

# Heterojunction Bipolar Transistor Technology (InGaP HBT)

## Broadband High Linearity Amplifier

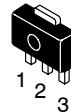
The MMG3014NT1 is a General Purpose Amplifier that is internally input matched and internally output prematched. It is designed for a broad range of Class A, small-signal, high linearity, general purpose applications. It is suitable for applications with frequencies from 40 to 4000 MHz such as Cellular, PCS, BWA, WLL, PHS, CATV, VHF, UHF, UMTS and general small-signal RF.

### Features

- Frequency: 40-4000 MHz
- P1dB: 25 dBm @ 900 MHz
- Small-Signal Gain: 19.5 dB @ 900 MHz
- Third Order Output Intercept Point: 40.5 dBm @ 900 MHz
- Single 5 Volt Supply
- Active Bias
- Low Cost SOT-89 Surface Mount Package
- RoHS Compliant
- In Tape and Reel. T1 Suffix = 1,000 Units per 12 mm, 7 inch Reel.

**MMG3014NT1**

**40-4000 MHz, 19.5 dB  
25 dBm  
InGaP HBT**



**CASE 1514-02, STYLE 1  
SOT-89  
PLASTIC**

**Table 1. Typical Performance <sup>(1)</sup>**

| Characteristic                     | Symbol         | 900 MHz | 2140 MHz | 3500 MHz | Unit |
|------------------------------------|----------------|---------|----------|----------|------|
| Small-Signal Gain (S21)            | G <sub>p</sub> | 19.5    | 15       | 10       | dB   |
| Input Return Loss (S11)            | IRL            | -25     | -12      | -8       | dB   |
| Output Return Loss (S22)           | ORL            | -11     | -13      | -19      | dB   |
| Power Output @1dB Compression      | P1db           | 25      | 25.8     | 25       | dBm  |
| Third Order Output Intercept Point | IP3            | 40.5    | 40.5     | 40       | dBm  |

1. V<sub>CC</sub> = 5 Vdc, T<sub>C</sub> = 25°C, 50 ohm system, in Freescale Application Circuits.

**Table 2. Maximum Ratings**

| Rating                              | Symbol           | Value       | Unit |
|-------------------------------------|------------------|-------------|------|
| Supply Voltage                      | V <sub>CC</sub>  | 6           | V    |
| Supply Current                      | I <sub>CC</sub>  | 300         | mA   |
| RF Input Power                      | P <sub>in</sub>  | 15          | dBm  |
| Storage Temperature Range           | T <sub>stg</sub> | -65 to +150 | °C   |
| Junction Temperature <sup>(2)</sup> | T <sub>J</sub>   | 150         | °C   |

2. For reliable operation, the junction temperature should not exceed 150°C.

**Table 3. Thermal Characteristics** (V<sub>CC</sub> = 5 Vdc, I<sub>CC</sub> = 135 mA, T<sub>C</sub> = 25°C)

| Characteristic                       | Symbol           | Value <sup>(3)</sup> | Unit |
|--------------------------------------|------------------|----------------------|------|
| Thermal Resistance, Junction to Case | R <sub>θJC</sub> | 27.4                 | °C/W |

3. Refer to AN1955, *Thermal Measurement Methodology of RF Power Amplifiers*. Go to <http://www.freescale.com/rf>. Select Documentation/Application Notes - AN1955.

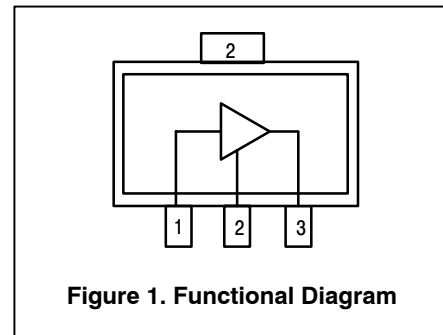
**Table 4. Electrical Characteristics** ( $V_{CC} = 5 \text{ Vdc}$ , 900 MHz,  $T_C = 25^\circ\text{C}$ , 50 ohm system, in Freescale Application Circuit)

| Characteristic                     | Symbol   | Min  | Typ  | Max | Unit |
|------------------------------------|----------|------|------|-----|------|
| Small-Signal Gain (S21)            | $G_p$    | 18.5 | 19.5 | —   | dB   |
| Input Return Loss (S11)            | IRL      | —    | -25  | —   | dB   |
| Output Return Loss (S22)           | ORL      | —    | -11  | —   | dB   |
| Power Output @ 1dB Compression     | P1dB     | —    | 25   | —   | dBm  |
| Third Order Output Intercept Point | IP3      | —    | 40.5 | —   | dBm  |
| Noise Figure                       | NF       | —    | 5.7  | —   | dB   |
| Supply Current <sup>(1)</sup>      | $I_{CC}$ | 110  | 135  | 160 | mA   |
| Supply Voltage <sup>(1)</sup>      | $V_{CC}$ | —    | 5    | —   | V    |

1. For reliable operation, the junction temperature should not exceed  $150^\circ\text{C}$ .

**Table 5. Functional Pin Description**

| Pin Number | Pin Function                 |
|------------|------------------------------|
| 1          | RF <sub>in</sub>             |
| 2          | Ground                       |
| 3          | RF <sub>out</sub> /DC Supply |

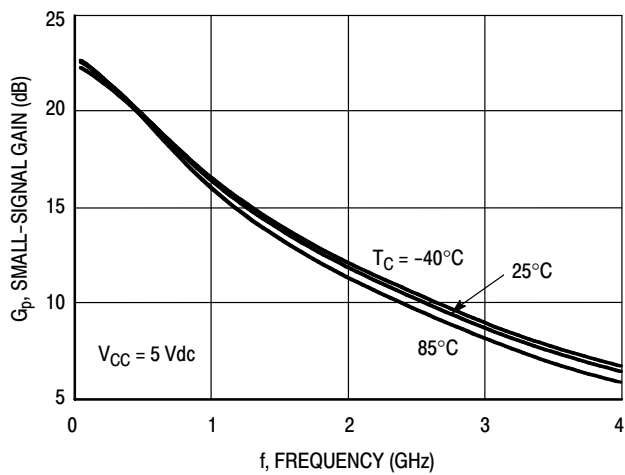
**Table 6. ESD Protection Characteristics**

| Test Conditions/Test Methodology       | Class        |
|----------------------------------------|--------------|
| Human Body Model (per JESD 22-A114)    | 1C (Minimum) |
| Machine Model (per EIA/JESD 22-A115)   | A (Minimum)  |
| Charge Device Model (per JESD 22-C101) | IV (Minimum) |

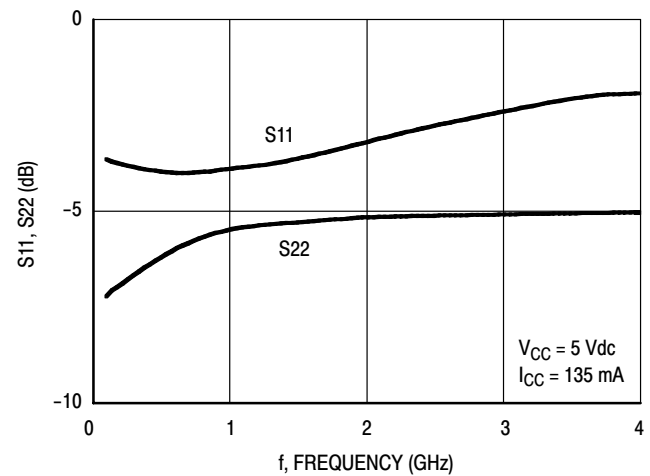
**Table 7. Moisture Sensitivity Level**

| Test Methodology                      | Rating | Package Peak Temperature | Unit |
|---------------------------------------|--------|--------------------------|------|
| Per JESD 22-A113, IPC/JEDEC J-STD-020 | 1      | 260                      | °C   |

