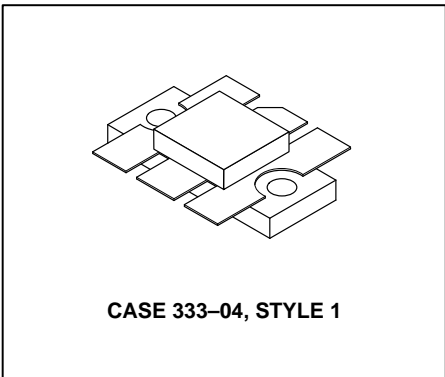


The RF Line  
**NPN Silicon**  
**RF Power Transistor**



**100 W, 100 to 500 MHz**  
**CONTROLLED "Q"**  
**BROADBAND RF POWER**  
**TRANSISTOR**  
**NPN SILICON**



... designed primarily for wideband large-signal output and driver amplifier stages in the 100 to 500 MHz frequency range.

- Specified 28 Volt, 400 MHz Characteristics —  
Output Power = 100 Watts  
Minimum Gain = 7.0 dB  
Efficiency = 50% (Min)
- Built-In Matching Network for Broadband Operation Using Double Match Technique
- 100% Tested for Load Mismatch at all Phase Angles with 3:1 VSWR
- Gold Metallization System for High Reliability

**MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	30	Vdc
Collector-Base Voltage	$V_{CBO}$	60	Vdc
Emitter-Base Voltage	$V_{EBO}$	4.0	Vdc
Collector Current — Continuous — Peak	$I_C$	9.0 12	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ (1) Derate above $25^\circ\text{C}$	$P_D$	270 1.54	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 (2)	$R_{\theta JC}$	0.65	$^\circ\text{C}/\text{W}$

**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 ( $I_C = 80 \text{ mAdc}$ , $I_B = 0$ )	$V_{(BR)CEO}$	30	—	—	Vdc
Collector-Emitter Breakdown Voltage ( $I_C = 80 \text{ mAdc}$ , $V_{BE} = 0$ )	$V_{(BR)CES}$	60	—	—	Vdc
Emitter-Base Breakdown Voltage ( $I_E = 8.0 \text{ mAdc}$ , $I_C = 0$ )	$V_{(BR)EBO}$	4.0	—	—	Vdc

NOTES:

(continued)

- This device is designed for RF operation. The total device dissipation rating applies only when the device is operated as an RF amplifier.
- Thermal Resistance is determined under specified RF operating conditions by infrared measurement techniques.

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

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS (continued)</b>					
Collector–Base Breakdown Voltage ( $I_C = 80\text{ mA dc}$ , $I_E = 0$ )	$V_{(BR)CBO}$	60	—	—	Vdc
Collector Cutoff Current ( $V_{CB} = 30\text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	—	—	5.0	mA dc

**ON CHARACTERISTICS**

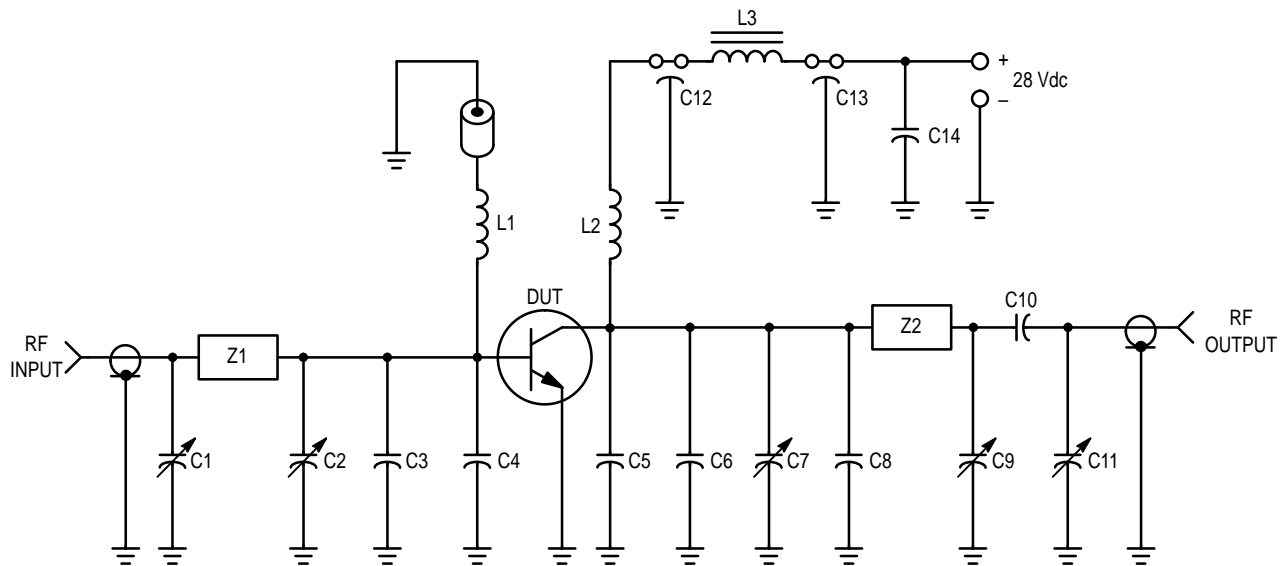
DC Current Gain ( $I_C = 4.0\text{ A dc}$ , $V_{CE} = 5.0\text{ Vdc}$ )	$h_{FE}$	20	—	80	—
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**DYNAMIC CHARACTERISTICS**

