

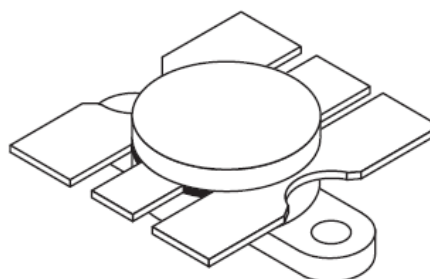
The RF Line NPN Silicon Power Transistor

60 W, 225 - 400 MHz, 28 V

Rev. V1

- Guaranteed performance in 225 to 400 MHz broadband amplifier @ 28 Vdc
Output power = 60 W 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

Product Image



CASE 316-01, STYLE 1

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

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
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ (1) Derate above 25°C	P_D	146 0.83	Watts $\text{W}/^\circ\text{C}$
Storage Temperature Range	T_{stg}	-65 to +200	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.2	$^\circ\text{C}/\text{W}$

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 ($I_C = 50 \text{ mAdc}$, $I_B = 0$)	$V_{(BR)CEO}$	33	—	—	Vdc
Collector-Emitter Breakdown Voltage ($I_C = 50 \text{ mAdc}$, $V_{BE} = 0$)	$V_{(BR)CES}$	60	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 5.0 \text{ mAdc}$, $I_C = 0$)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 30 \text{ Vdc}$, $I_E = 0$)	I_{CBO}	—	—	2.0	mAdc

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.

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

Characteristic	Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS					
DC Current Gain ($I_C = 1.0\text{ A dc}$, $V_{CE} = 5.0\text{ V dc}$)	h_{FE}	10	—	100	—
DYNAMIC CHARACTERISTICS					
Output Capacitance ($V_{CB} = 28\text{ V dc}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	C_{ob}	—	67	75	pF
BROADBAND FUNCTIONAL TESTS (Figure 6)					
Common-Emitter Amplifier Power Gain ($V_{CC} = 28\text{ V dc}$, $P_{out} = 60\text{ W}$, $f = 225\text{--}400\text{ MHz}$)	G_{PE}	7.8	8.5	—	dB
Electrical Ruggedness ($P_{out} = 60\text{ W}$, $V_{CC} = 28\text{ V dc}$, $f = 400\text{ MHz}$, VSWR 30:1 all phase angles)	ψ	No Degradation in Output Power			—
NARROW BAND FUNCTIONAL TESTS (Figure 1)					
Common-Emitter Amplifier Power Gain ($V_{CC} = 28\text{ V dc}$, $P_{out} = 60\text{ W}$, $f = 400\text{ MHz}$)	G_{PE}	7.8	10	—	dB
Collector Efficiency ($V_{CC} = 28\text{ V dc}$, $P_{out} = 60\text{ W}$, $f = 400\text{ MHz}$)	η	55	—	—	%

* Indicates JEDEC Registered Data.

