

MBC13916



(Scale 2:1)

Package Information

Plastic Package
 Case 1404
 (SOT-343R)

MBC13916

General Purpose SiGe:C RF Cascode Low Noise Amplifier

Ordering Information

| Device | Device Marking or Operating Temperature Range | Package |
|--------------------------|---|----------|
| MBC13916T1 ¹ | 916 | SOT-343R |
| MBC13916NT1 ¹ | 16N | SOT-343R |

¹ Refer to [Table 1](#).

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1 Introduction

The MBC13916 is a cost-effective, high isolation amplifier fabricated with an advanced RF BiCMOS process using the SiGe:C module. It is intended to be a replacement for the MRFIC0916 and is housed in the smaller SOT-343R surface mount package. As with the MRFIC0916, this device is designed for general purpose RF applications, yet has improved high frequency gain and noise figure. On-chip bias circuitry sets the bias point while matching is accomplished off-chip, affording the maximum in application flexibility.

- Usable frequency range = 100 to 2500 MHz
- 19 dB typical gain at 900 MHz, $V_{CC} = 2.7$ V
- NF_{min} (device level) = 0.9 dB @ 900 MHz
- NF_{min} (device level) = 1.9 dB @ 1.9 GHz
- 2.5 dBm typical output power at 1.0 dB gain compression at 900 MHz, $V_{CC} = 2.7$ V
- 45 dB typical reverse isolation (device level) at 900 MHz, $V_{CC} = 2.7$ V
- 4.7 mA typical bias current at $V_{CC} = 2.7$ V
- 2.7 to 5.0 V supply

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Ordering Information

- Industry standard SOT-343R package
- Device weight = 0.00642 g (typical)
- Available only in tape and reel packaging
- Available only in a lead free version (device number MBC13916NT1) (Refer to [Table 1.](#))

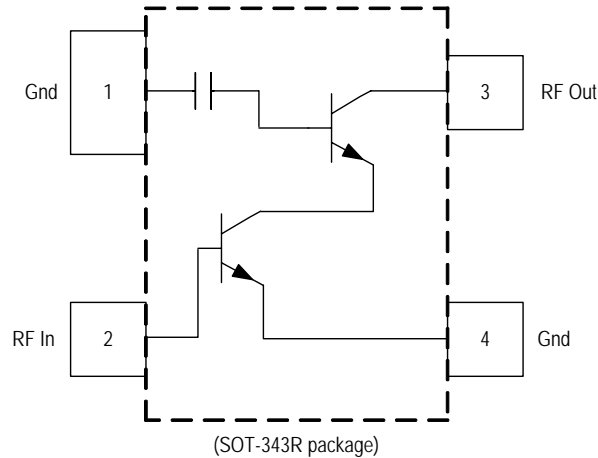


Figure 1. Functional Block Diagram

2 Ordering Information

[Table 1](#) provides additional details on MBC13916 orderable parts.

Table 1. Orderable Parts Details

| Device | Operating Temp Range (TA.) | Package | Lead Frame | RoHS Compliant | PB-Free | MSL Level | Solder Temp |
|-------------|----------------------------|---------------|------------|----------------|---------|-----------|-------------|
| MBC13916T1 | -40° to 85° C | Tape and Reel | Pb Plate | - | No | - | - |
| MBC13916NT1 | -40° to 85° C | Tape and Reel | Pb Free | Yes | Yes | 1 | 260° C |

3 Electrical Characteristics

Table 2. Recommended Operating Conditions

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|----------|-----|-----|------|------|
| RF Frequency | f_{RF} | 100 | - | 2500 | MHz |
| Supply Voltage | V_{CC} | 2.7 | - | 5.0 | Vdc |

Table 3. Maximum Ratings

| Ratings | Symbol | Value | Unit |
|----------------|----------|-------|------|
| Supply Voltage | V_{CC} | 6.0 | Vdc |
| RF Input Power | P_{RF} | 10 | dBm |

Table 3. Maximum Ratings

| Ratings | Symbol | Value | Unit |
|--------------------------------------|-----------------|------------|------|
| Power Dissipation | P_{DIS} | 100 | mW |
| Supply Current | I_{CC} | 20 | mA |
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 400 | °C/W |
| Storage Temperature Range | T_{stg} | -65 to 150 | °C |

Note: Maximum Ratings and ESD

1. Maximum Ratings are those values beyond which damage to the device may occur. Functional operation should be restricted to the limits in the Recommended Operating Conditions and Electrical Characteristics tables.
2. ESD (electrostatic discharge) immunity meets Human Body Model (HBM) ≤ 550 V and Machine Model (MM) ≤ 50 V. Additional ESD data available upon request.

Table 4. Device Level Characteristics

($V_{CC} = 2.7$ V, $T_A = 25^\circ$ C, measured in S-parameter test fixture, unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|--------------|--------|--------------|--------|------|
| Insertion Gain f = 900 MHz f = 1900 MHz | $ S_{21} ^2$ | - - | 16.5 10 | - - | dB |
| Maximum Stable Gain and/or Maximum Available Gain [Note 1] f = 900 MHz f = 1900 MHz | MSG, MAG | - - | 24.5 14.3 | - - | dB |
| Minimum Noise Figure [Note 2] f = 900 MHz f = 1900 MHz | NF_{min} | - - | 0.9 1.9 | - - | dB |
| Output Third Order Intercept Point [Note 3] f = 900 MHz f = 1900 MHz | OIP3 | - - | 13 9 | - - | dBm |
| Reverse Isolation f = 900 MHz f = 1900 MHz | $ S_{12} ^2$ | - - | -45 -31 | - - | dB |

