

Microwave Pulse Power Silicon NPN Transistor

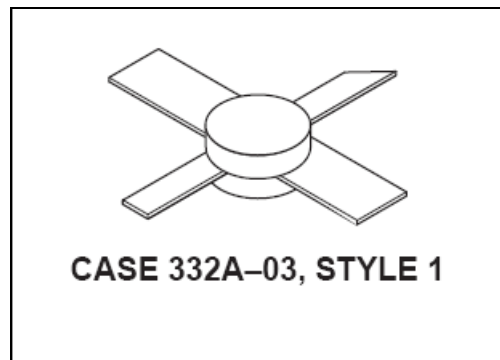
90W (peak), 960–1215MHz

Rev. V1

Product Image

Designed for Class B and C common base amplifier applications in short pulse TACAN, IFF, and DME transmitters.

- Guaranteed performance @ 1090 MHz, 50 Vdc
Output power = 90 W Peak
Minimum gain = 8.4 dB
- 100% tested for load mismatch at all phase angles with 10:1 VSWR
- Industry standard package
- Nitride passivated
- Gold metallized for long life and resistance to metal migration
- Internal input matching for broadband operation



MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Base Voltage	V_{CBO}	70	Vdc
Emitter–Base Voltage	V_{EBO}	4.0	Vdc
Collector–Current — Peak (1)	I_C	6.0	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ (1) (2) Derate above 25°C	P_D	290 1.66	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 (3)	$R_{\theta JC}$	0.6	$^\circ\text{C/W}$

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 ($I_C = 25\text{ mAdc}$, $V_{BE} = 0$)	$V_{(BR)CES}$	70	—	—	Vdc
Collector–Base Breakdown Voltage ($I_C = 25\text{ mAdc}$, $I_E = 0$)	$V_{(BR)CBO}$	70	—	—	Vdc
Emitter–Base Breakdown Voltage ($I_E = 5.0\text{ mAdc}$, $I_C = 0$)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 50\text{ Vdc}$, $I_E = 0$)	I_{CBO}	—	—	5.0	mAdc

ON CHARACTERISTICS

DC Current Gain (4) ($I_C = 2.5\text{ Adc}$, $V_{CE} = 5.0\text{ Vdc}$)	h_{FE}	10	30	—	—
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NOTES:

(continued)

- Pulse Width = 10 μs , Duty Cycle = 1%.
- 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.
- 80 μs Pulse on Tektronix 576 or equivalent.

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

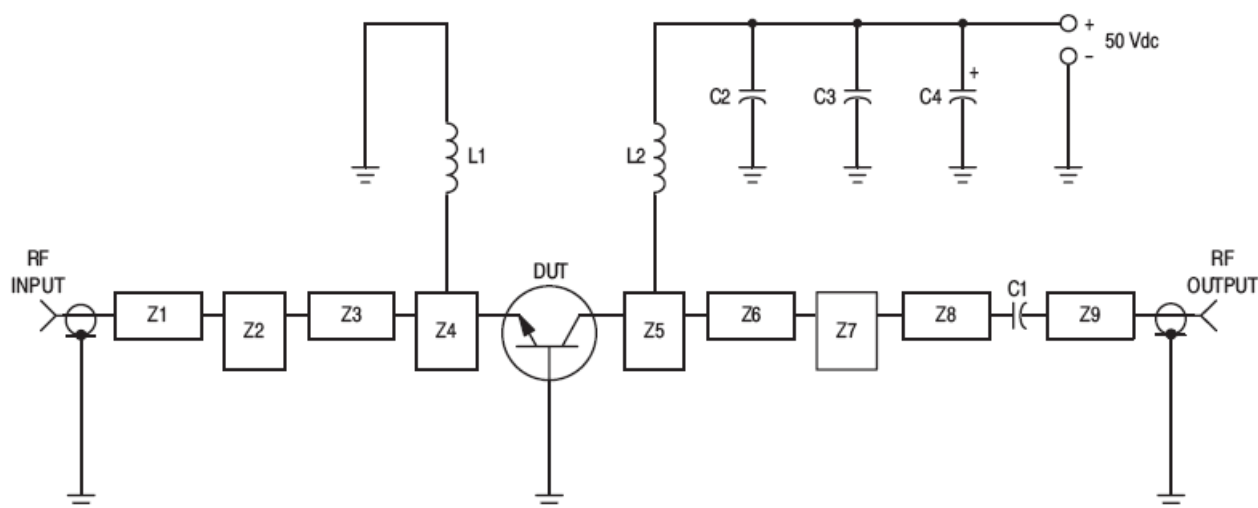
Characteristic	Symbol	Min	Typ	Max	Unit
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DYNAMIC CHARACTERISTICS

