

UHF/VHF OSCILLATOR AND VHF MIXER
NPN SILICON EPITAXIAL TRANSISTOR
SUPER MINI MOLD

DESCRIPTION

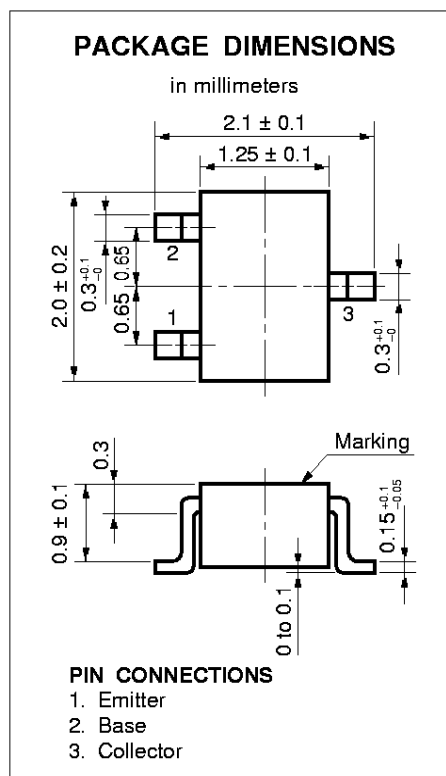
The 2SC4182 is designed for use as an oscillator or a mixer in a VHF TV tuners. Super mini mold package makes it suitable for use in small type equipments especially recommended for Hibrid Integrated Circuits and other applications.

FEATURES

- High Gain Bandwidth Product : $f_T = 1.1$ GHz TYP.
- Low Collector to Base Time Constant: $C_C \cdot r_{b'b} = 9$ ps TYP.
- Low Output Capacitance : $C_{ob} = 1.5$ pF MAX.

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$)

| | | | |
|------------------------------|-----------|-------------|------------------|
| Collector to Base Voltage | V_{CB0} | 30 | V |
| Collector to Emitter Voltage | V_{CE0} | 15 | V |
| Emitter to Base Voltage | V_{EB0} | 4.5 | V |
| Collector Current | I_C | 50 | mA |
| Total Power Dissipation | P_T | 160 | mW |
| Junction Temperature | T_j | 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | -65 to +150 | $^\circ\text{C}$ |



