

GaAs HETEROJUNCTION BIPOLAR TRANSISTOR NE52418

L to S BAND LOW NOISE AND HIGH GAIN AMPLIFIER NPN GaAs HBT

DESCRIPTION

The NE52418 is an NPN GaAs HBT (Heterojunction Bipolar Transistor) developed for L to S band mobile communication equipment.

FEATURES

- Ideal for low noise and high gain amplifiers
NF = 0.95 dB TYP., $G_a = 17$ dB TYP. (@ $V_{CE} = 2$ V, $I_c = 3$ mA, $f = 2$ GHz, $Z_s = Z_L = 50 \Omega$)
IIP₃ = +8 dBm TYP. (@ $V_{CE} = 2.5$ V, $I_c = 8$ mA, $f = 2$ GHz, 1 tone, $Z_s = Z_L = Z_{opt}$)
- 4-pin super minimold package employed (SOT-343 style)
- Grounded emitter transistor

APPLICATIONS

- Mobile communication terminals and other L to S band microwave communication applications

ORDERING INFORMATION

| Part Number | Package | Marking | Supplying Form |
|-------------|----------------------|---------|--|
| NE52418-T1 | 4-pin super minimold | V45 | <ul style="list-style-type: none">• 8 mm wide embossed taping• Pin 3 (Emitter), Pin 4 (Collector) face the perforation side of the tape• Qty 3 kpcs/reel |

Remark To order evaluation samples, consult your NEC sales representative.
Part number for sample order: NE52418

Because this product uses high-frequency technology, avoid excessive static electricity, etc.

The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.
Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C)

| Parameter | Symbol | Ratings | Unit |
|------------------------------|------------------|-------------|------|
| Collector to Emitter Voltage | V _{CEO} | 5.0 | V |
| Collector to Base Voltage | V _{CBO} | 3.0 | V |
| Emitter to Base Voltage | V _{EBO} | 3.0 | V |
| Collector Current | I _c | 40 | mA |
| Base Current | I _B | 0.3 | mA |
| Total Power Dissipation | P _{tot} | 150 | mW |
| Junction Temperature | T _j | +125 | °C |
| Storage Temperature | T _{stg} | -65 to +125 | °C |

RECOMMENDED OPERATING CONDITIONS (T_A = +25°C)

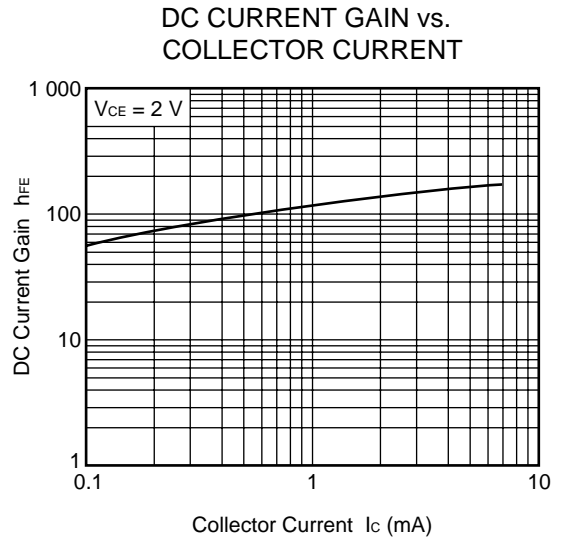
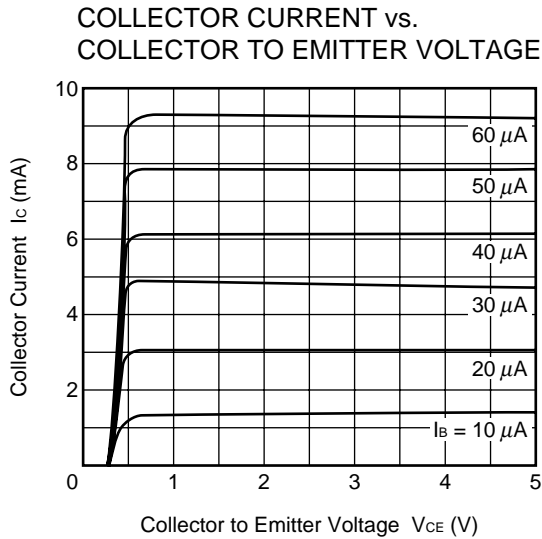
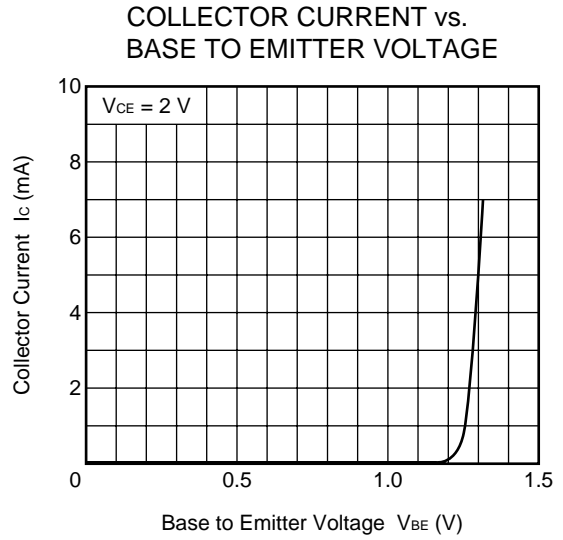
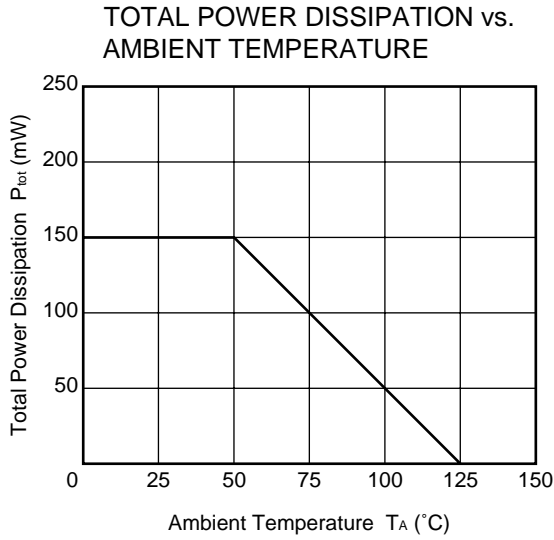
| Parameter | Symbol | MIN. | TYP. | MAX. | Unit |
|------------------------------|-----------------|------|------|------|------|
| Collector to Emitter Voltage | V _{CE} | 1.5 | 2.0 | 3.0 | V |
| Collector Current | I _c | - | 3 | 10 | mA |
| Input Power | P _{in} | - | - | 0 | dBm |

