

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

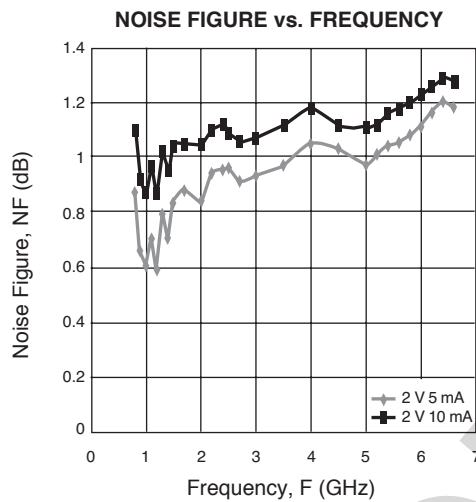
| SYMBOLS | PARAMETERS | UNITS | RATINGS |
|-----------|------------------------------|------------------|-------------|
| V_{CEO} | Collector to Emitter Voltage | V | 5.0 |
| V_{CBO} | Collector to Base Voltage | V | 3.0 |
| V_{EBO} | Emitter to Base Voltage | V | 3.0 |
| I_C | Collector Current | mA | 40 |
| I_B | Base Current | mA | 0.3 |
| P_T | Total Power Dissipation | mW | 150 |
| T_j | Junction Temperature | $^\circ\text{C}$ | +125 |
| T_{STG} | Storage Temperature | $^\circ\text{C}$ | -65 to +125 |

Note:

- Operation in excess of any of these parameters may result in permanent damage.

RECOMMENDED OPERATING CONDITIONS ($T_A = +25^\circ\text{C}$)

| SYMBOLS | PARAMETERS | UNITS | MIN. | TYP. | MAX. |
|----------|------------------------------|-------|------|------|------|
| V_{CE} | Collector to Emitter Voltage | V | 1.5 | 2.0 | 3.0 |
| I_C | Collector Current | mA | — | — | 30 |
| P_{IN} | Input Power | dBm | — | — | 0 |

TYPICAL PERFORMANCE CURVE ($T_A = 25^\circ\text{C}$)**TYPICAL SCATTERING PARAMETERS** ($T_A = 25^\circ\text{C}$)

NE52418

 $V_{CE} = 2.0\text{ V}$, $I_C = 3\text{ mA}$

| FREQUENCY GHz | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | |
|------------------|-----------------|--------|-----------------|--------|-----------------|-------|-----------------|--------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 2.0 | 0.601 | -82.0 | 5.571 | 107.2 | 0.064 | 47.4 | 0.733 | -38.7 |
| 2.5 | 0.505 | -98.5 | 4.898 | 94.9 | 0.067 | 41.0 | 0.669 | -43.7 |
| 3.0 | 0.438 | -115.1 | 4.405 | 83.4 | 0.073 | 38.5 | 0.619 | -48.5 |
| 3.5 | 0.384 | -132.3 | 4.008 | 73.6 | 0.077 | 38.5 | 0.583 | -53.5 |
| 4.0 | 0.346 | -148.8 | 3.645 | 64.2 | 0.078 | 39.2 | 0.550 | -58.7 |
| 4.5 | 0.328 | -166.8 | 3.333 | 54.9 | 0.083 | 38.7 | 0.525 | -64.5 |
| 5.0 | 0.327 | 178.2 | 3.100 | 46.7 | 0.085 | 41.0 | 0.509 | -70.7 |
| 5.5 | 0.326 | 164.7 | 2.894 | 38.3 | 0.094 | 41.7 | 0.502 | -76.9 |
| 6.0 | 0.344 | 152.8 | 2.708 | 30.2 | 0.099 | 41.6 | 0.485 | -84.4 |
| 6.5 | 0.366 | 140.7 | 2.573 | 22.1 | 0.108 | 41.6 | 0.474 | -90.1 |
| 7.0 | 0.382 | 130.2 | 2.445 | 14.2 | 0.121 | 40.7 | 0.457 | -97.9 |
| 7.5 | 0.402 | 120.3 | 2.320 | 6.2 | 0.128 | 37.2 | 0.428 | -107.0 |
| 8.0 | 0.431 | 110.9 | 2.209 | -2.5 | 0.146 | 35.6 | 0.410 | -117.1 |
| 8.5 | 0.46 | 102.2 | 2.124 | -11.7 | 0.161 | 32.0 | 0.398 | -132.9 |
| 9.0 | 0.516 | 94.2 | 2.023 | -21.2 | 0.175 | 26.1 | 0.395 | -151.4 |
| 9.5 | 0.572 | 87.1 | 1.912 | -31.0 | 0.191 | 19.7 | 0.436 | -170.0 |
| 10.0 | 0.617 | 78.8 | 1.782 | -41.3 | 0.201 | 13.7 | 0.475 | 172.1 |
| 10.5 | 0.664 | 73.4 | 1.663 | -51.2 | 0.211 | 6.4 | 0.541 | 156.3 |
| 11.0 | 0.699 | 66.5 | 1.513 | -61.8 | 0.210 | -0.7 | 0.594 | 140.7 |
| 11.5 | 0.720 | 61.6 | 1.373 | -72.1 | 0.211 | -9.0 | 0.636 | 127.1 |
| 12.0 | 0.728 | 55.5 | 1.228 | -83.1 | 0.207 | -17.2 | 0.695 | 113.6 |
| 12.5 | 0.720 | 49.1 | 1.073 | -34.6 | 0.196 | -26.2 | 0.747 | 99.9 |
| 13.0 | 0.701 | 43.4 | 0.910 | -107.7 | 0.172 | -33.0 | 0.789 | 86.8 |
| 13.5 | 0.643 | 38.2 | 0.737 | -121.2 | 0.150 | -39.8 | 0.864 | 75.9 |
| 14.0 | 0.587 | 36.7 | 0.523 | -137.3 | 0.119 | -39.1 | 0.893 | 65.4 |