Note: 1. Maximum Available Gain and Maximum Stable Gain are defined by the K factor as follows:

$$MAG = \left| \frac{S_{21}}{S_{12}} (K \pm \sqrt{K^2 - 1}) \right|, \text{ if } K > 1, \text{ MSG} = \left| \frac{S_{21}}{S_{12}} \right|, \text{ if } K < 1$$

2. Device matched for best noise figure.
3. Z_{out} matched for optimum IP3.

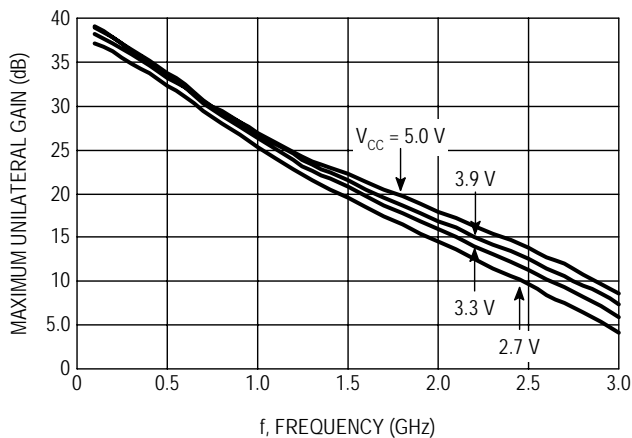


Figure 2. GUMax versus Frequency

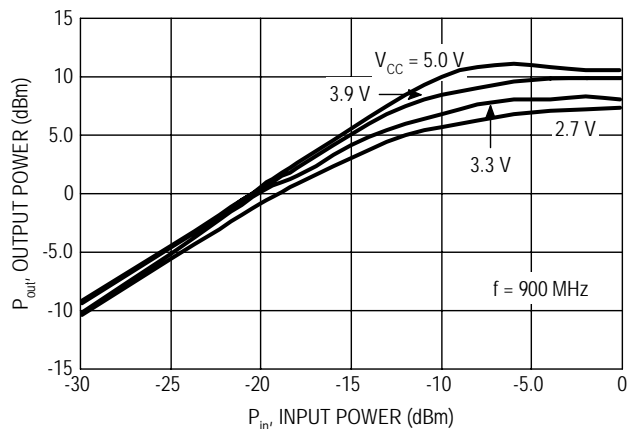


Figure 3. Output Power versus Input Power

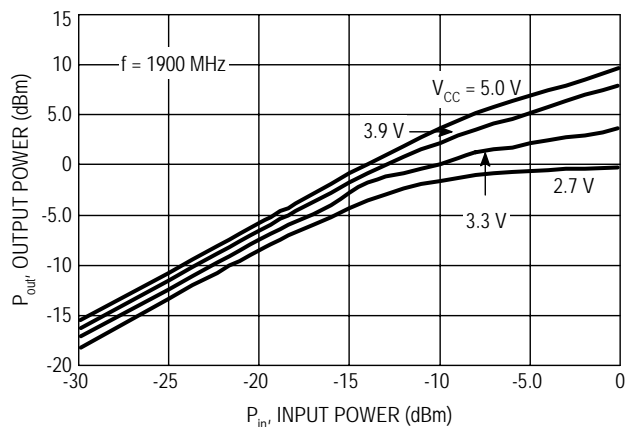


Figure 4. Output Power versus Input Power

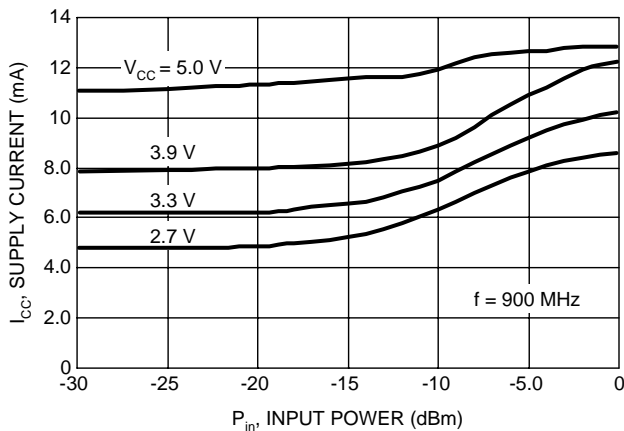


Figure 5. Supply Current versus Input Power

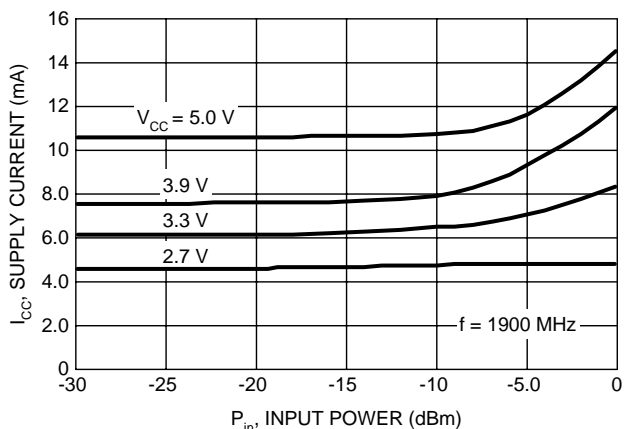


Figure 6. Supply Current versus Input Power

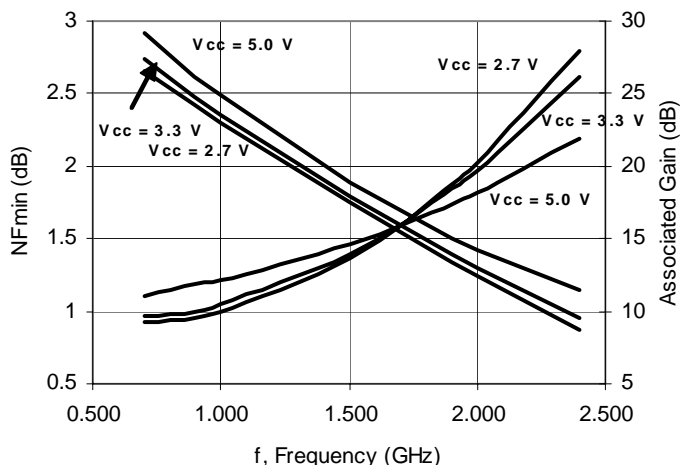


Figure 7. Minimum Noise Figure and Associated Gain versus Frequency

3.1 Applications Circuits

Figures 8 and 9 show the 900 MHz applications circuit configuration and printed circuit board. The 1.9 GHz application configuration circuit and printed circuit board are shown in Figures 10 and 11. Tables 5 and 6 represent the electrical characteristics for the tested 900 MHz and 1.9 GHz application circuits. The bill of materials is listed in Table 7.