Output Capacitance ($V_{CB} = 50\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	C_{ob}	—	12	16	pF
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FUNCTIONAL TESTS (Pulse Width = 10 μs , Duty Cycle = 1.0%)

Common-Base Amplifier Power Gain ($V_{CC} = 50\text{ Vdc}$, $P_{out} = 90\text{ W pk}$, $f = 1090\text{ MHz}$)	G_{PB}	8.4	10.8	—	dB
Collector Efficiency ($V_{CC} = 50\text{ Vdc}$, $P_{out} = 90\text{ W pk}$, $f = 1090\text{ MHz}$)	η	35	40	—	%
Load Mismatch ($V_{CC} = 50\text{ Vdc}$, $P_{out} = 90\text{ W pk}$, $f = 1090\text{ MHz}$, VSWR = 10:1 All Phase Angles)	ψ	No Degradation in Power Output			



C1, C2 — 220 pF Chip Capacitor, 100-mil ATC
 C3 — 0.1 μF
 C4 — 47 $\mu\text{F}/75\text{ V}$
 L1, L2 — 3 Turns #18 AWG, 1/8" ID
 Z1–Z9 — Distributed Microstrip Elements,
 See Photomaster
 Board Material — 0.031" Thick Glass Teflon, $\epsilon_r = 2.5$

Figure 1. 1090 MHz Test Circuit

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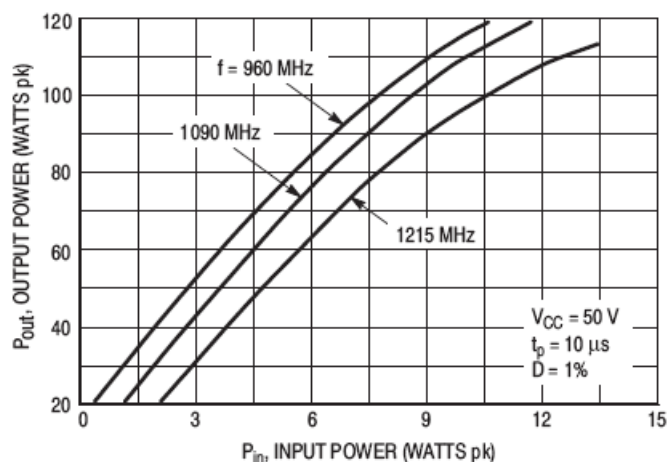


