NEC

# SILICON TRANSISTOR

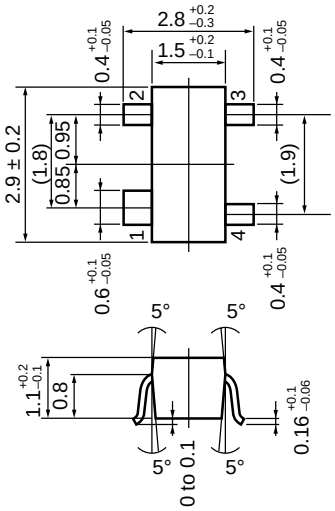
# 2SC5454

## NPN EPITAXIAL SILICON TRANSISTOR
## 4-PIN MINI MOLD

### FEATURE

- High gain, low noise
- Small reverse transfer capacitance
- Can operate at low voltage

### PACKAGE DIMENSIONS (in mm)




**PIN CONNECTIONS**

1: Collector
2: Emitter
3: Base
4: Emitter

### ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25 °C)

| PARAMETER | SYMBOL | RATING | UNIT |
|---|---|---|---|
| Collector to Base Voltage | $V_{CBO}$ | 9 | V |
| Collector to Emitter Voltage | $V_{CEO}$ | 6 | V |
| Emitter to Base Voltage | $V_{EBO}$ | 2 | V |
| Collector Current | $I_C$ | 50 | mA |
| Total Power Dissipation | $P_T$ | 200 | mW |
| Junction Temperature | $T_j$ | 150 | °C |
| Storage Temperature | $T_{stg}$ | –65 to +150 | °C |

### ELECTRICAL CHARACTERISTICS ($T_A$ = 25 °C)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Collector Cut-off Current | $I_{CBO}$ | $V_{CB}$ = 5 V, $I_E$ = 0 | | | 0.1 | μA |
| Emitter Cut-off Current | $I_{EBO}$ | $V_{EB}$ = 1 V, $I_C$ = 0 | | | 0.1 | μA |
| DC Current Gain | $h_{FE}$ | $V_{CE}$ = 3 V, $I_C$ = 20 mA **Note 1** | 75 | | 150 | |
| Gain Bandwidth Product | $f_T$ | $V_{CE}$ = 3 V, $I_C$ = 20 mA, f = 2 GHz | | 14.5 | | GHz |
| Reverse Transfer Capacitance | $C_{re}$ | $V_{CB}$ = 3 V, $I_E$ = 0, f = 1 MHz **Note 2** | | 0.3 | 0.5 | pF |
| Insertion Power Gain | $\|S_{21e}\|^2$ | $V_{CE}$ = 3 V, $I_C$ = 20 mA, f = 2 GHz | 10 | 12.0 | | dB |
| Noise Figure | NF | $V_{CE}$ = 3 V, $I_C$ = 5 mA, f = 2 GHz | | 1.5 | 2.5 | dB |

**Notes 1.** Pulse measurement $P_W \leq 350$ μs, duty cycle ≤ 2 %

**2.** Collector to base capacitance measured by capacitance meter (automatic balance bridge method) when emitter pin is connected to the guard pin.

**Because this product uses high-frequency process, avoid excessive input of static electricity, etc.**



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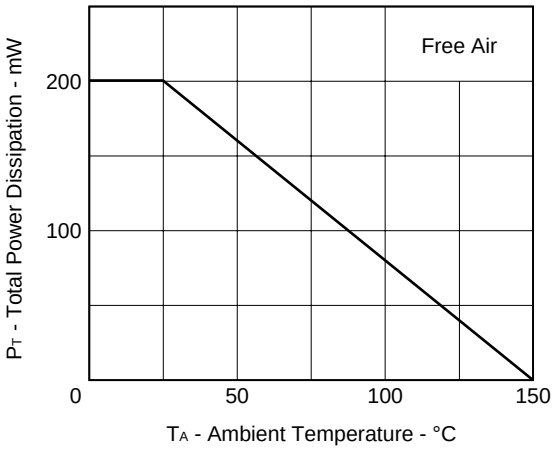
### $h_{FE}$ CLASSIFICATION

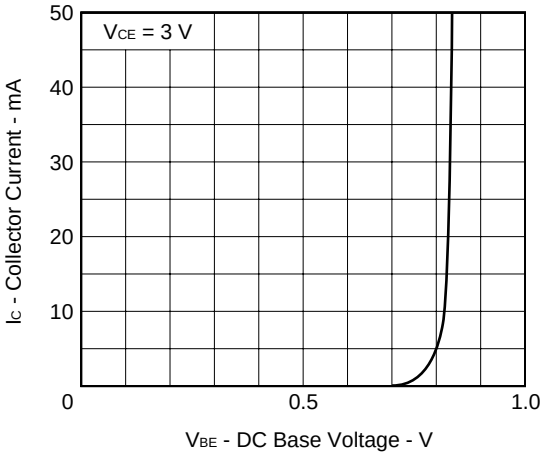
| RANK | FB |
|---|---|
| Marking | R54 |
| $h_{FE}$ | 75 to 150 |

## TYPICAL CHARACTERISTICS ($T_A$ = 25 °C)

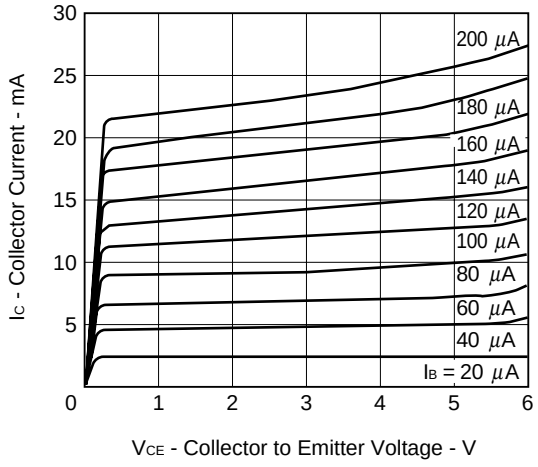
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