ELECTRICAL CHARACTERISTICS (Unless otherwise specified, T_A = +25°C)

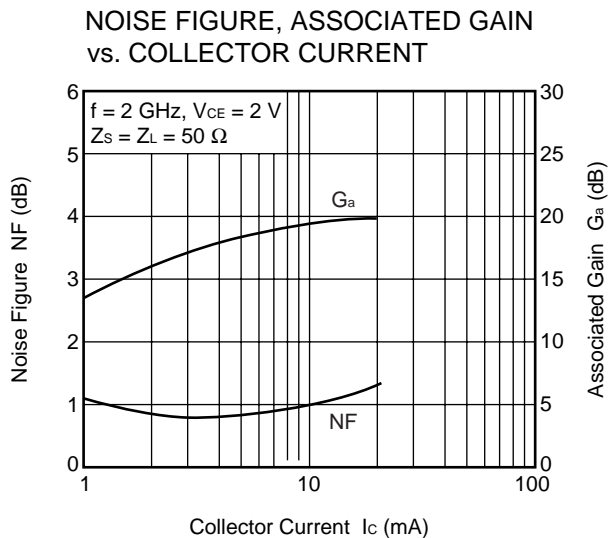
| Parameter | Symbol | Test Conditions | MIN. | TYP. | MAX. | Unit |
|--|------------------|---|------|------|------|------|
| Emitter to Base Leak Current | I _{EBO} | V _{EBO} = 3 V | - | 0.2 | 1.0 | μA |
| Collector to Base Leak Current | I _{CBO} | V _{CBO} = 3 V | - | 0.2 | 1.0 | μA |
| DC Current Gain | h _{FE} | V _{CE} = 2 V, I _c = 3 mA | 110 | 150 | 190 | - |
| Noise Figure | NF | V _{CE} = 2 V, I _c = 3 mA, f = 2 GHz, | - | 0.95 | 1.35 | dB |
| Associated Gain | G _a | Z _S = Z _L = 50 Ω | 15 | 17 | - | dB |
| 3rd Order Intermodulation Distortion Input Intercept Point | IIP ₃ | V _{CE} = 2.5 V, I _c = 8 mA, f = 2 GHz, 1 tone, Z _S = Z _L = Z _{opt} | - | +8 | - | dBm |

TYPICAL CHARACTERISTICS (Unless otherwise specified, $T_A = +25^\circ\text{C}$)

DC CHARACTERISTICS

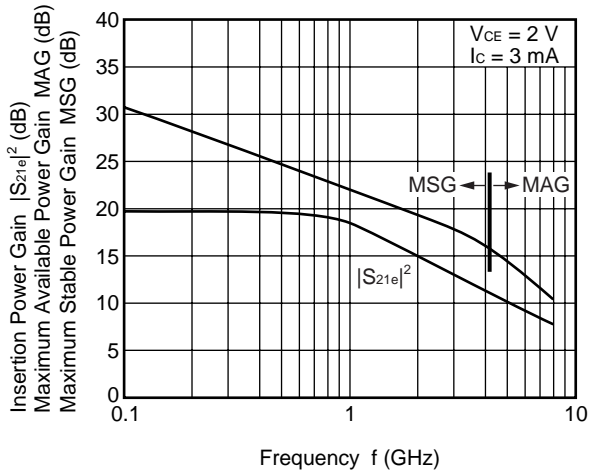


NOISE CHARACTERISTICS



GAIN CHARACTERISTICS

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



Remark The graphs indicate nominal characteristics.