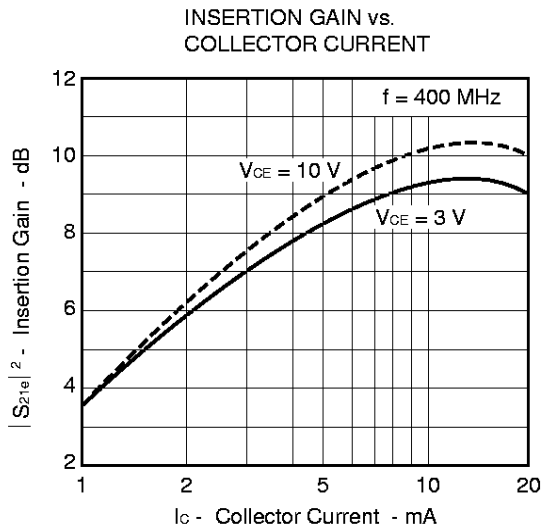
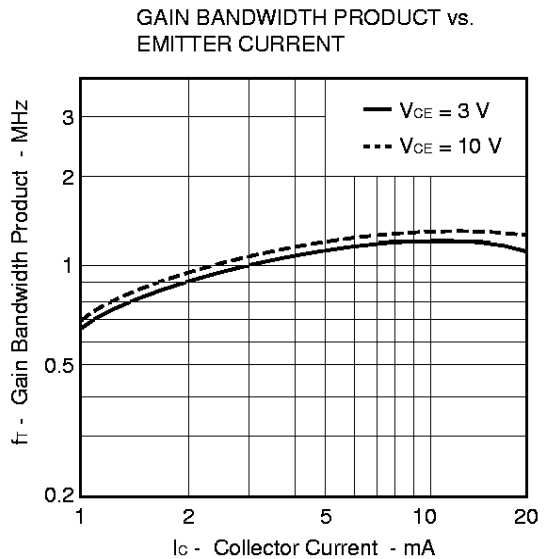
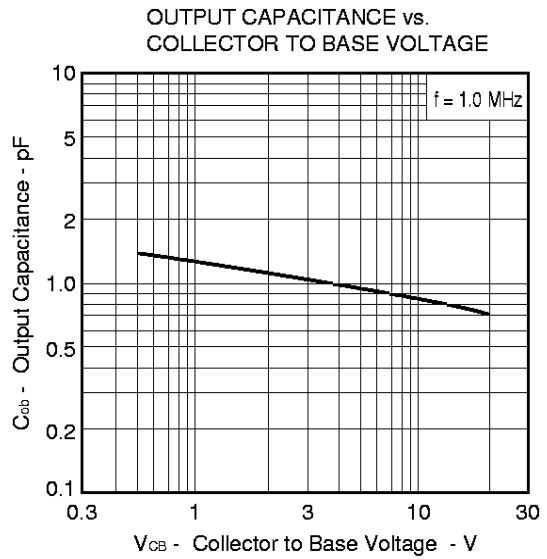
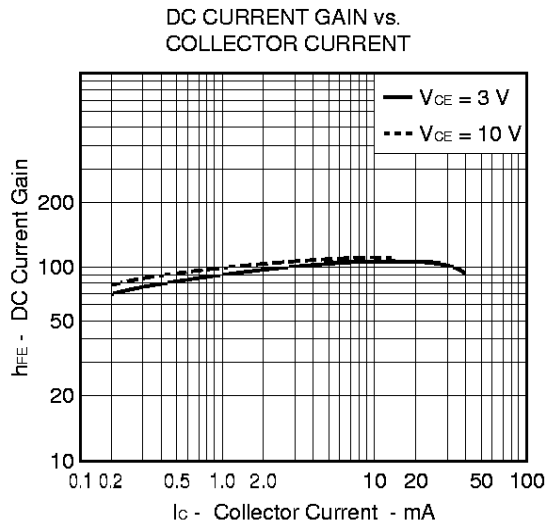
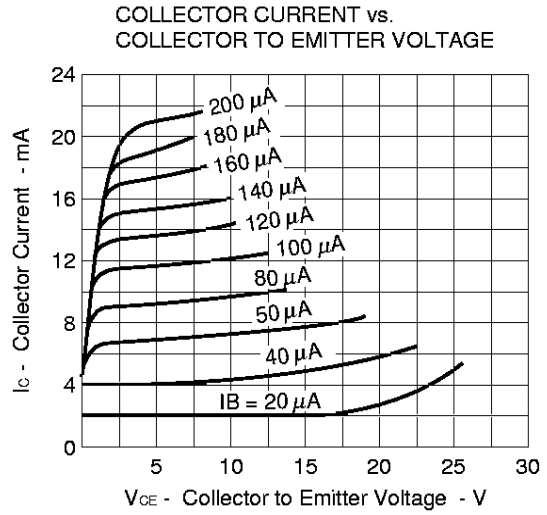
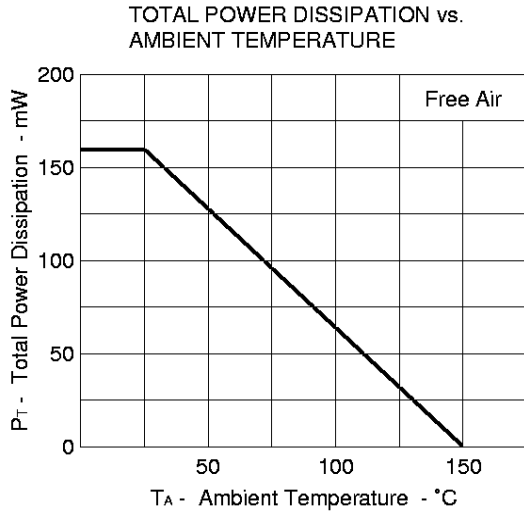
ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)

