

Microwave Power Silicon NPN Transistor 30W (peak), 960–1215MHz, 36V

Rev. V1

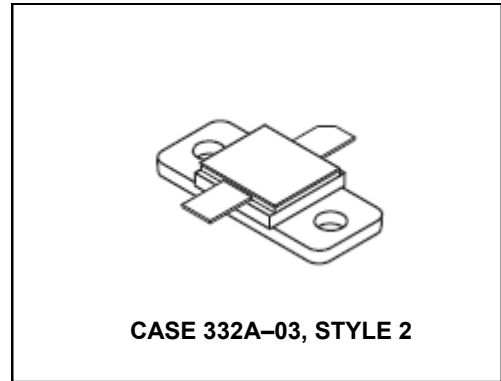
Features

- Guaranteed performance @ 960-1215MHz, 36Vdc
- Output power: 30W peak
- Minimum gain: 9.0dB min., 9.5dB typ.
- 100% tested for load mismatch at all phase angles with 10:1 VSWR
- Hermetically sealed, industry standard package
- Silicon nitride passivated
- Gold metallized, emitter ballasted for long life and resistance to metal migration
- Internal input matching for broadband operation

Description and Applications

Designed for 960–1215 MHz long or short pulse common base amplifier applications such as JTIDS and Mode–S transmitters.

Product Image



Maximum Ratings

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CES}	55	Vdc
Collector–Base Voltage (1)	V_{CBO}	55	Vdc
Emitter–Base Voltage	V_{EBO}	3.5	Vdc
Collector Current — Continuous (1)	I_C	3.0	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ (1), (2) Derate above 25°C	P_D	110 0.625	Watts mW/ $^\circ\text{C}$
Storage Temperature Range	T_{stg}	– 65 to + 200	$^\circ\text{C}$
Junction Temperature	T_J	200	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case (3)	$R_{\theta JC}$	1.6	$^\circ\text{C/W}$

NOTES:

1. Under pulse RF operating conditions.
2. These devices are designed for RF operation. The total device dissipation rating applies only when the devices are operated as pulsed RF amplifiers.
3. Thermal Resistance is determined under specified RF operating conditions by infrared measurement techniques. (Worst case θ_{JC} value measured @ 23% duty cycle)

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

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

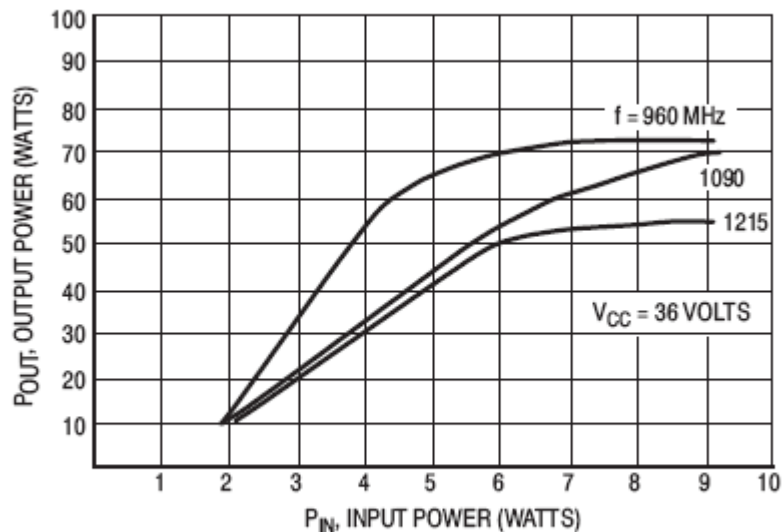
Collector–Emitter Breakdown Voltage ($I_C = 25\text{ mAdc}$, $V_{BE} = 0$)	$V_{(BR)CES}$	55	—	—	Vdc
Collector–Base Breakdown Voltage ($I_C = 25\text{ mAdc}$, $I_E = 0$)	$V_{(BR)CBO}$	55	—	—	Vdc
Emitter–Base Breakdown Voltage ($I_E = 5.0\text{ mAdc}$, $I_C = 0$)	$V_{(BR)EBO}$	3.5	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 36\text{ Vdc}$, $I_E = 0$)	I_{CBO}	—	—	2.0	mAdc