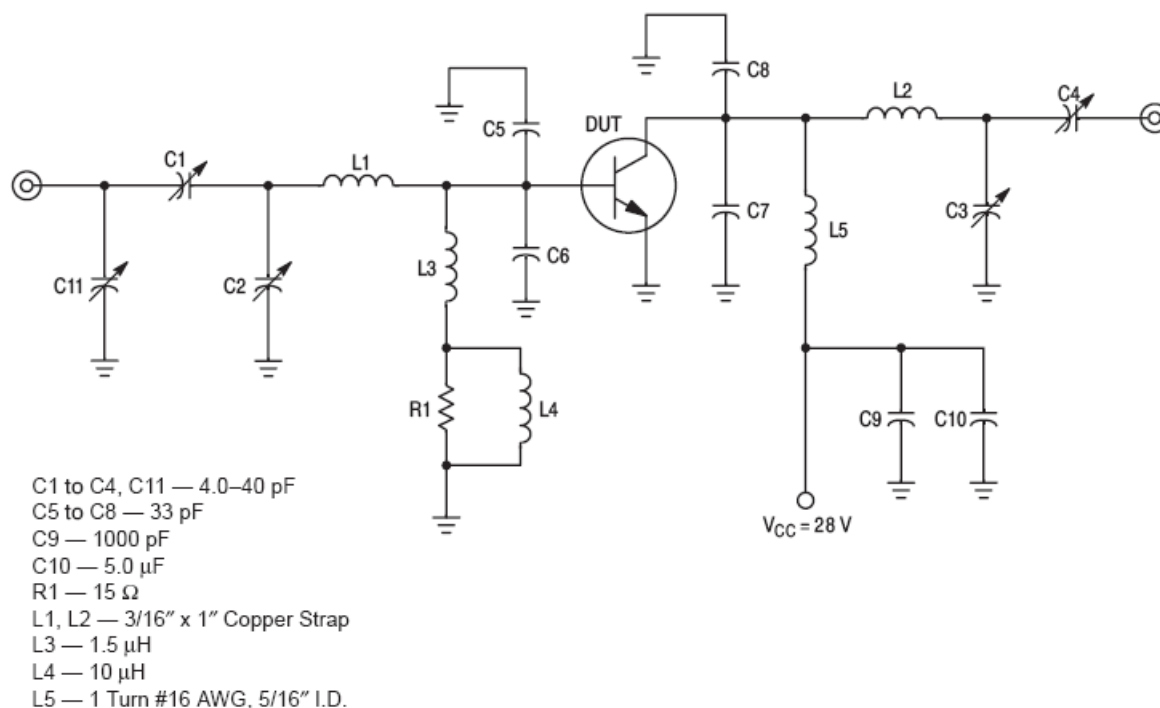


Figure 1. 400 MHz Test Amplifier (Narrow Band)