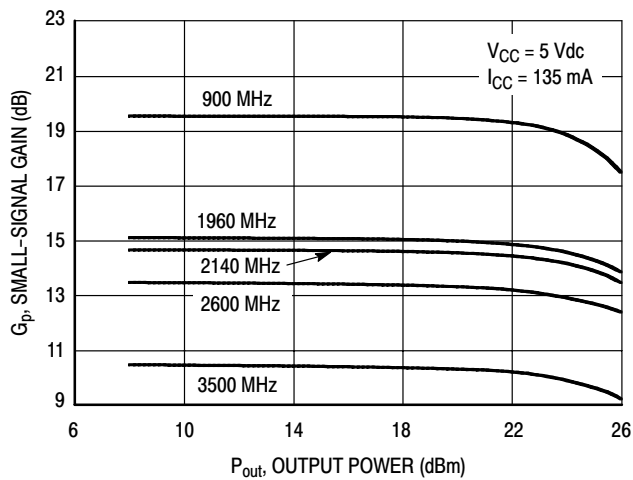
## 50 OHM TYPICAL CHARACTERISTICS



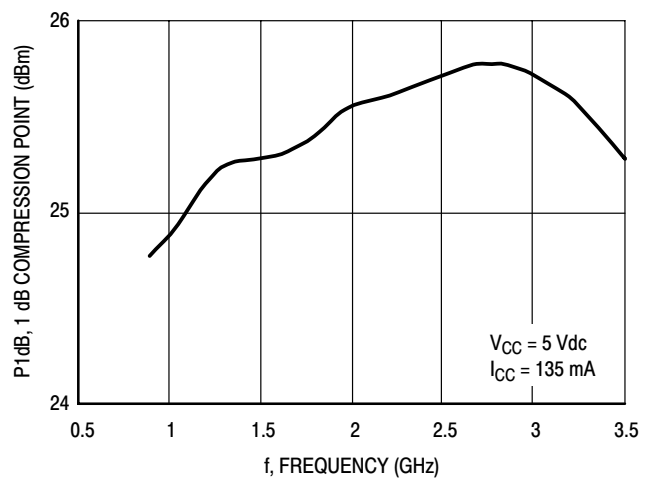
**Figure 2. Small-Signal Gain (S21) versus Frequency**



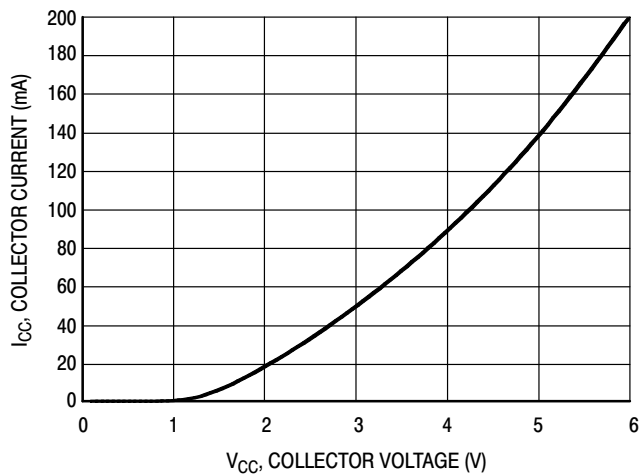
**Figure 3. Input/Output Return Loss versus Frequency**



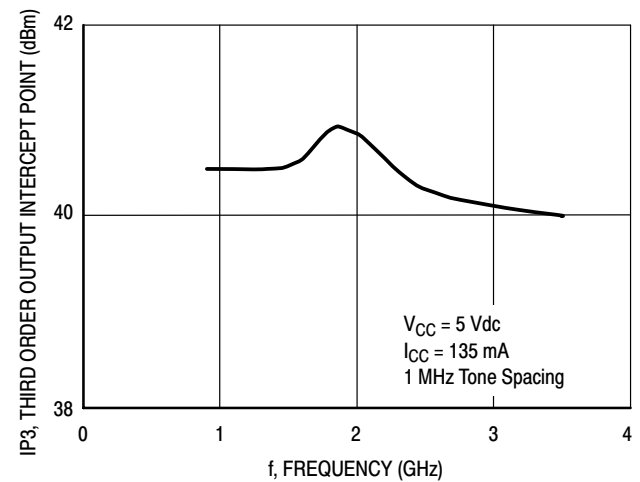
**Figure 4. Small-Signal Gain versus Output Power**



