



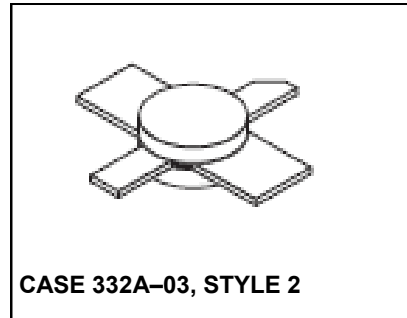
## Class A, Class AB Microwave Power Silicon NPN Transistor 0.7 W, 960–1215 MHz, 18V

Rev. V1

### Features

- Guaranteed performance @ 1090 MHz, 18 Vdc — Class A
- Output power: 0.2W
- Minimum gain: 10dB
- 100% tested for load mismatch at all phase angles with 10:1 VSWR
- Industry standard package
- Nitride passivated
- Gold metallized, emitter ballasted for long life and resistance to metal migration
- Internal input matching for broadband operation

### Product Image



### Description and Applications

Designed for Class A and AB common emitter amplifier applications in the low-power stages of IFF, DME, TACAN, radar transmitters, and CW systems.

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	$V_{CEO}$	20	Vdc
Collector–Base Voltage	$V_{CBO}$	50	Vdc
Emitter–Base Voltage	$V_{EBO}$	3.5	Vdc
Collector Current — Continuous	$I_C$	200	mAdc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ (1) Derate above $25^\circ\text{C}$	$P_D$	7.0 40	Watts mW/ $^\circ\text{C}$

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case (2)	$R_{\theta JC}$	25	$^\circ\text{C/W}$

### 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 ( $I_C = 5.0$ mAdc, $I_B = 0$ )	$V_{(BR)CEO}$	20	—	—	Vdc
Collector–Emitter Breakdown Voltage ( $I_C = 5.0$ mAdc, $V_{BE} = 0$ )	$V_{(BR)CES}$	50	—	—	Vdc
Collector–Base Breakdown Voltage ( $I_C = 5.0$ mAdc, $I_E = 0$ )	$V_{(BR)CBO}$	50	—	—	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 1.0$ mAdc, $I_C = 0$ )	$V_{(BR)EBO}$	3.5	—	—	Vdc
Collector Cutoff Current ( $V_{CB} = 20$ Vdc, $I_E = 0$ )	$I_{CBO}$	—	—	0.5	mAdc

### ON CHARACTERISTICS

DC Current Gain ( $I_C = 100$ mAdc, $V_{CE} = 5.0$ Vdc)	$h_{FE}$	10	—	100	—
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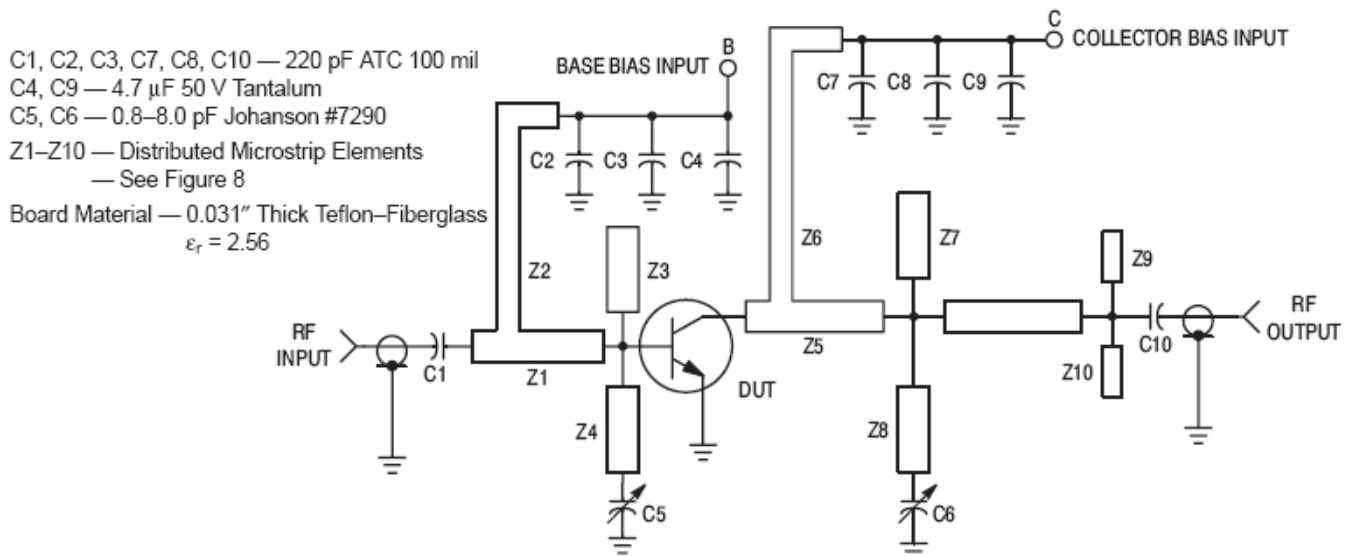
1. These devices are designed for RF operation. The total device dissipation rating applies only when the device is operated as RF amplifiers.
2. Thermal Resistance is determined under specified RF operating conditions by infrared measurement techniques.