ON CHARACTERISTICS

DC Current Gain ($I_C = 500\text{ mAdc}$, $V_{CE} = 5.0\text{ Vdc}$)	h_{FE}	20	—	—	—
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FUNCTIONAL TESTS (10 μs Pulses @ 50% duty cycle for 3.5 ms; overall duty cycle – 25%)

Common–Base Amplifier Power Gain ($V_{CC} = 36\text{ Vdc}$, $P_{out} = 30\text{ W Peak}$, $f = 960\text{ MHz}$)	G_{PB}	9.0	9.5	—	dB
Collector Efficiency ($V_{CC} = 36\text{ Vdc}$, $P_{out} = 30\text{ W Peak}$, $f = 960\text{ MHz}$)	η	40	45	—	%
Load Mismatch ($V_{CC} = 36\text{ Vdc}$, $P_{out} = 30\text{ W Peak}$, $f = 960\text{ MHz}$, VSWR = 10:1 All Phase Angles)	ψ	No Degradation in Output Power			



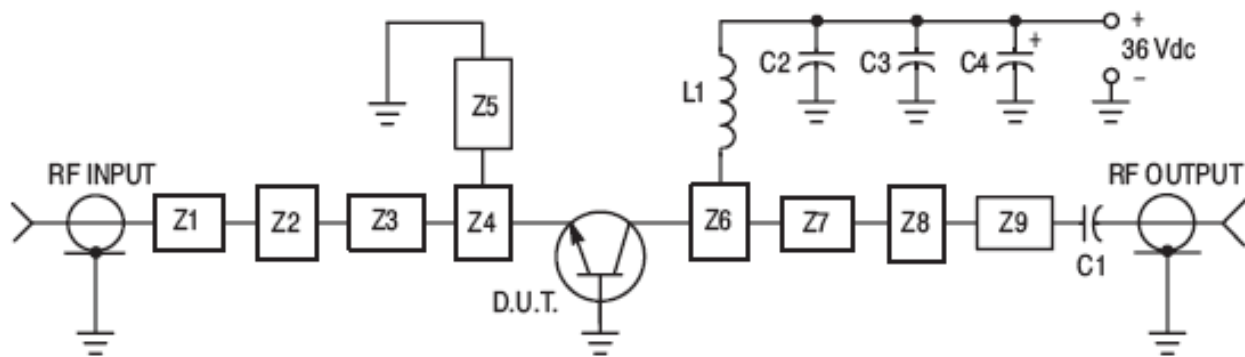
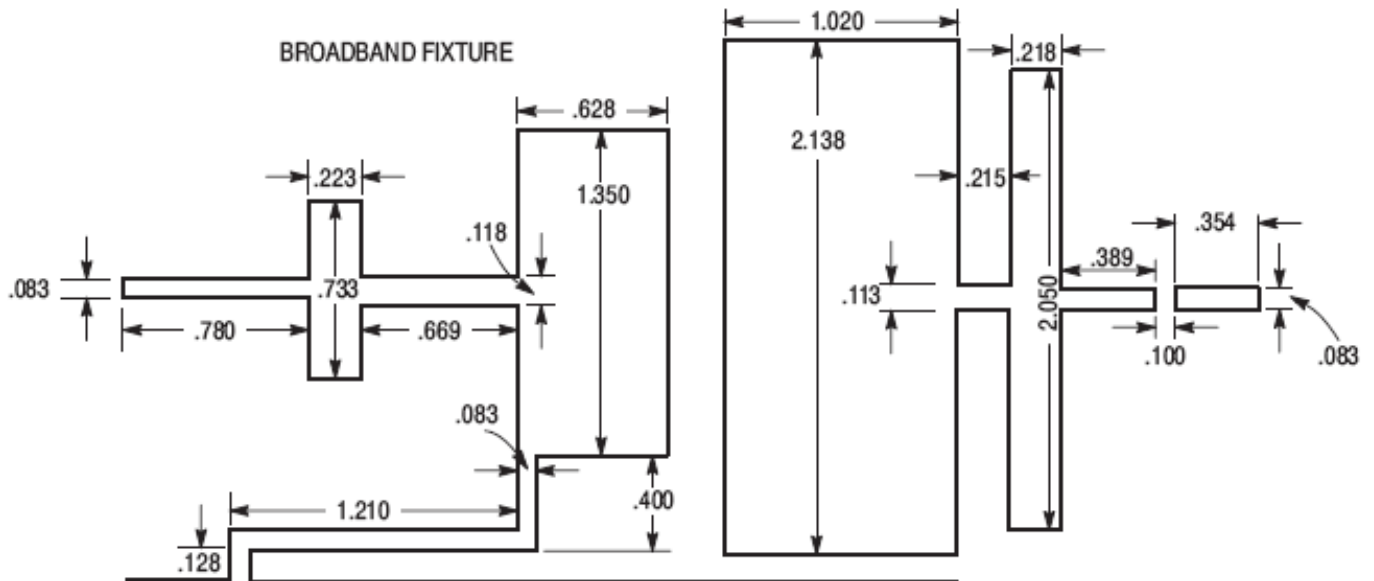
Output power versus input power

