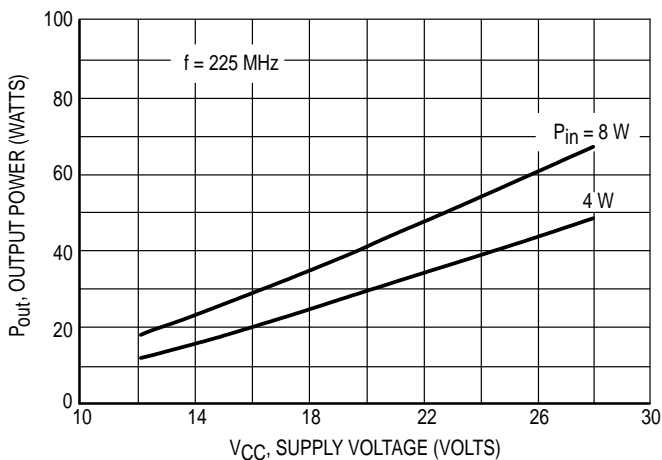
**Figure 3. Output Power versus Input Power**



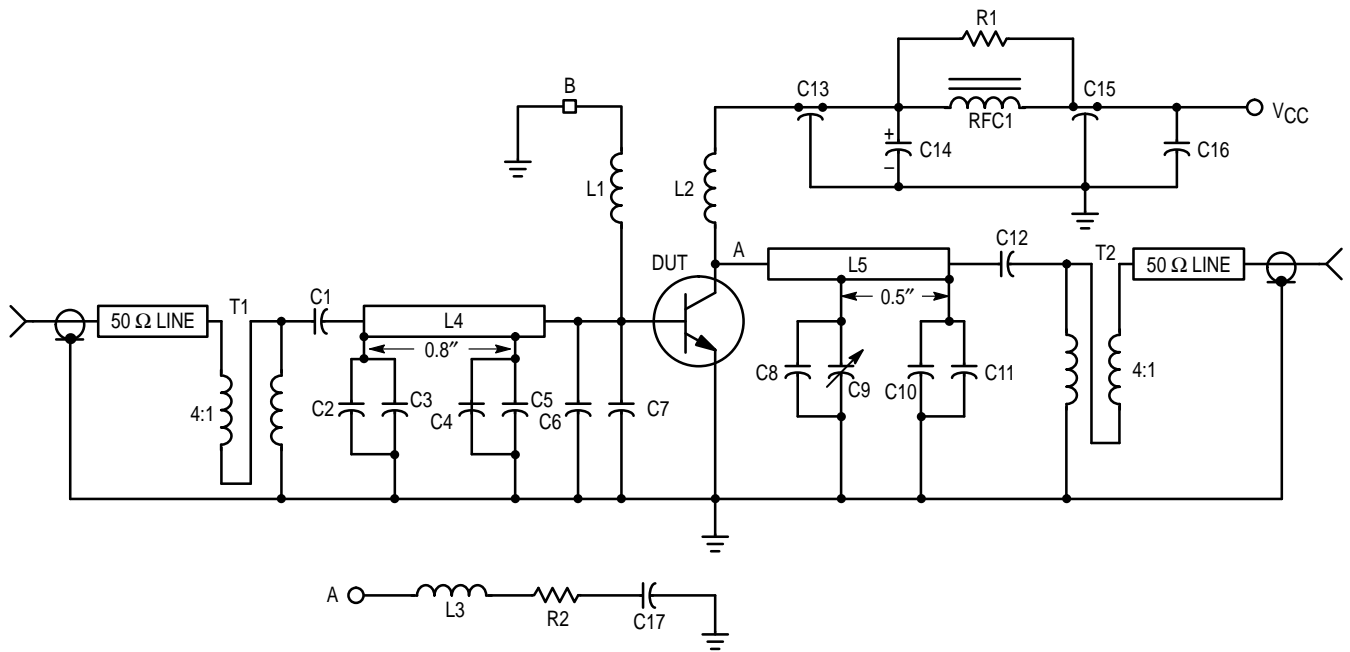
**Figure 4. Power Gain versus Frequency**



**Figure 5. Output Power versus Supply Voltage**



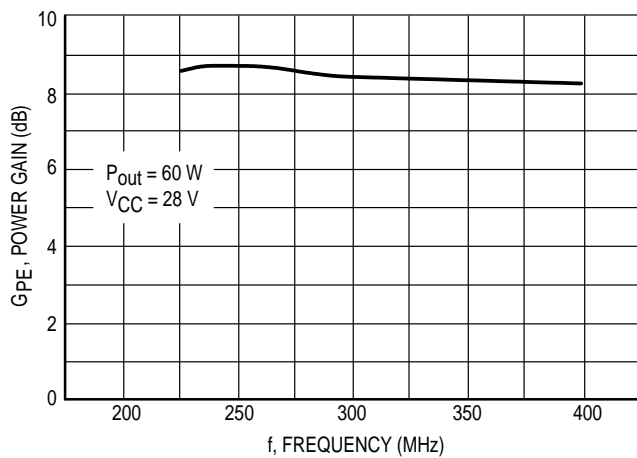
**Figure 6. Output Power versus Supply Voltage**



