

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

Rev. V1

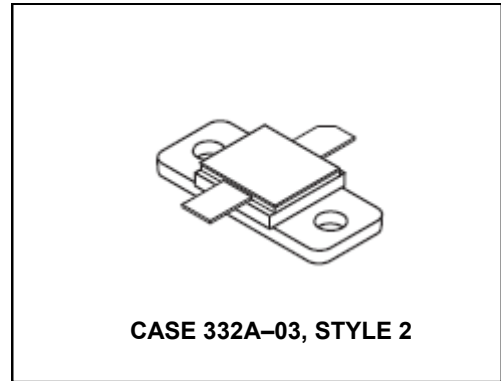
### Features

- 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 $25^\circ\text{C}$	$P_D$	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  $\theta_{JC}$  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

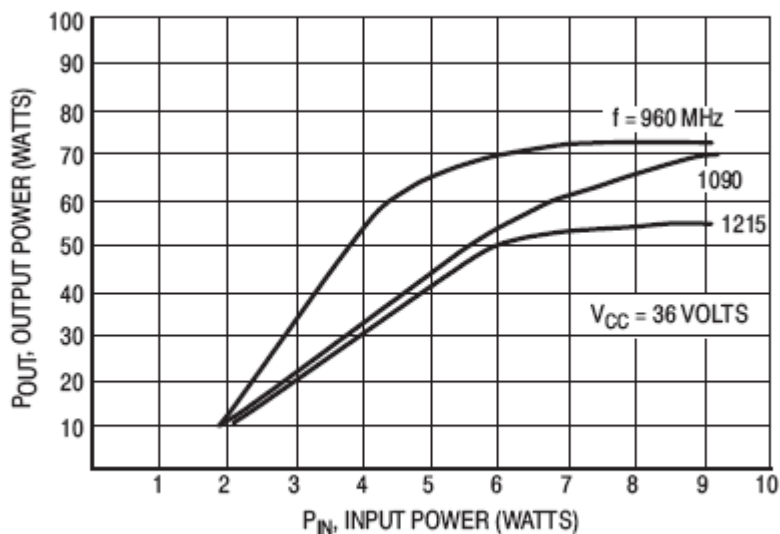
Collector–Emitter Breakdown Voltage ( $I_C = 25\text{ mAdc}$ , $V_{BE} = 0$ )	$V_{(BR)CES}$	55	—	—	Vdc
Collector–Base Breakdown Voltage ( $I_C = 25\text{ mAdc}$ , $I_E = 0$ )	$V_{(BR)CBO}$	55	—	—	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 5.0\text{ mAdc}$ , $I_C = 0$ )	$V_{(BR)EBO}$	3.5	—	—	Vdc
Collector 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 $\mu\text{s}$ 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 ( $V_{CC} = 36\text{ Vdc}$ , $P_{out} = 30\text{ W Peak}$ , $f = 960\text{ MHz}$ )	$\eta$	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)	$\psi$	No Degradation in Output Power			



