

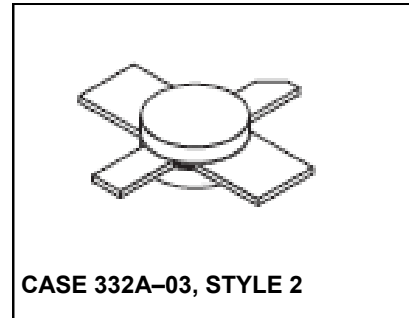
Class A, Class AB Microwave Power Silicon NPN Transistor 0.7 W, 960–1215 MHz, 18V

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°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 |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

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 | — |
|--|----------|----|---|-----|---|

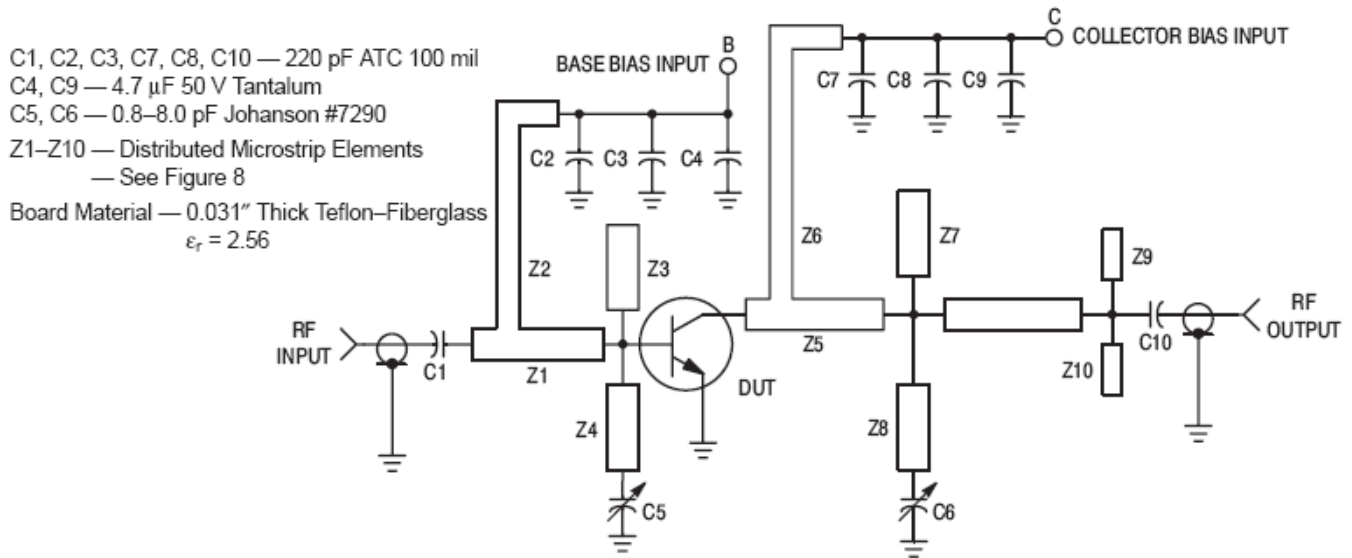
1. These devices are designed for RF operation. The total device dissipation rating applies only when the device is operated as RF amplifiers.
2. Thermal Resistance is determined under specified RF operating conditions by infrared measurement techniques.

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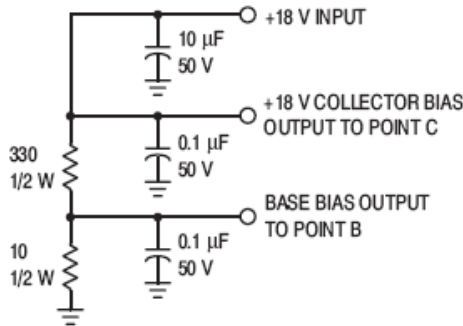
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ELECTRICAL CHARACTERISTICS — continued ($T_C = 25^\circ\text{C}$ unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|--|----------|--------------------------------|------|-----|------|
| DYNAMIC CHARACTERISTICS | | | | | |
| Output Capacitance ($V_{CB} = 28\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$) | C_{ob} | — | 2.0 | 5.0 | pF |
| FUNCTIONAL TESTS | | | | | |
| 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) | ψ | 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
 $I_C = 100\text{ mA}$, $V_{CE} = 18\text{ V}$