S-PARAMETERS

V_{CE} = 2 V, I_C = 3 mA

| Frequency MHz | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | | S ₂₁ ² dB | S ₁₂ ² dB | K |
|------------------|-----------------|--------|-----------------|--------|-----------------|-------|-----------------|--------|--------------------------------------|--------------------------------------|------|
| | MAG. | ANG. | MAG. | ANG. | MAG. | ANG. | MAG. | ANG. | | | |
| 2000 | 0.607 | -78.4 | 5.550 | 108.2 | 0.066 | 48.4 | 0.743 | -37.2 | 14.89 | -23.55 | 0.55 |
| 2100 | 0.581 | -80.8 | 5.392 | 105.7 | 0.068 | 47.4 | 0.729 | -37.8 | 14.64 | -23.30 | 0.59 |
| 2200 | 0.556 | -84.4 | 5.291 | 103.4 | 0.067 | 46.3 | 0.712 | -39.1 | 14.47 | -23.42 | 0.63 |
| 2300 | 0.540 | -87.3 | 5.133 | 100.7 | 0.069 | 46.8 | 0.702 | -40.3 | 14.21 | -23.16 | 0.65 |
| 2400 | 0.529 | -90.6 | 5.043 | 98.4 | 0.072 | 45.2 | 0.695 | -41.4 | 14.05 | -22.88 | 0.66 |
| 2500 | 0.521 | -92.0 | 4.923 | 96.8 | 0.073 | 45.0 | 0.690 | -41.8 | 13.84 | -22.70 | 0.67 |
| 2600 | 0.495 | -96.6 | 4.837 | 93.8 | 0.071 | 45.6 | 0.668 | -43.0 | 13.69 | -22.94 | 0.73 |
| 2700 | 0.480 | -98.4 | 4.713 | 91.9 | 0.075 | 43.4 | 0.663 | -43.7 | 13.47 | -22.45 | 0.74 |
| 2800 | 0.453 | -102.8 | 4.618 | 89.3 | 0.074 | 44.0 | 0.646 | -44.5 | 13.29 | -22.56 | 0.79 |
| 2900 | 0.449 | -106.2 | 4.508 | 87.5 | 0.078 | 42.7 | 0.647 | -45.9 | 13.08 | -22.21 | 0.78 |
| 3000 | 0.432 | -108.3 | 4.376 | 85.4 | 0.076 | 42.6 | 0.629 | -47.0 | 12.82 | -22.37 | 0.84 |
| 3100 | 0.408 | -112.4 | 4.309 | 83.3 | 0.079 | 41.3 | 0.621 | -47.5 | 12.69 | -22.09 | 0.86 |
| 3200 | 0.406 | -115.8 | 4.231 | 81.0 | 0.078 | 42.2 | 0.614 | -48.5 | 12.53 | -22.10 | 0.87 |
| 3300 | 0.400 | -119.1 | 4.171 | 79.3 | 0.081 | 42.4 | 0.608 | -49.5 | 12.41 | -21.82 | 0.87 |
| 3400 | 0.387 | -122.5 | 4.081 | 77.0 | 0.078 | 40.7 | 0.598 | -50.5 | 12.22 | -22.18 | 0.94 |
| 3500 | 0.373 | -124.4 | 4.012 | 75.6 | 0.081 | 40.2 | 0.587 | -51.3 | 12.07 | -21.87 | 0.95 |
| 3600 | 0.368 | -129.9 | 3.946 | 73.2 | 0.083 | 40.8 | 0.582 | -52.1 | 11.92 | -21.61 | 0.94 |
| 3700 | 0.361 | -132.4 | 3.867 | 71.5 | 0.082 | 40.8 | 0.575 | -53.0 | 11.75 | -21.74 | 0.98 |
| 3800 | 0.348 | -136.2 | 3.797 | 69.7 | 0.083 | 40.7 | 0.565 | -54.4 | 11.59 | -21.65 | 1.01 |
| 3900 | 0.335 | -138.6 | 3.720 | 68.0 | 0.085 | 40.1 | 0.564 | -55.1 | 11.41 | -21.40 | 1.01 |