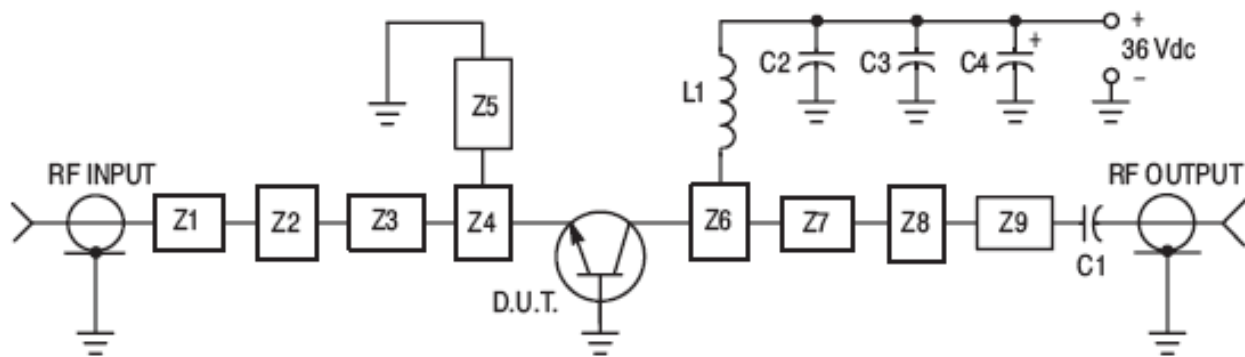
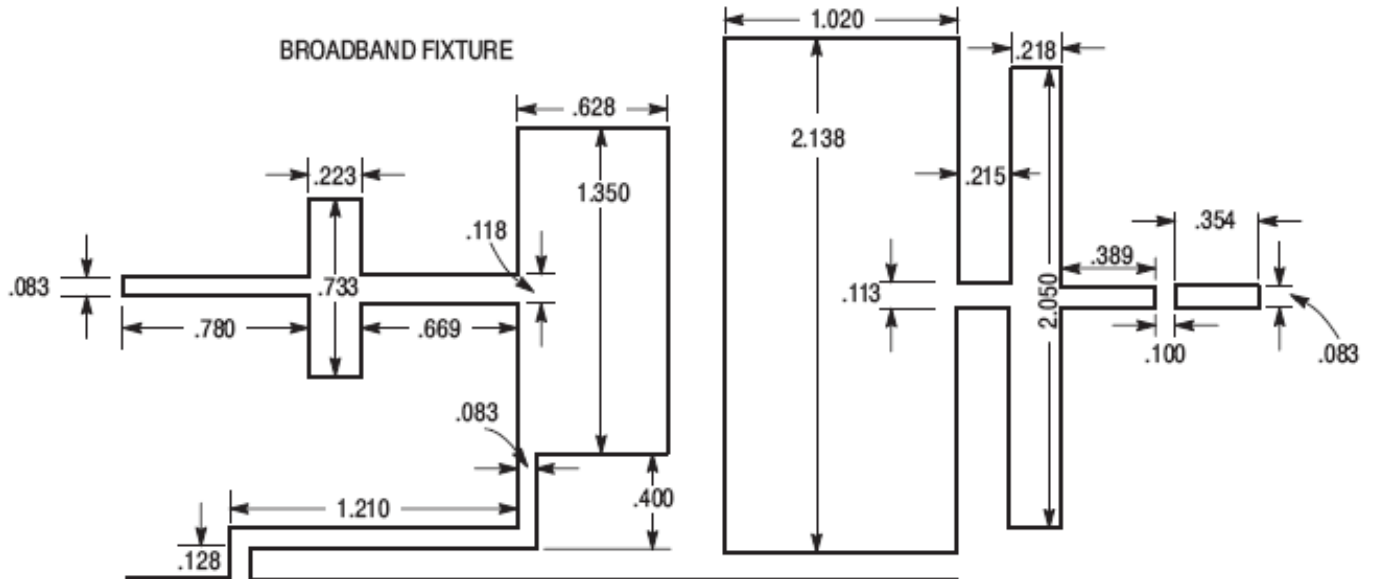
Output power versus input power

# MRF10031



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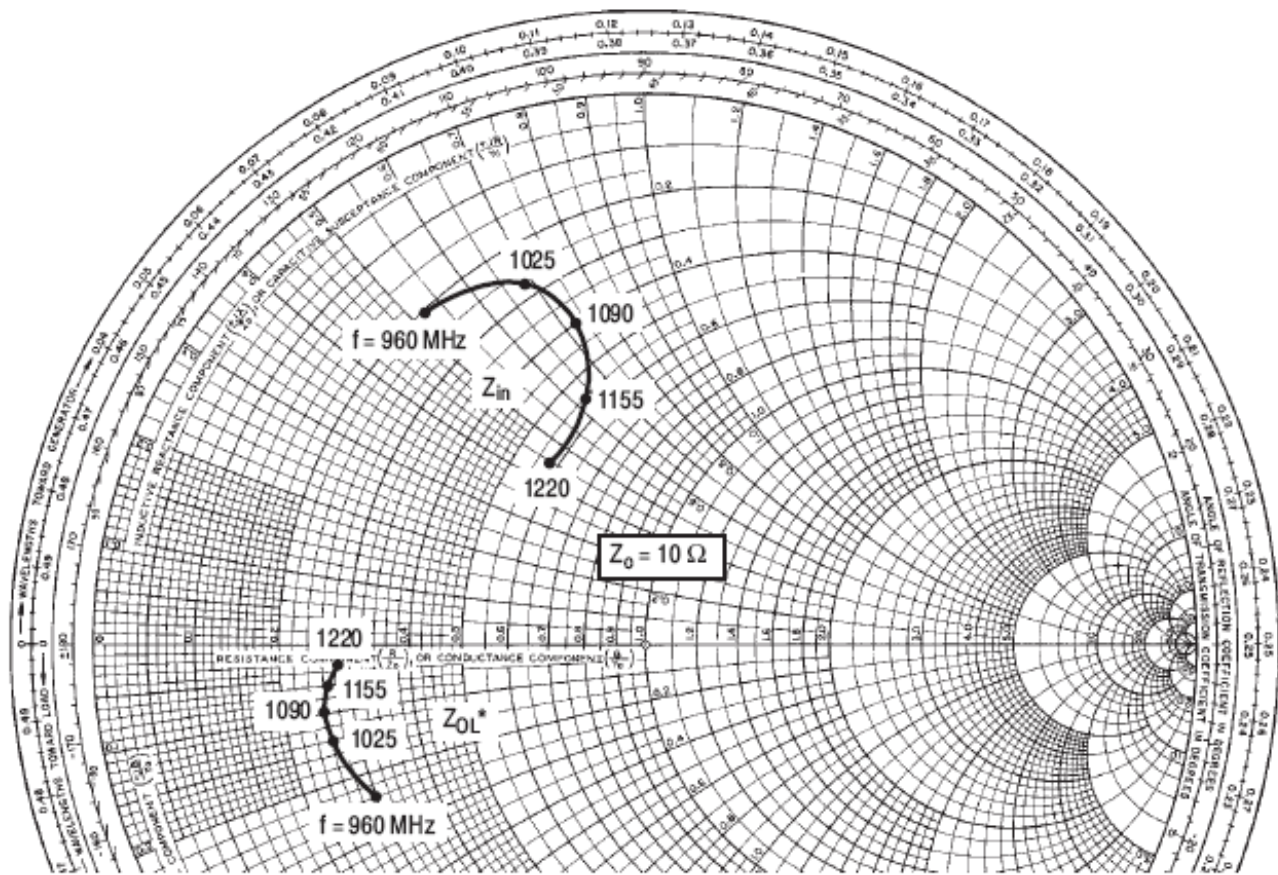