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NARROW BAND DATA

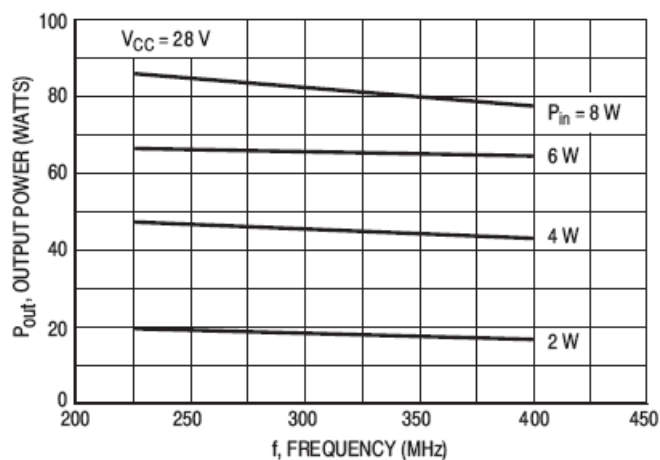


Figure 2. P_{out} versus Frequency

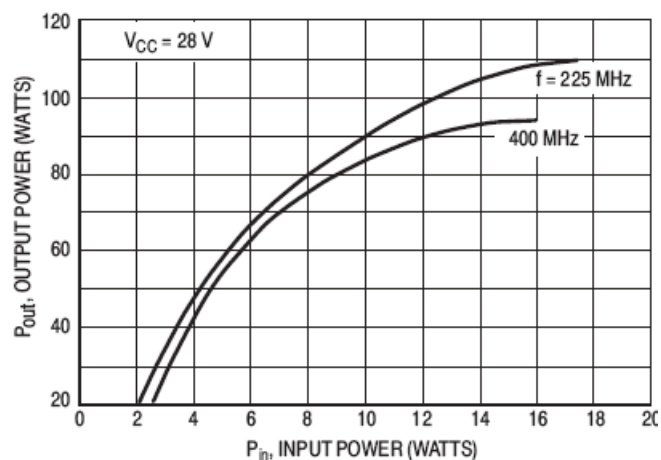


Figure 3. Output Power versus Input Power

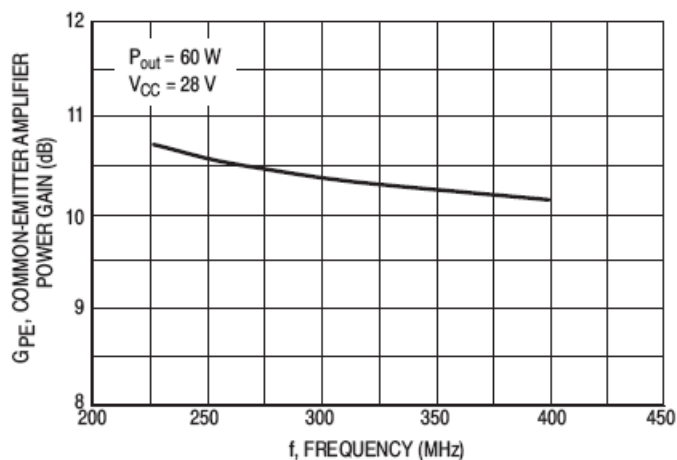