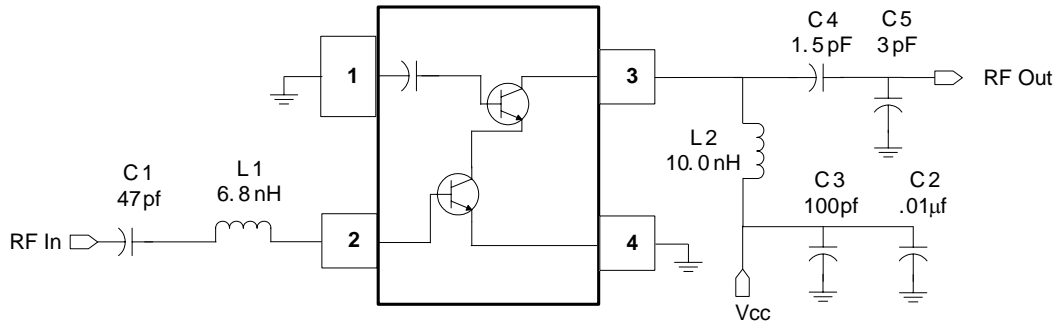


Figure 8. 900 MHz Applications Circuit Configuration

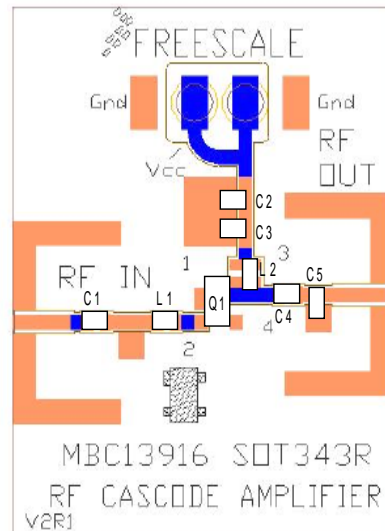


Figure 9. 900 MHz Printed Circuit Board

Table 5. Electrical Characteristics

($V_{CC} = 2.7\text{ V}$, $T_A = 25^\circ\text{ C}$, $f_{RF} = 900\text{ MHz}$, Tested in Circuit Shown in Figure 8, unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|-----------|-----|------|-----|------|
| Small Signal Gain | S_{21} | 17 | 19 | 21 | dB |
| Noise Figure | NF | - | 1.25 | - | dB |
| Power Output at 1.0 dB Gain Compression | P_{1dB} | 0 | 2.5 | - | dBm |
| Output 3rd Order Intercept Point | OIP3 | - | 11 | - | dBm |

Table 5. Electrical Characteristics

($V_{CC} = 2.7\text{ V}$, $T_A = 25^\circ\text{ C}$, $f_{RF} = 900\text{ MHz}$, Tested in Circuit Shown in Figure 8, unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|-------------------|----------|-----|-----|-----|------|
| Reverse Isolation | S_{12} | - | -42 | - | dB |
| Supply Current | I_{CC} | 3.8 | 4.7 | 5.6 | mA |