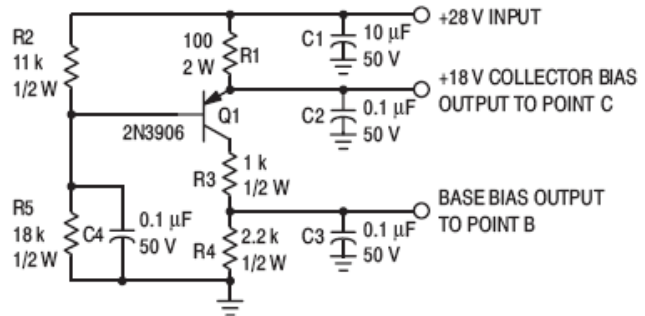


Figure 1. 1090 MHz Test Circuit

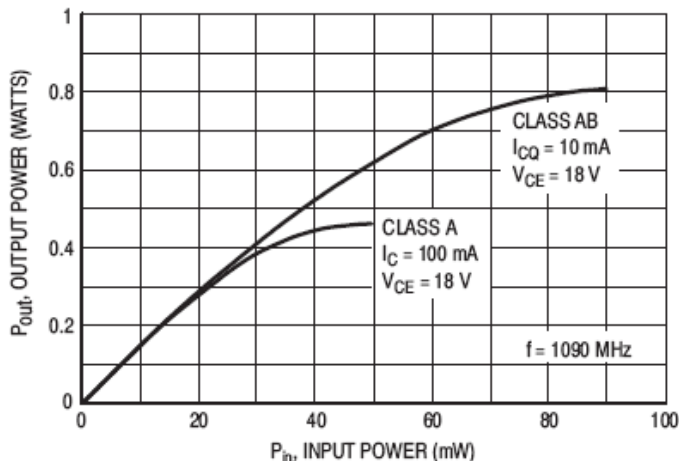


Figure 2. Output Power versus Input Power

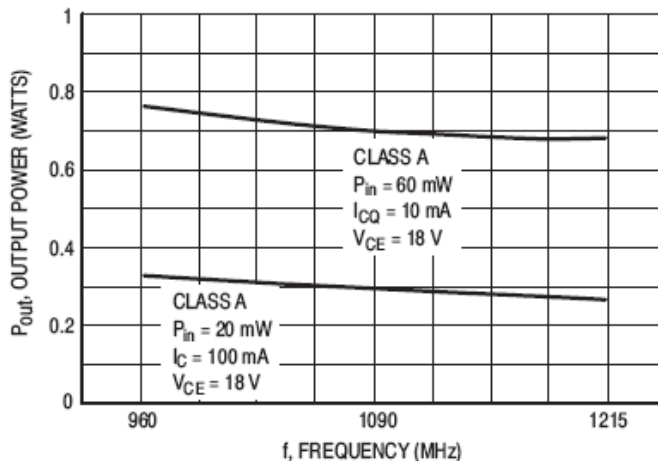


Figure 3. Output Power versus Frequency

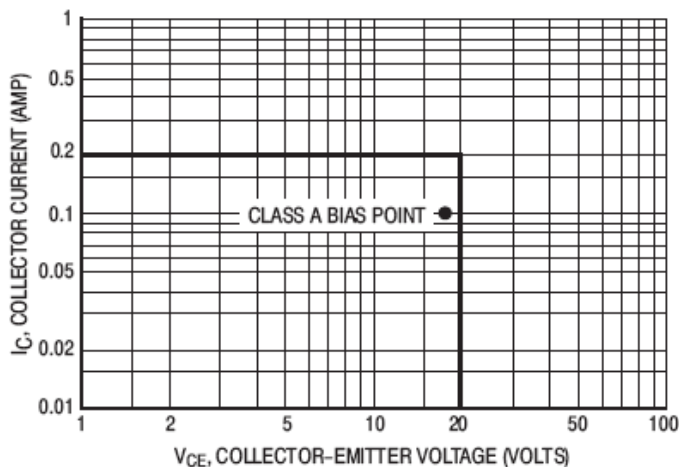


Figure 4. DC Safe Operating Area

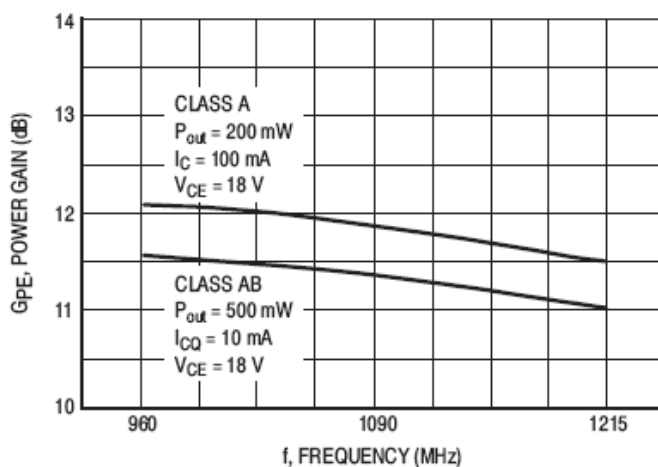
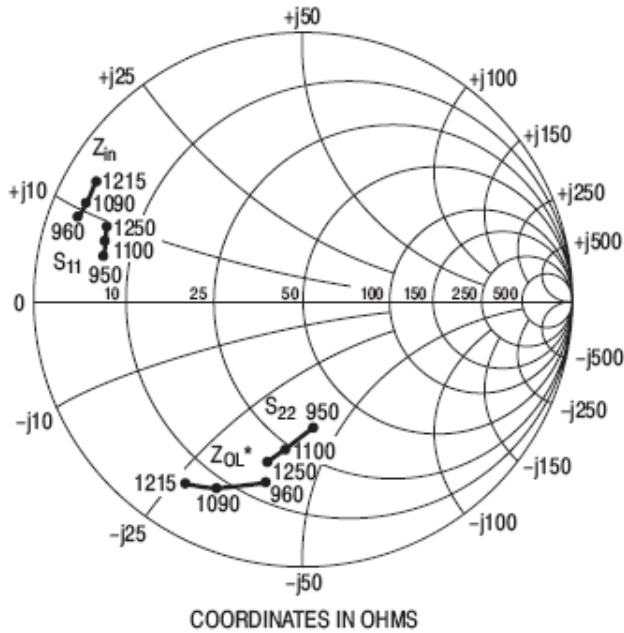


