2N6439

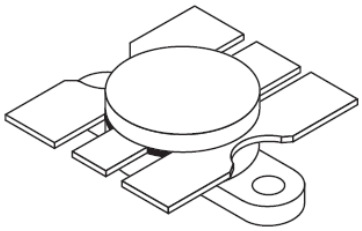
The RF Line NPN Silicon Power Transistor
60W, 225 to 400MHz, 28V

M/A-COM Products
Released - Rev. 07.07

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 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

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°C (1) Derate above 25°C	P_D	146 0.83	Watts W/°C
Storage Temperature Range	T_{stg}	–65 to +200	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.2	°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 = 50 mAdc, I_B = 0)	$V_{(BR)CEO}$	33	—	—	Vdc
Collector–Emitter Breakdown Voltage (I_C = 50 mAdc, V_{BE} = 0)	$V_{(BR)CES}$	60	—	—	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}	—	—	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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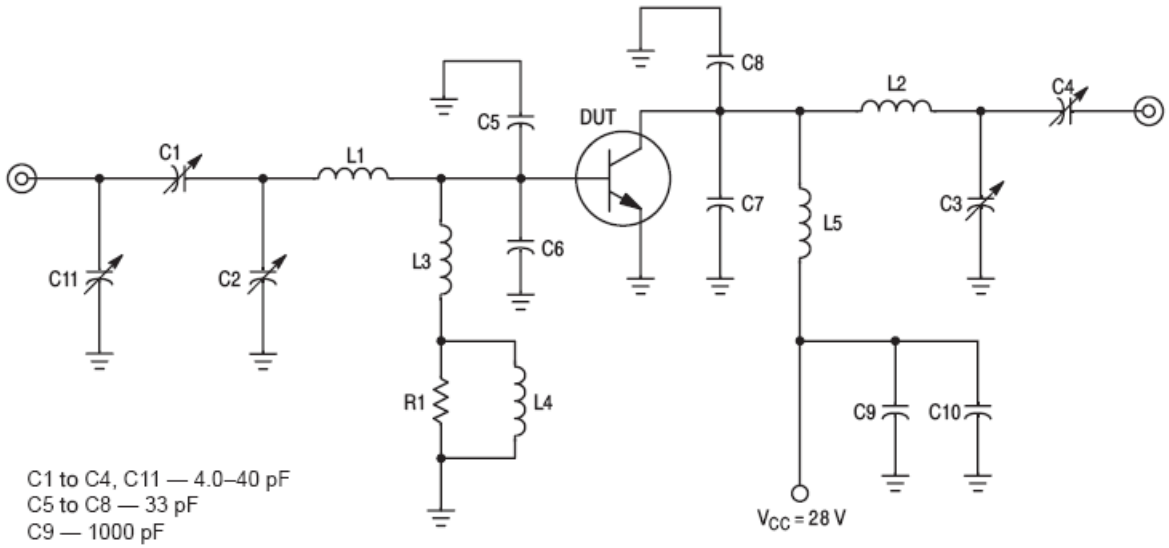
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ELECTRICAL CHARACTERISTICS* — continued (T_C = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS					
DC Current Gain (I_C = 1.0 Adc, V_{CE} = 5.0 Vdc)	h_{FE}	10	—	100	—
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 28 Vdc, I_E = 0, f = 1.0 MHz)	C_{ob}	—	67	75	pF
BROADBAND FUNCTIONAL TESTS (Figure 6)					
Common–Emitter Amplifier Power Gain (V_{CC} = 28 Vdc, P_{out} = 60 W, f = 225–400 MHz)	G_{PE}	7.8	8.5	—	dB
Electrical Ruggedness (P_{out} = 60 W, V_{CC} = 28 Vdc, f = 400 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 Vdc, P_{out} = 60 W, f = 400 MHz)	G_{PE}	7.8	10	—	dB
Collector Efficiency (V_{CC} = 28 Vdc, P_{out} = 60 W, f = 400 MHz)	η	55	—	—	%

* Indicates JEDEC Registered Data.



C1 to C4, C11 — 4.0–40 pF
C5 to C8 — 33 pF
C9 — 1000 pF
C10 — 5.0 µF
R1 — 15 Ω
L1, L2 — 3/16″ x 1″ Copper Strap
L3 — 1.5 µH
L4 — 10 µH
L5 — 1 Turn #16 AWG, 5/16″ I.D.