| 4000 | 0.329 | -141.3 | 3.658 | 66.4 | 0.084 | 40.0 | 0.561 | -56.0 | 11.27 | -21.53 | 1.05 |
| 4500 | 0.310 | -159.4 | 3.415 | 57.3 | 0.089 | 40.8 | 0.534 | -60.3 | 10.67 | -21.03 | 1.09 |
| 5000 | 0.299 | -176.4 | 3.158 | 49.0 | 0.097 | 41.2 | 0.524 | -67.1 | 9.99 | -20.28 | 1.09 |
| 5500 | 0.298 | 170.1 | 2.944 | 41.3 | 0.106 | 42.3 | 0.501 | -72.6 | 9.38 | -19.51 | 1.11 |
| 6000 | 0.314 | 157.1 | 2.761 | 33.5 | 0.108 | 42.0 | 0.492 | -78.1 | 8.82 | -19.37 | 1.14 |
| 6500 | 0.327 | 144.8 | 2.629 | 25.8 | 0.120 | 41.7 | 0.477 | -84.3 | 8.40 | -18.44 | 1.10 |
| 7000 | 0.344 | 133.1 | 2.482 | 18.2 | 0.134 | 40.2 | 0.454 | -90.3 | 7.89 | -17.44 | 1.07 |
| 7500 | 0.366 | 122.7 | 2.363 | 10.2 | 0.145 | 37.6 | 0.429 | -97.1 | 7.47 | -16.78 | 1.06 |
| 8000 | 0.398 | 113.0 | 2.276 | 3.1 | 0.159 | 36.1 | 0.399 | -106.2 | 7.14 | -15.97 | 1.02 |
| 8500 | 0.440 | 104.8 | 2.184 | -5.3 | 0.176 | 33.0 | 0.374 | -119.0 | 6.79 | -15.09 | 0.97 |
| 9000 | 0.485 | 97.8 | 2.098 | -13.7 | 0.194 | 27.5 | 0.359 | -136.5 | 6.44 | -14.26 | 0.92 |
| 9500 | 0.542 | 89.5 | 1.985 | -22.8 | 0.206 | 23.0 | 0.367 | -155.6 | 5.95 | -13.72 | 0.87 |
| 10000 | 0.600 | 82.4 | 1.877 | -31.9 | 0.225 | 16.4 | 0.398 | -174.3 | 5.47 | -12.97 | 0.79 |
| 10500 | 0.650 | 76.1 | 1.762 | -41.2 | 0.234 | 10.2 | 0.440 | 167.8 | 4.92 | -12.60 | 0.75 |
| 11000 | 0.697 | 70.7 | 1.629 | -49.6 | 0.242 | 3.6 | 0.484 | 152.9 | 4.24 | -12.32 | 0.70 |
| 11500 | 0.739 | 65.2 | 1.516 | -58.7 | 0.252 | -3.2 | 0.522 | 137.8 | 3.62 | -11.97 | 0.66 |
| 12000 | 0.772 | 60.3 | 1.401 | -67.4 | 0.255 | -9.6 | 0.556 | 123.6 | 2.93 | -11.88 | 0.64 |
| 12500 | 0.797 | 54.3 | 1.282 | -76.4 | 0.255 | -17.0 | 0.600 | 109.7 | 2.16 | -11.86 | 0.62 |
| 13000 | 0.815 | 48.8 | 1.152 | -85.1 | 0.252 | -24.5 | 0.643 | 96.5 | 1.23 | -11.98 | 0.62 |
| 13500 | 0.827 | 42.5 | 1.019 | -94.3 | 0.242 | -31.4 | 0.705 | 85.4 | 0.16 | -12.32 | 0.61 |
| 14000 | 0.832 | 35.9 | 0.895 | -102.7 | 0.229 | -38.8 | 0.742 | 75.6 | -0.97 | -12.81 | 0.62 |
| 14500 | 0.837 | 30.6 | 0.787 | -110.1 | 0.216 | -43.2 | 0.808 | 69.7 | -2.08 | -13.33 | 0.58 |
| 15000 | 0.831 | 26.2 | 0.678 | -118.6 | 0.209 | -50.8 | 0.838 | 62.6 | -3.38 | -13.58 | 0.54 |
| 15500 | 0.837 | 23.3 | 0.589 | -126.0 | 0.196 | -54.5 | 0.881 | 58.0 | -4.60 | -14.15 | 0.45 |
| 16000 | 0.818 | 21.7 | 0.498 | -133.5 | 0.186 | -59.7 | 0.897 | 52.8 | -6.05 | -14.61 | 0.42 |