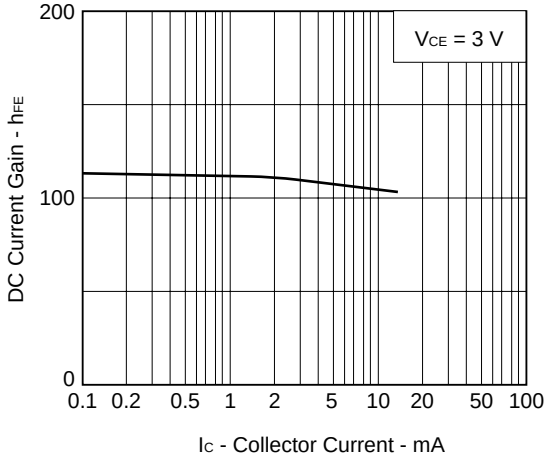

COLLECTOR CURRENT vs. DC BASE VOLTAGE



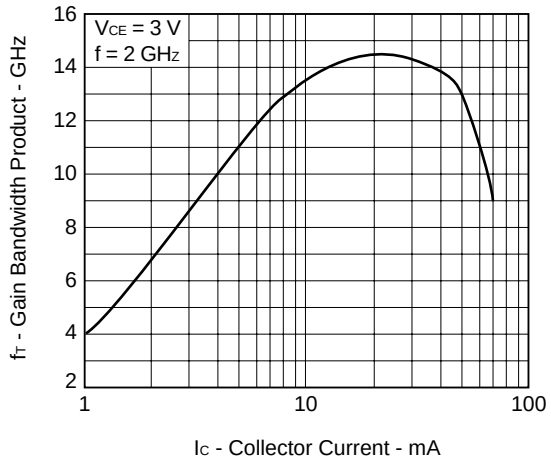

COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



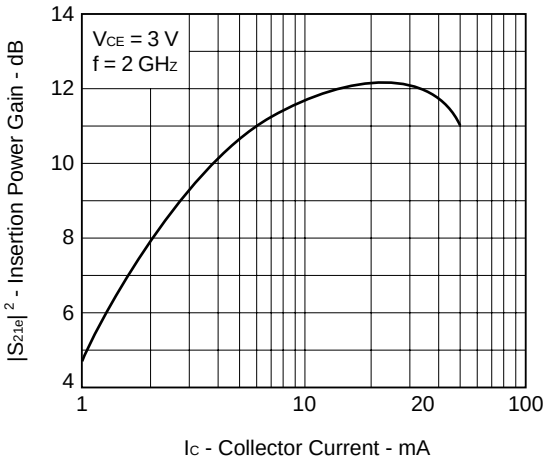

DC CURRENT GAIN vs. COLLECTOR CURRENT



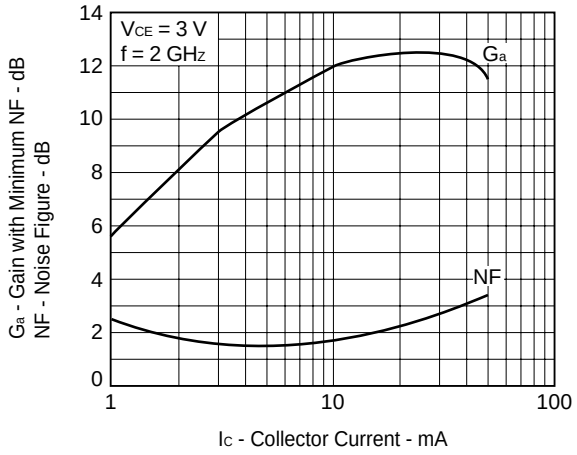
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