Figure 1. 400 MHz Test Amplifier (Narrow Band)

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NARROW BAND DATA

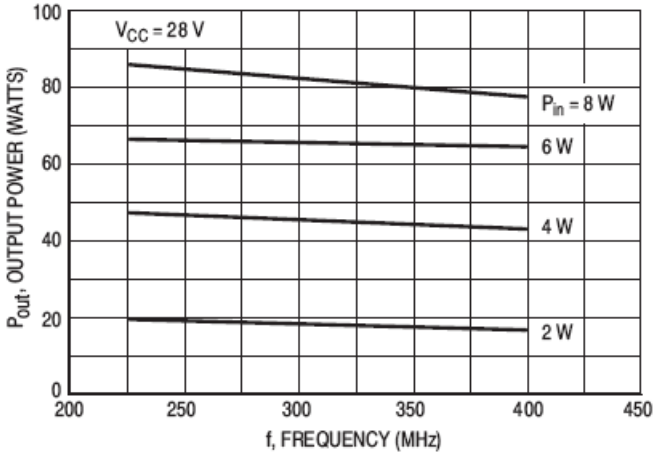


Figure 2. P_{out} versus Frequency

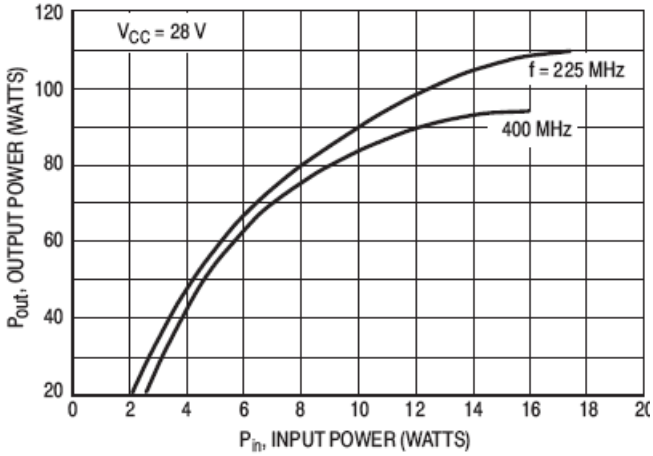


Figure 3. Output Power versus Input Power

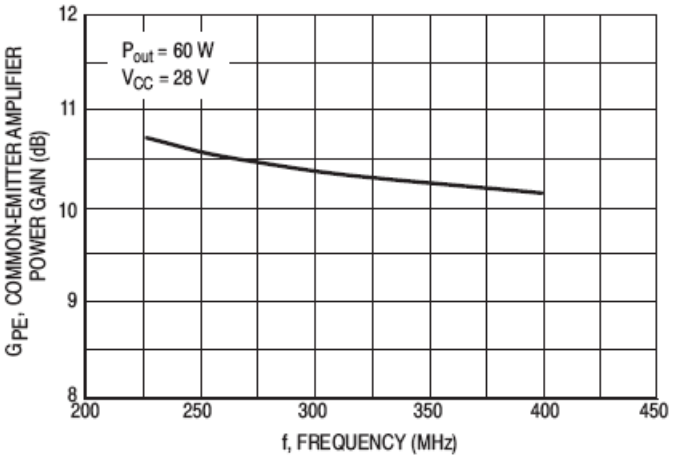


Figure 4. Power Gain versus Frequency