**Figure 5. P1dB versus Frequency**

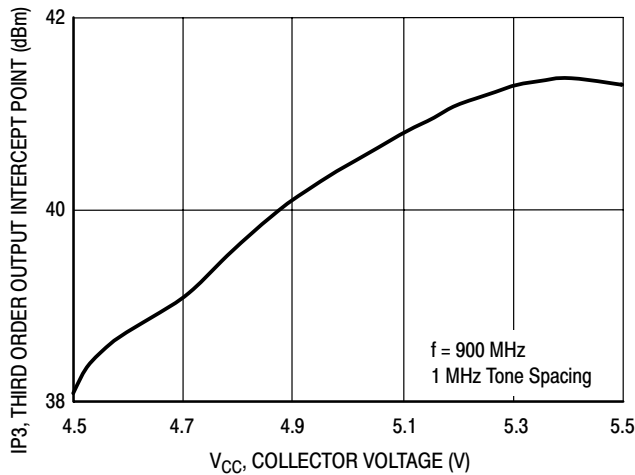


**Figure 6. Collector Current versus Collector Voltage**

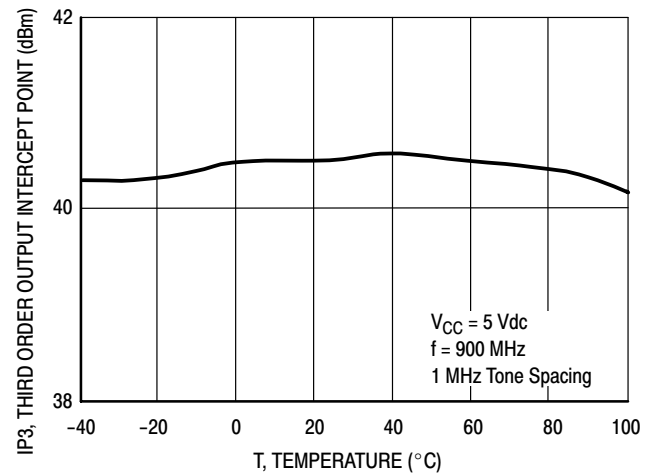


**Figure 7. Third Order Output Intercept Point versus Frequency**

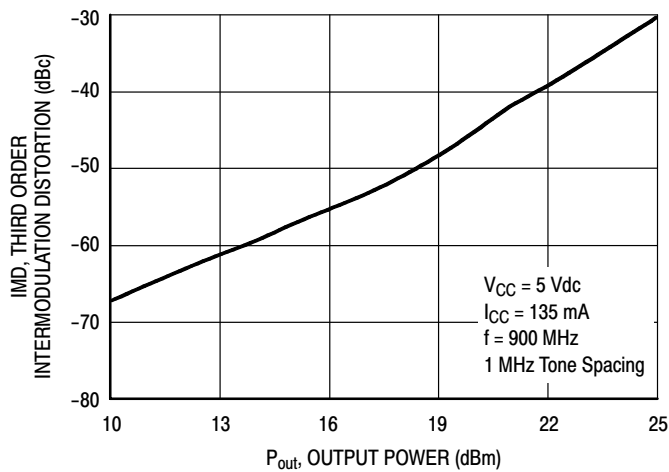
## 50 OHM TYPICAL CHARACTERISTICS



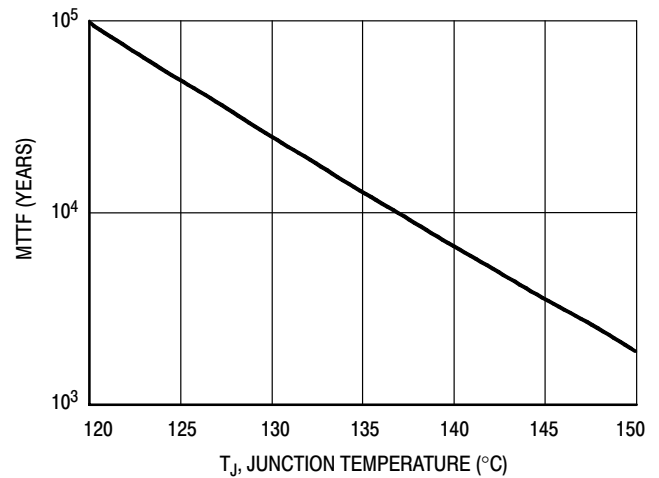
**Figure 8. Third Order Output Intercept Point versus Collector Voltage**



**Figure 9. Third Order Output Intercept Point versus Case Temperature**

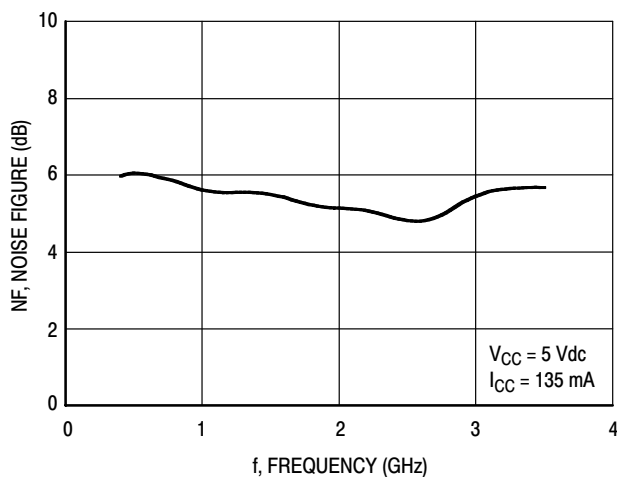


**Figure 10. Third Order Intermodulation versus Output Power**

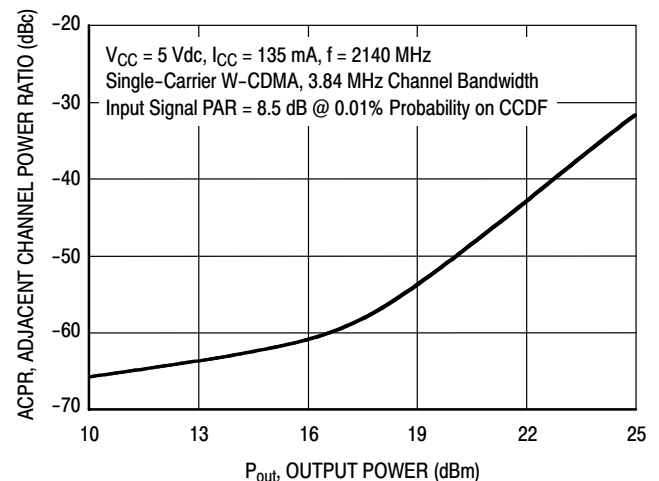


NOTE: The MTTF is calculated with  $V_{CC} = 5 \text{ Vdc}$ ,  $I_{CC} = 135 \text{ mA}$