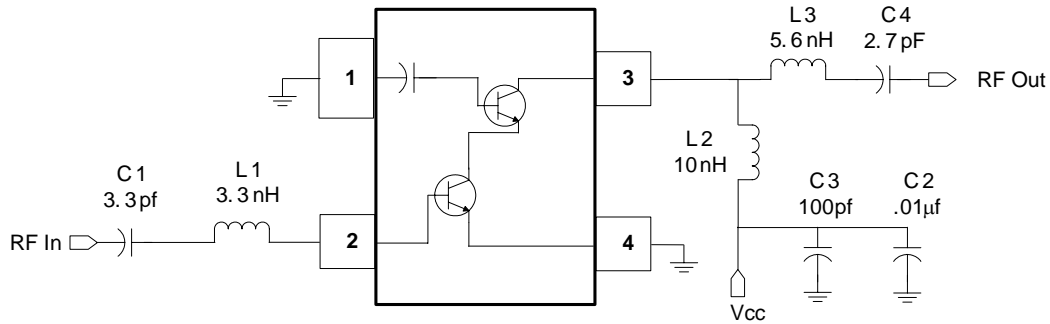


Figure 10. 1.9 GHz Application Configuration Circuit

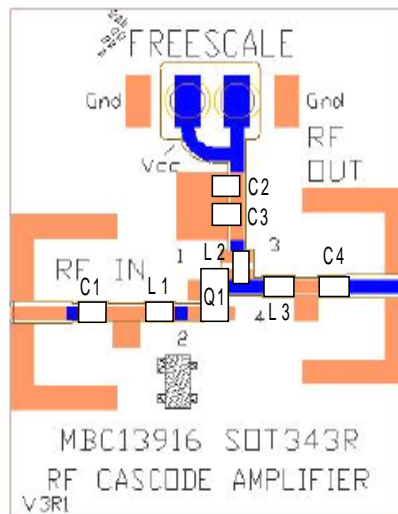


Figure 11. 1.9 GHz Printed Circuit Board

Table 6. Electrical Characteristics

($V_{CC} = 2.7\text{ V}$, $T_A = 25^\circ\text{ C}$, $f_{RF} = 1.9\text{ GHz}$, Tested in Circuit Shown in Figure 10, unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|-----------|-----|------|------|------|
| Small Signal Gain | S_{21} | 9.5 | 11.5 | 13.5 | dB |
| Noise Figure | NF | - | 2.1 | - | dB |
| Power Output at 1.0 dB Gain Compression | P_{1dB} | - | -4.0 | - | dBm |
| Output 3rd Order Intercept Point | OIP3 | - | 5.5 | - | dBm |

Table 6. Electrical Characteristics (continued)

 ($V_{CC} = 2.7\text{ V}$, $T_A = 25^\circ\text{C}$, $f_{RF} = 1.9\text{ GHz}$, Tested in Circuit Shown in [Figure 10](#), unless otherwise noted.)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|-------------------|----------|-----|-----|-----|------|
| Reverse Isolation | S_{12} | - | -28 | - | dB |
| Supply Current | I_{CC} | 3.8 | 4.7 | 5.6 | mA |

Table 7. Bill of Materials¹

| Component | Value | Case | Manufacturer | Comments |
|-----------------------------------|----------|---------|--------------|--------------------------------|
| 900 MHz Figure 8 | | | | |
| C1 | 47 pF | 0402 | Murata | DC Block |
| C2 | .01 uF | 0402 | Murata | Low freq bypass to improve IP3 |
| C3 | 100 pF | 0402 | Murata | RF bypass |
| C4 | 1.5 pF | 0402 | Murata | DC block, Output match |
| C5 | 3.0 pF | 0402 | Murata | Output match, S22 improvement |
| L1 | 6.8 nH | 0402 | Toko | Input match |
| L2 | 10.0 nH | 0402 | Toko | DC Feedthrough, Output match |
| Q1 | MBC13916 | SOT343R | Freescale | SiGe cascode amp |
| 1.9 GHz Figure 10 | | | | |
| C1 | 3.3 pF | 0402 | Murata | DC Block, Input match |
| C2 | .01 uF | 0402 | Murata | Low freq bypass to improve IP3 |
| C3 | 100 pF | 0402 | Murata | RF bypass |
| C4 | 2.7 pF | 0402 | Murata | DC block, Output match |
| L1 | 3.3 nH | 0402 | Murata | Input match |
| L2 | 10 nH | 0402 | Toko | DC Feedthrough, Output match |
| L3 | 5.6 nH | 0402 | Toko | Output match |
| Q1 | MBC13916 | SOT343R | Freescale | SiGe cascode amp |

¹ All components are RoHS compliant.

Table 8. Scattering Parameters
($V_{CC} = 2.7\text{ V}$, $50\ \Omega$ System)