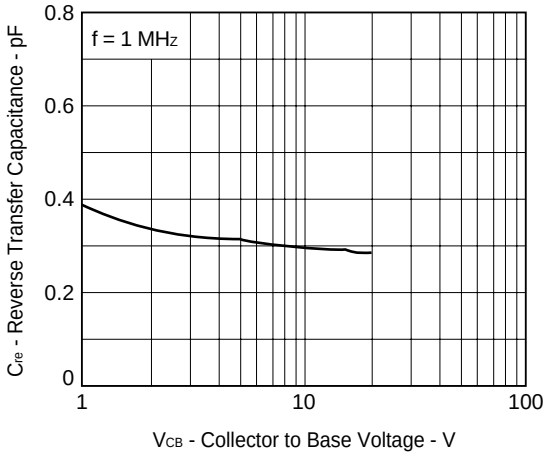

INSERTION POWER GAIN
vs. COLLECTOR CURRENT



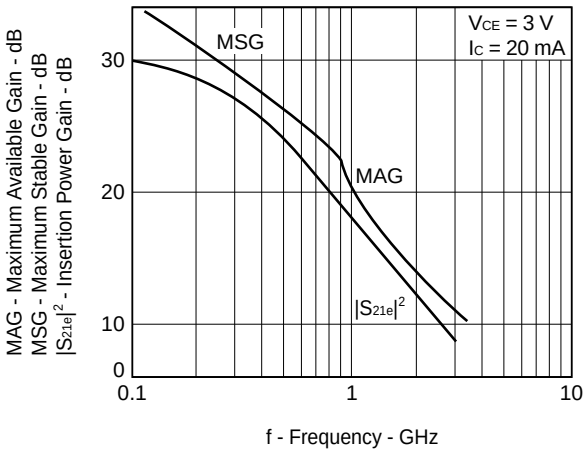

GAIN WITH MINIMUM NF/NOISE FIGURE
vs. COLLECTOR CURRENT



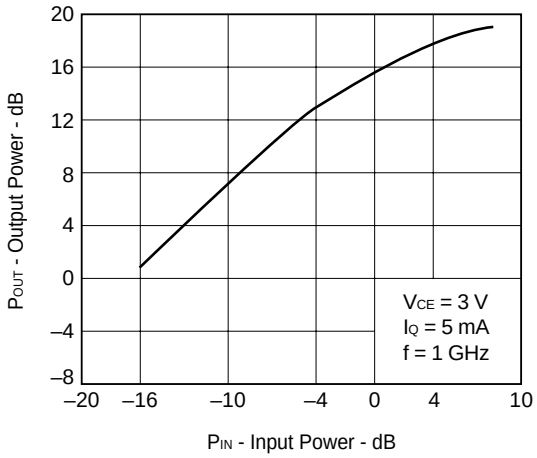

REVERSE TRANSFER CAPACITANCE
vs. COLLECTOR TO BASE VOLTAGE



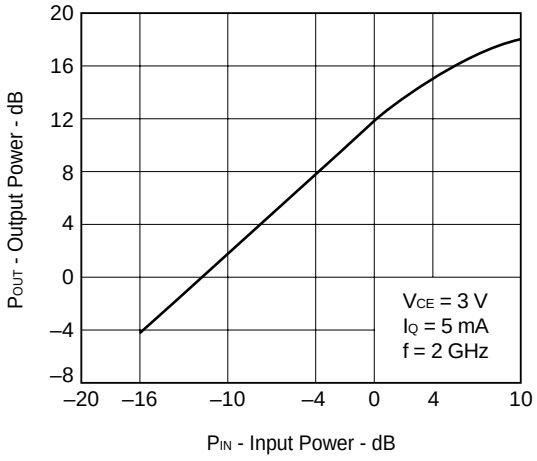
MAXIMUM AVAILABLE GAIN/
MAXIMUM STABLE GAIN/INSERTION
POWER GAIN vs. FREQUENCY




OUTPUT POWER vs. INPUT POWER




OUTPUT POWER vs. INPUT POWER



## 2SC5454 S PARAMETER

$V_{CE}$ = 3 V, $I_C$ = 5 mA, $Z_0$ = 50 Ω

| FREQUENCY | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|---|---|---|---|---|---|---|---|---|
| MHz | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 100.00 | 0.829 | –19.2 | 14.261 | 164.7 | 0.015 | 78.1 | 0.972 | –11.1 |
| 200.00 | 0.783 | –37.0 | 13.252 | 150.7 | 0.029 | 69.1 | 0.913 | –21.6 |
| 300.00 | 0.727 | –54.1 | 12.245 | 139.2 | 0.040 | 59.1 | 0.843 | –30.2 |
| 400.00 | 0.666 | –68.7 | 10.804 | 129.3 | 0.048 | 52.8 | 0.764 | –37.5 |
| 500.00 | 0.606 | –82.9 | 9.964 | 118.9 | 0.053 | 49.2 | 0.699 | –42.6 |
| 600.00 | 0.556 | –95.8 | 9.028 | 111.1 | 0.057 | 44.9 | 0.645 | –47.3 |
| 700.00 | 0.517 | –106.6 | 8.120 | 104.1 | 0.061 | 42.4 | 0.591 | –51.3 |
| 800.00 | 0.486 | –117.5 | 7.393 | 98.0 | 0.063 | 40.0 | 0.557 | –54.4 |
| 900.00 | 0.462 | –126.8 | 6.709 | 92.5 | 0.065 | 39.3 | 0.518 | –57.9 |
| 1000.00 | 0.446 | –135.6 | 6.178 | 87.4 | 0.067 | 38.3 | 0.491 | –60.3 |
| 1100.00 | 0.433 | –143.5 | 5.702 | 82.9 | 0.069 | 38.2 | 0.470 | –63.3 |
| 1200.00 | 0.426 | –151.0 | 5.280 | 78.5 | 0.071 | 37.7 | 0.450 | –65.9 |
| 1300.00 | 0.422 | –157.9 | 4.919 | 74.6 | 0.072 | 38.3 | 0.433 | –69.2 |
| 1400.00 | 0.420 | –164.1 | 4.610 | 70.6 | 0.073 | 37.5 | 0.420 | –71.6 |
| 1500.00 | 0.422 | –170.2 | 4.331 | 67.0 | 0.075 | 37.7 | 0.408 | –75.3 |
| 1600.00 | 0.424 | –175.5 | 4.070 | 63.3 | 0.077 | 39.3 | 0.400 | –78.3 |
| 1700.00 | 0.429 | 179.4 | 3.856 | 59.7 | 0.078 | 39.0 | 0.393 | –81.8 |
| 1800.00 | 0.434 | 174.8 | 3.661 | 56.5 | 0.082 | 40.2 | 0.389 | –84.7 |
| 1900.00 | 0.441 | 170.2 | 3.481 | 53.1 | 0.083 | 40.5 | 0.378 | –89.2 |
| 2000.00 | 0.448 | 166.4 | 3.306 | 50.0 | 0.086 | 41.9 | 0.378 | –91.4 |
| 2100.00 | 0.456 | 162.2 | 3.150 | 46.6 | 0.088 | 41.7 | 0.372 | –96.5 |
| 2200.00 | 0.465 | 158.7 | 3.013 | 43.5 | 0.090 | 42.7 | 0.378 | –98.3 |
| 2300.00 | 0.470 | 155.1 | 2.857 | 40.2 | 0.093 | 43.1 | 0.370 | –104.0 |
| 2400.00 | 0.482 | 151.7 | 2.758 | 37.3 | 0.097 | 44.1 | 0.380 | –105.1 |
| 2500.00 | 0.484 | 148.8 | 2.637 | 34.8 | 0.100 | 45.1 | 0.378 | –110.7 |
| 2600.00 | 0.495 | 145.8 | 2.526 | 31.7 | 0.105 | 44.9 | 0.389 | –112.3 |
| 2700.00 | 0.503 | 143.4 | 2.456 | 28.6 | 0.109 | 45.7 | 0.394 | –117.8 |
| 2800.00 | 0.512 | 140.4 | 2.347 | 25.9 | 0.113 | 45.7 | 0.403 | –120.2 |
| 2900.00 | 0.522 | 138.0 | 2.261 | 22.7 | 0.119 | 45.6 | 0.413 | –125.1 |
| 3000.00 | 0.528 | 135.3 | 2.171 | 20.3 | 0.123 | 45.0 | 0.418 | –128.1 |

