

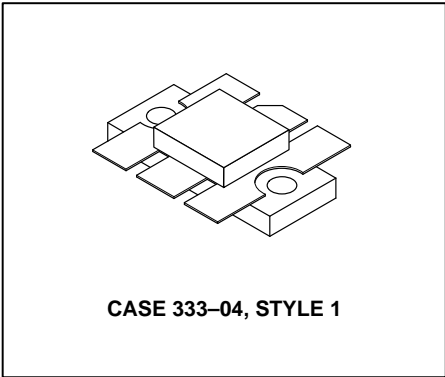
The RF Line
NPN Silicon
RF Power Transistor

... 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



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



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°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	$^\circ\text{C/W}$

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
OFF CHARACTERISTICS (continued)					
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

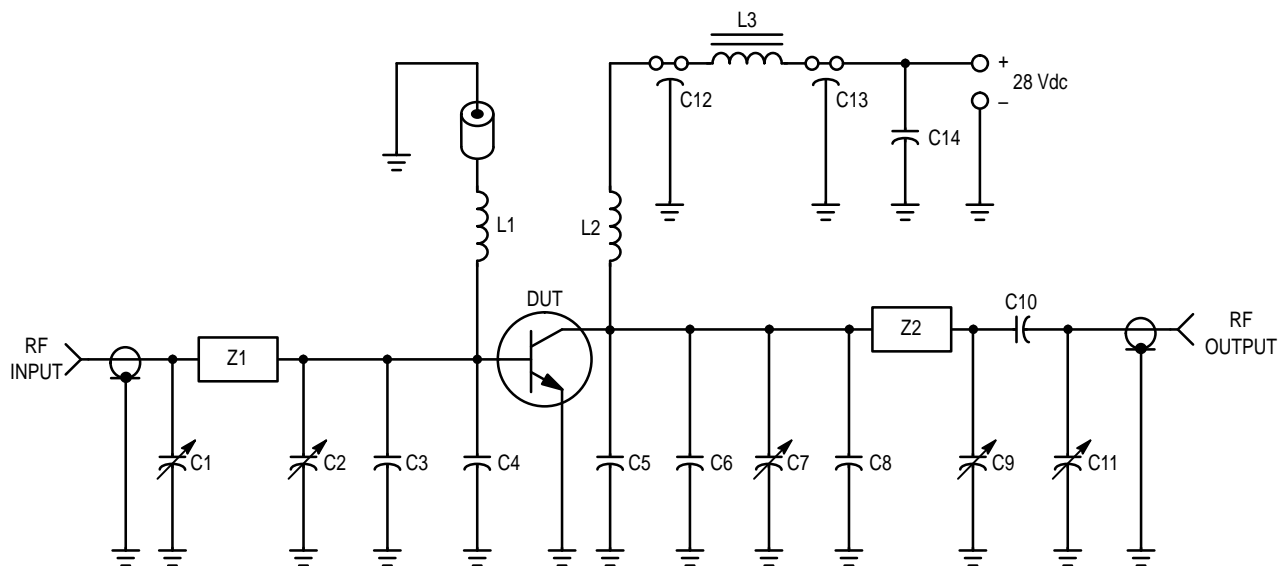
DC Current Gain ($I_C = 4.0\text{ A dc}$, $V_{CE} = 5.0\text{ Vdc}$)	h_{FE}	20	—	80	—
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DYNAMIC CHARACTERISTICS

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 ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 100\text{ W}$, $f = 400\text{ MHz}$)	η	50	60	—	%
Load Mismatch ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 100\text{ W}$, $f = 400\text{ MHz}$, $VSWR = 3:1$ all angles)	ψ	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 μF Erie Redcap

