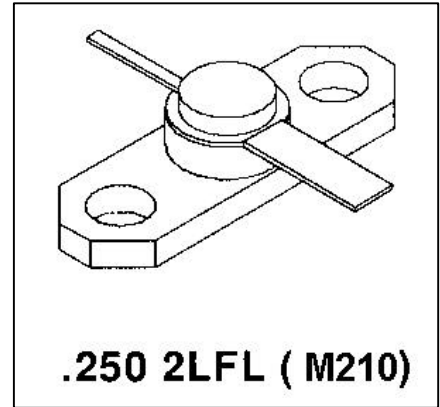


**MSC4000**

**RF AND MICROWAVE TRANSISTORS  
GENERAL PURPOSE AMPLIFIER APPLICATIONS**

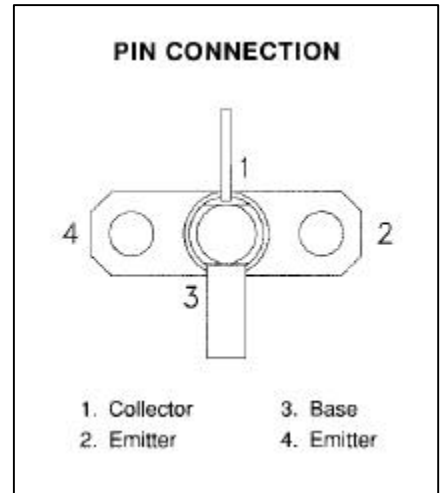
**Features**

- 3:1 VSWR AT RATED CONDITIONS
- HERMETIC STRIPAC® PACKAGE
- P<sub>OUT</sub> = 0.5 W MIN. WITH 5.0 dB GAIN AT 4.0 GHz



**DESCRIPTION:**

The MSC4000 common-base, hermetically sealed silicon NPN microwave power transistor features a unique Microgrid™ structure and can withstand 3:1 VSWR at any phase angle under rated conditions. It is designed for Class C amplifier applications in the 2.0 – 4.4 GHz frequency range.



**ABSOLUTE MAXIMUM RATINGS (T<sub>CASE</sub> = 25°C)**

| Symbol            | Parameter                                  | Value       | Unit |
|-------------------|--|-------------|------|
| P <sub>DISS</sub> | Power Dissipation*                         | 3.89        | W    |
| I <sub>C</sub>    | Device Current*                            | 0.15        | A    |
| V <sub>CC</sub>   | Collector Supply Voltage*                  | 30          | V    |
| T <sub>J</sub>    | Junction Temperature (Pulsed RF Operation) | +200        | °C   |
| T <sub>STG</sub>  | Storage Temperature                        | -65 to +200 | °C   |

**THERMAL DATA**

|                      |                                   |    |      |
|----------------------|-----------------------------------|----|------|
| R <sub>TH(j-c)</sub> | Junction-Case Thermal Resistance* | 45 | °C/W |
|----------------------|-----------------------------------|----|------|

\*Applies only to rated RF amplifier operation

**ELECTRICAL SPECIFICATIONS (T<sub>CASE</sub> = 25°C)**
**STATIC**

| Symbol                  | Test Conditions              |                               |  | Value      |      |            | Unit      |
|-------------------------|------------------------------|-------------------------------|--|------------|------|------------|-----------|
|                         |                              |                               |  | Min.       | Typ. | Max.       |           |
| <b>BV<sub>CBO</sub></b> | <b>I<sub>C</sub> = 1 mA</b>  | <b>I<sub>E</sub> = 0 mA</b>   |  | <b>45</b>  | ---  | ---        | <b>V</b>  |
| <b>BV<sub>EBO</sub></b> | <b>I<sub>E</sub> = 1 mA</b>  | <b>I<sub>C</sub> = 0 mA</b>   |  | <b>3.5</b> | ---  | ---        | <b>V</b>  |
| <b>BV<sub>CER</sub></b> | <b>I<sub>C</sub> = 5 mA</b>  | <b>R<sub>BE</sub> = 10 Ω</b>  |  | <b>45</b>  | ---  | ---        | <b>V</b>  |
| <b>I<sub>CBO</sub></b>  | <b>V<sub>BE</sub> = 28 V</b> |                               |  | ---        | ---  | <b>0.5</b> | <b>mA</b> |
| <b>h<sub>FE</sub></b>   | <b>V<sub>CE</sub> = 5 V</b>  | <b>I<sub>C</sub> = 100 mA</b> |  | <b>15</b>  | ---  | <b>120</b> | ---       |

**DYNAMIC**

| Symbol                 | Test Conditions    |                                |                              | Value      |            |            | Unit      |
|------------------------|--------------------|--------------------------------|------------------------------|------------|------------|------------|-----------|
|                        |                    |                                |                              | Min.       | Typ.       | Max.       |           |
| <b>P<sub>OUT</sub></b> | <b>f = 4.0 GHz</b> | <b>P<sub>IN</sub> = 0.16 W</b> | <b>V<sub>CC</sub> = 28 V</b> | <b>0.5</b> | <b>0.6</b> | ---        | <b>W</b>  |
| <b>η<sub>C</sub></b>   | <b>f = 4.0 GHz</b> | <b>P<sub>IN</sub> = 0.16 W</b> | <b>V<sub>CC</sub> = 28 V</b> | <b>25</b>  | <b>27</b>  | ---        | <b>%</b>  |
| <b>G<sub>P</sub></b>   | <b>f = 4.0 GHz</b> | <b>P<sub>IN</sub> = 0.16 W</b> | <b>V<sub>CC</sub> = 28 V</b> | <b>5.0</b> | <b>5.8</b> | ---        | <b>dB</b> |
| <b>C<sub>OB</sub></b>  | <b>f = 1 MHz</b>   | <b>V<sub>CB</sub> = 28 V</b>   |                              | ---        | ---        | <b>2.5</b> | <b>pF</b> |