**Figure 11. MTTF versus Junction Temperature**



**Figure 12. Noise Figure versus Frequency**



**Figure 13. Single-Carrier W-CDMA Adjacent Channel Power Ratio versus Output Power**

## 50 OHM APPLICATION CIRCUIT: 800-1000 MHz

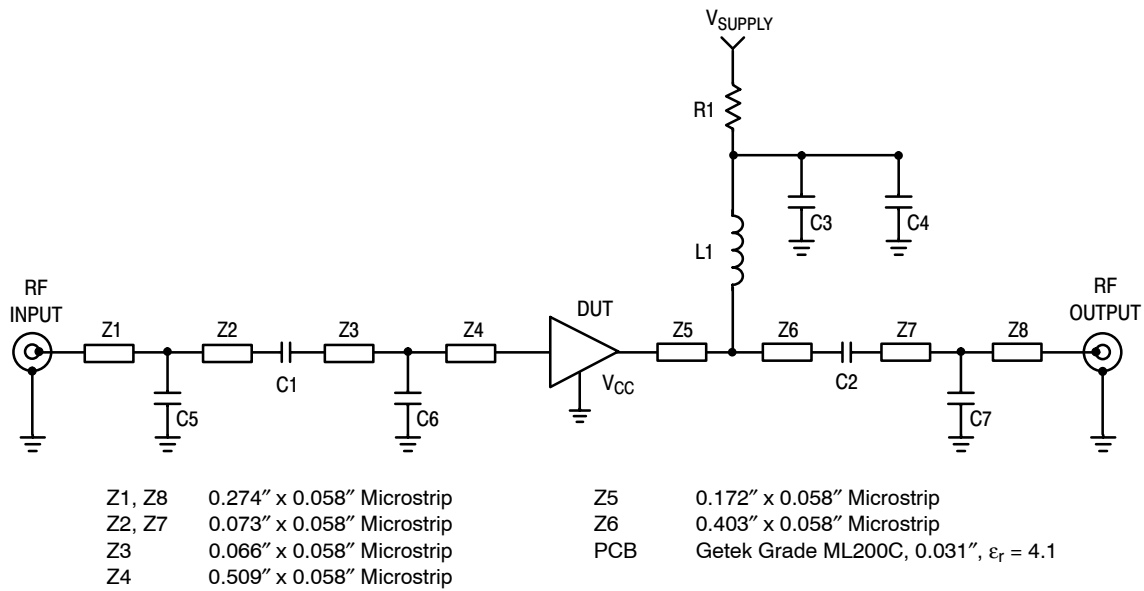


Figure 14. 50 Ohm Test Circuit Schematic

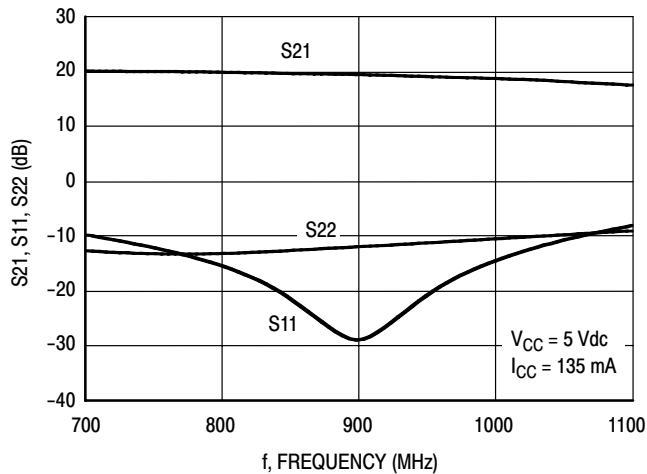


Figure 15. S21, S11 and S22 versus Frequency

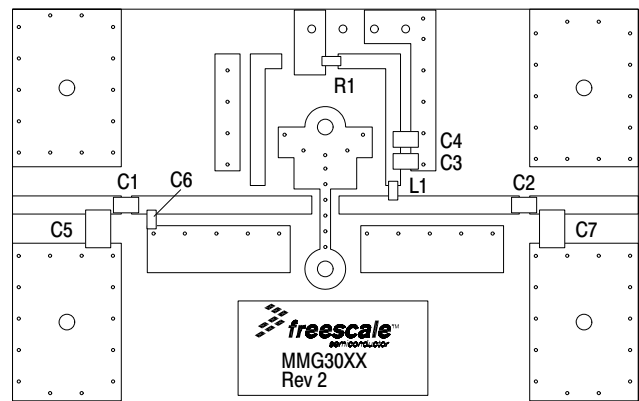


Figure 16. 50 Ohm Test Circuit Component Layout

Table 8. 50 Ohm Test Circuit Component Designations and Values

| Part   | Description                      | Part Number    | Manufacturer |
|--------|----------------------------------|----------------|--------------|
| C1, C2 | 220 pF Chip Capacitors           | C0805C221J5GAC | Kemet        |
| C3     | 0.1 $\mu\text{F}$ Chip Capacitor | C0603C104J5RAC | Kemet        |
| C4     | 2.2 $\mu\text{F}$ Chip Capacitor | C0805C225J4RAC | Kemet        |
| C5     | 0.2 pF Chip Capacitor            | 12065J0R2BS    | AVX          |
| C6     | 4.7 pF Chip Capacitor            | C0603C479J5GAC | Kemet        |
| C7     | 1.8 pF Chip Capacitor            | C0603C189J5GAC | Kemet        |
| L1     | 10 nH Chip Inductor              | HK160810NJ-T   | Taiyo Yuden  |
| R1     | 0 $\Omega$ Chip Resistor         | ERJ3GEY0R00V   | Panasonic    |

## 50 OHM APPLICATION CIRCUIT: 1800-2200 MHz

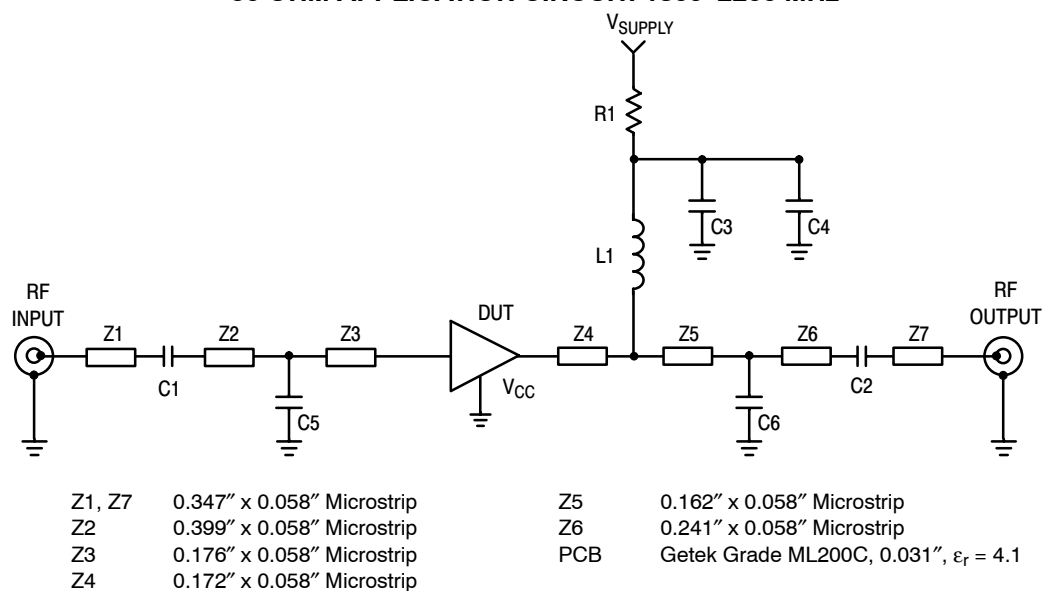


Figure 17. 50 Ohm Test Circuit Schematic

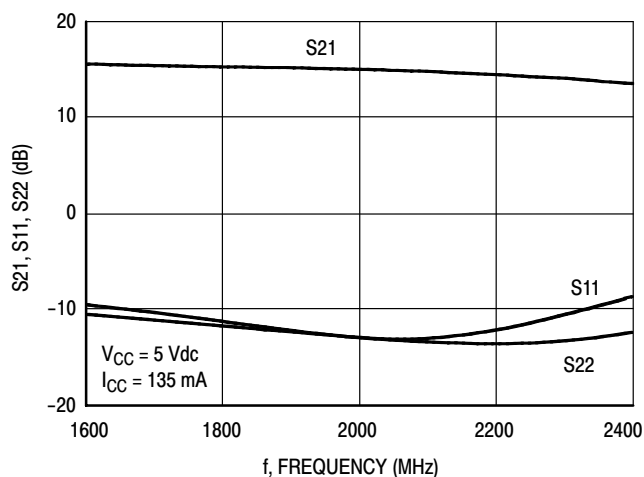


Figure 18. S21, S11 and S22 versus Frequency

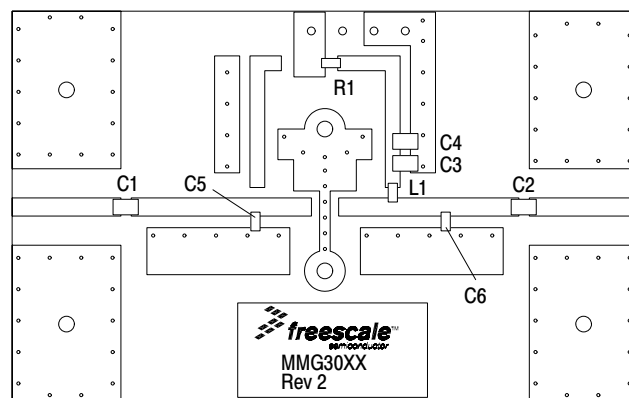


Figure 19. 50 Ohm Test Circuit Component Layout

Table 9. 50 Ohm Test Circuit Component Designations and Values

| Part   | Description                | Part Number    | Manufacturer |
|--------|----------------------------|----------------|--------------|
| C1, C2 | 22 pF Chip Capacitors      | C0805C220J5GAC | Kemet        |
| C3     | 0.1 $\mu$ F Chip Capacitor | C0603C104J5RAC | Kemet        |
| C4     | 2.2 $\mu$ F Chip Capacitor | C0805C225J4RAC | Kemet        |
| C5     | 1.5 pF Chip Capacitor      | C0603C159J5RAC | Kemet        |
| C6     | 1.1 pF Chip Capacitor      | C0603C119J5GAC | Kemet        |
| L1     | 15 nH Chip Inductor        | HK160815NJ-T   | Taiyo Yuden  |
| R1     | 0 $\Omega$ Chip Resistor   | ERJ3GEY0R00V   | Panasonic    |

