

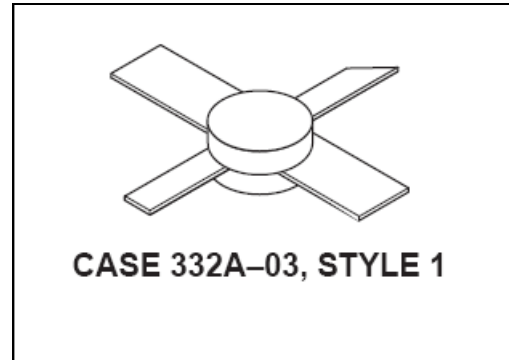
Microwave Pulse Power Silicon NPN Transistor 90W (peak), 960–1215MHz

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_{CB0}	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	$^\circ\text{C}/\text{W}$

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

Characteristic	Symbol	Min	Typ	Max	Unit
----------------	--------	-----	-----	-----	------

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	—	—
---	----------	----	----	---	---

NOTES:

1. Pulse Width = 10 μs , Duty Cycle = 1%.
2. This device is designed for RF operation. The total device dissipation rating applies only when the device is operated as an RF amplifier.
3. Thermal Resistance is determined under specified RF operating conditions by infrared measurement techniques.
4. 80 μs Pulse on Tektronix 576 or equivalent.

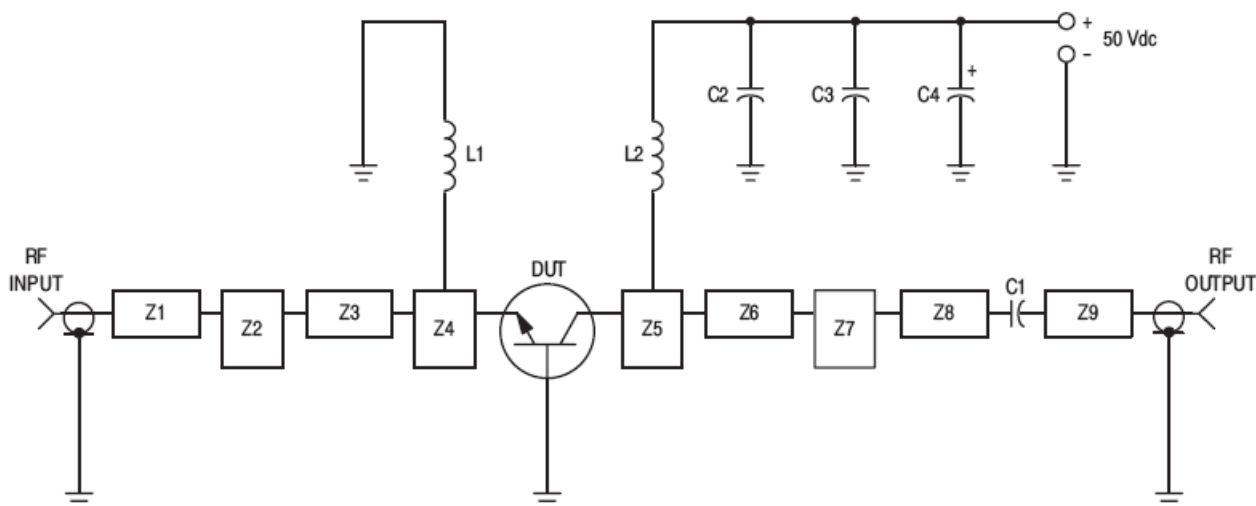
(continued)

Microwave Pulse Power Silicon NPN Transistor 90W (peak), 960–1215MHz

Rev. V1

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

Characteristic	Symbol	Min	Typ	Max	Unit
DYNAMIC CHARACTERISTICS					
Output Capacitance ($V_{CB} = 50\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	C_{ob}	—	12	16	pF
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