MRF10031



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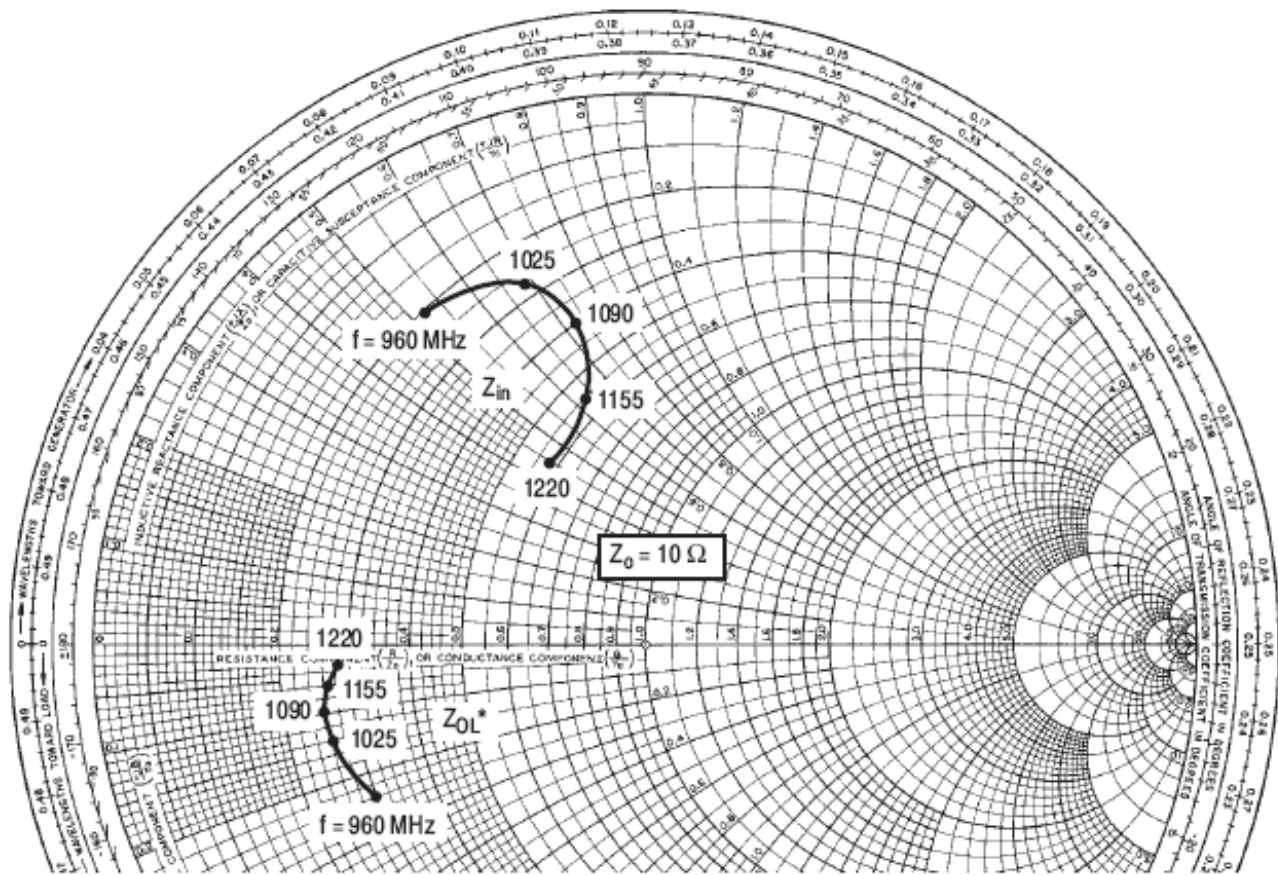