Figure 2. Output Power versus Input Power

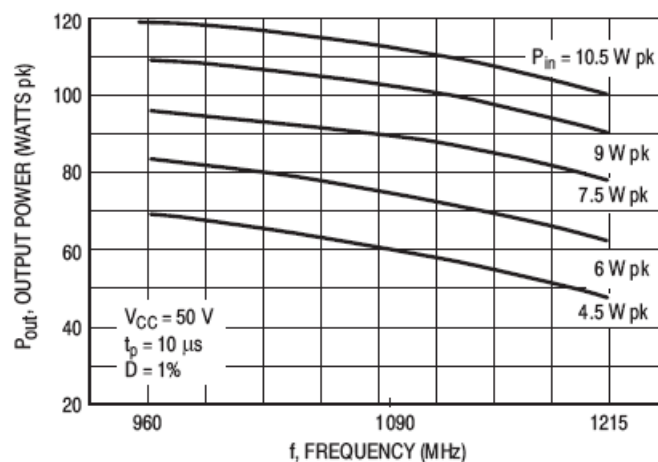


Figure 3. Output Power versus Frequency

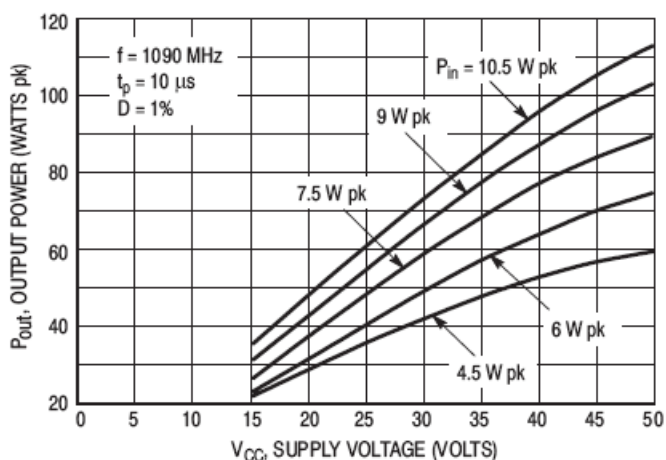


Figure 4. Output Power versus Supply Voltage

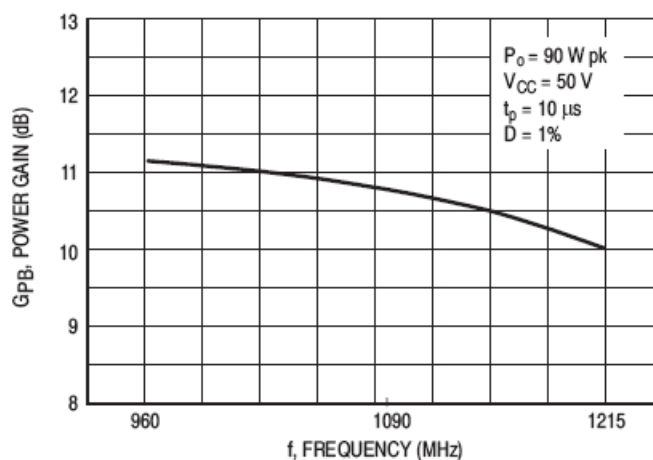
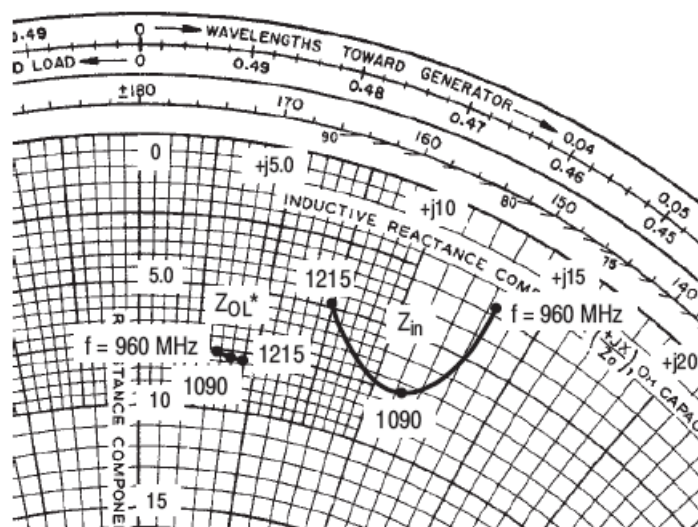


Figure 5. Power Gain versus Frequency

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Coordinates in Ohms

$P_{out} = 90 \text{ W pk}$ $V_{CC} = 50 \text{ V}$
 $t_p = 10 \mu\text{s}$ $D = 1\%$

f MHz	Z_{in} Ohms	Z_{OL}^* Ohms
960	$2.8 + j13.2$	$7.6 + j3.5$
1090	$7.4 + j11.4$	$7.6 + j4.0$
1215	$4.7 + j7.5$	$7.7 + j4.5$

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

Figure 6. Series Equivalent Input/Output Impedance

$P_o = 90 \text{ W pk}$
 $V_{CC} = 50 \text{ V}$
 $t_p = 10 \mu\text{s}$
 $D = 1\%$
 $f = 1090 \text{ MHz}$

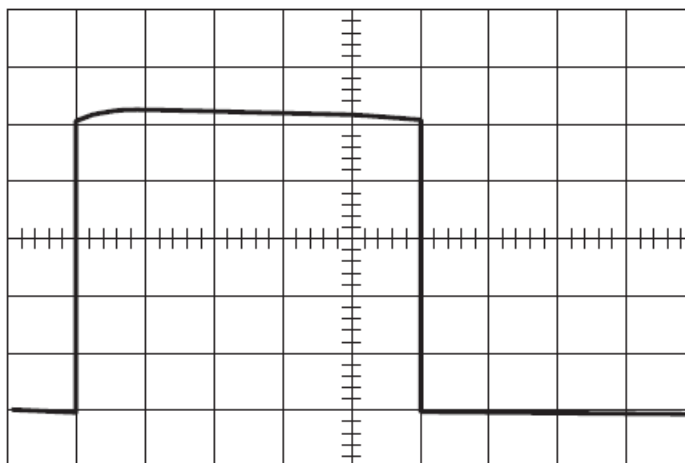
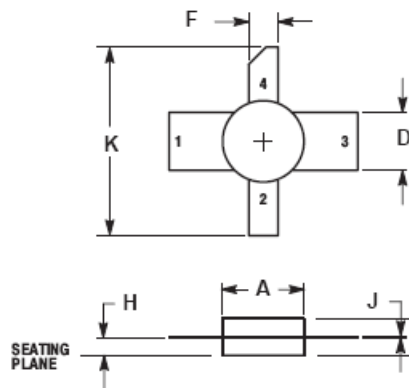


Figure 7. Typical Pulse Performance

PACKAGE DIMENSIONS



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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.270	0.290	6.86	7.36
C	0.115	0.135	2.93	3.42
D	0.195	0.205	4.96	5.20
F	0.095	0.105	2.42	2.66
H	0.050	0.070	1.27	1.77
J	0.003	0.007	0.08	0.17
K	0.600	---	15.24	---

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

CASE 332A-03
ISSUE D

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