V_{CE} = 2 V, I_c = 5 mA

| Frequency MHz | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | | S ₂₁ ² dB | S ₁₂ ² dB | K |
|------------------|-----------------|--------|-----------------|--------|-----------------|-------|-----------------|--------|--------------------------------------|--------------------------------------|------|
| | MAG. | ANG. | MAG. | ANG. | MAG. | ANG. | MAG. | ANG. | | | |
| 2000 | 0.471 | -86.1 | 6.989 | 100.2 | 0.058 | 54.3 | 0.661 | -37.8 | 16.89 | -24.74 | 0.70 |
| 2100 | 0.444 | -88.2 | 6.726 | 98.1 | 0.059 | 51.9 | 0.648 | -38.3 | 16.55 | -24.52 | 0.75 |
| 2200 | 0.420 | -91.6 | 6.521 | 95.9 | 0.060 | 51.0 | 0.630 | -39.0 | 16.29 | -24.37 | 0.79 |
| 2300 | 0.403 | -94.8 | 6.310 | 93.5 | 0.063 | 50.9 | 0.620 | -40.1 | 16.00 | -24.02 | 0.81 |
| 2400 | 0.397 | -97.8 | 6.156 | 91.4 | 0.063 | 50.8 | 0.614 | -40.9 | 15.79 | -23.96 | 0.82 |
| 2500 | 0.385 | -99.0 | 5.971 | 89.8 | 0.066 | 50.8 | 0.611 | -40.9 | 15.52 | -23.67 | 0.83 |
| 2600 | 0.366 | -103.5 | 5.839 | 87.3 | 0.067 | 49.4 | 0.592 | -42.1 | 15.33 | -23.50 | 0.87 |
| 2700 | 0.354 | -105.2 | 5.675 | 85.7 | 0.069 | 50.1 | 0.584 | -42.8 | 15.08 | -23.28 | 0.89 |
| 2800 | 0.329 | -109.9 | 5.516 | 83.4 | 0.070 | 49.7 | 0.573 | -43.4 | 14.83 | -23.08 | 0.91 |
| 2900 | 0.327 | -113.2 | 5.366 | 81.6 | 0.070 | 50.1 | 0.571 | -44.8 | 14.59 | -23.11 | 0.93 |
| 3000 | 0.315 | -115.8 | 5.191 | 80.0 | 0.072 | 49.5 | 0.555 | -45.3 | 14.31 | -22.90 | 0.96 |
| 3100 | 0.293 | -119.0 | 5.088 | 77.8 | 0.071 | 50.1 | 0.549 | -45.8 | 14.13 | -22.95 | 1.00 |
| 3200 | 0.291 | -123.3 | 4.981 | 76.0 | 0.077 | 49.3 | 0.543 | -46.7 | 13.95 | -22.33 | 0.97 |
| 3300 | 0.287 | -126.2 | 4.894 | 74.5 | 0.077 | 49.9 | 0.537 | -47.7 | 13.79 | -22.22 | 0.98 |
| 3400 | 0.276 | -129.9 | 4.759 | 72.4 | 0.079 | 50.0 | 0.532 | -48.3 | 13.55 | -22.05 | 0.99 |
| 3500 | 0.266 | -132.0 | 4.661 | 71.3 | 0.080 | 50.9 | 0.525 | -49.1 | 13.37 | -21.98 | 1.02 |
| 3600 | 0.266 | -138.9 | 4.580 | 69.0 | 0.081 | 50.3 | 0.519 | -49.7 | 13.22 | -21.86 | 1.02 |
| 3700 | 0.261 | -140.5 | 4.483 | 67.7 | 0.081 | 50.1 | 0.513 | -50.1 | 13.03 | -21.86 | 1.05 |
| 3800 | 0.248 | -144.3 | 4.392 | 66.0 | 0.082 | 48.5 | 0.508 | -52.1 | 12.85 | -21.73 | 1.06 |
| 3900 | 0.238 | -147.6 | 4.292 | 64.4 | 0.086 | 49.6 | 0.502 | -52.3 | 12.65 | -21.26 | 1.05 |
| 4000 | 0.236 | -150.1 | 4.212 | 62.9 | 0.087 | 50.1 | 0.498 | -53.5 | 12.49 | -21.25 | 1.07 |
| 4500 | 0.225 | -169.6 | 3.899 | 54.8 | 0.096 | 48.4 | 0.478 | -57.3 | 11.82 | -20.36 | 1.07 |
| 5000 | 0.229 | 173.0 | 3.591 | 47.3 | 0.102 | 48.5 | 0.468 | -63.5 | 11.10 | -19.86 | 1.09 |
| 5500 | 0.231 | 160.1 | 3.332 | 40.2 | 0.112 | 47.3 | 0.449 | -69.4 | 10.45 | -19.01 | 1.09 |
| 6000 | 0.254 | 147.7 | 3.135 | 33.0 | 0.122 | 45.2 | 0.438 | -74.9 | 9.92 | -18.31 | 1.07 |
| 6500 | 0.273 | 137.6 | 2.960 | 25.8 | 0.133 | 43.3 | 0.423 | -80.8 | 9.43 | -17.50 | 1.05 |
| 7000 | 0.295 | 125.9 | 2.800 | 18.7 | 0.145 | 39.5 | 0.401 | -86.2 | 8.94 | -16.75 | 1.03 |
| 7500 | 0.321 | 117.5 | 2.666 | 11.3 | 0.158 | 36.7 | 0.377 | -92.5 | 8.52 | -16.01 | 1.01 |
| 8000 | 0.355 | 108.9 | 2.563 | 4.3 | 0.168 | 33.4 | 0.342 | -101.5 | 8.17 | -15.49 | 1.01 |
| 8500 | 0.399 | 101.6 | 2.462 | -3.6 | 0.186 | 30.6 | 0.315 | -114.3 | 7.82 | -14.63 | 0.96 |
| 9000 | 0.445 | 94.7 | 2.359 | -11.4 | 0.200 | 26.0 | 0.294 | -133.4 | 7.45 | -13.97 | 0.93 |
| 9500 | 0.507 | 87.6 | 2.251 | -19.8 | 0.212 | 19.6 | 0.300 | -153.2 | 7.05 | -13.47 | 0.88 |
| 10000 | 0.564 | 81.6 | 2.149 | -28.6 | 0.229 | 14.6 | 0.333 | -174.3 | 6.65 | -12.80 | 0.83 |
| 10500 | 0.620 | 74.9 | 2.031 | -37.5 | 0.235 | 8.7 | 0.371 | 167.3 | 6.15 | -12.56 | 0.79 |
| 11000 | 0.671 | 70.2 | 1.898 | -46.0 | 0.242 | 1.5 | 0.418 | 151.8 | 5.57 | -12.32 | 0.74 |
| 11500 | 0.709 | 64.9 | 1.776 | -54.5 | 0.253 | -4.2 | 0.453 | 137.4 | 4.99 | -11.95 | 0.71 |
| 12000 | 0.748 | 60.4 | 1.651 | -63.2 | 0.252 | -10.1 | 0.489 | 122.3 | 4.35 | -11.97 | 0.70 |
| 12500 | 0.779 | 54.3 | 1.530 | -72.1 | 0.254 | -17.7 | 0.541 | 109.1 | 3.69 | -11.89 | 0.67 |
| 13000 | 0.799 | 48.2 | 1.385 | -81.5 | 0.251 | -25.4 | 0.591 | 96.1 | 2.83 | -12.00 | 0.66 |
| 13500 | 0.812 | 42.7 | 1.252 | -90.5 | 0.243 | -33.0 | 0.658 | 85.0 | 1.95 | -12.29 | 0.64 |
| 14000 | 0.821 | 35.9 | 1.106 | -100.2 | 0.233 | -40.1 | 0.698 | 75.4 | 0.87 | -12.65 | 0.63 |
| 14500 | 0.821 | 29.9 | 0.987 | -108.3 | 0.218 | -44.8 | 0.773 | 69.6 | -0.12 | -13.25 | 0.60 |
| 15000 | 0.814 | 25.6 | 0.848 | -117.4 | 0.207 | -50.4 | 0.811 | 63.8 | -1.44 | -13.66 | 0.56 |
| 15500 | 0.810 | 22.8 | 0.748 | -125.6 | 0.188 | -55.8 | 0.847 | 58.4 | -2.53 | -14.53 | 0.50 |
| 16000 | 0.786 | 21.1 | 0.631 | -134.7 | 0.182 | -61.0 | 0.881 | 53.9 | -4.00 | -14.82 | 0.42 |