Microwave Pulse Power Silicon NPN Transistor 90W (peak), 960–1215MHz

Rev. V1

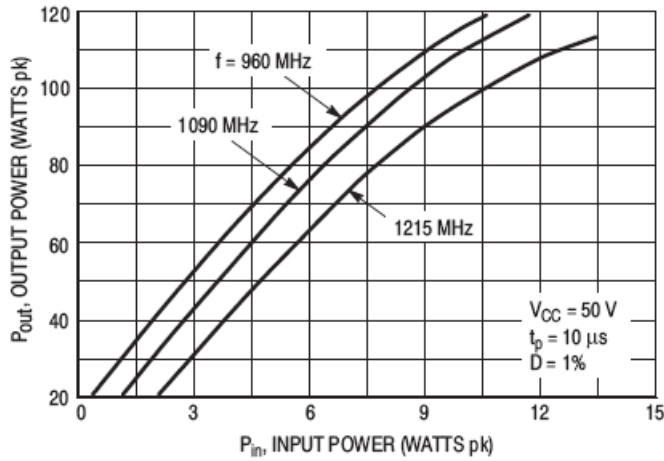


Figure 2. Output Power versus Input Power

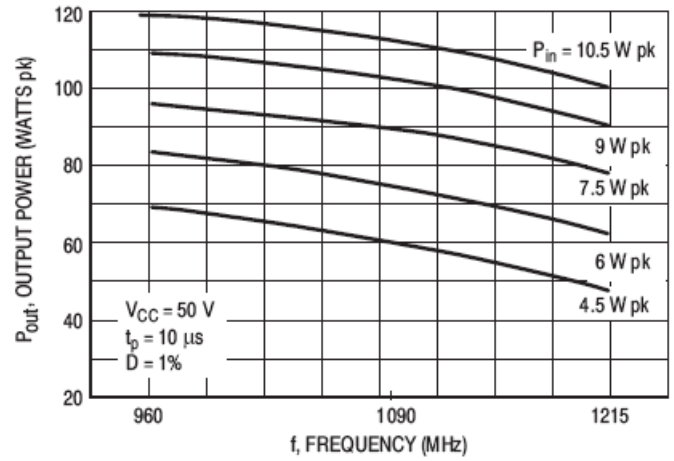


Figure 3. Output Power versus Frequency

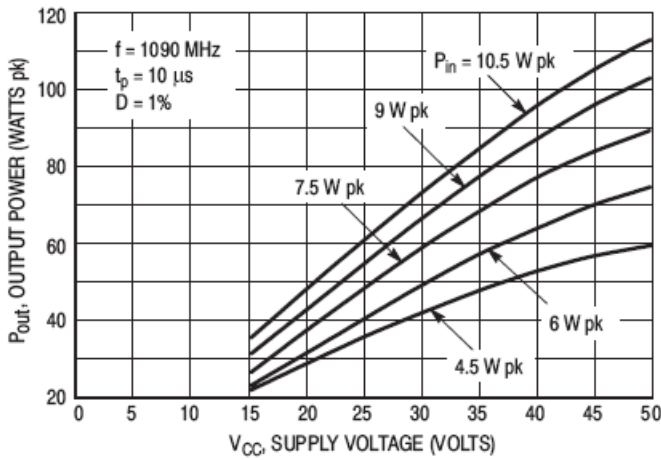


Figure 4. Output Power versus Supply Voltage

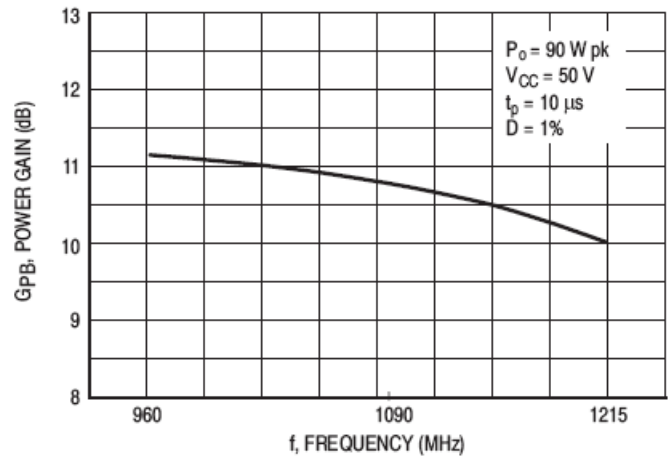
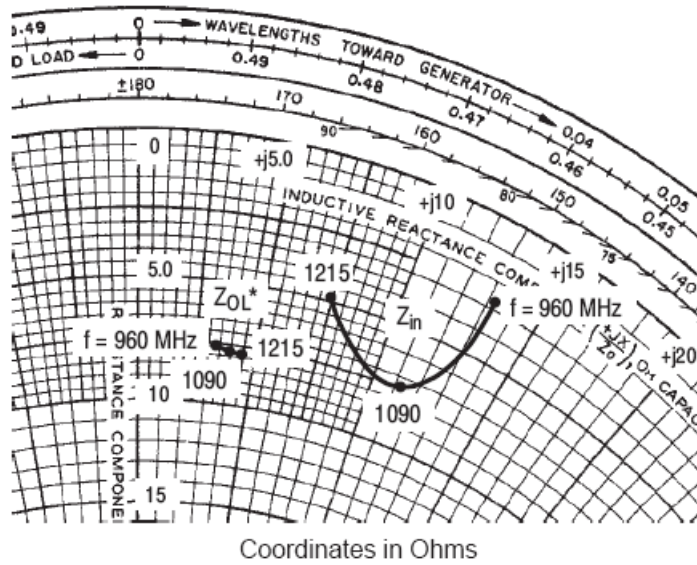