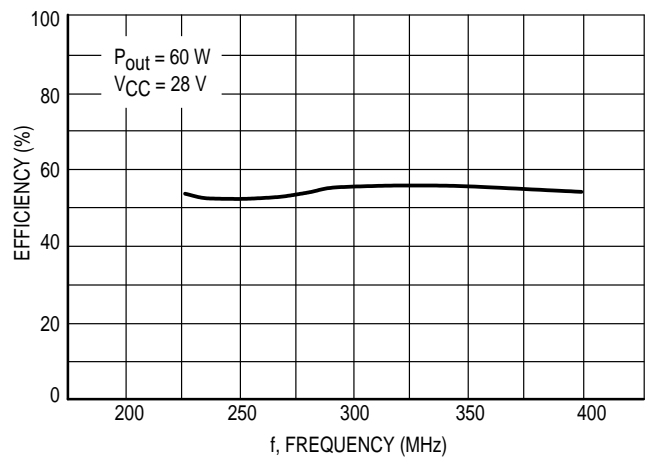
- |                                       |  |
|---------------------------------------|--|
| C1 — 68 pF                            | RFC1 — Ferrite Bead Choke, Ferroxcube VK200 19/4B                                    |
| C2, C4, C8, C10 — 27 pF               | B — Ferroxcube 56-590-65/4B Ferrite Bead   |
| C3, C5, C11 — 10 pF                   | T1, T2 — 25 Ohms (UT25) Miniature Coaxial Cable, 1 turn                              |
| C6, C7 — 51 pF                        | R1 — 11 $\Omega$ , 1.0 W   |
| C9 — 1.0–10 pF JOHANSON               | R2 — 20 $\Omega$ , 1/4 W   |
| C12 — 100 pF                          | L1 — 10 Turns, #22 AWG, 1/8" I.D.  |
| C13, C15 — 680 pF                     | L2 — 4 Turns, #16 AWG, 1/4" I.D.   |
| C14, C16 — 1.0 $\mu$ F, 35 V Tantalum | L3 — 6 Turns, #24 AWG, 1/8" I.D.   |
| C17 — 0.1 $\mu$ F, ERIE Red Cap       | L4, L5 — 1" x 0.25" Microstrip Line<br>Board Material 0.031" Thick Teflon-Fiberglass |

**Figure 7. 225 to 400 MHz Broadband Test Circuit Schematic**

**BROADBAND DATA (Circuit, Figure 7)**



**Figure 8. Power Gain versus Frequency**



**Figure 9. Efficiency versus Frequency**

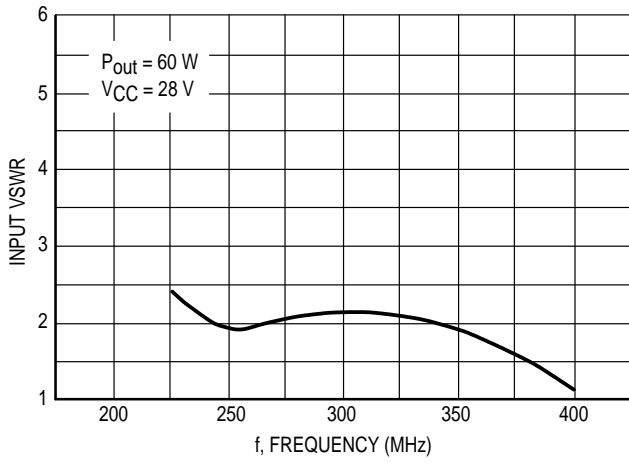


Figure 10. Input VSWR versus Frequency

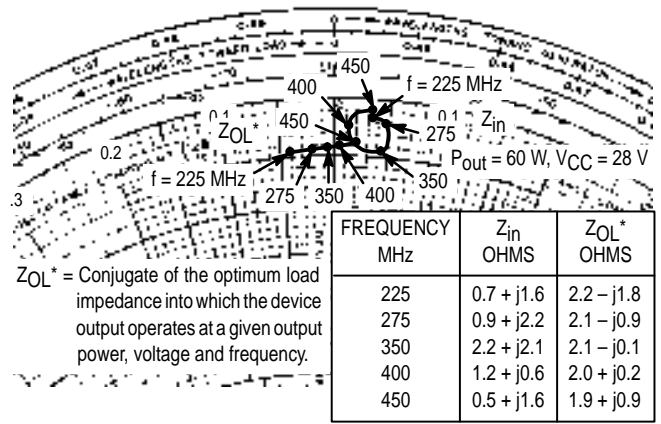
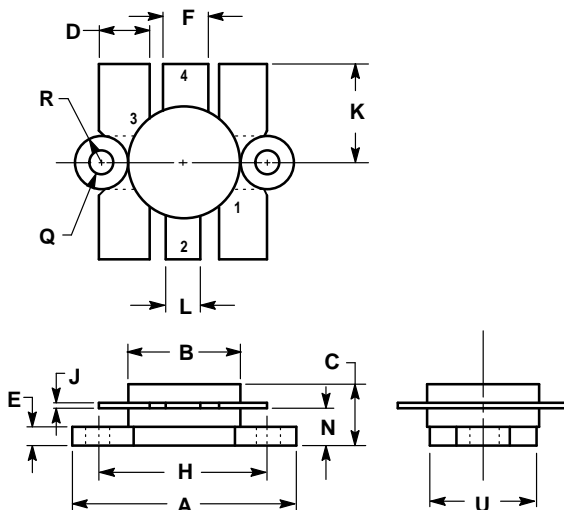


Figure 11. Series Equivalent Input-Output Impedance

# 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

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