V_{CE} = 2 V, I_c = 8 mA

| Frequency MHz | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | | S ₂₁ ² dB | S ₁₂ ² dB | K |
|------------------|-----------------|--------|-----------------|--------|-----------------|-------|-----------------|--------|--------------------------------------|--------------------------------------|------|
| | MAG. | ANG. | MAG. | ANG. | MAG. | ANG. | MAG. | ANG. | | | |
| 2000 | 0.358 | -89.7 | 8.123 | 94.6 | 0.055 | 57.1 | 0.596 | -37.0 | 18.19 | -25.22 | 0.82 |
| 2100 | 0.334 | -91.4 | 7.762 | 92.5 | 0.055 | 57.4 | 0.585 | -37.0 | 17.80 | -25.12 | 0.87 |
| 2200 | 0.316 | -94.4 | 7.496 | 90.7 | 0.057 | 55.9 | 0.568 | -37.3 | 17.50 | -24.95 | 0.90 |
| 2300 | 0.303 | -97.2 | 7.214 | 88.5 | 0.058 | 57.8 | 0.560 | -38.5 | 17.16 | -24.67 | 0.92 |
| 2400 | 0.293 | -100.4 | 7.013 | 86.6 | 0.060 | 57.0 | 0.555 | -39.4 | 16.92 | -24.42 | 0.92 |
| 2500 | 0.286 | -100.5 | 6.781 | 85.1 | 0.062 | 57.5 | 0.551 | -39.7 | 16.63 | -24.11 | 0.93 |
| 2600 | 0.273 | -105.4 | 6.606 | 83.1 | 0.062 | 55.5 | 0.538 | -39.9 | 16.40 | -24.09 | 0.97 |
| 2700 | 0.260 | -106.3 | 6.393 | 81.4 | 0.065 | 57.7 | 0.532 | -40.6 | 16.11 | -23.74 | 0.97 |
| 2800 | 0.237 | -111.4 | 6.201 | 79.5 | 0.068 | 57.6 | 0.521 | -41.6 | 15.85 | -23.38 | 0.99 |
| 2900 | 0.236 | -116.0 | 6.046 | 77.8 | 0.069 | 58.3 | 0.520 | -42.5 | 15.63 | -23.22 | 0.98 |
| 3000 | 0.225 | -116.9 | 5.828 | 76.3 | 0.069 | 58.8 | 0.505 | -42.9 | 15.31 | -23.28 | 1.04 |
| 3100 | 0.212 | -121.4 | 5.687 | 74.6 | 0.073 | 57.6 | 0.501 | -43.6 | 15.10 | -22.74 | 1.02 |
| 3200 | 0.209 | -125.7 | 5.567 | 72.8 | 0.075 | 57.2 | 0.496 | -44.2 | 14.91 | -22.46 | 1.02 |
| 3300 | 0.206 | -129.4 | 5.444 | 71.5 | 0.074 | 56.4 | 0.491 | -45.0 | 14.72 | -22.58 | 1.05 |
| 3400 | 0.196 | -133.1 | 5.289 | 69.6 | 0.078 | 54.9 | 0.486 | -46.0 | 14.47 | -22.19 | 1.05 |
| 3500 | 0.184 | -134.9 | 5.187 | 68.5 | 0.080 | 56.7 | 0.479 | -46.5 | 14.30 | -21.94 | 1.05 |
| 3600 | 0.186 | -142.0 | 5.084 | 66.5 | 0.082 | 55.3 | 0.477 | -46.9 | 14.12 | -21.72 | 1.05 |
| 3700 | 0.184 | -144.7 | 4.963 | 65.4 | 0.084 | 54.8 | 0.471 | -48.2 | 13.92 | -21.48 | 1.05 |
| 3800 | 0.174 | -149.0 | 4.857 | 63.8 | 0.085 | 53.2 | 0.464 | -49.2 | 13.73 | -21.45 | 1.07 |
| 3900 | 0.170 | -152.4 | 4.744 | 62.3 | 0.089 | 53.7 | 0.462 | -49.6 | 13.52 | -21.00 | 1.06 |