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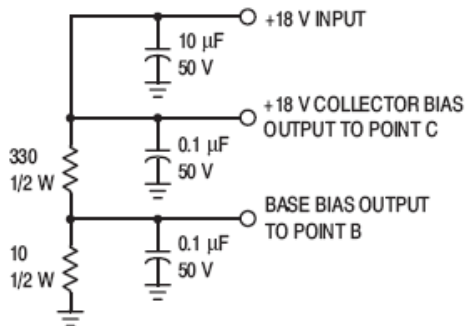
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**ELECTRICAL CHARACTERISTICS — continued** ( $T_C = 25^\circ\text{C}$  unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>DYNAMIC CHARACTERISTICS</b>					
Output Capacitance ( $V_{CB} = 28\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )	$C_{ob}$	—	2.0	5.0	pF
<b>FUNCTIONAL TESTS</b>					
Common-Emitter Power Gain — Class A ( $V_{CE} = 18\text{ Vdc}$ , $I_C = 100\text{ mAdc}$ , $f = 1090\text{ MHz}$ , $P_{out} = 200\text{ mW}$ )	$G_{PE}$	10	12	—	dB
Common-Emitter Power Gain — Class AB ( $V_{CE} = 18\text{ Vdc}$ , $I_{CQ} = 10\text{ mAdc}$ , $f = 1090\text{ MHz}$ , $P_{out} = 0.7\text{ W}$ )	$G_{PE}$	—	10.7	—	dB
Load Mismatch — Class A ( $V_{CE} = 18\text{ Vdc}$ , $I_C = 100\text{ mAdc}$ , $f = 1090\text{ MHz}$ , $P_{out} = 200\text{ mW}$ , VSWR = 10:1 All Phase Angles)	$\psi$	No Degradation in Power Output			



**Class AB Bias Control Circuit**  
18 V Output  $I_{CQ}$  10 mA Nominal



**Class A Constant Current Bias Control Circuit**  
 $I_C = 100\text{ mA}$ ,  $V_{CE} = 18\text{ V}$

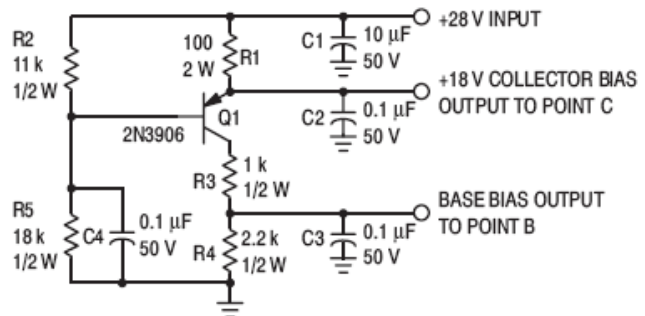


Figure 1. 1090 MHz Test Circuit

**Class A, Class AB Microwave Power Silicon NPN Transistor**  
**0.7 W, 960–1215 MHz, 18V**

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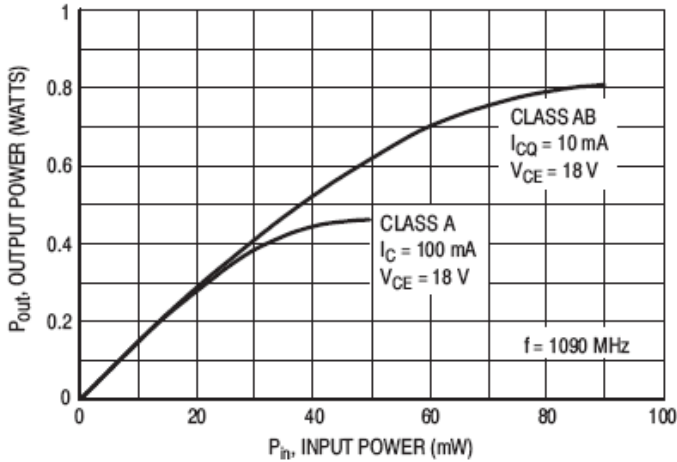