$V_{CE}$ = 3 V, $I_C$ = 10 mA, $Z_0$ = 50 Ω

| FREQUENCY | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|---|---|---|---|---|---|---|---|---|
| MHz | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 100.00 | 0.706 | –27.6 | 23.264 | 159.2 | 0.014 | 75.1 | 0.940 | –15.8 |
| 200.00 | 0.636 | –52.0 | 20.474 | 141.9 | 0.026 | 64.8 | 0.837 | –29.1 |
| 300.00 | 0.561 | –73.4 | 17.706 | 128.5 | 0.033 | 57.4 | 0.724 | –38.7 |
| 400.00 | 0.503 | –90.1 | 14.932 | 118.5 | 0.039 | 52.2 | 0.628 | –45.8 |
| 500.00 | 0.457 | –105.7 | 12.978 | 109.0 | 0.042 | 50.5 | 0.557 | –49.8 |
| 600.00 | 0.423 | –119.0 | 11.348 | 102.1 | 0.046 | 49.0 | 0.503 | –53.5 |
| 700.00 | 0.401 | –130.0 | 9.988 | 96.1 | 0.049 | 48.7 | 0.457 | –56.6 |
| 800.00 | 0.386 | –140.1 | 8.935 | 90.8 | 0.052 | 48.1 | 0.424 | –59.5 |
| 900.00 | 0.377 | –148.8 | 8.023 | 86.3 | 0.055 | 48.0 | 0.394 | –61.9 |
| 1000.00 | 0.373 | –156.7 | 7.305 | 82.0 | 0.057 | 48.8 | 0.374 | –64.3 |
| 1100.00 | 0.370 | –163.6 | 6.687 | 78.2 | 0.061 | 48.6 | 0.355 | –67.5 |
| 1200.00 | 0.371 | –170.1 | 6.157 | 74.4 | 0.065 | 48.9 | 0.342 | –69.5 |
| 1300.00 | 0.375 | –175.8 | 5.720 | 70.9 | 0.068 | 49.7 | 0.326 | –73.0 |
| 1400.00 | 0.378 | 178.9 | 5.332 | 67.6 | 0.071 | 50.0 | 0.320 | –75.5 |
| 1500.00 | 0.384 | 174.1 | 4.997 | 64.4 | 0.074 | 50.5 | 0.309 | –79.4 |
| 1600.00 | 0.389 | 169.7 | 4.693 | 61.1 | 0.078 | 50.2 | 0.307 | –82.4 |
| 1700.00 | 0.397 | 165.8 | 4.450 | 58.0 | 0.081 | 50.4 | 0.298 | –86.4 |
| 1800.00 | 0.403 | 162.1 | 4.192 | 55.0 | 0.084 | 50.5 | 0.296 | –89.1 |
| 1900.00 | 0.413 | 158.6 | 3.978 | 51.8 | 0.089 | 49.8 | 0.289 | –94.6 |
| 2000.00 | 0.420 | 155.7 | 3.791 | 49.0 | 0.092 | 49.7 | 0.293 | –96.8 |
| 2100.00 | 0.431 | 152.1 | 3.590 | 46.1 | 0.096 | 49.8 | 0.286 | –102.4 |
| 2200.00 | 0.441 | 149.5 | 3.450 | 43.2 | 0.100 | 49.5 | 0.292 | –104.1 |
| 2300.00 | 0.447 | 146.4 | 3.276 | 40.3 | 0.103 | 49.3 | 0.289 | –111.0 |
| 2400.00 | 0.461 | 143.8 | 3.139 | 37.8 | 0.107 | 48.9 | 0.296 | –111.1 |
| 2500.00 | 0.462 | 141.3 | 3.011 | 35.5 | 0.111 | 49.2 | 0.293 | –117.1 |
| 2600.00 | 0.475 | 138.7 | 2.882 | 32.7 | 0.117 | 48.7 | 0.307 | –118.2 |
| 2700.00 | 0.484 | 136.9 | 2.803 | 29.9 | 0.122 | 48.2 | 0.315 | –124.0 |
| 2800.00 | 0.494 | 134.2 | 2.689 | 27.4 | 0.127 | 47.3 | 0.323 | –126.8 |
| 2900.00 | 0.504 | 132.3 | 2.588 | 24.5 | 0.132 | 46.8 | 0.334 | –131.5 |
| 3000.00 | 0.511 | 129.7 | 2.493 | 22.3 | 0.136 | 46.1 | 0.341 | –134.8 |