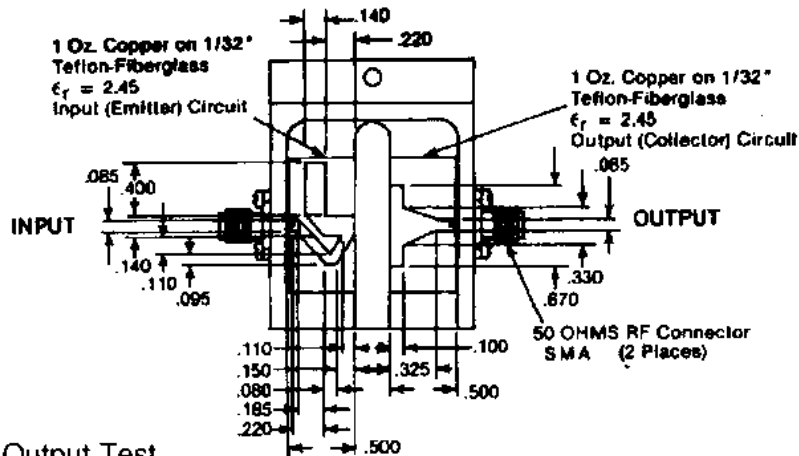
**MSC4000**

**IMPEDANCE DATA**

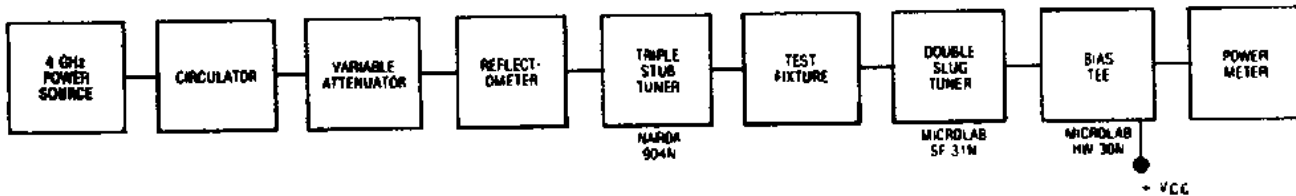
| Freq.   | Z <sub>IN</sub> (Ω) | Z <sub>CL</sub> (Ω) |
|---------|---------------------|---------------------|
| 2.0 GHz | 60.0 – j 85.0       | 6.0 + j 22.0        |
| 2.3 GHz | 42.0 – j 60.0       | 4.5 + j 18.0        |
| 3.0 GHz | 24.0 – j 17.5       | 2.0 + j 5.5         |
| 3.5 GHz | 24.0 + j 42.0       | 2.0 + j 1.3         |
| 4.0 GHz | 33.0 + j 90.0       | 2.0 – j 10.0        |
| 4.4 GHz | 50.0 + j 150.0      | 5.0 – j 17.5        |

**TEST CIRCUIT**

Ref.: Dwg. No. C125504B



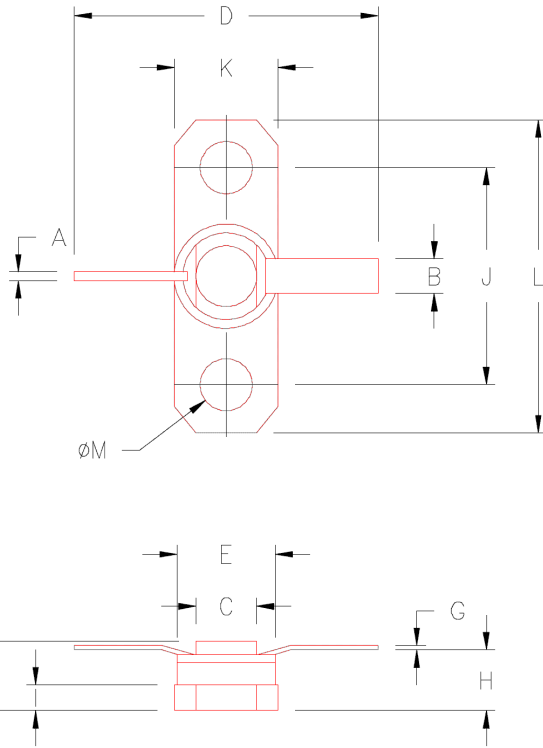
**RF Amplifier Power Output Test**



All dimensions are in inches.

**PACKAGE MECHANICAL DATA**

**PACKAGE STYLE M210**



| INCHES/MM  |   |            |            |
|------------|---|------------|------------|
| .028/0,71  |   |            |            |
| .110/2,80  | K | .245/6,22  | .255/6,48  |
| .165/4,19  | L | .790/20,07 | .810/20,57 |
| .740/18,80 | M | .128/3,25  | .132/3,35  |
| .225/5,72  |   |            |            |
| .149/2,30  |   |            |            |
| .003/0,08  |   |            |            |
| .117/2,97  |   |            |            |
| .058/1,47  |   |            |            |