| Characteristics | Symbol | MIN. | TYP. | MAX. | Unit | Test Conditions |
|---------------------------------|---------------------|------|-------|------|---------------|---|
| Collector Cutoff Current | I_{CB0} | | | 0.1 | μA | $V_{CB} = 20$ V, $I_E = 0$ |
| DC Current Gain | h_{FE} | 60 | | 220 | | $V_{CE} = 3$ V, $I_C = 5$ mA |
| Collector Saturation Voltage | $V_{CE(sat)}$ | | | 0.5 | V | $I_C = 10$ mA, $I_B = 1$ mA |
| Gain Bandwidth Product | f_T | | 1 100 | | MHz | $V_{CE} = 3$ V, $I_C = 5$ mA |
| Output Capacitance | C_{ob} | | 1.1 | 1.5 | pF | $V_{CB} = 3$ V, $I_E = 0$ |
| Collector to Base Time Constant | $C_C \cdot r_{b'b}$ | | 9 | 15 | ps | $V_{CE} = 3$ V, $I_E = -5$ mA, $f = 31.9$ MHz |

h_{FE} Classifications

| Rank | T32 | T33 | T34 |
|----------|-----------|-----------|------------|
| Marking | T32 | T33 | T34 |
| h_{FE} | 60 to 105 | 85 to 150 | 120 to 220 |

TYPICAL CHARACTERISTICS (T_A = 25 °C)



S-PARAMETER

V_{CE} = 3 V, I_c = 3 mA

| Frequency MHz | S11 | | S21 | | S12 | | S22 | |
|------------------|-------|--------|-------|-------|-------|------|-------|-------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 100.00 | 0.644 | -57.9 | 6.137 | 125.9 | 0.045 | 66.9 | 0.857 | -14.1 |
| 200.00 | 0.466 | -85.1 | 3.833 | 104.4 | 0.065 | 59.1 | 0.764 | -15.7 |
| 300.00 | 0.388 | -103.6 | 2.855 | 91.8 | 0.085 | 54.1 | 0.718 | -18.6 |
| 400.00 | 0.365 | -117.7 | 2.189 | 83.9 | 0.100 | 54.0 | 0.701 | -19.7 |
| 500.00 | 0.363 | -130.2 | 1.802 | 76.5 | 0.111 | 50.7 | 0.670 | -21.5 |
| 600.00 | 0.371 | -142.2 | 1.559 | 71.6 | 0.125 | 50.5 | 0.675 | -23.8 |
| 700.00 | 0.378 | -153.2 | 1.392 | 64.2 | 0.133 | 48.2 | 0.665 | -25.6 |
| 800.00 | 0.390 | -161.9 | 1.268 | 59.0 | 0.144 | 47.3 | 0.673 | -29.6 |
| 900.00 | 0.403 | -169.1 | 1.132 | 53.7 | 0.147 | 48.7 | 0.671 | -32.7 |
| 1000.00 | 0.429 | -176.5 | 1.040 | 49.1 | 0.153 | 47.5 | 0.658 | -38.1 |
| 1100.00 | 0.454 | 175.9 | 0.969 | 45.6 | 0.159 | 50.1 | 0.653 | -42.2 |
| 1200.00 | 0.466 | 167.3 | 0.918 | 40.3 | 0.167 | 49.9 | 0.631 | -46.4 |
| 1300.00 | 0.473 | 161.5 | 0.886 | 35.9 | 0.178 | 50.8 | 0.618 | -50.4 |
| 1400.00 | 0.476 | 157.0 | 0.799 | 31.7 | 0.179 | 51.8 | 0.607 | -54.3 |
| 1500.00 | 0.503 | 153.0 | 0.757 | 26.1 | 0.189 | 52.1 | 0.604 | -58.7 |
| 1600.00 | 0.527 | 148.9 | 0.696 | 26.0 | 0.196 | 56.4 | 0.599 | -64.0 |
| 1700.00 | 0.547 | 142.8 | 0.647 | 23.2 | 0.207 | 57.0 | 0.591 | -69.6 |
| 1800.00 | 0.566 | 138.1 | 0.636 | 22.6 | 0.227 | 59.8 | 0.578 | -76.3 |
| 1900.00 | 0.574 | 134.2 | 0.604 | 20.1 | 0.247 | 59.8 | 0.568 | -81.5 |
| 2000.00 | 0.588 | 130.5 | 0.594 | 16.7 | 0.267 | 58.3 | 0.549 | -87.6 |