| f (MHz) | S_{11} | | S_{21} | | S_{12} | | S_{22} | |
|------------|------------|--------------|------------|--------------|------------|--------------|------------|--------------|
| | $ S_{11} $ | $\angle\phi$ | $ S_{21} $ | $\angle\phi$ | $ S_{12} $ | $\angle\phi$ | $ S_{22} $ | $\angle\phi$ |
| 100 | 0.829 | -11 | 11.98 | 165 | 0.001 | 17 | 0.955 | -4 |
| 200 | 0.798 | -21 | 11.43 | 152 | 0.002 | 47 | 0.957 | -7 |
| 300 | 0.753 | -31 | 10.69 | 139 | 0.002 | 55 | 0.956 | -11 |
| 400 | 0.701 | -39 | 10.12 | 128 | 0.003 | 56 | 0.955 | -14 |
| 500 | 0.648 | -46 | 9.28 | 118 | 0.003 | 51 | 0.955 | -18 |
| 600 | 0.599 | -53 | 8.66 | 108 | 0.004 | 49 | 0.954 | -22 |
| 700 | 0.554 | -58 | 7.95 | 98 | 0.004 | 41 | 0.947 | -26 |
| 800 | 0.518 | -61 | 7.33 | 90 | 0.004 | 24 | 0.941 | -30 |
| 900 | 0.485 | -65 | 6.83 | 82 | 0.004 | 15 | 0.933 | -34 |
| 1000 | 0.458 | -67 | 6.23 | 74 | 0.004 | -4 | 0.926 | -38 |
| 1100 | 0.438 | -69 | 5.78 | 67 | 0.004 | -28 | 0.915 | -43 |
| 1200 | 0.426 | -71 | 5.39 | 60 | 0.005 | -50 | 0.902 | -46 |
| 1300 | 0.417 | -72 | 4.97 | 52 | 0.006 | -74 | 0.893 | -51 |
| 1400 | 0.414 | -73 | 4.59 | 46 | 0.008 | -93 | 0.879 | -54 |
| 1500 | 0.415 | -74 | 4.31 | 39 | 0.011 | -106 | 0.868 | -58 |
| 1600 | 0.421 | -75 | 3.99 | 32 | 0.014 | -115 | 0.851 | -62 |
| 1700 | 0.430 | -76 | 3.66 | 25 | 0.018 | -125 | 0.835 | -66 |
| 1800 | 0.441 | -78 | 3.43 | 19 | 0.022 | -131 | 0.818 | -70 |
| 1900 | 0.455 | -80 | 3.16 | 12 | 0.027 | -139 | 0.803 | -73 |
| 2000 | 0.474 | -82 | 2.93 | 5 | 0.033 | -146 | 0.777 | -77 |
| 2100 | 0.490 | -85 | 2.70 | -1 | 0.039 | -152 | 0.761 | -81 |
| 2200 | 0.504 | -88 | 2.48 | -8 | 0.045 | -159 | 0.735 | -85 |
| 2300 | 0.524 | -92 | 2.27 | -14 | 0.052 | -163 | 0.707 | -89 |
| 2400 | 0.542 | -95 | 2.09 | -21 | 0.059 | -169 | 0.683 | -93 |
| 2500 | 0.559 | -98 | 1.90 | -28 | 0.067 | -175 | 0.651 | -98 |
| 2600 | 0.572 | -103 | 1.70 | -34 | 0.075 | 180 | 0.624 | -102 |
| 2700 | 0.587 | -106 | 1.56 | -40 | 0.083 | 174 | 0.593 | -107 |
| 2800 | 0.603 | -110 | 1.40 | -48 | 0.091 | 169 | 0.562 | -111 |
| 2900 | 0.610 | -114 | 1.26 | -55 | 0.098 | 163 | 0.533 | -116 |
| 3000 | 0.613 | -118 | 1.11 | -60 | 0.105 | 160 | 0.501 | -120 |

Table 9. Scattering Parameters
($V_{CC} = 3.0\text{ V}$, $50\ \Omega$ System)

| f (MHz) | S_{11} | | S_{21} | | S_{12} | | S_{22} | |
|------------|------------|--------------|------------|--------------|------------|--------------|------------|--------------|
| | $ S_{11} $ | $\angle\phi$ | $ S_{21} $ | $\angle\phi$ | $ S_{12} $ | $\angle\phi$ | $ S_{22} $ | $\angle\phi$ |
| 100 | 0.812 | -11 | 13.42 | 165 | 0.001 | 11 | 0.954 | -3 |
| 200 | 0.778 | -21 | 12.73 | 151 | 0.001 | 50 | 0.955 | -7 |
| 300 | 0.731 | -30 | 11.82 | 138 | 0.002 | 58 | 0.956 | -11 |
| 400 | 0.677 | -38 | 11.10 | 127 | 0.003 | 50 | 0.954 | -14 |
| 500 | 0.623 | -44 | 10.12 | 116 | 0.003 | 51 | 0.954 | -18 |
| 600 | 0.575 | -50 | 9.37 | 107 | 0.003 | 43 | 0.952 | -22 |
| 700 | 0.533 | -54 | 8.56 | 98 | 0.003 | 30 | 0.945 | -26 |
| 800 | 0.499 | -57 | 7.85 | 90 | 0.004 | 24 | 0.937 | -30 |
| 900 | 0.470 | -59 | 7.29 | 82 | 0.004 | 8 | 0.930 | -34 |
| 1000 | 0.448 | -61 | 6.63 | 74 | 0.003 | -11 | 0.923 | -38 |
| 1100 | 0.433 | -63 | 6.14 | 67 | 0.004 | -38 | 0.911 | -42 |
| 1200 | 0.423 | -64 | 5.72 | 60 | 0.005 | -58 | 0.900 | -46 |
| 1300 | 0.418 | -65 | 5.27 | 53 | 0.006 | -77 | 0.891 | -50 |
| 1400 | 0.421 | -66 | 4.87 | 47 | 0.008 | -96 | 0.878 | -54 |
| 1500 | 0.425 | -67 | 4.56 | 40 | 0.011 | -108 | 0.868 | -58 |
| 1600 | 0.432 | -68 | 4.23 | 34 | 0.014 | -120 | 0.852 | -61 |
| 1700 | 0.444 | -70 | 3.89 | 27 | 0.018 | -126 | 0.838 | -65 |
| 1800 | 0.459 | -72 | 3.63 | 21 | 0.022 | -133 | 0.822 | -69 |
| 1900 | 0.473 | -74 | 3.35 | 15 | 0.027 | -140 | 0.809 | -73 |
| 2000 | 0.490 | -77 | 3.12 | 8 | 0.033 | -147 | 0.784 | -77 |
| 2100 | 0.509 | -80 | 2.87 | 2 | 0.039 | -152 | 0.769 | -80 |
| 2200 | 0.527 | -83 | 2.64 | -5 | 0.045 | -159 | 0.744 | -84 |
| 2300 | 0.545 | -86 | 2.42 | -11 | 0.051 | -163 | 0.717 | -88 |
| 2400 | 0.560 | -90 | 2.23 | -17 | 0.059 | -170 | 0.694 | -92 |
| 2500 | 0.579 | -94 | 2.03 | -24 | 0.067 | -175 | 0.663 | -97 |
| 2600 | 0.594 | -98 | 1.82 | -30 | 0.075 | -180 | 0.637 | -101 |
| 2700 | 0.606 | -101 | 1.68 | -36 | 0.083 | 175 | 0.607 | -105 |
| 2800 | 0.620 | -105 | 1.50 | -43 | 0.090 | 169 | 0.576 | -110 |
| 2900 | 0.630 | -110 | 1.35 | -50 | 0.097 | 164 | 0.548 | -114 |
| 3000 | 0.636 | -113 | 1.19 | -55 | 0.105 | 160 | 0.516 | -119 |