## 2SC5454 S PARAMETER

$V_{CE}$ = 3 V, $I_C$ = 20 mA, $Z_0$ = 50 Ω

| FREQUENCY | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|---|---|---|---|---|---|---|---|---|
| MHz | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 100.00 | 0.550 | –39.8 | 33.319 | 152.6 | 0.012 | 73.8 | 0.886 | –21.4 |
| 200.00 | 0.478 | –71.8 | 27.020 | 132.5 | 0.021 | 63.3 | 0.734 | –36.5 |
| 300.00 | 0.420 | –96.3 | 21.715 | 118.9 | 0.027 | 56.8 | 0.598 | –45.6 |
| 400.00 | 0.381 | –115.0 | 17.550 | 109.5 | 0.032 | 55.7 | 0.502 | –51.2 |
| 500.00 | 0.363 | –129.9 | 14.737 | 101.5 | 0.035 | 56.4 | 0.439 | –54.1 |
| 600.00 | 0.351 | –141.9 | 12.630 | 95.6 | 0.039 | 55.7 | 0.395 | –57.3 |
| 700.00 | 0.344 | –151.7 | 10.983 | 90.4 | 0.043 | 56.8 | 0.357 | –59.7 |
| 800.00 | 0.344 | –160.1 | 9.738 | 86.1 | 0.047 | 57.1 | 0.335 | –61.7 |
| 900.00 | 0.343 | –167.5 | 8.689 | 82.0 | 0.051 | 57.2 | 0.310 | –64.5 |
| 1000.00 | 0.347 | –173.7 | 7.876 | 78.3 | 0.055 | 57.8 | 0.294 | –66.3 |
| 1100.00 | 0.350 | –179.2 | 7.199 | 74.9 | 0.059 | 57.7 | 0.281 | –69.5 |
| 1200.00 | 0.355 | 175.4 | 6.619 | 71.5 | 0.063 | 57.6 | 0.268 | –72.1 |
| 1300.00 | 0.362 | 171.0 | 6.132 | 68.4 | 0.068 | 57.7 | 0.261 | –75.9 |
| 1400.00 | 0.367 | 166.7 | 5.704 | 65.3 | 0.072 | 57.4 | 0.257 | –78.1 |
| 1500.00 | 0.375 | 163.0 | 5.338 | 62.4 | 0.076 | 57.1 | 0.246 | –82.3 |
| 1600.00 | 0.382 | 159.4 | 5.011 | 59.5 | 0.080 | 56.6 | 0.246 | –86.2 |
| 1700.00 | 0.391 | 156.4 | 4.728 | 56.6 | 0.085 | 56.4 | 0.239 | –90.0 |
| 1800.00 | 0.398 | 153.4 | 4.476 | 54.0 | 0.089 | 56.0 | 0.240 | –93.9 |
| 1900.00 | 0.408 | 150.5 | 4.226 | 50.8 | 0.093 | 55.7 | 0.237 | –99.8 |
| 2000.00 | 0.416 | 148.3 | 4.028 | 48.4 | 0.098 | 54.7 | 0.238 | –102.1 |
| 2100.00 | 0.427 | 145.1 | 3.829 | 45.6 | 0.102 | 54.1 | 0.235 | –108.6 |
| 2200.00 | 0.437 | 143.2 | 3.661 | 42.9 | 0.107 | 53.2 | 0.241 | –109.3 |
| 2300.00 | 0.443 | 140.4 | 3.489 | 40.3 | 0.110 | 52.7 | 0.239 | –116.7 |
| 2400.00 | 0.457 | 138.3 | 3.330 | 37.8 | 0.115 | 51.6 | 0.247 | –117.1 |
| 2500.00 | 0.459 | 136.1 | 3.206 | 35.6 | 0.119 | 51.7 | 0.250 | –124.4 |
| 2600.00 | 0.473 | 133.8 | 3.603 | 33.0 | 0.125 | 50.8 | 0.259 | –124.2 |
| 2700.00 | 0.480 | 132.5 | 2.967 | 30.2 | 0.130 | 50.9 | 0.271 | –131.1 |
| 2800.00 | 0.492 | 129.8 | 2.857 | 28.0 | 0.135 | 48.9 | 0.277 | –133.2 |
| 2900.00 | 0.501 | 128.3 | 2.747 | 25.2 | 0.140 | 47.7 | 0.292 | –138.6 |
| 3000.00 | 0.509 | 125.7 | 2.655 | 23.3 | 0.144 | 46.8 | 0.295 | –141.0 |

$V_{CE}$ = 3 V, $I_C$ = 30 mA, $Z_0$ = 50 Ω

| FREQUENCY | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|---|---|---|---|---|---|---|---|---|
| MHz | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 100.00 | 0.459 | –49.1 | 38.164 | 148.7 | 0.011 | 70.7 | 0.849 | –24.6 |
| 200.00 | 0.404 | –85.8 | 29.422 | 127.7 | 0.019 | 62.8 | 0.674 | –40.3 |
| 300.00 | 0.368 | –111.3 | 22.866 | 114.5 | 0.024 | 58.5 | 0.537 | –48.1 |
| 400.00 | 0.347 | –129.3 | 18.143 | 105.5 | 0.029 | 57.5 | 0.445 | –53.4 |
| 500.00 | 0.341 | –142.9 | 15.068 | 98.2 | 0.033 | 59.4 | 0.386 | –55.5 |
| 600.00 | 0.337 | –153.4 | 12.826 | 92.7 | 0.037 | 60.8 | 0.350 | –57.7 |
| 700.00 | 0.337 | –162.3 | 11.115 | 87.9 | 0.040 | 60.4 | 0.317 | –60.2 |
| 800.00 | 0.340 | –169.5 | 9.819 | 83.9 | 0.046 | 61.1 | 0.296 | –62.3 |
| 900.00 | 0.343 | –176.0 | 8.752 | 80.1 | 0.049 | 61.1 | 0.278 | –64.4 |
| 1000.00 | 0.349 | 178.6 | 7.932 | 76.6 | 0.054 | 61.0 | 0.264 | –66.5 |
| 1100.00 | 0.354 | 173.9 | 7.224 | 73.3 | 0.058 | 61.2 | 0.253 | –70.0 |
| 1200.00 | 0.360 | 169.2 | 6.638 | 70.2 | 0.063 | 61.4 | 0.243 | –72.3 |
| 1300.00 | 0.368 | 165.4 | 6.149 | 67.2 | 0.068 | 61.1 | 0.234 | –76.6 |
| 1400.00 | 0.374 | 161.6 | 5.716 | 64.2 | 0.073 | 61.1 | 0.231 | –79.1 |
| 1500.00 | 0.382 | 158.3 | 5.351 | 61.4 | 0.077 | 59.7 | 0.226 | –83.8 |
| 1600.00 | 0.389 | 155.1 | 5.015 | 58.5 | 0.081 | 59.8 | 0.223 | –87.6 |
| 1700.00 | 0.399 | 152.5 | 4.742 | 55.6 | 0.085 | 58.8 | 0.221 | –92.5 |
| 1800.00 | 0.405 | 149.7 | 4.476 | 52.9 | 0.090 | 57.8 | 0.223 | –95.9 |
| 1900.00 | 0.415 | 147.1 | 4.229 | 50.2 | 0.095 | 57.0 | 0.217 | –101.9 |
| 2000.00 | 0.423 | 145.1 | 4.021 | 47.5 | 0.100 | 56.1 | 0.220 | –103.7 |
| 2100.00 | 0.434 | 142.2 | 3.814 | 44.8 | 0.104 | 55.3 | 0.218 | –111.0 |
| 2200.00 | 0.444 | 140.5 | 3.659 | 42.2 | 0.109 | 54.6 | 0.225 | –111.8 |
| 2300.00 | 0.450 | 137.8 | 3.473 | 39.6 | 0.114 | 53.5 | 0.225 | –120.1 |
| 2400.00 | 0.464 | 135.8 | 3.323 | 37.2 | 0.117 | 53.2 | 0.231 | –119.7 |
| 2500.00 | 0.465 | 133.7 | 3.194 | 34.9 | 0.122 | 52.7 | 0.236 | –127.5 |
| 2600.00 | 0.479 | 131.8 | 3.056 | 32.5 | 0.127 | 52.0 | 0.247 | –127.2 |
| 2700.00 | 0.487 | 130.4 | 2.981 | 30.0 | 0.133 | 50.5 | 0.258 | –134.1 |
| 2800.00 | 0.498 | 127.9 | 2.852 | 27.8 | 0.138 | 49.6 | 0.267 | –136.0 |
| 2900.00 | 0.508 | 126.4 | 2.740 | 25.0 | 0.143 | 47.8 | 0.279 | –141.3 |
| 3000.00 | 0.515 | 124.0 | 2.652 | 23.0 | 0.147 | 47.4 | 0.285 | –144.2 |