V_{CE} = 3 V, I_c = 10 mA

| Frequency MHz | S11 | | S21 | | S12 | | S22 | |
|------------------|-------|--------|-------|-------|-------|------|-------|-------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 100.00 | 0.411 | -89.0 | 9.009 | 109.8 | 0.031 | 63.2 | 0.727 | -14.9 |
| 200.00 | 0.371 | -119.5 | 5.001 | 93.7 | 0.050 | 59.7 | 0.663 | -14.3 |
| 300.00 | 0.377 | -137.9 | 3.455 | 83.5 | 0.066 | 56.7 | 0.632 | -16.4 |
| 400.00 | 0.398 | -150.7 | 2.725 | 77.1 | 0.075 | 57.8 | 0.622 | -17.3 |
| 500.00 | 0.423 | -161.2 | 2.198 | 70.6 | 0.084 | 56.5 | 0.601 | -18.9 |
| 600.00 | 0.441 | -170.7 | 1.874 | 66.3 | 0.095 | 58.8 | 0.608 | -21.0 |
| 700.00 | 0.452 | -179.3 | 1.644 | 59.5 | 0.103 | 58.7 | 0.605 | -22.9 |
| 800.00 | 0.466 | 174.9 | 1.478 | 54.7 | 0.113 | 60.0 | 0.614 | -26.8 |
| 900.00 | 0.476 | 170.4 | 1.298 | 49.9 | 0.120 | 62.7 | 0.617 | -30.1 |
| 1000.00 | 0.510 | 165.1 | 1.182 | 45.5 | 0.130 | 62.8 | 0.608 | -35.4 |
| 1100.00 | 0.539 | 159.6 | 1.088 | 42.6 | 0.140 | 65.9 | 0.604 | -39.8 |
| 1200.00 | 0.549 | 152.3 | 1.021 | 37.7 | 0.151 | 66.4 | 0.585 | -44.1 |
| 1300.00 | 0.554 | 147.3 | 0.977 | 33.4 | 0.168 | 67.6 | 0.573 | -48.2 |
| 1400.00 | 0.554 | 143.7 | 0.874 | 29.6 | 0.177 | 68.6 | 0.564 | -52.5 |
| 1500.00 | 0.577 | 140.5 | 0.821 | 24.1 | 0.195 | 67.9 | 0.561 | -57.0 |
| 1600.00 | 0.596 | 137.3 | 0.750 | 24.4 | 0.209 | 71.0 | 0.557 | -62.5 |
| 1700.00 | 0.615 | 132.3 | 0.693 | 21.7 | 0.228 | 69.9 | 0.548 | -68.4 |
| 1800.00 | 0.629 | 128.5 | 0.676 | 21.3 | 0.253 | 71.0 | 0.536 | -75.4 |
| 1900.00 | 0.636 | 125.1 | 0.640 | 19.1 | 0.277 | 69.2 | 0.527 | -81.1 |
| 2000.00 | 0.649 | 121.9 | 0.626 | 15.9 | 0.302 | 66.3 | 0.510 | -87.4 |