Table 10. Scattering Parameters
($V_{CC} = 3.9\text{ V}$, $50\ \Omega$ System)

| f (MHz) | S_{11} | | S_{21} | | S_{12} | | S_{22} | |
|------------|------------|--------------|------------|--------------|------------|--------------|------------|--------------|
| | $ S_{11} $ | $\angle\phi$ | $ S_{21} $ | $\angle\phi$ | $ S_{12} $ | $\angle\phi$ | $ S_{22} $ | $\angle\phi$ |
| 100 | 0.796 | -11 | 14.82 | 164 | 0.001 | 25 | 0.954 | -3 |
| 200 | 0.760 | -20 | 13.98 | 150 | 0.001 | 50 | 0.955 | -7 |
| 300 | 0.711 | -29 | 12.90 | 137 | 0.002 | 46 | 0.955 | -11 |
| 400 | 0.655 | -36 | 12.03 | 126 | 0.002 | 55 | 0.955 | -14 |
| 500 | 0.602 | -42 | 10.90 | 115 | 0.003 | 50 | 0.954 | -18 |
| 600 | 0.556 | -46 | 10.04 | 106 | 0.003 | 45 | 0.954 | -22 |
| 700 | 0.517 | -50 | 9.12 | 97 | 0.003 | 34 | 0.947 | -26 |
| 800 | 0.487 | -52 | 8.34 | 89 | 0.003 | 22 | 0.940 | -30 |
| 900 | 0.463 | -54 | 7.72 | 82 | 0.003 | 11 | 0.933 | -34 |
| 1000 | 0.444 | -56 | 7.02 | 74 | 0.003 | -6 | 0.927 | -38 |
| 1100 | 0.432 | -57 | 6.49 | 67 | 0.003 | -40 | 0.917 | -42 |
| 1200 | 0.428 | -58 | 6.03 | 61 | 0.005 | -69 | 0.905 | -46 |
| 1300 | 0.427 | -59 | 5.55 | 53 | 0.006 | -88 | 0.896 | -50 |
| 1400 | 0.430 | -60 | 5.13 | 48 | 0.008 | -99 | 0.883 | -53 |
| 1500 | 0.437 | -61 | 4.81 | 41 | 0.011 | -111 | 0.874 | -57 |
| 1600 | 0.449 | -62 | 4.45 | 35 | 0.014 | -118 | 0.858 | -61 |
| 1700 | 0.462 | -64 | 4.09 | 29 | 0.018 | -128 | 0.843 | -64 |
| 1800 | 0.475 | -66 | 3.83 | 23 | 0.022 | -134 | 0.829 | -68 |
| 1900 | 0.493 | -69 | 3.53 | 17 | 0.027 | -140 | 0.815 | -72 |
| 2000 | 0.512 | -72 | 3.28 | 10 | 0.032 | -148 | 0.790 | -76 |
| 2100 | 0.529 | -75 | 3.03 | 4 | 0.038 | -152 | 0.776 | -79 |
| 2200 | 0.544 | -78 | 2.79 | -2 | 0.045 | -159 | 0.752 | -83 |
| 2300 | 0.565 | -82 | 2.56 | -8 | 0.051 | -164 | 0.726 | -87 |
| 2400 | 0.583 | -85 | 2.37 | -14 | 0.058 | -169 | 0.704 | -91 |
| 2500 | 0.599 | -89 | 2.16 | -21 | 0.067 | -175 | 0.674 | -96 |
| 2600 | 0.613 | -93 | 1.94 | -27 | 0.075 | -179 | 0.648 | -100 |
| 2700 | 0.629 | -97 | 1.79 | -32 | 0.083 | 175 | 0.621 | -105 |
| 2800 | 0.643 | -101 | 1.60 | -39 | 0.091 | 170 | 0.589 | -109 |
| 2900 | 0.650 | -105 | 1.44 | -46 | 0.098 | 164 | 0.562 | -114 |
| 3000 | 0.653 | -109 | 1.28 | -51 | 0.105 | 160 | 0.531 | -118 |