## 50 OHM APPLICATION CIRCUIT: 2300-2700 MHz

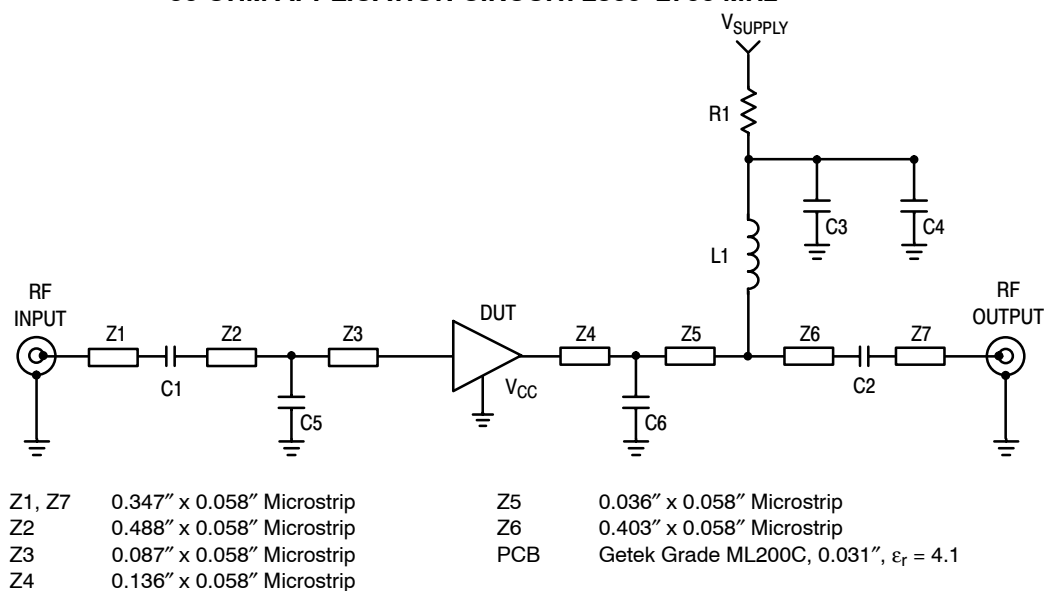


Figure 20. 50 Ohm Test Circuit Schematic

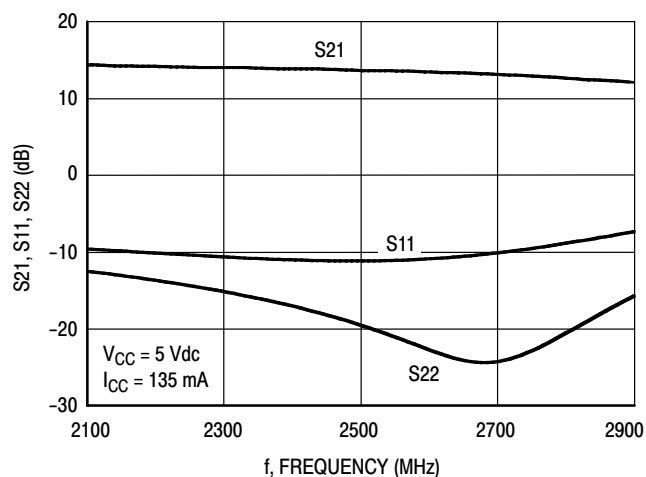


Figure 21. S21, S11 and S22 versus Frequency

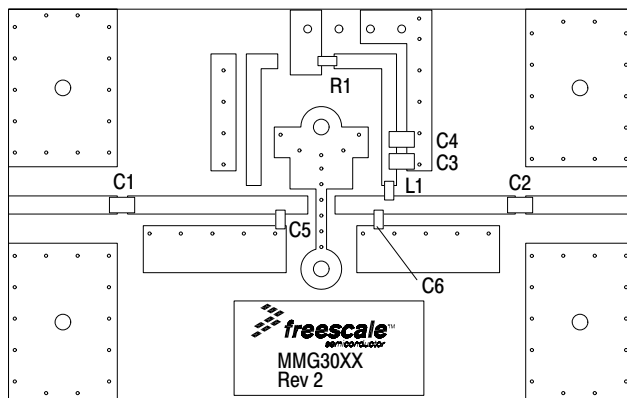


Figure 22. 50 Ohm Test Circuit Component Layout

Table 10. 50 Ohm Test Circuit Component Designations and Values

| Part   | Description                      | Part Number    | Manufacturer |
|--------|----------------------------------|----------------|--------------|
| C1, C2 | 22 pF Chip Capacitors            | C0805C220J5GAC | Kemet        |
| C3     | 0.1 $\mu\text{F}$ Chip Capacitor | C0603C104J5RAC | Kemet        |
| C4     | 2.2 $\mu\text{F}$ Chip Capacitor | C0805C225J4RAC | Kemet        |
| C5, C6 | 1.1 pF Chip Capacitors           | C0603C119J5GAC | Kemet        |
| L1     | 15 nH Chip Inductor              | HK160815NJ-T   | Taiyo Yuden  |
| R1     | 0 $\Omega$ Chip Resistor         | ERJ3GEY0R00V   | Panasonic    |