V_{CE} = 5 V, I_c = 3 mA

| Frequency MHz | S11 | | S21 | | S12 | | S22 | |
|------------------|-------|--------|-------|-------|-------|------|-------|-------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 100.00 | 0.657 | -54.8 | 6.220 | 127.2 | 0.038 | 66.5 | 0.876 | -12.6 |
| 200.00 | 0.473 | -80.6 | 3.926 | 105.9 | 0.058 | 60.5 | 0.793 | -14.0 |
| 300.00 | 0.391 | -98.6 | 2.930 | 93.4 | 0.078 | 55.6 | 0.748 | -16.8 |
| 400.00 | 0.364 | -112.6 | 2.253 | 85.6 | 0.091 | 55.7 | 0.734 | -17.8 |
| 500.00 | 0.359 | -125.0 | 1.855 | 78.5 | 0.102 | 52.4 | 0.702 | -19.4 |
| 600.00 | 0.365 | -137.5 | 1.606 | 73.9 | 0.115 | 52.1 | 0.709 | -21.5 |
| 700.00 | 0.370 | -148.9 | 1.437 | 66.5 | 0.122 | 50.2 | 0.700 | -23.1 |
| 800.00 | 0.381 | -158.2 | 1.307 | 61.5 | 0.133 | 49.7 | 0.709 | -26.9 |
| 900.00 | 0.393 | -165.8 | 1.164 | 56.2 | 0.135 | 50.7 | 0.709 | -29.7 |
| 1000.00 | 0.417 | -173.6 | 1.074 | 51.6 | 0.141 | 49.7 | 0.697 | -34.8 |
| 1100.00 | 0.442 | 178.4 | 0.998 | 48.1 | 0.147 | 52.6 | 0.692 | -38.5 |
| 1200.00 | 0.454 | 169.6 | 0.945 | 42.9 | 0.153 | 52.9 | 0.669 | -42.4 |
| 1300.00 | 0.460 | 163.6 | 0.911 | 38.5 | 0.164 | 53.9 | 0.656 | -45.8 |
| 1400.00 | 0.463 | 159.0 | 0.822 | 34.3 | 0.165 | 55.4 | 0.645 | -49.4 |
| 1500.00 | 0.491 | 154.8 | 0.779 | 28.9 | 0.176 | 55.9 | 0.642 | -53.3 |
| 1600.00 | 0.515 | 150.5 | 0.717 | 28.7 | 0.183 | 60.6 | 0.639 | -58.0 |
| 1700.00 | 0.536 | 144.3 | 0.667 | 25.8 | 0.195 | 61.2 | 0.631 | -63.1 |
| 1800.00 | 0.555 | 139.4 | 0.657 | 25.1 | 0.214 | 64.0 | 0.618 | -69.2 |
| 1900.00 | 0.563 | 135.4 | 0.625 | 22.5 | 0.234 | 64.0 | 0.609 | -74.0 |
| 2000.00 | 0.578 | 131.6 | 0.614 | 18.9 | 0.255 | 62.6 | 0.589 | -79.5 |