| 4000 | 0.167 | -154.4 | 4.665 | 61.1 | 0.088 | 53.5 | 0.457 | -50.5 | 13.38 | -21.08 | 1.08 |
| 4500 | 0.164 | -176.7 | 4.296 | 53.5 | 0.099 | 52.0 | 0.440 | -54.6 | 12.66 | -20.06 | 1.07 |
| 5000 | 0.174 | 165.3 | 3.947 | 46.7 | 0.108 | 49.9 | 0.426 | -61.2 | 11.93 | -19.32 | 1.07 |
| 5500 | 0.182 | 151.5 | 3.657 | 40.1 | 0.121 | 49.5 | 0.409 | -66.7 | 11.26 | -18.37 | 1.06 |
| 6000 | 0.207 | 139.9 | 3.430 | 33.3 | 0.130 | 45.9 | 0.401 | -72.1 | 10.71 | -17.70 | 1.04 |
| 6500 | 0.228 | 132.4 | 3.243 | 26.5 | 0.141 | 44.2 | 0.384 | -77.6 | 10.22 | -17.02 | 1.03 |
| 7000 | 0.255 | 121.5 | 3.061 | 19.6 | 0.156 | 40.6 | 0.361 | -83.0 | 9.72 | -16.13 | 1.00 |
| 7500 | 0.281 | 112.9 | 2.911 | 12.6 | 0.164 | 36.9 | 0.331 | -88.2 | 9.28 | -15.73 | 1.02 |
| 8000 | 0.316 | 105.3 | 2.794 | 6.2 | 0.178 | 32.2 | 0.301 | -97.0 | 8.93 | -15.01 | 0.99 |
| 8500 | 0.360 | 99.0 | 2.690 | -1.6 | 0.188 | 29.9 | 0.269 | -109.7 | 8.59 | -14.51 | 0.98 |
| 9000 | 0.410 | 93.6 | 2.589 | -8.9 | 0.208 | 25.1 | 0.245 | -129.5 | 8.26 | -13.63 | 0.93 |
| 9500 | 0.469 | 86.6 | 2.476 | -17.2 | 0.222 | 19.9 | 0.249 | -152.1 | 7.88 | -13.09 | 0.90 |
| 10000 | 0.533 | 80.9 | 2.371 | -25.4 | 0.229 | 14.4 | 0.277 | -174.2 | 7.50 | -12.79 | 0.86 |
| 10500 | 0.590 | 75.0 | 2.256 | -34.1 | 0.243 | 7.9 | 0.318 | 165.0 | 7.07 | -12.29 | 0.82 |
| 11000 | 0.640 | 70.2 | 2.108 | -42.3 | 0.244 | 1.3 | 0.367 | 149.7 | 6.48 | -12.26 | 0.79 |
| 11500 | 0.684 | 64.8 | 1.991 | -50.8 | 0.254 | -5.9 | 0.403 | 135.1 | 5.98 | -11.90 | 0.76 |
| 12000 | 0.725 | 60.4 | 1.869 | -59.5 | 0.256 | -12.1 | 0.439 | 120.6 | 5.43 | -11.83 | 0.73 |
| 12500 | 0.755 | 54.9 | 1.738 | -68.1 | 0.253 | -18.5 | 0.492 | 107.3 | 4.80 | -11.92 | 0.72 |
| 13000 | 0.787 | 48.8 | 1.596 | -77.5 | 0.254 | -26.5 | 0.543 | 95.1 | 4.06 | -11.90 | 0.70 |
| 13500 | 0.796 | 42.3 | 1.458 | -86.7 | 0.240 | -32.4 | 0.613 | 84.4 | 3.27 | -12.41 | 0.70 |
| 14000 | 0.806 | 35.5 | 1.300 | -96.8 | 0.232 | -39.1 | 0.664 | 76.0 | 2.28 | -12.68 | 0.68 |
| 14500 | 0.808 | 29.3 | 1.166 | -105.3 | 0.218 | -44.7 | 0.741 | 70.0 | 1.33 | -13.22 | 0.65 |
| 15000 | 0.795 | 25.0 | 1.021 | -115.2 | 0.203 | -51.2 | 0.790 | 63.8 | 0.18 | -13.86 | 0.60 |
| 15500 | 0.789 | 22.4 | 0.889 | -124.5 | 0.190 | -55.4 | 0.829 | 59.2 | -1.02 | -14.43 | 0.53 |
| 16000 | 0.753 | 21.4 | 0.759 | -135.0 | 0.181 | -61.5 | 0.868 | 54.6 | -2.39 | -14.84 | 0.43 |