- L1 — 0.15 μH 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

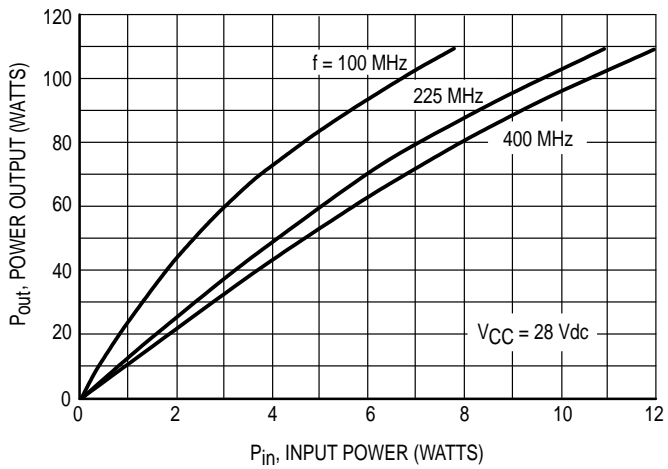


Figure 2. Output Power versus Input Power

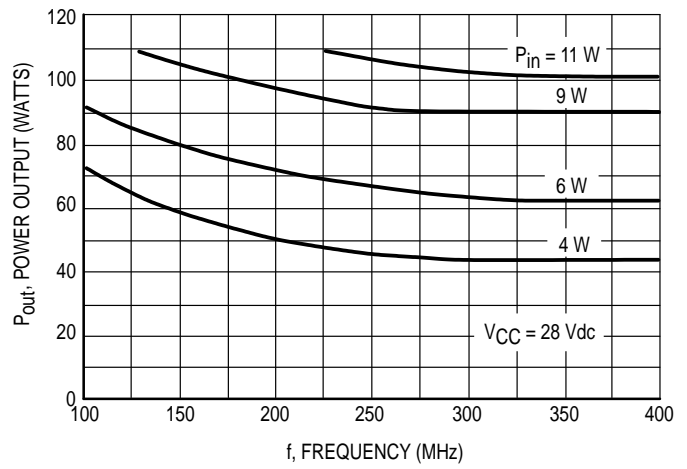


Figure 3. Output Power versus Frequency

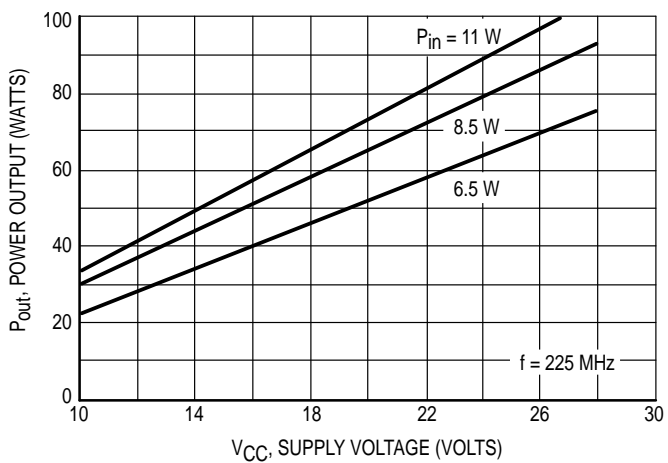


Figure 4. Output Power versus Supply Voltage

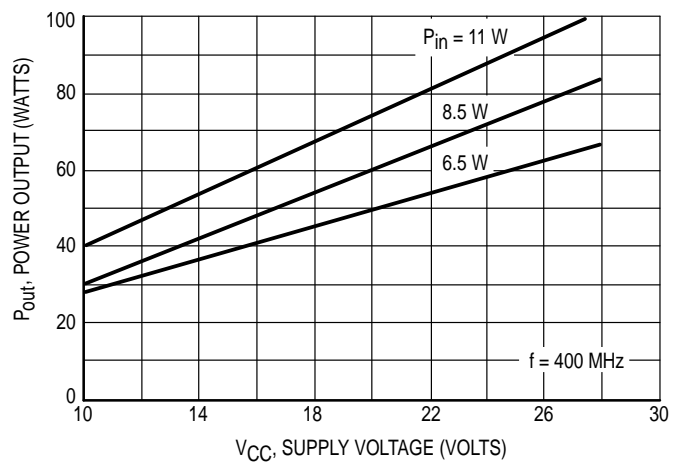


Figure 5. Output Power versus Supply Voltage