Figure 4. Power Gain versus Frequency

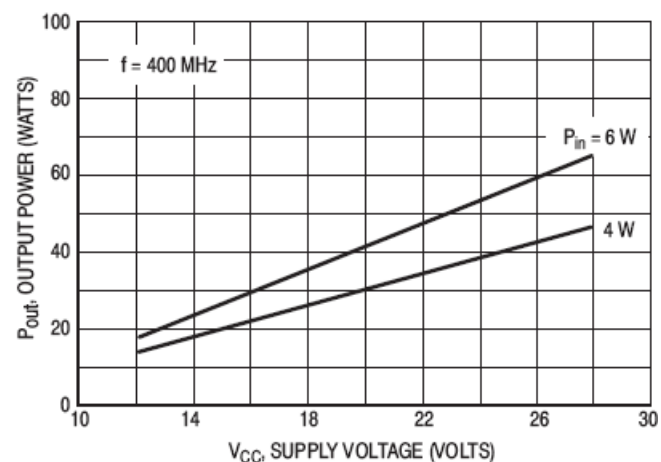


Figure 5. Output Power versus Supply Voltage

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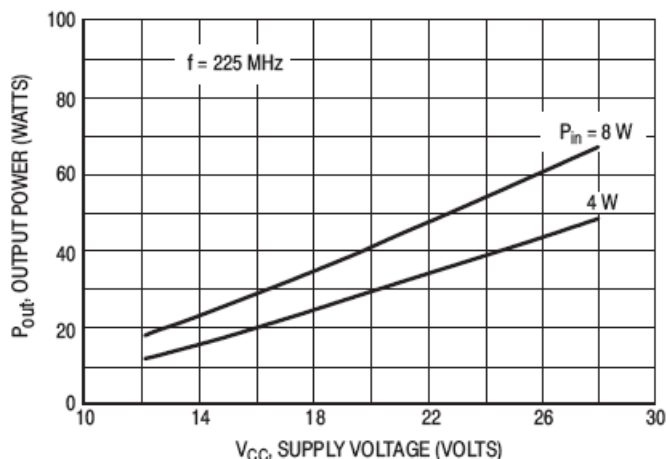
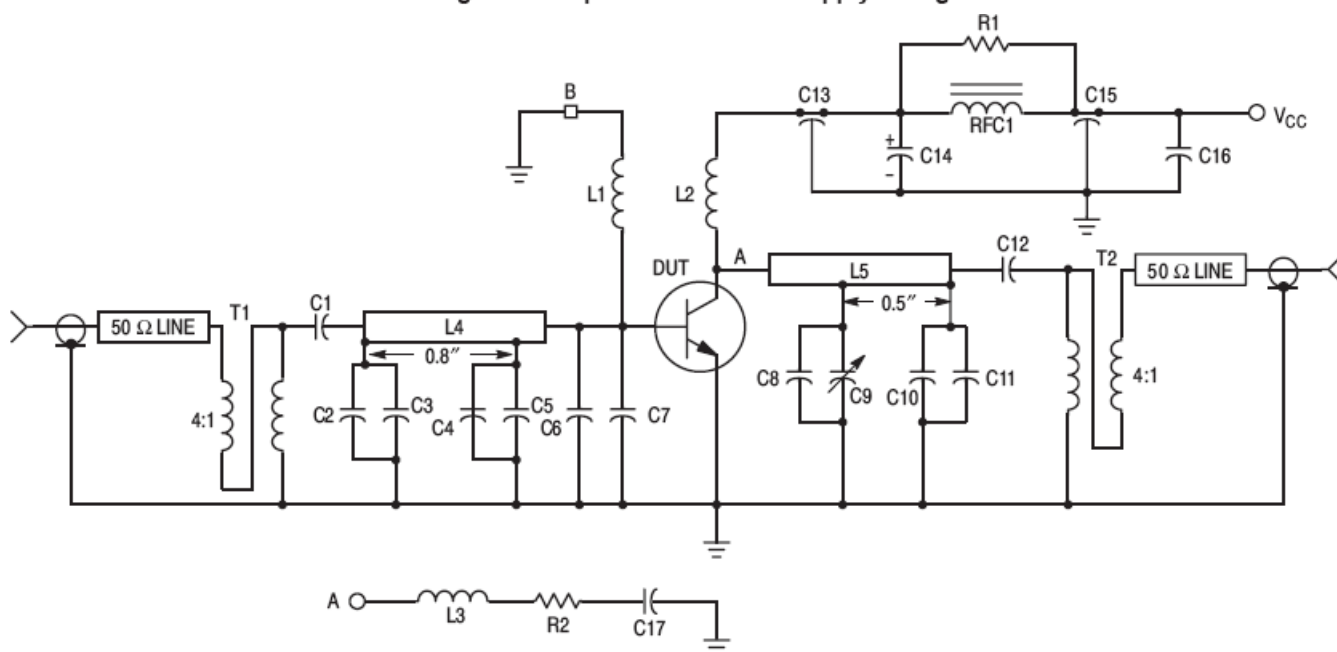