Table 11. Scattering Parameters
($V_{CC} = 5.0\text{ V}$, $50\ \Omega$ System)

| f (MHz) | S_{11} | | S_{21} | | S_{12} | | S_{22} | |
|------------|------------|--------------|------------|--------------|------------|--------------|------------|--------------|
| | $ S_{11} $ | $\angle\phi$ | $ S_{21} $ | $\angle\phi$ | $ S_{12} $ | $\angle\phi$ | $ S_{22} $ | $\angle\phi$ |
| 100 | 0.719 | -9 | 21.47 | 161 | 0.001 | 5 | 0.939 | -3 |
| 200 | 0.678 | -17 | 19.60 | 145 | 0.001 | 18 | 0.939 | -7 |
| 300 | 0.628 | -23 | 17.43 | 132 | 0.001 | 38 | 0.940 | -10 |
| 400 | 0.579 | -27 | 15.66 | 120 | 0.002 | 47 | 0.937 | -14 |
| 500 | 0.540 | -30 | 13.78 | 110 | 0.002 | 38 | 0.936 | -18 |
| 600 | 0.512 | -32 | 12.40 | 101 | 0.003 | 37 | 0.934 | -22 |
| 700 | 0.492 | -34 | 11.05 | 93 | 0.002 | 32 | 0.927 | -26 |
| 800 | 0.480 | -34 | 9.97 | 86 | 0.002 | 9 | 0.920 | -30 |
| 900 | 0.472 | -35 | 9.12 | 79 | 0.002 | -14 | 0.914 | -34 |
| 1000 | 0.470 | -37 | 8.21 | 73 | 0.002 | -54 | 0.908 | -38 |
| 1100 | 0.473 | -37 | 7.54 | 67 | 0.003 | -75 | 0.899 | -42 |
| 1200 | 0.478 | -39 | 6.97 | 61 | 0.004 | -90 | 0.890 | -46 |
| 1300 | 0.484 | -40 | 6.37 | 54 | 0.006 | -101 | 0.884 | -50 |
| 1400 | 0.496 | -42 | 5.86 | 50 | 0.008 | -114 | 0.875 | -54 |
| 1500 | 0.509 | -44 | 5.49 | 44 | 0.010 | -120 | 0.871 | -57 |
| 1600 | 0.521 | -46 | 5.08 | 39 | 0.013 | -128 | 0.858 | -60 |
| 1700 | 0.535 | -49 | 4.67 | 34 | 0.017 | -133 | 0.848 | -63 |
| 1800 | 0.552 | -51 | 4.38 | 29 | 0.021 | -139 | 0.838 | -67 |
| 1900 | 0.570 | -54 | 4.06 | 23 | 0.025 | -144 | 0.829 | -70 |
| 2000 | 0.587 | -56 | 3.80 | 18 | 0.030 | -150 | 0.807 | -73 |
| 2100 | 0.604 | -60 | 3.54 | 13 | 0.036 | -154 | 0.795 | -76 |
| 2200 | 0.621 | -63 | 3.28 | 7 | 0.042 | -160 | 0.772 | -79 |
| 2300 | 0.643 | -67 | 3.04 | 2 | 0.048 | -164 | 0.746 | -83 |
| 2400 | 0.658 | -70 | 2.84 | -4 | 0.056 | -169 | 0.722 | -87 |
| 2500 | 0.673 | -74 | 2.61 | -10 | 0.063 | -175 | 0.687 | -91 |
| 2600 | 0.690 | -78 | 2.36 | -16 | 0.071 | -179 | 0.657 | -96 |
| 2700 | 0.705 | -82 | 2.19 | -21 | 0.079 | 176 | 0.623 | -101 |
| 2800 | 0.715 | -86 | 1.97 | -27 | 0.088 | 170 | 0.588 | -107 |
| 2900 | 0.720 | -91 | 1.78 | -33 | 0.094 | 164 | 0.556 | -113 |
| 3000 | 0.723 | -94 | 1.57 | -38 | 0.101 | 161 | 0.523 | -119 |

4 Noise Parameters

Noise parameters for the MBC13916 are represented in [Table 12](#).

Table 12. Noise Parameters

| Freq | Fmin | Gamma Opt | | Rn | Ga |
|---|------|-----------|--------|------|-------|
| MHz | dB | Mag | Angle | | dB |
| (V _{CC} = 2.7 V, I _{CC} = 4.7 mA) | | | | | |
| 0.500 | 0.92 | 0.14 | 47.6 | 0.18 | 29.08 |
| 0.700 | 0.92 | 0.14 | 64.2 | 0.14 | 26.61 |
| 0.900 | 0.96 | 0.14 | 79.6 | 0.12 | 24.22 |
| 1.000 | 0.99 | 0.14 | 86 | 0.11 | 23.05 |
| 1.500 | 1.37 | 0.15 | 119.4 | 0.11 | 17.5 |
| 1.900 | 1.88 | 0.17 | 140.3 | 0.15 | 13.4 |
| 2.000 | 2.03 | 1.8 | 144.9 | 0.16 | 12.43 |
| 2.400 | 2.79 | 0.2 | 160.4 | 0.22 | 8.71 |
| V _{CC} = 3.3 V, I _{CC} = 6 mA | | | | | |
| 0.500 | 0.96 | 0.13 | 35.5 | 0.19 | 29.98 |
| 0.700 | 0.97 | 0.13 | 55.3 | 0.15 | 27.34 |
| 0.900 | 1 | 0.12 | 75.1 | 0.13 | 24.81 |
| 1.000 | 1.05 | 0.12 | 85.1 | 0.12 | 23.59 |
| 1.500 | 1.39 | 0.13 | 135.7 | 0.12 | 17.91 |
| 1.900 | 1.84 | 0.14 | 176.5 | 0.16 | 13.88 |
| 2.000 | 1.97 | 0.15 | -173.9 | 0.17 | 12.95 |
| 2.400 | 2.62 | 0.17 | -135.5 | 0.24 | 9.48 |
| V _{CC} = 5 V, I _{CC} = 10.5 mA | | | | | |
| 0.500 | 1.07 | 0.11 | 0.2 | 0.21 | 32.36 |
| 0.700 | 1.11 | 0.1 | 28.8 | 0.18 | 29.19 |
| 0.900 | 1.18 | 0.09 | 61.3 | 0.15 | 26.22 |
| 1.000 | 1.21 | 0.08 | 78.8 | 0.14 | 24.87 |
| 1.500 | 1.46 | 0.07 | 179.8 | 0.13 | 18.81 |
| 1.900 | 1.74 | 0.07 | -83.2 | 0.19 | 14.98 |
| 2.000 | 1.82 | 0.07 | -56.7 | 0.22 | 14.17 |
| 2.400 | 2.19 | 0.09 | 58.2 | 0.2 | 11.47 |