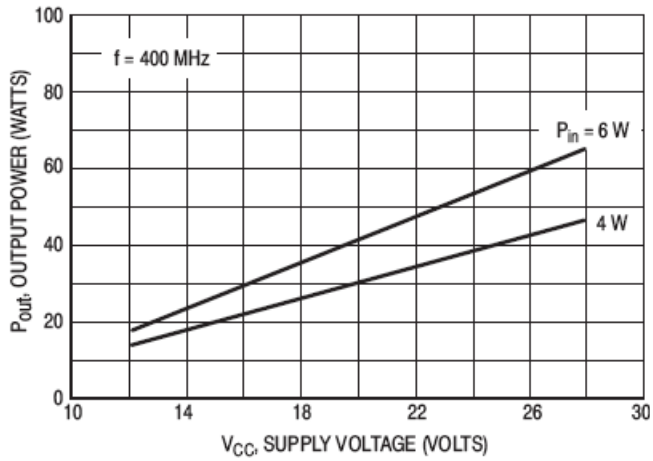


Figure 5. Output Power versus Supply Voltage

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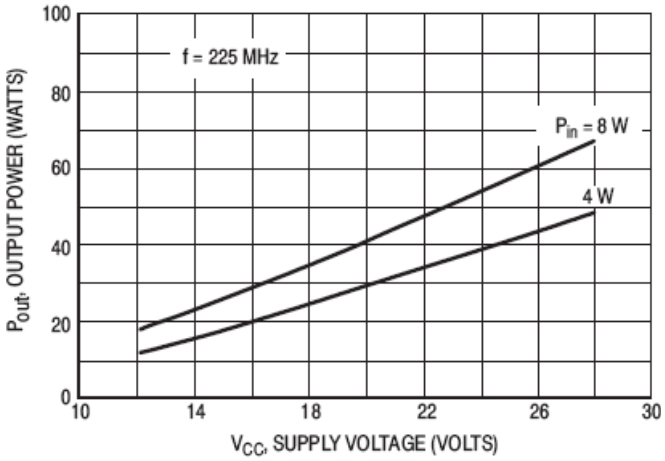
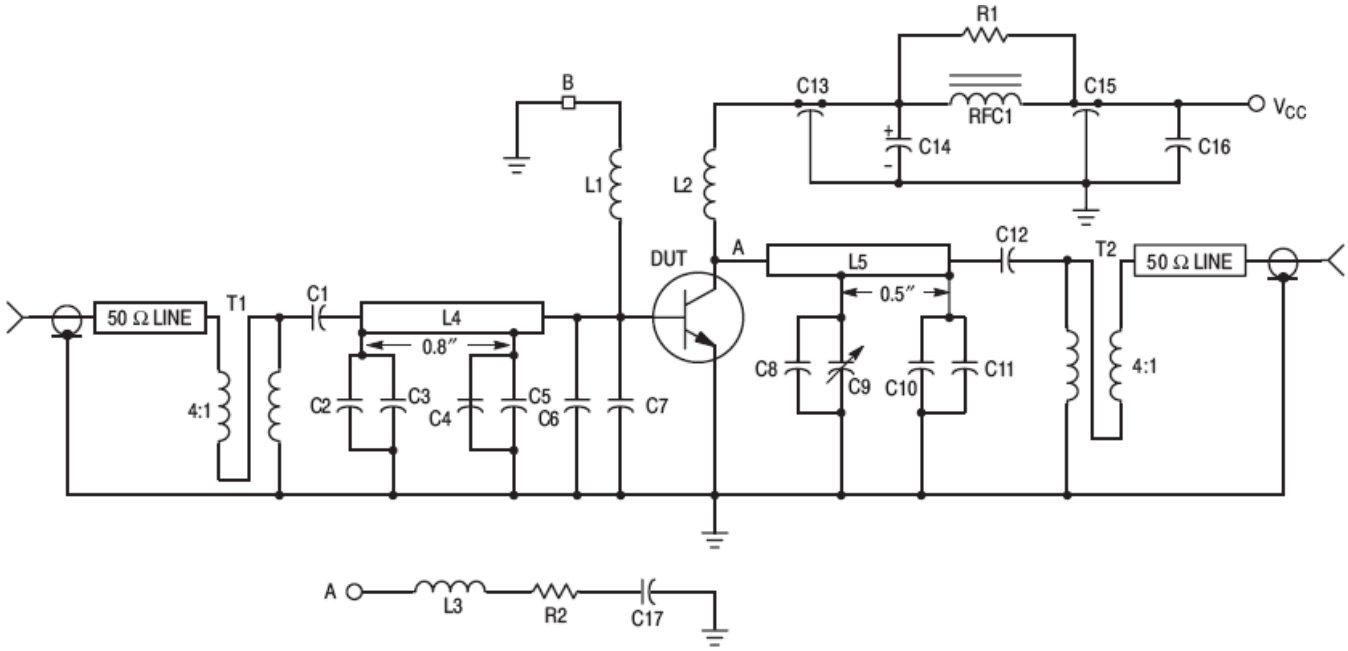


Figure 6. Output Power versus Supply Voltage



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, Feroxcube 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)