Figure 6. Output Power versus Supply Voltage



C1 — 68 pF
C2, C4, C8, C10 — 27 pF
C3, C5, C11 — 10 pF
C6, C7 — 51 pF
C9 — 1.0–10 pF JOHANSON
C12 — 100 pF
C13, C15 — 680 pF
C14, C16 — 1.0 μF, 35 V Tantalum
C17 — 0.1 μF, ERIE Red Cap

RFC1 — Ferrite Bead Choke, Ferroxcube VK200 19/4B
B — Ferroxcube 56-590-65/4B Ferrite Bead
T1, T2 — 25 Ohms (UT25) Miniature Coaxial Cable, 1 turn
R1 — 11 Ω, 1.0 W
R2 — 20 Ω, 1/4 W
L1 — 10 Turns, #22 AWG, 1/8" I.D.
L2 — 4 Turns, #16 AWG, 1/4" I.D.
L3 — 6 Turns, #24 AWG, 1/8" I.D.
L4, L5 — 1" x 0.25" Microstrip Line
Board Material 0.031" Thick Teflon-Fiberglass

Figure 7. 225 to 400 MHz Broadband Test Circuit Schematic

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BROADBAND DATA (Circuit, Figure 7)

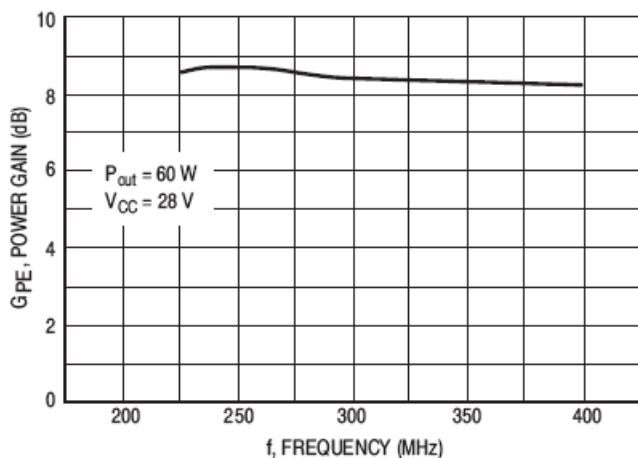


Figure 8. Power Gain versus Frequency

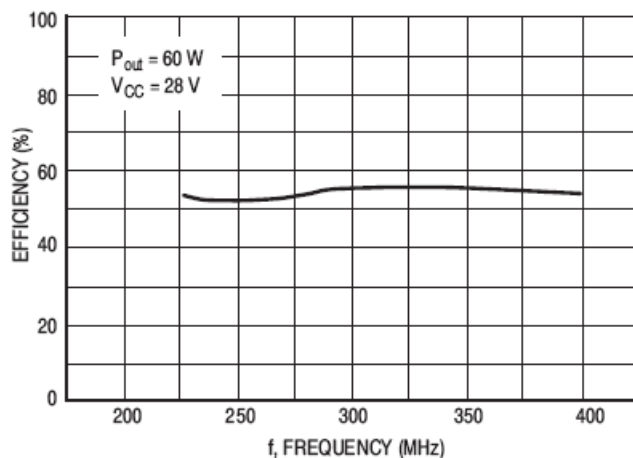


Figure 9. Efficiency versus Frequency

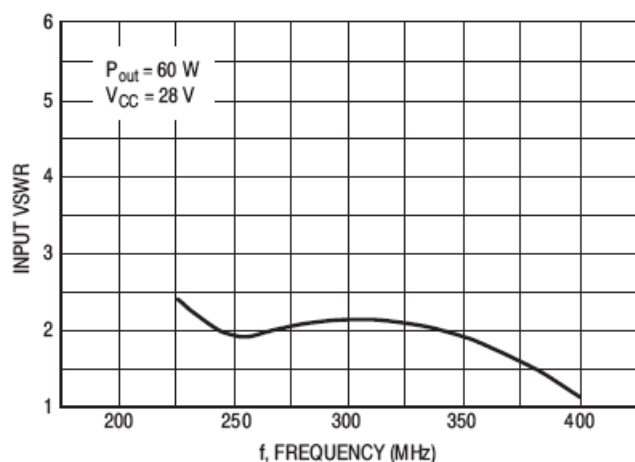


Figure 10. Input VSWR versus Frequency

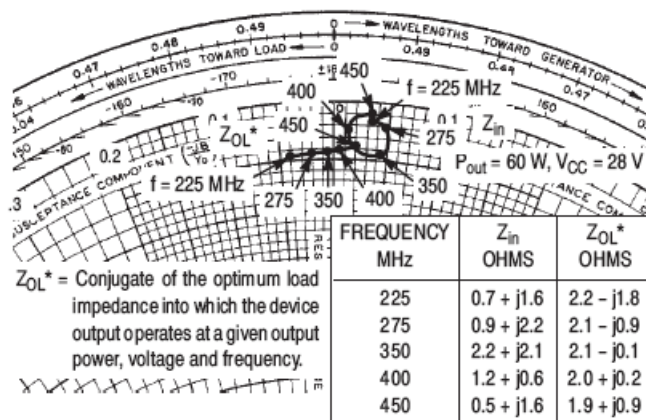
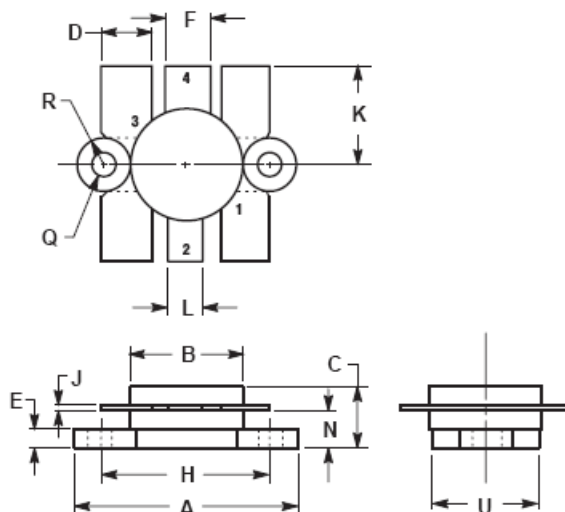


Figure 11. Series Equivalent Input-Output Impedance

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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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