NOISE PARAMETERS

$V_{CE} = 2\text{ V}$, $I_C = 3\text{ mA}$

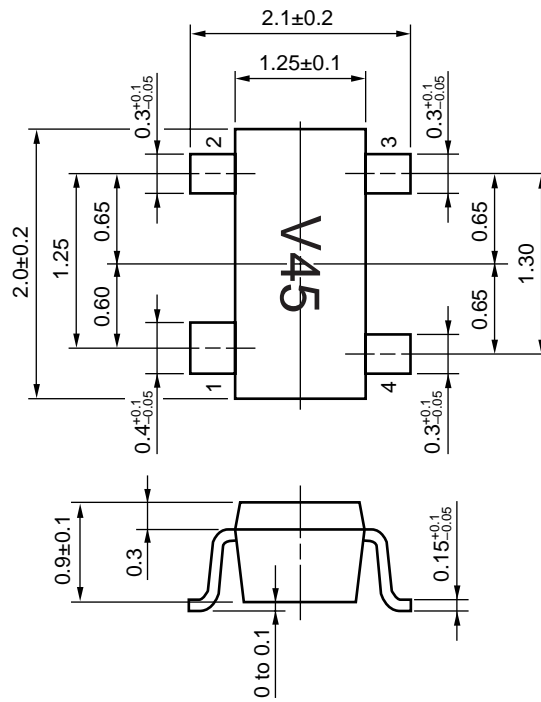
| Frequency (GHz) | NF _{min.} (dB) | G _a (dB) | Γ _{opt} | | Rn/50 |
|--------------------|----------------------------|------------------------|------------------|-------------|-------|
| | | | MAG. | ANG. (deg.) | |
| 0.8 | 0.24 | 25.2 | 0.39 | 6.0 | 0.20 |
| 1.0 | 0.43 | 24.4 | 0.42 | 13.0 | 0.21 |
| 1.2 | 0.44 | 21.6 | 0.44 | 17.0 | 0.22 |
| 1.4 | 0.56 | 18.9 | 0.54 | 16.6 | 0.20 |
| 1.6 | 0.60 | 19.0 | 0.45 | 21.6 | 0.21 |
| 1.8 | 0.67 | 18.3 | 0.43 | 26.0 | 0.21 |
| 2.0 | 0.75 | 17.2 | 0.43 | 31.4 | 0.21 |
| 2.2 | 0.83 | 16.2 | 0.42 | 35.1 | 0.21 |
| 2.4 | 0.91 | 16.0 | 0.41 | 37.0 | 0.20 |
| 2.6 | 0.99 | 15.3 | 0.35 | 44.0 | 0.20 |

$V_{CE} = 2\text{ V}$, $I_C = 5\text{ mA}$

| Frequency (GHz) | NF _{min.} (dB) | G _a (dB) | Γ _{opt} | | Rn/50 |
|--------------------|----------------------------|------------------------|------------------|-------------|-------|
| | | | MAG. | ANG. (deg.) | |
| 0.8 | 0.51 | 26.2 | 0.40 | 8.3 | 0.19 |
| 1.0 | 0.54 | 24.2 | 0.38 | 10.0 | 0.20 |
| 1.2 | 0.59 | 22.7 | 0.39 | 11.9 | 0.20 |
| 1.4 | 0.69 | 21.3 | 0.38 | 13.2 | 0.20 |
| 1.6 | 0.73 | 19.8 | 0.38 | 14.4 | 0.19 |
| 1.8 | 0.84 | 18.9 | 0.38 | 17.2 | 0.19 |
| 2.0 | 0.84 | 18.1 | 0.35 | 21.1 | 0.19 |
| 2.2 | 0.89 | 17.6 | 0.32 | 28.0 | 0.18 |
| 2.4 | 0.95 | 17.1 | 0.30 | 33.4 | 0.18 |
| 2.6 | 0.95 | 16.6 | 0.26 | 42.8 | 0.18 |

PACKAGE DIMENSIONS

4-PIN SUPER MINIMOLD (UNIT: mm)



PIN CONNECTIONS

- 1. Emitter
- 2. Base
- 3. Emitter
- 4. Collector

PRECAUTION

Because this product uses high-frequency technology, sufficient care must be taken regarding static electricity and strong electric fields.

Take measures against static electricity and make sure the body is earthed when mounting the device.

RECOMMENDED SOLDERING CONDITIONS

This product should be soldered and mounted under the following recommended conditions. For soldering methods and conditions other than those recommended below, contact your NEC sales representative.

| Soldering Method | Soldering Conditions | Recommended Condition Symbol |
|------------------|---|------------------------------|
| Infrared Reflow | Package peak temperature: 240°C or below, Time: 30 seconds or less (at 210°C or higher), Count: 3 times or less, Exposure limit: None ^{Note} | IR40-00-3 |
| Partial Heating | Pin temperature: 300°C or below, Time: 3 seconds or less (per side of device), Exposure limit: None ^{Note} | — |

Note After opening the dry pack, store it at 25°C or less and 65% RH or less for the allowable storage period.

Caution Do not use different soldering methods together (except for partial heating).

For the details the recommended soldering conditions, refer to the document **SEMICONDUCTOR DEVICE MOUNTING TECHNOLOGY MANUAL (C10535E)**.

[MEMO]

SAFETY INFORMATION ON THIS PRODUCT

| | | |
|-----------------------|----------------------|---|
| <p>Caution</p> | <p>GaAs Products</p> | <p>The product contains gallium arsenide, GaAs. GaAs vapor and powder are hazardous to human health if inhaled or ingested.</p> <ul style="list-style-type: none"> • Do not destroy or burn the product. • Do not cut or cleave off any part of the product. • Do not crush or chemically dissolve the product. • Do not put the product in the mouth. <p>Follow related laws and ordinances for disposal. The product should be excluded from general industrial waste or household garbage.</p> |
|-----------------------|----------------------|---|

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 "Special": Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)
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