V_{CE} = 5 V, I_c = 10 mA

| Frequency MHz | S11 | | S21 | | S12 | | S22 | |
|------------------|-------|--------|-------|-------|-------|------|-------|-------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 100.00 | 0.420 | -83.2 | 9.315 | 111.3 | 0.029 | 67.9 | 0.759 | -13.4 |
| 200.00 | 0.366 | -112.8 | 5.199 | 95.2 | 0.045 | 62.5 | 0.701 | -12.8 |
| 300.00 | 0.364 | -132.2 | 3.618 | 85.3 | 0.060 | 57.8 | 0.669 | -14.9 |
| 400.00 | 0.381 | -146.0 | 2.856 | 78.9 | 0.070 | 59.4 | 0.661 | -15.7 |
| 500.00 | 0.403 | -156.9 | 2.306 | 72.7 | 0.078 | 57.8 | 0.638 | -17.0 |
| 600.00 | 0.420 | -167.0 | 1.967 | 68.5 | 0.088 | 59.6 | 0.647 | -19.0 |
| 700.00 | 0.432 | -176.0 | 1.729 | 61.8 | 0.095 | 60.0 | 0.644 | -20.5 |
| 800.00 | 0.446 | 177.8 | 1.553 | 57.0 | 0.106 | 61.0 | 0.655 | -24.1 |
| 900.00 | 0.457 | 172.8 | 1.367 | 52.2 | 0.111 | 64.0 | 0.658 | -27.0 |
| 1000.00 | 0.490 | 167.3 | 1.243 | 48.0 | 0.121 | 64.3 | 0.648 | -32.0 |
| 1100.00 | 0.518 | 161.5 | 1.147 | 44.9 | 0.130 | 67.6 | 0.644 | -36.0 |
| 1200.00 | 0.529 | 154.0 | 1.074 | 40.1 | 0.140 | 68.5 | 0.626 | -39.8 |
| 1300.00 | 0.535 | 149.0 | 1.029 | 35.7 | 0.155 | 70.0 | 0.615 | -43.4 |
| 1400.00 | 0.536 | 145.3 | 0.920 | 31.9 | 0.164 | 71.2 | 0.605 | -47.0 |
| 1500.00 | 0.559 | 142.1 | 0.865 | 26.4 | 0.181 | 70.9 | 0.604 | -51.0 |
| 1600.00 | 0.579 | 138.7 | 0.791 | 26.7 | 0.196 | 74.1 | 0.600 | -55.8 |
| 1700.00 | 0.598 | 133.7 | 0.732 | 23.9 | 0.213 | 73.4 | 0.593 | -61.2 |
| 1800.00 | 0.614 | 129.8 | 0.716 | 23.2 | 0.237 | 74.5 | 0.580 | -67.3 |
| 1900.00 | 0.621 | 126.3 | 0.677 | 20.9 | 0.260 | 73.1 | 0.571 | -72.4 |
| 2000.00 | 0.635 | 123.0 | 0.663 | 17.4 | 0.285 | 70.2 | 0.553 | -78.0 |

V_{CE} = 10 V, I_c = 3 mA

| Frequency MHz | S11 | | S21 | | S12 | | S22 | |
|------------------|-------|--------|-------|-------|-------|------|-------|-------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 100.00 | 0.671 | -50.9 | 6.248 | 128.7 | 0.035 | 69.8 | 0.897 | -10.6 |
| 200.00 | 0.486 | -74.5 | 3.991 | 107.7 | 0.052 | 62.3 | 0.824 | -12.2 |
| 300.00 | 0.398 | -91.4 | 2.991 | 95.4 | 0.070 | 57.2 | 0.781 | -14.9 |
| 400.00 | 0.367 | -104.8 | 2.306 | 87.9 | 0.083 | 57.2 | 0.770 | -15.8 |
| 500.00 | 0.356 | -117.2 | 1.902 | 80.9 | 0.092 | 54.0 | 0.738 | -17.2 |
| 600.00 | 0.359 | -130.2 | 1.654 | 76.4 | 0.104 | 54.5 | 0.747 | -19.1 |
| 700.00 | 0.361 | -142.0 | 1.482 | 69.3 | 0.111 | 52.1 | 0.739 | -20.3 |
| 800.00 | 0.367 | -152.0 | 1.347 | 64.4 | 0.121 | 51.7 | 0.750 | -23.8 |
| 900.00 | 0.379 | -160.5 | 1.202 | 59.0 | 0.123 | 53.2 | 0.751 | -26.3 |
| 1000.00 | 0.399 | -168.8 | 1.110 | 54.4 | 0.129 | 52.1 | 0.739 | -31.1 |
| 1100.00 | 0.422 | -177.3 | 1.030 | 50.9 | 0.134 | 55.0 | 0.734 | -34.5 |
| 1200.00 | 0.433 | 173.5 | 0.976 | 45.8 | 0.140 | 55.5 | 0.711 | -37.9 |
| 1300.00 | 0.440 | 167.2 | 0.940 | 41.4 | 0.149 | 56.7 | 0.698 | -40.8 |
| 1400.00 | 0.445 | 162.3 | 0.848 | 37.2 | 0.151 | 58.6 | 0.686 | -43.8 |
| 1500.00 | 0.472 | 157.8 | 0.803 | 31.8 | 0.161 | 59.6 | 0.687 | -47.0 |
| 1600.00 | 0.497 | 153.2 | 0.743 | 31.6 | 0.167 | 64.5 | 0.683 | -51.2 |
| 1700.00 | 0.517 | 146.7 | 0.691 | 28.6 | 0.180 | 65.5 | 0.678 | -55.8 |
| 1800.00 | 0.537 | 141.5 | 0.681 | 27.7 | 0.198 | 68.3 | 0.667 | -61.0 |
| 1900.00 | 0.546 | 137.3 | 0.649 | 25.0 | 0.216 | 68.8 | 0.657 | -65.4 |
| 2000.00 | 0.561 | 133.5 | 0.637 | 21.2 | 0.237 | 67.2 | 0.638 | -70.2 |