Output Capacitance ( $V_{CB} = 28\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )	$C_{ob}$	—	95	125	pF
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**FUNCTIONAL TESTS (Figure 1)**

Common–Emitter Amplifier Power Gain ( $V_{CC} = 28\text{ Vdc}$ , $P_{out} = 100\text{ W}$ , $f = 400\text{ MHz}$ )	$G_{PE}$	7.0	9.7	—	dB
Collector Efficiency ( $V_{CC} = 28\text{ Vdc}$ , $P_{out} = 100\text{ W}$ , $f = 400\text{ MHz}$ )	$\eta$	50	60	—	%
Load Mismatch ( $V_{CC} = 28\text{ Vdc}$ , $P_{out} = 100\text{ W}$ , $f = 400\text{ MHz}$ , $VSWR = 3:1$ all angles)	$\psi$	No Degradation in Output Power			



- C1, C2, C7, C9 — 1.0–20 pF Johanson (JMC 5501)
- C3, C4 — 36 pF 100 mil Chip Cap (ATC)
- C5, C6 — 50 pF 100 mil Chip Cap (ATC)
- C8 — 30 pF 100 mil Chip Cap (ATC)
- C10 — 2.0–150 pF 100 mil Chip Caps in Parallel (ATC)
- C11 — 1.0–10 pF Johanson (JMC 5201)
- C12, C13 — 1000 pF UNELCO Feedthru
- C14 — 0.1  $\mu\text{F}$  Erie Redcap

- L1 — 0.15  $\mu\text{H}$  Molded Choke with Ferrite Bead (Ferroxcube #56–590–65/4B) on Ground End
- L2 — 4 Turns #18 AWG, 1/4" ID
- L3 — Ferroxcube VK200–19/4B
- Z1 — Microstrip Line 2300 mils L x 210 mils W
- Z2 — Microstrip Line 2300 mils L x 280 mils W
- Board — Glass Teflon,  $t = 0.062''$ ,  $\epsilon_r = 2.56$