## 2SC5454 S PARAMETER

$V_{CE}$ = 5 V, $I_C$ = 5 mA, $Z_0$ = 50 Ω

| FREQUENCY | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|---|---|---|---|---|---|---|---|---|
| MHz | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 100.00 | 0.836 | –18.3 | 14.254 | 165.1 | 0.014 | 78.2 | 0.970 | –10.4 |
| 200.00 | 0.792 | –35.6 | 13.300 | 151.4 | 0.027 | 69.3 | 0.920 | –20.6 |
| 300.00 | 0.736 | –52.0 | 12.328 | 140.2 | 0.038 | 60.4 | 0.849 | –28.9 |
| 400.00 | 0.675 | –66.1 | 10.931 | 130.3 | 0.046 | 54.1 | 0.776 | –35.8 |
| 500.00 | 0.612 | –80.1 | 10.126 | 119.9 | 0.051 | 49.6 | 0.715 | –40.9 |
| 600.00 | 0.561 | –92.6 | 9.208 | 112.1 | 0.055 | 45.8 | 0.659 | –45.5 |
| 700.00 | 0.521 | –103.4 | 8.276 | 105.2 | 0.059 | 43.1 | 0.608 | –49.2 |
| 800.00 | 0.487 | –113.9 | 7.567 | 99.0 | 0.061 | 41.3 | 0.572 | –52.4 |
| 900.00 | 0.461 | –123.3 | 6.874 | 93.5 | 0.063 | 39.9 | 0.536 | –55.6 |
| 1000.00 | 0.442 | –132.2 | 6.347 | 88.3 | 0.064 | 39.2 | 0.509 | –58.1 |
| 1100.00 | 0.429 | –140.1 | 5.862 | 83.8 | 0.066 | 38.8 | 0.486 | –61.0 |
| 1200.00 | 0.419 | –147.9 | 5.432 | 79.4 | 0.068 | 38.5 | 0.468 | –63.8 |
| 1300.00 | 0.414 | –154.8 | 5.068 | 75.4 | 0.069 | 38.8 | 0.450 | –66.7 |
| 1400.00 | 0.410 | –161.3 | 4.754 | 71.4 | 0.071 | 39.0 | 0.437 | –69.4 |
| 1500.00 | 0.411 | –167.3 | 4.461 | 67.8 | 0.073 | 39.6 | 0.425 | –72.7 |
| 1600.00 | 0.413 | –172.9 | 4.195 | 64.1 | 0.074 | 40.2 | 0.418 | –75.6 |
| 1700.00 | 0.417 | –178.1 | 3.983 | 60.7 | 0.076 | 40.6 | 0.407 | –79.1 |
| 1800.00 | 0.421 | 177.1 | 3.779 | 57.3 | 0.078 | 41.3 | 0.405 | –81.9 |
| 1900.00 | 0.428 | 172.3 | 3.582 | 53.7 | 0.080 | 41.6 | 0.396 | –86.2 |
| 2000.00 | 0.434 | 168.4 | 3.411 | 50.7 | 0.083 | 43.0 | 0.395 | –88.6 |
| 2100.00 | 0.442 | 164.0 | 3.253 | 47.0 | 0.086 | 43.6 | 0.386 | –93.7 |
| 2200.00 | 0.452 | 160.5 | 3.114 | 44.2 | 0.089 | 43.9 | 0.392 | –95.3 |
| 2300.00 | 0.457 | 156.7 | 2.969 | 40.9 | 0.091 | 44.6 | 0.383 | –100.7 |
| 2400.00 | 0.468 | 153.2 | 2.846 | 37.9 | 0.094 | 45.5 | 0.393 | –102.0 |
| 2500.00 | 0.470 | 150.3 | 2.733 | 35.5 | 0.097 | 46.2 | 0.387 | –107.2 |
| 2600.00 | 0.481 | 147.2 | 2.621 | 32.0 | 0.102 | 46.8 | 0.401 | –108.9 |
| 2700.00 | 0.490 | 144.8 | 2.540 | 29.2 | 0.107 | 47.2 | 0.408 | –114.1 |
| 2800.00 | 0.500 | 141.7 | 2.432 | 26.5 | 0.112 | 47.1 | 0.415 | –117.1 |
| 2900.00 | 0.509 | 139.3 | 2.340 | 23.2 | 0.116 | 46.7 | 0.426 | –121.8 |
| 3000.00 | 0.517 | 136.4 | 2.250 | 21.0 | 0.121 | 46.5 | 0.428 | –125.0 |