- C1 — 75 pF 100 Mil Chip Capacitor
- C2 — 39 pF 100 Mil Chip Capacitor
- C3 — 0.1  $\mu$ F
- C4 — 1000  $\mu$ F, 50 Vdc, Electrolytic
- L1 — 3 Turns #18 AWG, 1/8" ID, 0.18 Long

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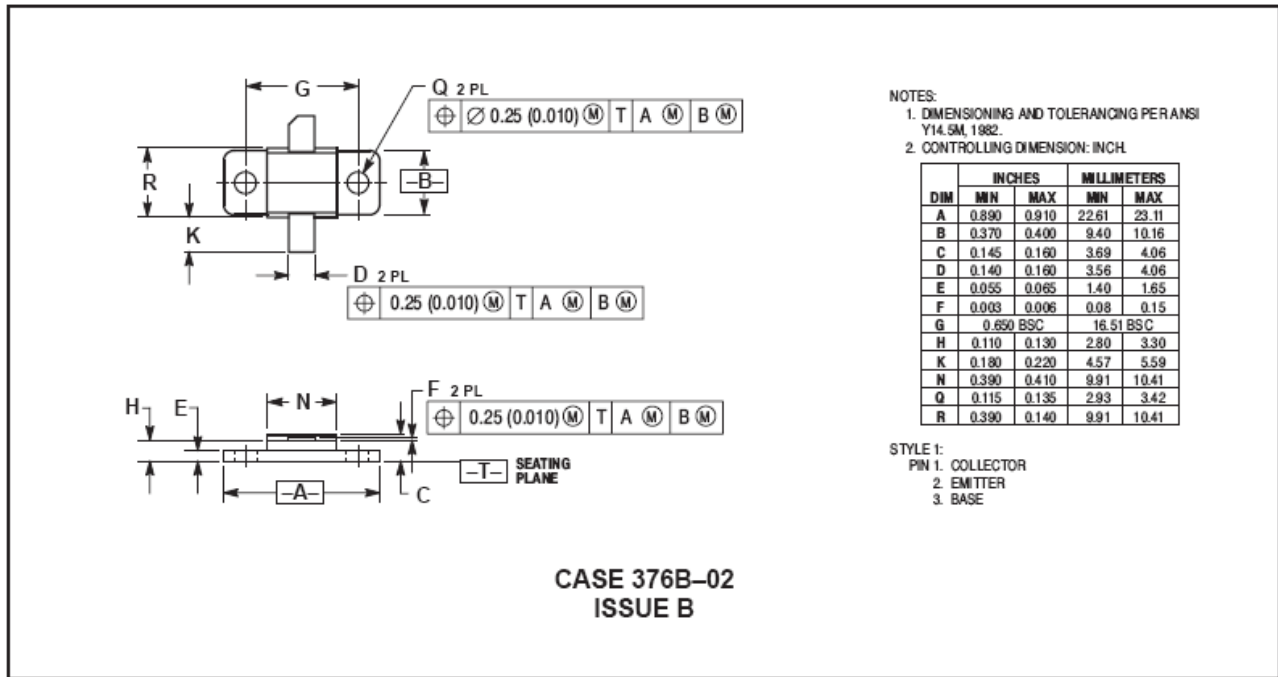
$P_{out} = 30 \text{ Wpk}$   $V_{CC} = 36 \text{ V}$

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



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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.890	0.910	22.61	23.11
B	0.370	0.400	9.40	10.16
C	0.145	0.160	3.69	4.06
D	0.140	0.160	3.56	4.06
E	0.055	0.065	1.40	1.65
F	0.003	0.006	0.08	0.15
G	0.650 BSC		16.51 BSC	
H	0.110	0.130	2.80	3.30
K	0.180	0.220	4.57	5.59
N	0.390	0.410	9.91	10.41
Q	0.115	0.135	2.93	3.42
R	0.390	0.140	9.91	10.41

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