**Figure 1. 400 MHz Test Circuit**

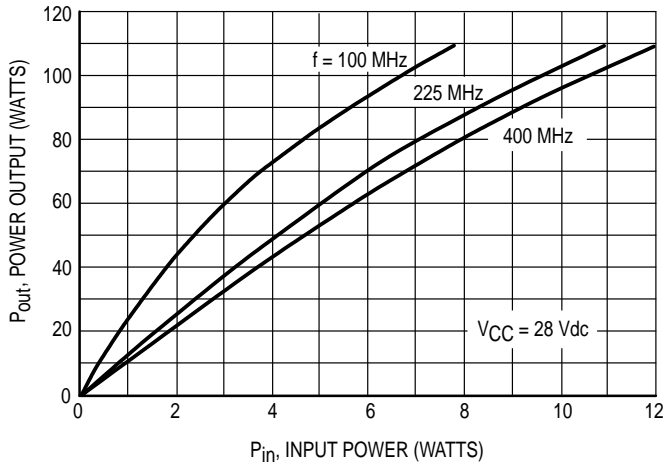


Figure 2. Output Power versus Input Power

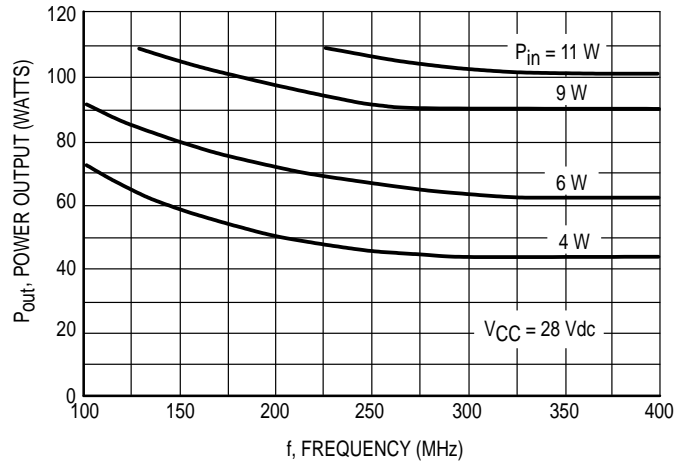


Figure 3. Output Power versus Frequency

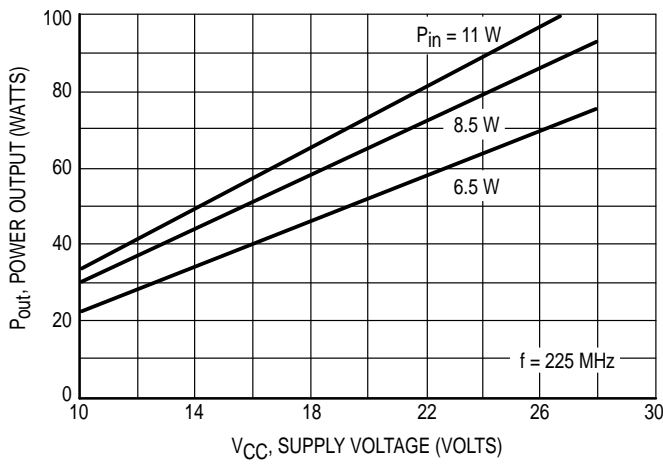


Figure 4. Output Power versus Supply Voltage

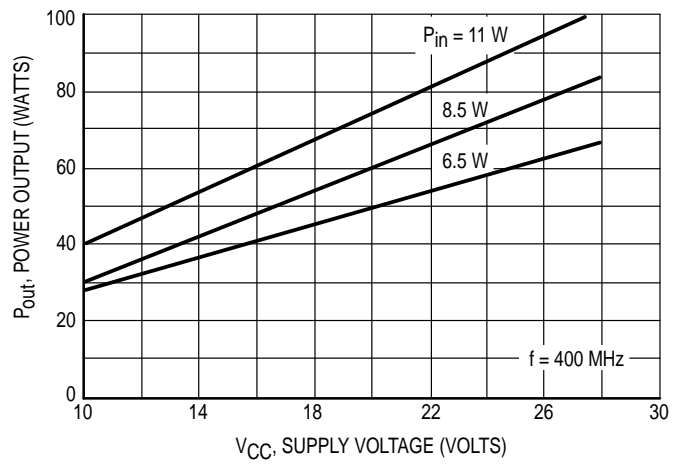


Figure 5. Output Power versus Supply Voltage

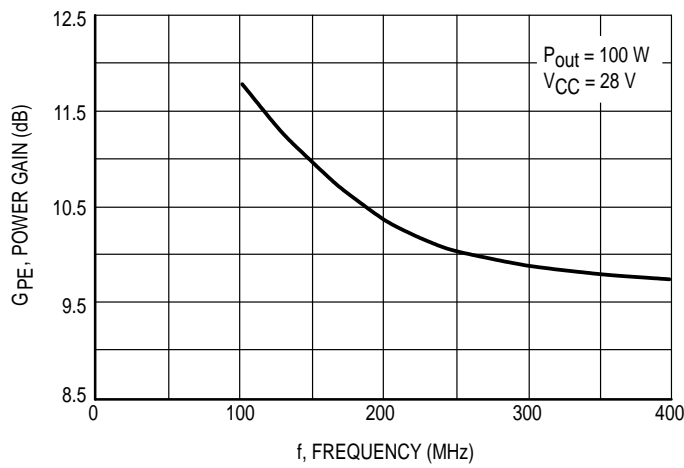
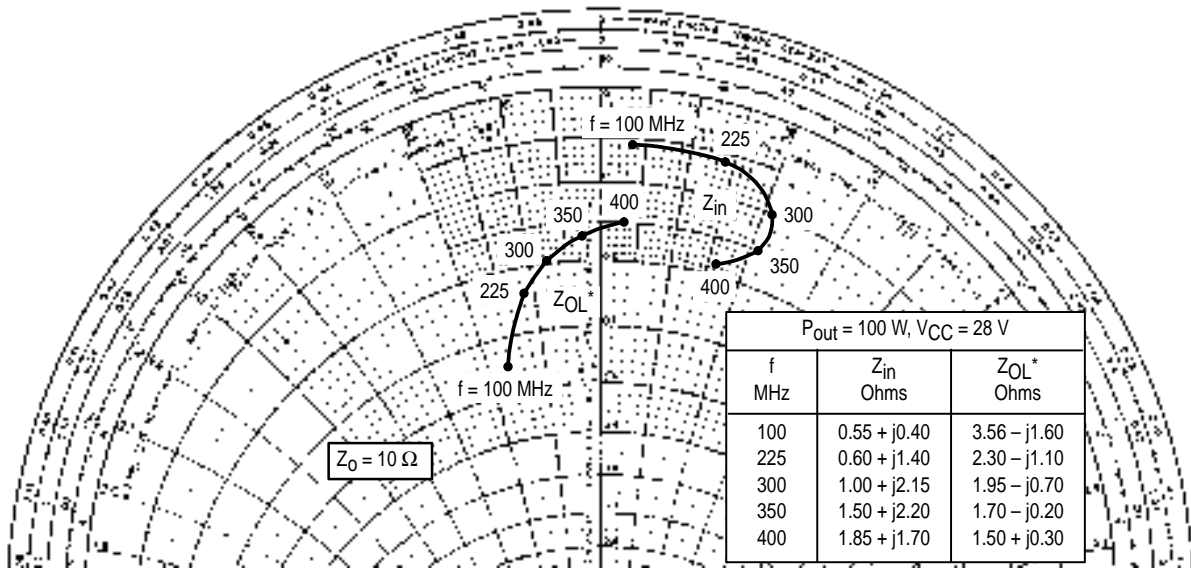


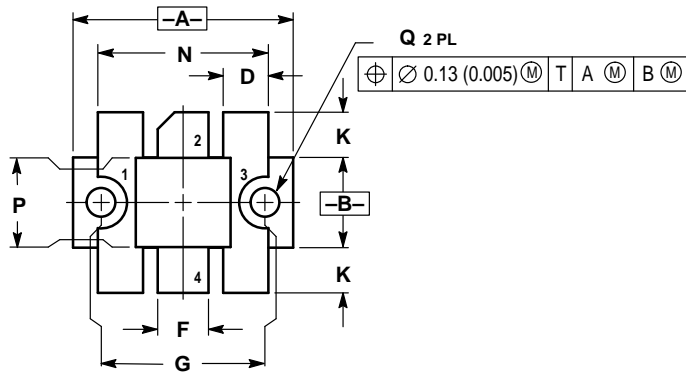
Figure 6. Power Gain versus Frequency



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

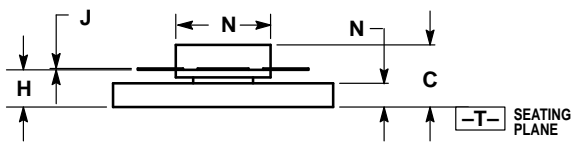
**Figure 7. Series Equivalent Input/Output Impedance**

# PACKAGE DIMENSIONS




- NOTES:  
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
 2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.965	0.985	24.51	25.02
B	0.390	0.410	9.91	10.41
C	0.250	0.290	6.73	7.36
D	0.190	0.210	4.83	5.33
E	0.095	0.115	2.42	2.92
F	0.215	0.235	5.47	5.96
G	0.725 BSC		18.42 BSC	
H	0.155	0.175	3.94	4.44
J	0.004	0.006	0.10	0.15
K	0.195	0.205	4.95	5.21
L	0.740	0.770	18.80	19.55
N	0.415	0.425	10.54	10.80
P	0.390	0.400	9.91	10.16
Q	0.120	0.135	3.05	3.42



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

**CASE 333-04  
 ISSUE E**

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