Figure 5. Power Gain versus Frequency

Microwave Pulse Power Silicon NPN Transistor 90W (peak), 960–1215MHz

Rev. V1



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

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

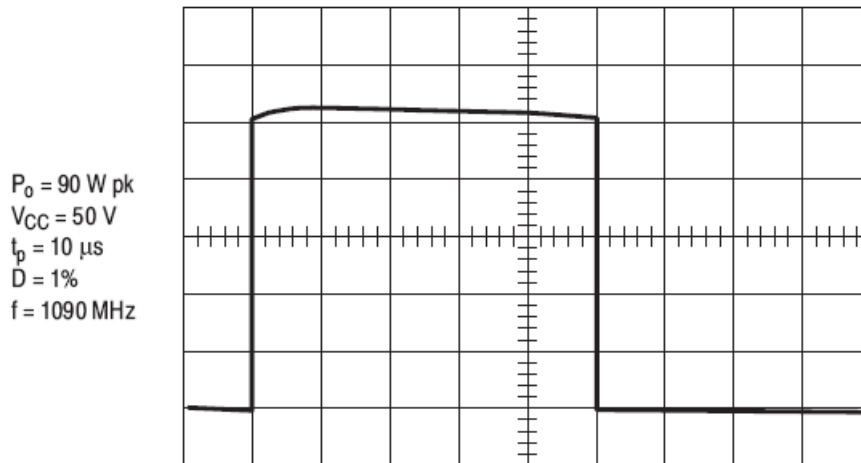
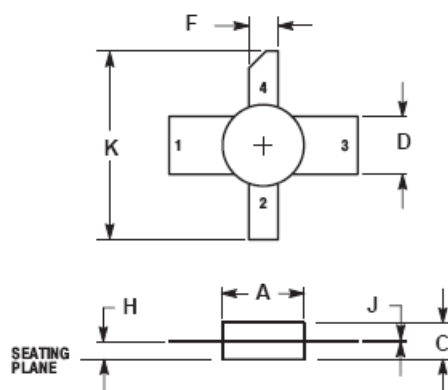


Figure 7. Typical Pulse Performance

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

M/A-COM Technology Solutions Inc. All rights reserved.

Information in this document is provided in connection with M/A-COM Technology Solutions Inc ("MACOM") products. These materials are provided by MACOM as a service to its customers and may be used for informational purposes only. Except as provided in MACOM's Terms and Conditions of Sale for such products or in any separate agreement related to this document, MACOM assumes no liability whatsoever. MACOM assumes no responsibility for errors or omissions in these materials. MACOM may make changes to specifications and product descriptions at any time, without notice. MACOM makes no commitment to update the information and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to its specifications and product descriptions. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document.

THESE MATERIALS ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, RELATING TO SALE AND/OR USE OF MACOM PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, CONSEQUENTIAL OR INCIDENTAL DAMAGES, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT. MACOM FURTHER DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. MACOM SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS, WHICH MAY RESULT FROM THE USE OF THESE MATERIALS.

MACOM products are not intended for use in medical, lifesaving or life sustaining applications. MACOM customers using or selling MACOM products for use in such applications do so at their own risk and agree to fully indemnify MACOM for any damages resulting from such improper use or sale.