V_{CE} = 10 V, I_c = 10 mA

| Frequency MHz | S11 | | S21 | | S12 | | S22 | |
|------------------|-------|--------|-------|-------|-------|------|-------|-------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 100.00 | 0.438 | -73.6 | 9.469 | 113.2 | 0.026 | 67.2 | 0.799 | -11.6 |
| 200.00 | 0.363 | -101.5 | 5.347 | 97.4 | 0.042 | 63.1 | 0.744 | -11.4 |
| 300.00 | 0.348 | -121.7 | 3.753 | 87.6 | 0.057 | 58.9 | 0.711 | -13.6 |
| 400.00 | 0.356 | -136.7 | 2.984 | 81.4 | 0.066 | 60.0 | 0.703 | -14.2 |
| 500.00 | 0.373 | -148.8 | 2.420 | 75.4 | 0.073 | 58.6 | 0.678 | -15.2 |
| 600.00 | 0.388 | -159.8 | 2.073 | 71.3 | 0.082 | 60.5 | 0.688 | -16.9 |
| 700.00 | 0.398 | -169.7 | 1.824 | 64.7 | 0.089 | 60.1 | 0.685 | -18.1 |
| 800.00 | 0.412 | -176.6 | 1.644 | 60.0 | 0.099 | 61.4 | 0.697 | -21.4 |
| 900.00 | 0.425 | 177.7 | 1.449 | 55.2 | 0.103 | 64.5 | 0.701 | -23.9 |
| 1000.00 | 0.456 | 171.7 | 1.321 | 50.9 | 0.112 | 64.6 | 0.692 | -28.5 |
| 1100.00 | 0.483 | 165.3 | 1.216 | 47.7 | 0.120 | 68.1 | 0.688 | -31.9 |
| 1200.00 | 0.495 | 157.6 | 1.147 | 43.0 | 0.128 | 69.4 | 0.667 | -35.3 |
| 1300.00 | 0.501 | 152.4 | 1.093 | 38.6 | 0.142 | 71.0 | 0.657 | -38.3 |
| 1400.00 | 0.504 | 148.5 | 0.978 | 34.8 | 0.149 | 72.8 | 0.646 | -41.1 |
| 1500.00 | 0.528 | 145.1 | 0.922 | 29.2 | 0.165 | 72.9 | 0.648 | -44.4 |
| 1600.00 | 0.550 | 141.6 | 0.846 | 29.2 | 0.178 | 76.4 | 0.644 | -48.5 |
| 1700.00 | 0.570 | 136.4 | 0.784 | 26.2 | 0.194 | 75.9 | 0.640 | -53.1 |
| 1800.00 | 0.587 | 132.1 | 0.766 | 25.3 | 0.217 | 77.6 | 0.630 | -58.4 |
| 1900.00 | 0.595 | 128.7 | 0.728 | 22.7 | 0.238 | 76.4 | 0.621 | -62.9 |
| 2000.00 | 0.610 | 125.2 | 0.711 | 18.8 | 0.262 | 74.0 | 0.603 | -67.8 |

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