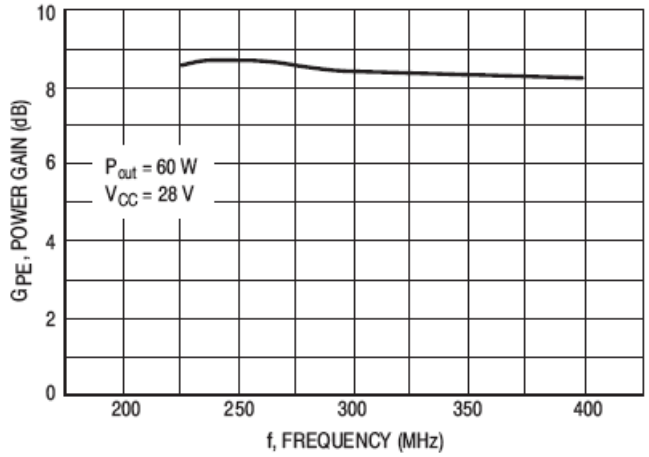


Figure 8. Power Gain versus Frequency

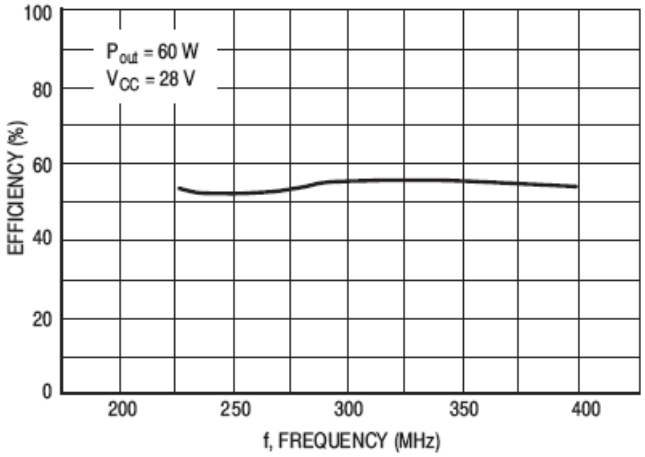


Figure 9. Efficiency versus Frequency

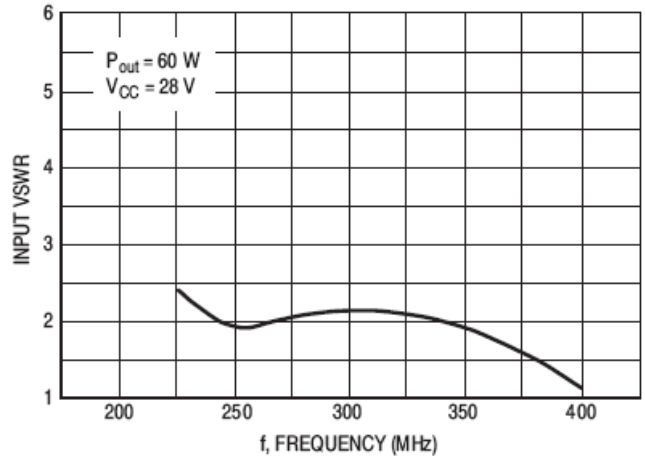
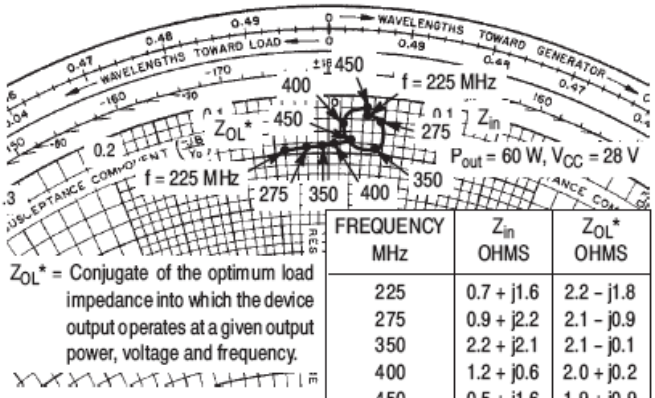


Figure 10. Input VSWR versus Frequency



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

FREQUENCY MHz	Z_{in} OHMS	Z_{OL}* OHMS
225	0.7 + j1.6	2.2 – j1.8
275	0.9 + j2.2	2.1 – j0.9
350	2.2 + j2.1	2.1 – j0.1
400	1.2 + j0.6	2.0 + j0.2
450	0.5 + j1.6	1.9 + j0.9

Figure 11. Series Equivalent Input-Output Impedance

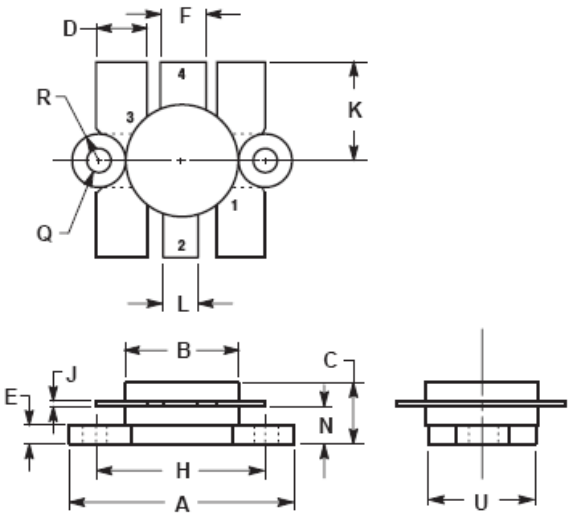
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PACKAGE DIMENSIONS



NOTES:
1. FLANGE IS ISOLATED IN ALL STYLES.

DIM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS 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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