## 50 OHM APPLICATION CIRCUIT: 3400-3600 MHz

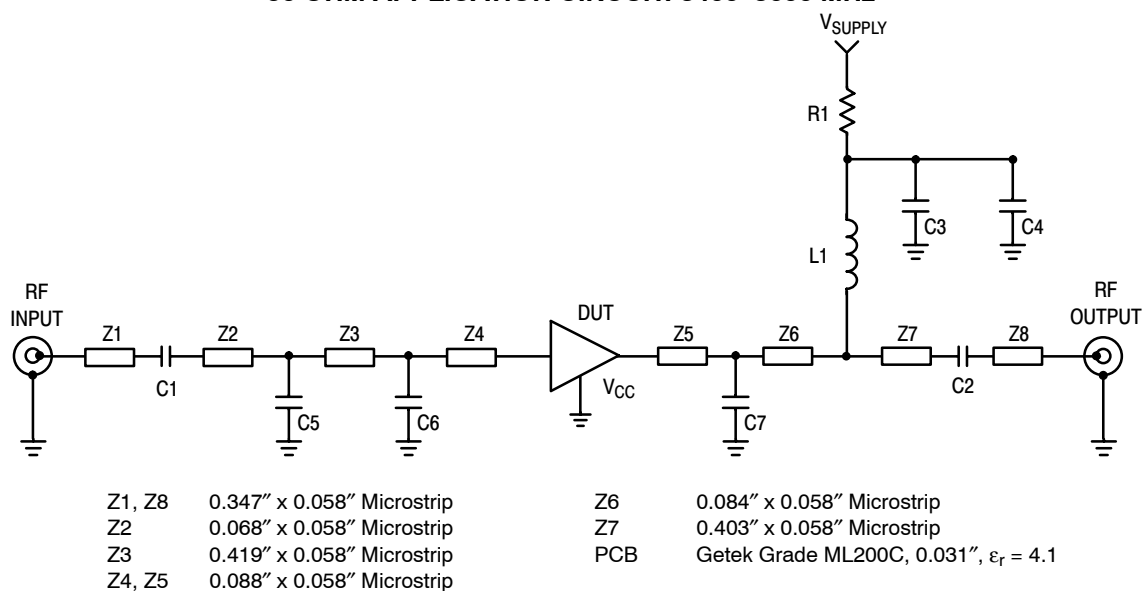


Figure 23. 50 Ohm Test Circuit Schematic

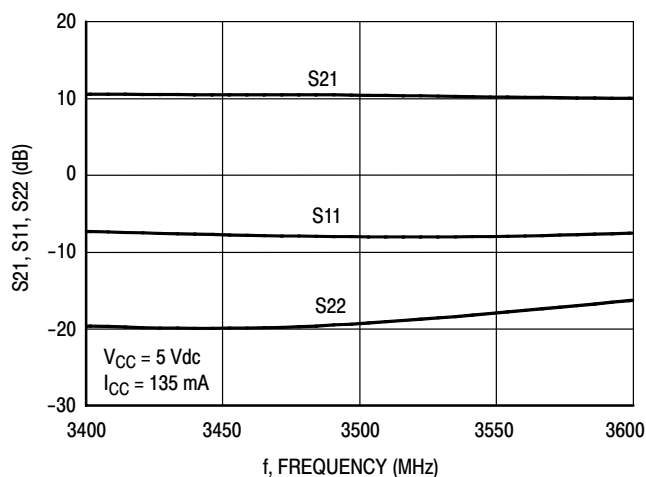


Figure 24. S21, S11 and S22 versus Frequency

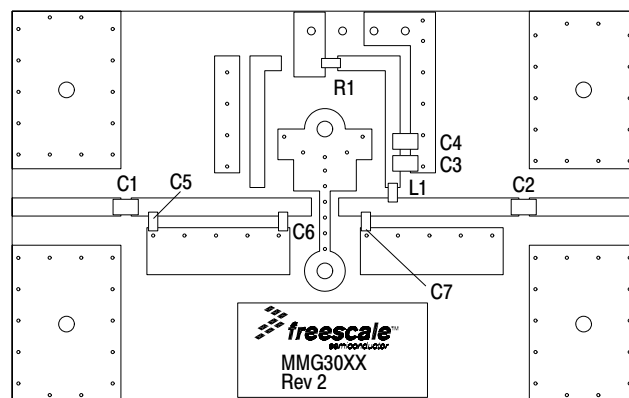


Figure 25. 50 Ohm Test Circuit Component Layout

Table 11. 50 Ohm Test Circuit Component Designations and Values

| Part | Description                | Part Number    | Manufacturer |
|------|----------------------------|----------------|--------------|
| C1   | 3.3 pF Chip Capacitor      | C0805C339J5GAC | Kemet        |
| C2   | 2.0 pF Chip Capacitor      | C0805C209J5GAC | Kemet        |
| C3   | 0.1 $\mu$ F Chip Capacitor | C0603C104J5RAC | Kemet        |
| C4   | 2.2 $\mu$ F Chip Capacitor | C0805C225J4RAC | Kemet        |
| C5   | 0.6 pF Chip Capacitor      | 06035J0R6BS    | AVX          |
| C6   | 0.9 pF Chip Capacitor      | 06035J0R9BS    | AVX          |
| C7   | 0.8 pF Chip Capacitor      | 06035J0R8BS    | AVX          |
| L1   | 56 nH Chip Inductor        | HK160856NJ-T   | Taiyo Yuden  |
| R1   | 0 $\Omega$ Chip Resistor   | ERJ3GEY0R00V   | Panasonic    |

## 50 OHM TYPICAL CHARACTERISTICS

**Table 12. Common Emitter S-Parameters** ( $V_{CC} = 5 \text{ Vdc}$ ,  $I_{CC} = 135 \text{ mA}$ ,  $T_C = 25^\circ\text{C}$ , 50 Ohm System)