$V_{CE}$ = 5 V, $I_C$ = 10 mA, $Z_0$ = 50 Ω

| FREQUENCY | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|---|---|---|---|---|---|---|---|---|
| MHz | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 100.00 | 0.722 | –26.0 | 23.176 | 159.8 | 0.013 | 77.0 | 0.943 | –14.8 |
| 200.00 | 0.653 | –49.0 | 20.533 | 142.9 | 0.024 | 65.3 | 0.844 | –27.7 |
| 300.00 | 0.575 | –69.4 | 17.914 | 129.9 | 0.032 | 57.6 | 0.738 | –36.6 |
| 400.00 | 0.512 | –86.2 | 15.194 | 119.8 | 0.037 | 52.9 | 0.647 | –43.5 |
| 500.00 | 0.462 | –101.1 | 13.254 | 110.1 | 0.041 | 51.2 | 0.575 | –47.5 |
| 600.00 | 0.423 | –113.9 | 11.637 | 103.2 | 0.045 | 49.3 | 0.522 | –51.5 |
| 700.00 | 0.398 | –125.2 | 10.262 | 97.1 | 0.047 | 48.9 | 0.475 | –54.3 |
| 800.00 | 0.379 | –135.3 | 9.193 | 92.0 | 0.050 | 48.9 | 0.443 | –56.8 |
| 900.00 | 0.367 | –144.3 | 8.257 | 87.4 | 0.054 | 48.6 | 0.413 | –59.6 |
| 1000.00 | 0.361 | –152.5 | 7.531 | 82.8 | 0.057 | 49.3 | 0.392 | –61.6 |
| 1100.00 | 0.357 | –159.6 | 6.895 | 79.0 | 0.059 | 49.6 | 0.374 | –64.4 |
| 1200.00 | 0.356 | –166.5 | 6.370 | 75.2 | 0.062 | 49.8 | 0.358 | –66.6 |
| 1300.00 | 0.358 | –172.4 | 5.906 | 71.9 | 0.065 | 50.2 | 0.345 | –69.7 |
| 1400.00 | 0.361 | –177.9 | 5.512 | 68.4 | 0.069 | 50.1 | 0.338 | –72.1 |
| 1500.00 | 0.367 | 177.1 | 5.172 | 65.1 | 0.072 | 50.4 | 0.327 | –75.9 |
| 1600.00 | 0.371 | 172.4 | 4.856 | 62.0 | 0.075 | 50.7 | 0.321 | –78.9 |
| 1700.00 | 0.379 | 168.4 | 4.615 | 58.6 | 0.079 | 50.8 | 0.313 | –82.6 |
| 1800.00 | 0.385 | 164.5 | 4.332 | 55.8 | 0.083 | 50.9 | 0.313 | –85.5 |
| 1900.00 | 0.395 | 160.7 | 4.123 | 52.5 | 0.086 | 50.8 | 0.304 | –90.4 |
| 2000.00 | 0.402 | 157.9 | 3.914 | 49.8 | 0.089 | 51.2 | 0.308 | –92.6 |
| 2100.00 | 0.413 | 153.9 | 3.734 | 46.9 | 0.093 | 50.7 | 0.300 | –98.1 |
| 2200.00 | 0.424 | 151.3 | 3.579 | 44.1 | 0.098 | 50.6 | 0.305 | –99.6 |
| 2300.00 | 0.429 | 148.2 | 3.390 | 41.2 | 0.101 | 50.7 | 0.299 | –106.1 |
| 2400.00 | 0.443 | 145.4 | 3.257 | 38.6 | 0.105 | 50.3 | 0.305 | –106.8 |
| 2500.00 | 0.444 | 142.9 | 3.135 | 36.2 | 0.109 | 50.2 | 0.306 | –112.7 |
| 2600.00 | 0.458 | 140.2 | 2.999 | 33.5 | 0.114 | 49.8 | 0.319 | –113.7 |
| 2700.00 | 0.467 | 138.4 | 2.909 | 30.5 | 0.119 | 50.0 | 0.325 | –119.6 |
| 2800.00 | 0.477 | 135.5 | 2.797 | 28.1 | 0.124 | 48.8 | 0.332 | –122.0 |
| 2900.00 | 0.487 | 133.7 | 2.695 | 25.2 | 0.129 | 48.2 | 0.345 | –127.6 |
| 3000.00 | 0.495 | 131.0 | 2.592 | 22.9 | 0.133 | 47.2 | 0.348 | –130.5 |

## 2SC5454 S PARAMETER

$V_{CE}$ = 5 V, $I_C$ = 20 mA, $Z_0$ = 50 Ω

| FREQUENCY | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|---|---|---|---|---|---|---|---|---|
| MHz | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 100.00 | 0.584 | –36.1 | 33.272 | 153.6 | 0.012 | 73.1 | 0.896 | –19.7 |
| 200.00 | 0.503 | –65.9 | 27.312 | 134.0 | 0.020 | 63.7 | 0.751 | –34.7 |
| 300.00 | 0.434 | –89.4 | 22.196 | 120.4 | 0.027 | 58.1 | 0.618 | –43.4 |
| 400.00 | 0.385 | –107.3 | 18.070 | 110.8 | 0.031 | 56.3 | 0.526 | –48.9 |
| 500.00 | 0.361 | –122.5 | 15.219 | 102.7 | 0.034 | 56.6 | 0.459 | –51.9 |
| 600.00 | 0.341 | –135.0 | 13.079 | 96.8 | 0.038 | 57.0 | 0.415 | –54.6 |
| 700.00 | 0.331 | –145.4 | 11.392 | 91.4 | 0.042 | 57.1 | 0.374 | –56.9 |
| 800.00 | 0.327 | –154.4 | 10.113 | 87.1 | 0.046 | 57.1 | 0.353 | –58.8 |
| 900.00 | 0.325 | –162.3 | 9.025 | 83.0 | 0.049 | 57.2 | 0.326 | –61.5 |
| 1000.00 | 0.326 | –169.1 | 8.193 | 79.2 | 0.054 | 57.6 | 0.312 | –63.2 |
| 1100.00 | 0.329 | –175.0 | 7.486 | 75.8 | 0.057 | 57.9 | 0.300 | –65.7 |
| 1200.00 | 0.334 | 179.1 | 6.878 | 72.4 | 0.061 | 58.2 | 0.288 | –68.2 |
| 1300.00 | 0.338 | 174.5 | 6.379 | 69.3 | 0.066 | 58.0 | 0.278 | –71.6 |
| 1400.00 | 0.344 | 169.9 | 5.935 | 66.2 | 0.070 | 57.7 | 0.270 | –74.6 |
| 1500.00 | 0.352 | 165.9 | 5.566 | 63.2 | 0.074 | 57.3 | 0.263 | –78.1 |
| 1600.00 | 0.358 | 162.1 | 5.220 | 60.3 | 0.078 | 57.4 | 0.260 | –81.1 |
| 1700.00 | 0.367 | 158.9 | 4.949 | 57.4 | 0.082 | 57.0 | 0.255 | –85.8 |
| 1800.00 | 0.373 | 155.7 | 4.651 | 54.6 | 0.087 | 56.6 | 0.254 | –88.9 |
| 1900.00 | 0.385 | 152.7 | 4.411 | 51.8 | 0.091 | 55.6 | 0.248 | –94.5 |
| 2000.00 | 0.391 | 150.3 | 4.195 | 49.0 | 0.096 | 55.2 | 0.250 | –96.7 |
| 2100.00 | 0.403 | 147.2 | 3.990 | 46.3 | 0.099 | 54.3 | 0.246 | –103.1 |
| 2200.00 | 0.414 | 145.1 | 3.817 | 43.9 | 0.104 | 53.8 | 0.252 | –104.1 |
| 2300.00 | 0.421 | 142.2 | 3.633 | 41.0 | 0.108 | 53.5 | 0.247 | –111.5 |
| 2400.00 | 0.435 | 140.0 | 3.488 | 38.6 | 0.113 | 52.6 | 0.256 | –112.0 |
| 2500.00 | 0.436 | 137.8 | 3.349 | 36.3 | 0.116 | 52.3 | 0.258 | –118.4 |
| 2600.00 | 0.450 | 135.4 | 3.203 | 33.9 | 0.121 | 51.7 | 0.269 | –118.7 |
| 2700.00 | 0.459 | 134.0 | 3.126 | 31.2 | 0.127 | 51.2 | 0.275 | –125.1 |
| 2800.00 | 0.470 | 131.3 | 2.995 | 28.7 | 0.132 | 49.6 | 0.285 | –127.4 |
| 2900.00 | 0.481 | 129.7 | 2.881 | 26.0 | 0.137 | 48.8 | 0.296 | –133.1 |
| 3000.00 | 0.489 | 127.2 | 2.788 | 24.0 | 0.141 | 48.0 | 0.302 | –136.2 |