Figure 5. Power Gain versus Frequency

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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.

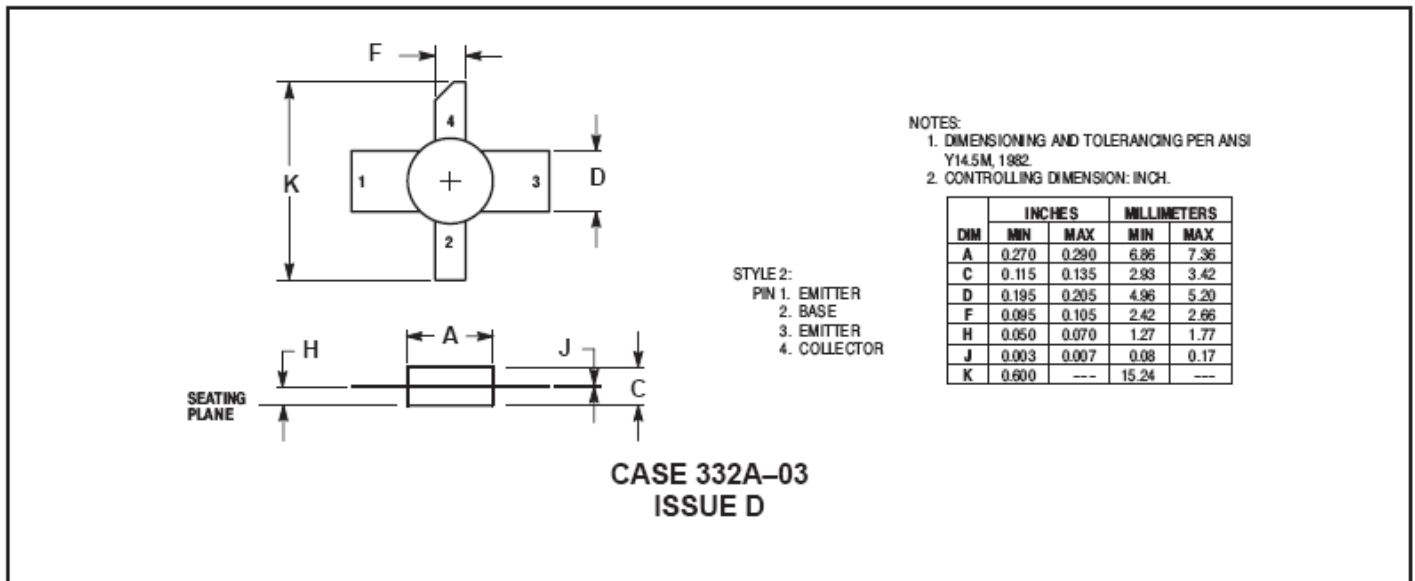
S-PARAMETERS — $V_{CE} = 18 \text{ Vdc}$, $I_C = 100 \text{ mA dc}$, Class A

| 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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