Figure 2. Output Power versus Input Power

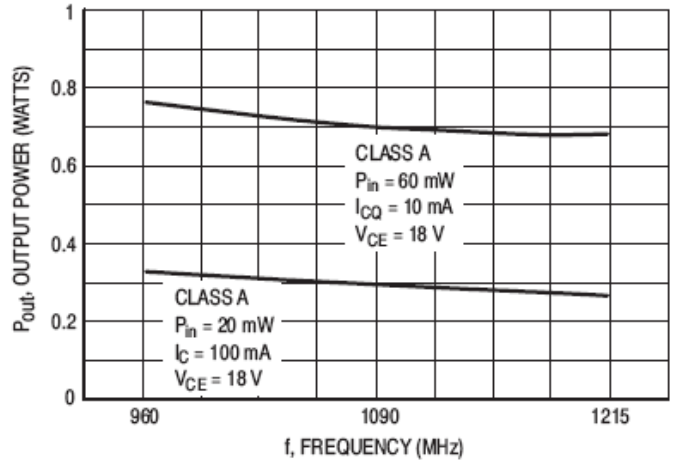


Figure 3. Output Power versus Frequency

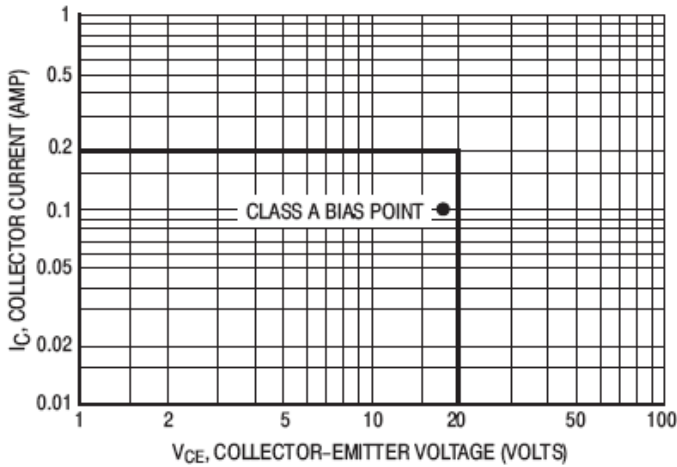


Figure 4. DC Safe Operating Area

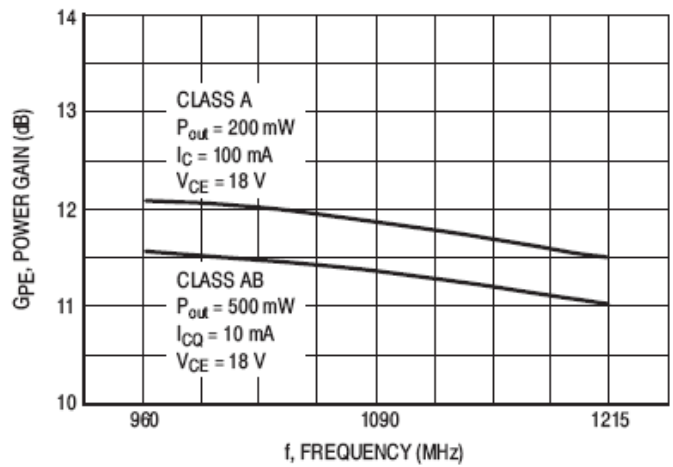
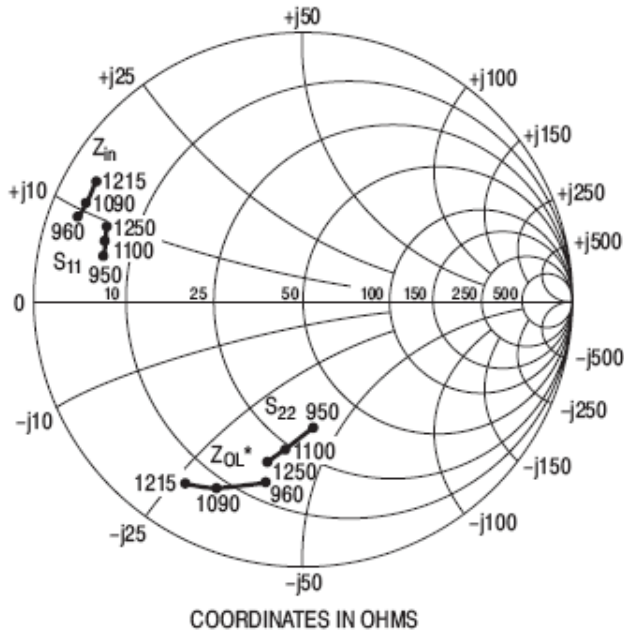