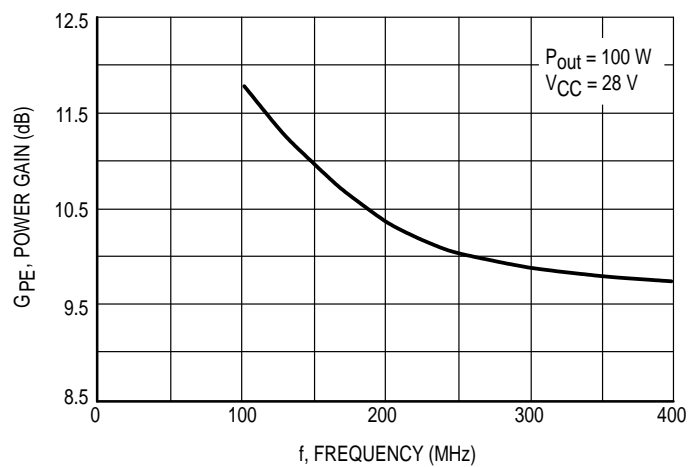
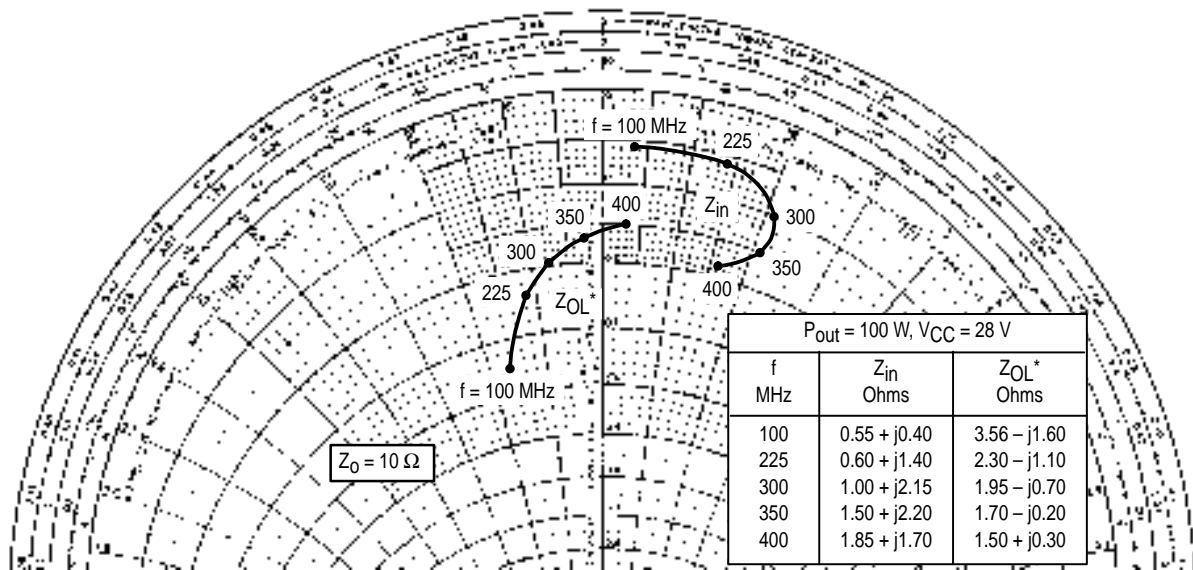


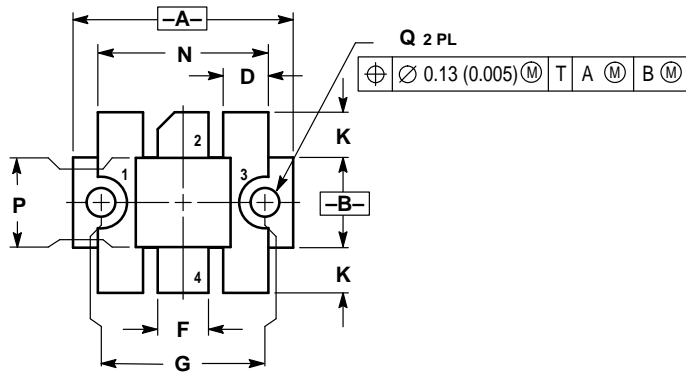
Figure 6. Power Gain versus Frequency



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

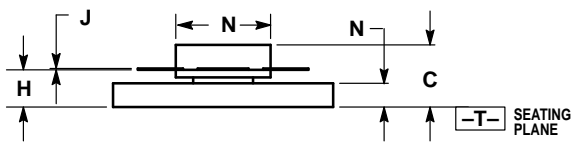
Figure 7. Series Equivalent Input/Output Impedance

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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