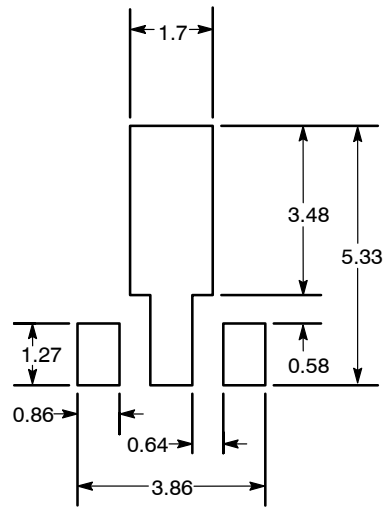
| f<br>MHz | S <sub>11</sub> |               | S <sub>21</sub> |               | S <sub>12</sub> |               | S <sub>22</sub> |               |
|----------|-----------------|---------------|-----------------|---------------|-----------------|---------------|-----------------|---------------|
|          | S <sub>11</sub> | $\angle \phi$ | S <sub>21</sub> | $\angle \phi$ | S <sub>12</sub> | $\angle \phi$ | S <sub>22</sub> | $\angle \phi$ |
| 250      | 0.622           | 174.6         | 10.280          | 153.8         | 0.0336          | 0.6           | 0.448           | -171.6        |
| 300      | 0.618           | 174.0         | 10.107          | 148.3         | 0.0336          | 0.3           | 0.457           | -171.9        |
| 350      | 0.616           | 173.4         | 9.933           | 143.1         | 0.0337          | -0.1          | 0.465           | -172.5        |
| 400      | 0.613           | 173.0         | 9.760           | 138.3         | 0.0337          | -0.4          | 0.475           | -173.3        |
| 450      | 0.611           | 172.5         | 9.586           | 133.8         | 0.0338          | -0.6          | 0.483           | -174.0        |
| 500      | 0.611           | 172.0         | 9.300           | 129.8         | 0.0338          | -0.8          | 0.490           | -174.9        |
| 550      | 0.610           | 171.4         | 9.009           | 126.0         | 0.0339          | -1.0          | 0.497           | -175.8        |
| 600      | 0.610           | 170.9         | 8.716           | 122.4         | 0.0339          | -1.2          | 0.503           | -176.8        |
| 650      | 0.610           | 170.4         | 8.363           | 119.2         | 0.0340          | -1.4          | 0.508           | -177.9        |
| 700      | 0.611           | 169.9         | 8.064           | 116.2         | 0.0340          | -1.6          | 0.512           | -178.9        |
| 750      | 0.615           | 169.5         | 7.734           | 113.3         | 0.0341          | -1.7          | 0.517           | 176.5         |
| 800      | 0.618           | 171.8         | 7.403           | 110.9         | 0.0342          | -1.8          | 0.526           | 175.5         |
| 850      | 0.621           | 171.4         | 7.073           | 108.4         | 0.0342          | -1.9          | 0.533           | 174.5         |
| 900      | 0.625           | 170.9         | 6.838           | 106.0         | 0.0343          | -2.0          | 0.536           | 173.5         |
| 950      | 0.624           | 170.2         | 6.629           | 103.7         | 0.0343          | -2.2          | 0.536           | 172.6         |
| 1000     | 0.624           | 169.6         | 6.422           | 101.5         | 0.0344          | -2.3          | 0.537           | 171.8         |
| 1050     | 0.624           | 168.9         | 6.227           | 99.4          | 0.0344          | -2.5          | 0.537           | 170.9         |
| 1100     | 0.625           | 168.3         | 6.044           | 97.3          | 0.0346          | -2.7          | 0.538           | 169.9         |
| 1150     | 0.626           | 167.6         | 5.866           | 95.4          | 0.0347          | -2.8          | 0.538           | 169.1         |
| 1200     | 0.628           | 166.9         | 5.700           | 93.5          | 0.0349          | -3.0          | 0.539           | 168.2         |
| 1250     | 0.629           | 166.1         | 5.545           | 91.7          | 0.0351          | -3.2          | 0.540           | 167.3         |
| 1300     | 0.632           | 165.4         | 5.393           | 89.9          | 0.0352          | -3.4          | 0.540           | 166.5         |
| 1350     | 0.634           | 164.6         | 5.257           | 88.2          | 0.0354          | -3.6          | 0.541           | 165.6         |
| 1400     | 0.636           | 163.8         | 5.117           | 86.5          | 0.0355          | -3.8          | 0.543           | 164.9         |
| 1450     | 0.640           | 163.0         | 4.988           | 84.8          | 0.0356          | -4.0          | 0.544           | 164.1         |
| 1500     | 0.643           | 162.2         | 4.864           | 83.2          | 0.0357          | -4.2          | 0.545           | 163.3         |
| 1550     | 0.646           | 161.3         | 4.742           | 81.7          | 0.0359          | -4.4          | 0.547           | 162.6         |
| 1600     | 0.649           | 160.5         | 4.630           | 80.1          | 0.0360          | -4.5          | 0.549           | 161.8         |
| 1650     | 0.653           | 159.7         | 4.517           | 78.6          | 0.0361          | -4.8          | 0.550           | 161.1         |
| 1700     | 0.657           | 158.9         | 4.414           | 77.1          | 0.0362          | -5.0          | 0.552           | 160.3         |
| 1750     | 0.661           | 158.0         | 4.312           | 75.6          | 0.0363          | -5.2          | 0.554           | 159.6         |
| 1800     | 0.665           | 157.2         | 4.215           | 74.2          | 0.0364          | -5.5          | 0.556           | 158.9         |
| 1850     | 0.669           | 156.4         | 4.123           | 72.7          | 0.0364          | -5.7          | 0.557           | 158.2         |
| 1900     | 0.673           | 155.5         | 4.033           | 71.3          | 0.0365          | -6.0          | 0.559           | 157.4         |
| 1950     | 0.677           | 154.7         | 3.947           | 69.8          | 0.0366          | -6.3          | 0.560           | 156.7         |
| 2000     | 0.681           | 153.8         | 3.864           | 68.4          | 0.0367          | -6.6          | 0.562           | 156.0         |
| 2050     | 0.685           | 153.0         | 3.783           | 67.0          | 0.0367          | -6.9          | 0.563           | 155.2         |
| 2100     | 0.689           | 152.2         | 3.707           | 65.5          | 0.0368          | -7.2          | 0.564           | 154.4         |
| 2150     | 0.693           | 151.3         | 3.633           | 64.1          | 0.0369          | -7.6          | 0.564           | 153.6         |
| 2200     | 0.697           | 150.5         | 3.562           | 62.7          | 0.0369          | -7.9          | 0.565           | 152.8         |
| 2250     | 0.701           | 149.6         | 3.494           | 61.3          | 0.0370          | -8.3          | 0.565           | 152.0         |
| 2300     | 0.705           | 148.7         | 3.426           | 59.8          | 0.0371          | -8.7          | 0.565           | 151.2         |
| 2350     | 0.709           | 147.8         | 3.363           | 58.4          | 0.0371          | -9.1          | 0.564           | 150.3         |

(continued)

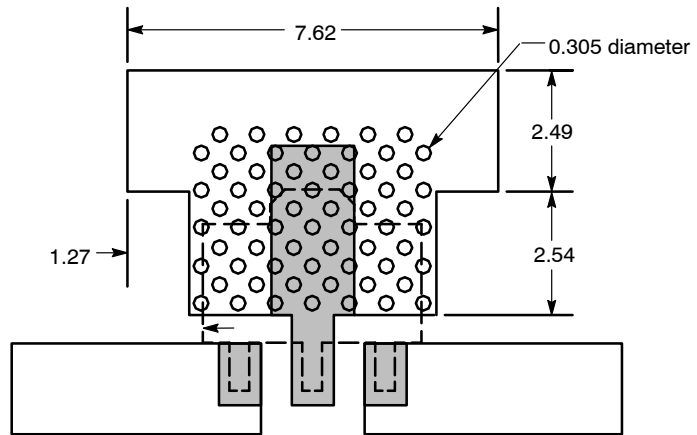
## 50 OHM TYPICAL CHARACTERISTICS

**Table 12. Common Emitter S-Parameters** ( $V_{CC} = 5 \text{ Vdc}$ ,  $I_{CC} = 135 \text{ mA}$ ,  $T_C = 25^\circ\text{C}$ , 50 Ohm System) (continued)