Figure 5. Power Gain versus Frequency

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### SERIES EQUIVALENT IMPEDANCES

$P_{out} = 0.5 \text{ W}$ ,  $V_{CE} = 18 \text{ Vdc}$ ,  
 $I_{CQ} = 10 \text{ mA dc}$ , Class AB

f MHz	$Z_{in}$ Ohms	$Z_{OL}^*$ Ohms
960	$3.0 + j9.0$	$16 - j40$
1090	$3.2 + j10$	$8.5 - j31$
1215	$2.8 + j12$	$7.0 - j26$

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

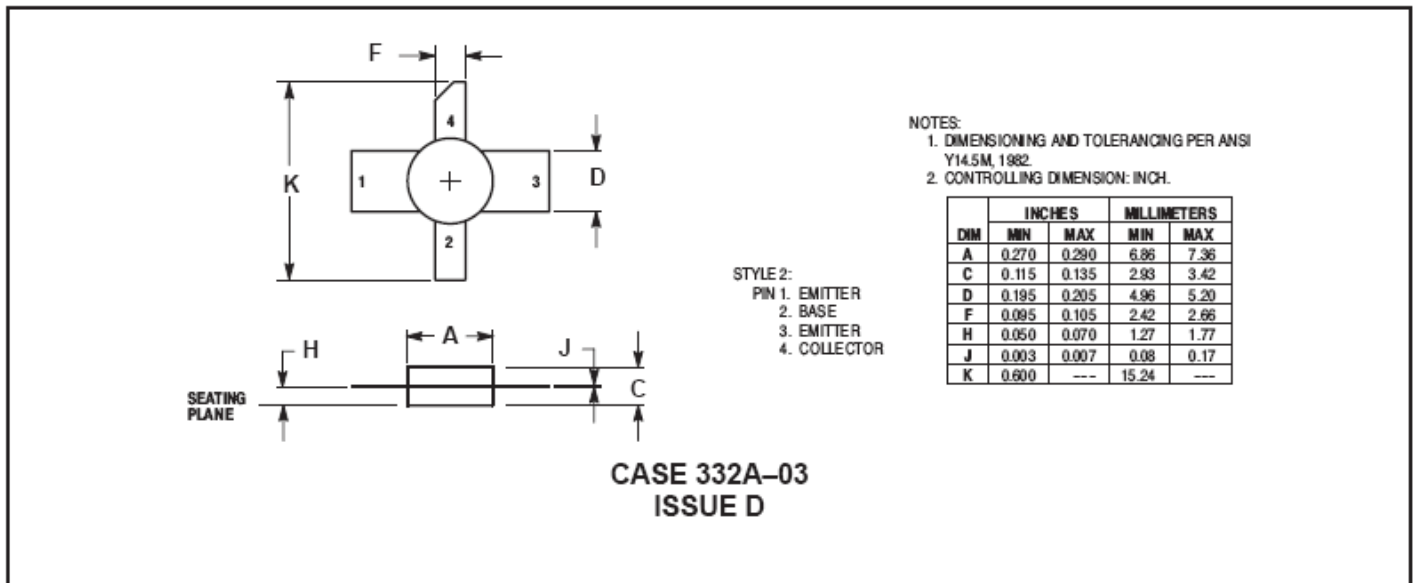
### S-PARAMETERS — $V_{CE} = 18 \text{ Vdc}$ , $I_C = 100 \text{ mA dc}$ , Class A

f (MHz)	$S_{11}$		$S_{21}$		$S_{12}$		$S_{22}$	
	$ S_{11} $	$\angle \phi$	$ S_{21} $	$\angle \phi$	$ S_{12} $	$\angle \phi$	$ S_{22} $	$\angle \phi$
950	0.77	166	2.42	40	0.016	42	0.48	-87
1000	0.78	165	2.36	38	0.016	48	0.50	-90
1050	0.77	163	2.31	33	0.016	46	0.51	-94
1100	0.77	162	2.31	28	0.016	46	0.54	-97
1150	0.78	161	2.20	23	0.015	46	0.57	-100
1200	0.78	159	2.20	19	0.016	47	0.59	-103
1250	0.78	158	2.12	12	0.016	42	0.61	-106

Figure 6. Common-Emitter S-Parameters and Series Equivalent Input/Output Impedances

Replaces MRF1000MA/D

### PACKAGE DIMENSIONS



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