$V_{CE}$ = 5 V, $I_C$ = 30 mA, $Z_0$ = 50 Ω

| FREQUENCY | $S_{11}$ | | $S_{21}$ | | $S_{12}$ | | $S_{22}$ | |
|---|---|---|---|---|---|---|---|---|
| MHz | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 100.00 | 0.508 | –42.8 | 38.283 | 149.9 | 0.011 | 72.3 | 0.861 | –22.9 |
| 200.00 | 0.433 | –76.3 | 30.011 | 129.4 | 0.019 | 61.8 | 0.692 | –37.6 |
| 300.00 | 0.378 | –100.7 | 23.555 | 116.0 | 0.023 | 59.8 | 0.558 | –45.6 |
| 400.00 | 0.342 | –119.6 | 18.822 | 107.1 | 0.028 | 59.3 | 0.472 | –50.4 |
| 500.00 | 0.332 | –133.8 | 15.690 | 99.5 | 0.032 | 59.2 | 0.411 | –52.5 |
| 600.00 | 0.321 | –145.1 | 13.390 | 93.9 | 0.036 | 61.0 | 0.369 | –54.9 |
| 700.00 | 0.317 | –154.9 | 11.613 | 89.1 | 0.041 | 60.5 | 0.337 | –57.0 |
| 800.00 | 0.316 | –163.1 | 10.259 | 84.9 | 0.045 | 60.7 | 0.315 | –58.5 |
| 900.00 | 0.318 | –169.9 | 9.171 | 81.1 | 0.048 | 61.6 | 0.297 | –60.9 |
| 1000.00 | 0.323 | –176.1 | 8.300 | 77.5 | 0.053 | 60.8 | 0.283 | –62.7 |
| 1100.00 | 0.326 | 178.5 | 7.579 | 74.2 | 0.058 | 60.9 | 0.271 | –65.6 |
| 1200.00 | 0.332 | 173.3 | 6.964 | 71.1 | 0.062 | 61.2 | 0.263 | –67.9 |
| 1300.00 | 0.339 | 169.1 | 6.463 | 68.1 | 0.066 | 61.0 | 0.256 | –71.6 |
| 1400.00 | 0.345 | 165.0 | 6.012 | 65.1 | 0.071 | 60.2 | 0.248 | –74.6 |
| 1500.00 | 0.354 | 161.5 | 5.620 | 62.3 | 0.074 | 59.9 | 0.241 | –78.7 |
| 1600.00 | 0.359 | 158.0 | 5.271 | 59.4 | 0.080 | 59.6 | 0.242 | –82.4 |
| 1700.00 | 0.369 | 155.0 | 4.972 | 56.4 | 0.083 | 58.7 | 0.236 | –86.8 |
| 1800.00 | 0.376 | 152.4 | 4.693 | 54.0 | 0.088 | 58.0 | 0.233 | –90.5 |
| 1900.00 | 0.387 | 149.5 | 4.454 | 51.2 | 0.092 | 57.5 | 0.229 | –96.2 |
| 2000.00 | 0.393 | 147.5 | 4.222 | 48.6 | 0.097 | 56.9 | 0.232 | –97.9 |
| 2100.00 | 0.405 | 144.4 | 4.035 | 45.7 | 0.102 | 56.3 | 0.232 | –104.8 |
| 2200.00 | 0.416 | 142.5 | 3.850 | 43.2 | 0.107 | 54.9 | 0.233 | –106.3 |
| 2300.00 | 0.422 | 139.9 | 3.660 | 40.5 | 0.111 | 54.1 | 0.231 | –114.3 |
| 2400.00 | 0.436 | 137.9 | 3.517 | 38.0 | 0.115 | 54.0 | 0.240 | –113.8 |
| 2500.00 | 0.438 | 135.7 | 3.360 | 36.0 | 0.119 | 53.1 | 0.240 | –120.9 |
| 2600.00 | 0.453 | 133.5 | 3.235 | 33.6 | 0.124 | 52.5 | 0.254 | –121.0 |
| 2700.00 | 0.461 | 132.3 | 3.147 | 31.0 | 0.130 | 51.6 | 0.262 | –127.4 |
| 2800.00 | 0.473 | 129.6 | 3.010 | 28.6 | 0.135 | 50.2 | 0.270 | –129.8 |
| 2900.00 | 0.483 | 128.1 | 2.905 | 25.9 | 0.140 | 49.3 | 0.283 | –135.7 |
| 3000.00 | 0.491 | 125.6 | 2.800 | 23.9 | 0.144 | 48.1 | 0.286 | –138.5 |

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