5 Packaging

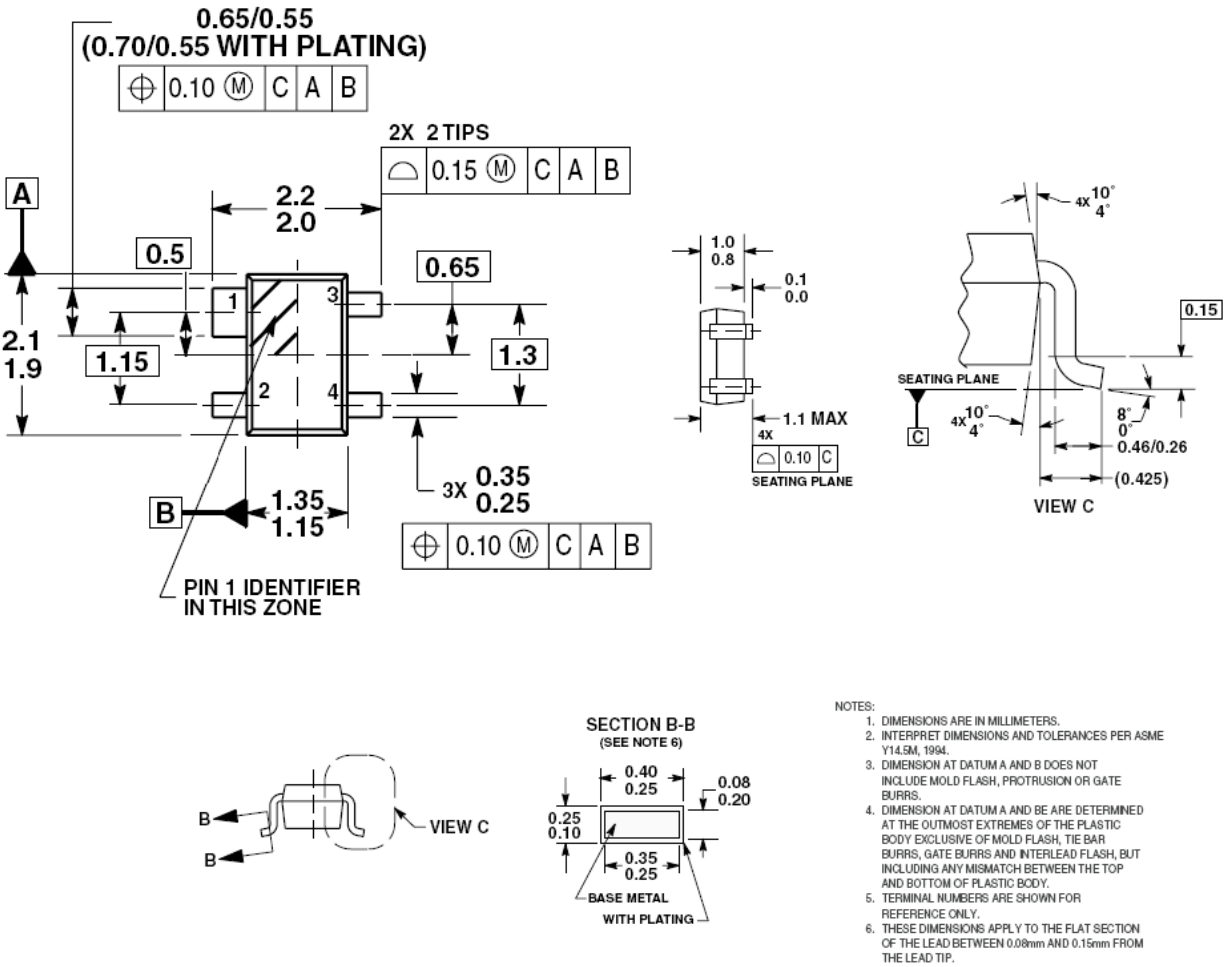


Figure 12. Outline Dimensions for SOT-343R
(Case 1404-01, Issue 0)

6 Product Documentation

This data sheet is labeled as a particular type: Product Preview, Advance Information, or Technical Data. Definitions of these types are available at: <http://www.freescale.com> on the documentation page.

[Table 13](#) summarizes revisions to this document since the previous release (Rev. 2.1).

Table 13. Revision History

| Location | Revision |
|---|---|
| Table 4 Device Level Characteristics | Updated Output Third Order Intercept Point. |
| Figure 8 900 MHz Applications Circuit Configuration | Updated. |
| Figure 9 1.9 GHz Application Configuration Circuit | Replaced. |
| Table 5 Electrical Characteristics | Updated Output 3rd Order Intercept Point. |
| Figure 10 1.9 GHz Application Configuration Circuit | Updated. |
| Table 7 Bill of Materials | Updated through out the table. |
| Figure 12 Outline Dimensions for SOT-343R | Updated. |

NOTES

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