- C1 — 75 pF 100 Mil Chip Capacitor
- C2 — 39 pF 100 Mil Chip Capacitor
- C3 — 0.1 μ F
- C4 — 1000 μ F, 50 Vdc, Electrolytic
- L1 — 3 Turns #18 AWG, 1/8" ID, 0.18 Long

- Z1–Z9 — Microstrip, See Details
- Board Material — Teflon, Glass Laminate
- Dielectric Thickness = 0.030"
- $\epsilon_r = 2.55$, 2 Oz. Copper

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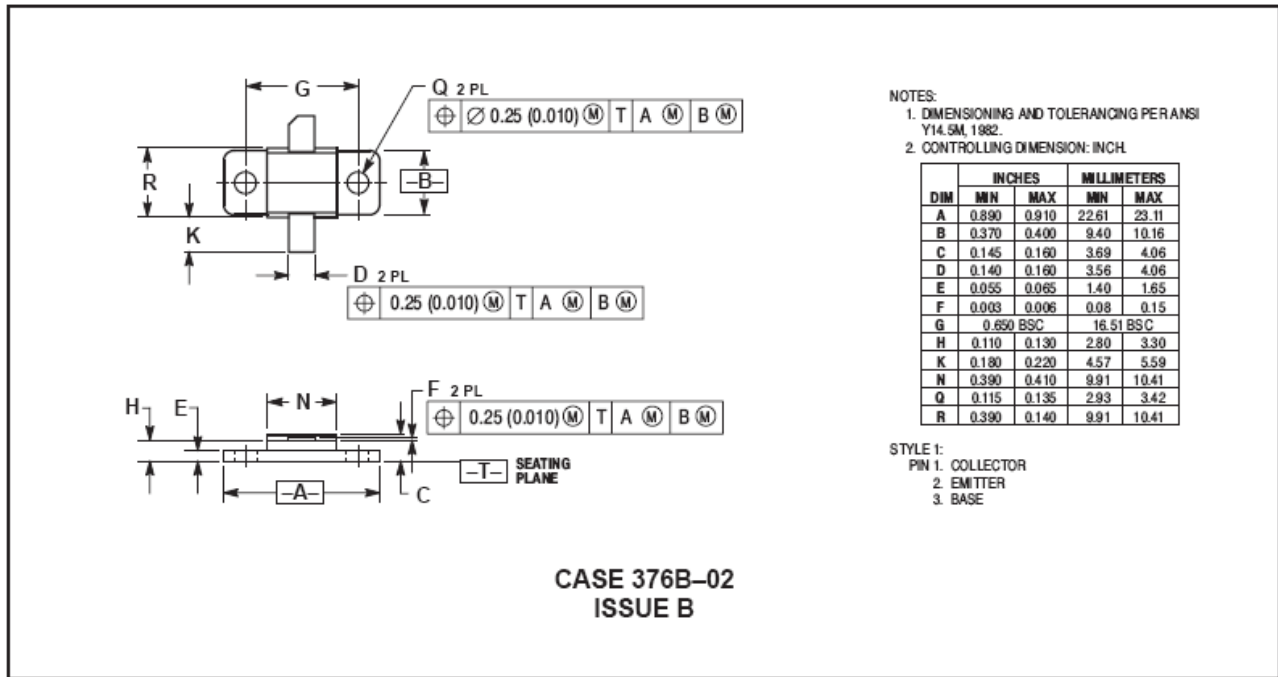
$P_{out} = 30 \text{ Wpk}$ $V_{CC} = 36 \text{ V}$

f MHz	Z_{in} Ohms	Z_{OL}^* Ohms
960	$2.05 + j5.2$	$2.9 - j2.35$
1025	$2.67 + j6.34$	$2.55 - j1.3$
1090	$4.0 + j7.1$	$2.52 - j0.9$
1155	$5.5 + j6.2$	$2.6 - j0.6$
1220	$5.7 + j4.3$	$2.8 - j0.3$

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

Series equivalent input/output impedances

PACKAGE DIMENSIONS



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