| f<br>MHz | S <sub>11</sub> |       | S <sub>21</sub> |      | S <sub>12</sub> |       | S <sub>22</sub> |       |
|----------|-----------------|-------|-----------------|------|-----------------|-------|-----------------|-------|
|          | S <sub>11</sub> | ∠ φ   | S <sub>21</sub> | ∠ φ  | S <sub>12</sub> | ∠ φ   | S <sub>22</sub> | ∠ φ   |
| 2400     | 0.712           | 146.9 | 3.299           | 57.0 | 0.0372          | -9.5  | 0.564           | 149.5 |
| 2450     | 0.715           | 146.0 | 3.240           | 55.6 | 0.0373          | -9.9  | 0.563           | 148.6 |
| 2500     | 0.719           | 145.0 | 3.181           | 54.1 | 0.0373          | -10.3 | 0.562           | 147.7 |
| 2550     | 0.722           | 144.1 | 3.124           | 52.7 | 0.0374          | -10.8 | 0.562           | 146.8 |
| 2600     | 0.724           | 143.1 | 3.071           | 51.3 | 0.0374          | -11.2 | 0.561           | 145.9 |
| 2650     | 0.728           | 142.2 | 3.017           | 49.9 | 0.0375          | -11.6 | 0.560           | 145.0 |
| 2700     | 0.730           | 141.2 | 2.968           | 48.5 | 0.0376          | -12.0 | 0.559           | 144.0 |
| 2750     | 0.733           | 140.2 | 2.920           | 47.1 | 0.0377          | -12.4 | 0.559           | 143.1 |
| 2800     | 0.736           | 139.2 | 2.872           | 45.8 | 0.0378          | -12.9 | 0.558           | 142.1 |
| 2850     | 0.738           | 138.2 | 2.828           | 44.4 | 0.0380          | -13.4 | 0.557           | 141.1 |
| 2900     | 0.740           | 137.2 | 2.784           | 43.0 | 0.0381          | -13.8 | 0.557           | 140.1 |
| 2950     | 0.742           | 136.2 | 2.743           | 41.7 | 0.0382          | -14.4 | 0.557           | 139.1 |
| 3000     | 0.745           | 135.2 | 2.703           | 40.3 | 0.0384          | -14.9 | 0.557           | 138.1 |
| 3050     | 0.747           | 134.2 | 2.664           | 39.0 | 0.0385          | -15.4 | 0.557           | 137.1 |
| 3100     | 0.749           | 133.1 | 2.627           | 37.6 | 0.0386          | -15.9 | 0.557           | 136.1 |
| 3150     | 0.751           | 132.1 | 2.590           | 36.3 | 0.0388          | -16.4 | 0.557           | 135.1 |
| 3200     | 0.753           | 131.1 | 2.555           | 35.0 | 0.0389          | -17.0 | 0.558           | 134.1 |
| 3250     | 0.756           | 130.1 | 2.521           | 33.7 | 0.0390          | -17.5 | 0.558           | 133.2 |
| 3300     | 0.758           | 129.1 | 2.487           | 32.4 | 0.0391          | -18.0 | 0.559           | 132.2 |
| 3350     | 0.760           | 128.1 | 2.455           | 31.1 | 0.0393          | -18.5 | 0.560           | 131.3 |
| 3400     | 0.762           | 127.1 | 2.422           | 29.8 | 0.0394          | -19.0 | 0.560           | 130.5 |
| 3450     | 0.764           | 126.1 | 2.392           | 28.6 | 0.0395          | -19.5 | 0.561           | 129.6 |
| 3500     | 0.766           | 125.1 | 2.361           | 27.3 | 0.0396          | -20.0 | 0.562           | 128.9 |
| 3550     | 0.768           | 124.2 | 2.331           | 26.1 | 0.0397          | -20.5 | 0.563           | 128.1 |
| 3600     | 0.770           | 123.2 | 2.302           | 24.9 | 0.0398          | -21.0 | 0.564           | 127.4 |
| 3650     | 0.772           | 122.3 | 2.273           | 23.7 | 0.0399          | -21.4 | 0.565           | 126.7 |
| 3700     | 0.774           | 121.3 | 2.246           | 22.6 | 0.0400          | -21.8 | 0.566           | 126.1 |
| 3750     | 0.775           | 120.4 | 2.218           | 21.5 | 0.0401          | -22.2 | 0.567           | 125.6 |
| 3800     | 0.777           | 119.5 | 2.192           | 20.4 | 0.0403          | -22.6 | 0.568           | 125.1 |
| 3850     | 0.778           | 118.6 | 2.167           | 19.2 | 0.0404          | -23.0 | 0.569           | 124.6 |
| 3900     | 0.780           | 117.6 | 2.142           | 18.1 | 0.0405          | -23.4 | 0.570           | 124.2 |
| 3950     | 0.781           | 116.7 | 2.118           | 17.1 | 0.0406          | -23.9 | 0.571           | 123.7 |
| 4000     | 0.783           | 115.8 | 2.091           | 16.0 | 0.0407          | -24.2 | 0.572           | 123.5 |



Recommended Solder Stencil



NOTES:

1. THERMAL AND RF GROUNDING CONSIDERATIONS SHOULD BE USED IN PCB LAYOUT DESIGN.
2. DEPENDING ON PCB DESIGN RULES, AS MANY VIAS AS POSSIBLE SHOULD BE PLACED ON THE LANDING PATTERN.
3. IF VIAS CANNOT BE PLACED ON THE LANDING PATTERN, THEN AS MANY VIAS AS POSSIBLE SHOULD BE PLACED AS CLOSE TO THE LANDING PATTERN AS POSSIBLE FOR OPTIMAL THERMAL AND RF PERFORMANCE.
4. RECOMMENDED VIA PATTERN SHOWN HAS 0.381 x 0.762 MM PITCH.

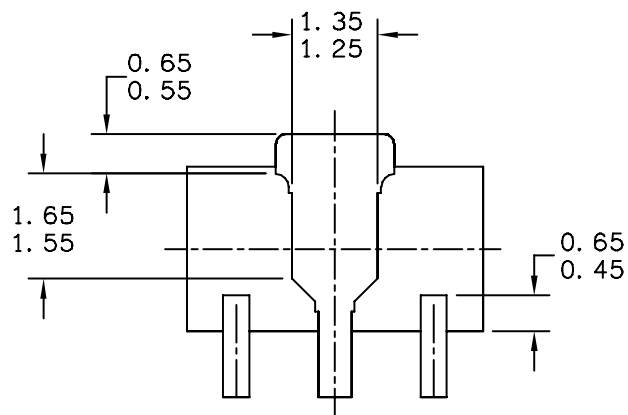
Figure 26. Recommended Mounting Configuration

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RF Device Data



BOTTOM VIEW

CASE STYLE:

STYLE 1:

PIN 1. RF INPUT  
PIN 2. GROUND  
PIN 3. RF OUTPUT

STYLE 2:

PIN 1. GATE  
PIN 2. SOURCE  
PIN 3. DRAIN

|                                                              |  |                    |                          |                            |             |
|--------------------------------------------------------------|--|--------------------|--------------------------|----------------------------|-------------|
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|                                                              |  |                    | CASE NUMBER: 1514-02     |                            | 27 JUN 2007 |
|                                                              |  |                    | STANDARD: NON-JEDEC      |                            |             |

NOTES:

1 DIMENSIONING AND TOLERANCING PER ASME Y14.5M – 1994.

2 ALL DIMENSIONS ARE IN MILLIMETERS.

△3 DIMENSIONS DOES NOT INCLUDE MOLD FLASH. PROTRUSIONS OR GATE BURRS.  
MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.5mm PER END.  
DIMENSION DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH  
OR PROTRUSION SHALL NOT EXCEED 0.5 mm PER SIDE.

△4 DIMENSION ARE DETERMINED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY  
EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT  
INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY.

△5 TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.

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|                                                          | CASE NUMBER: 1514-02      |                            | 27 JUN 2007 |
|                                                          | STANDARD: NON-JEDEC       |                            |             |

## PRODUCT DOCUMENTATION

Refer to the following documents to aid your design process.

### Application Notes

- AN1955: Thermal Measurement Methodology of RF Power Amplifiers
- AN3100: General Purpose Amplifier Biasing

## REVISION HISTORY

The following table summarizes revisions to this document.

| Revision | Date       | Description                                                                                                                                                                                                                                                                          |
|----------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0        | Apr. 2008  | <ul style="list-style-type: none"><li>• Initial Release of Data Sheet</li></ul>                                                                                                                                                                                                      |
| 1        | Sept. 2008 | <ul style="list-style-type: none"><li>• Updated Fig. 15, "S21, S11 and S22 versus Frequency", to correct S11 and S22 curve label transposition error, p. 6</li><li>• Updated data in Table 12, "Common Emitter S-Parameters", for better simulation response, p. 10 and 11</li></ul> |



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