TYPICAL SCATTERING PARAMETERS, cont. ($T_A = 25^\circ\text{C}$)

NE52418

 $V_{CE} = 2.0\text{ V}$, $I_C = 10\text{ mA}$

| FREQUENCY | | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | |
|-----------|--|-----------------|--------|-----------------|--------|-----------------|-------|-----------------|--------|
| GHz | | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 2.0 | | 0.306 | -95.3 | 8.717 | 91.6 | 0.051 | 59.1 | 0.556 | -37.9 |
| 2.5 | | 0.237 | -111.7 | 7.212 | 82.2 | 0.060 | 60.0 | 0.512 | -40.1 |
| 3.0 | | 0.191 | -128.4 | 6.201 | 73.3 | 0.067 | 55.4 | 0.478 | -43.7 |
| 3.5 | | 0.170 | -148.2 | 5.469 | 65.9 | 0.077 | 55.5 | 0.451 | -47.6 |
| 4.0 | | 0.160 | -168.5 | 4.904 | 58.7 | 0.086 | 54.3 | 0.430 | -52.8 |
| 4.5 | | 0.167 | 171.7 | 4.433 | 51.4 | 0.094 | 53.1 | 0.412 | -57.5 |
| 5.0 | | 0.181 | 156.2 | 4.093 | 44.6 | 0.106 | 51.6 | 0.398 | -63.5 |
| 5.5 | | 0.195 | 144.5 | 3.813 | 37.7 | 0.115 | 48.5 | 0.389 | -69.9 |
| 6.0 | | 0.216 | 134.5 | 3.553 | 30.7 | 0.126 | 45.8 | 0.376 | -77.3 |
| 6.5 | | 0.245 | 127.0 | 3.372 | 23.7 | 0.133 | 42.2 | 0.363 | -82.9 |
| 7.0 | | 0.266 | 117.7 | 3.192 | 16.8 | 0.143 | 38.0 | 0.343 | -90.1 |
| 7.5 | | 0.295 | 109.6 | 3.023 | 9.8 | 0.152 | 35.1 | 0.311 | -97.6 |
| 8.0 | | 0.325 | 103.3 | 2.897 | 2.0 | 0.165 | 30.8 | 0.293 | -106.7 |
| 8.5 | | 0.370 | 96.3 | 2.793 | -6.0 | 0.179 | 27.3 | 0.271 | -123.9 |
| 9.0 | | 0.423 | 89.5 | 2.587 | -14.5 | 0.188 | 21.0 | 0.260 | -145.1 |
| 9.5 | | 0.476 | 83.4 | 2.579 | -23.3 | 0.201 | 15.5 | 0.292 | -166.3 |
| 10.0 | | 0.528 | 76.3 | 2.456 | -33.0 | 0.208 | 8.6 | 0.337 | 172.9 |
| 10.5 | | 0.580 | 71.2 | 2.317 | -42.3 | 0.210 | 2.4 | 0.403 | 156.1 |
| 11.0 | | 0.620 | 64.7 | 2.180 | -52.8 | 0.213 | -5.5 | 0.461 | 141.9 |
| 11.5 | | 0.640 | 60.7 | 2.022 | -63.2 | 0.212 | -12.6 | 0.522 | 128.6 |
| 12.0 | | 0.651 | 54.1 | 1.875 | -74.8 | 0.205 | -20.4 | 0.588 | 115.5 |
| 12.5 | | 0.636 | 47.4 | 1.685 | -88.3 | 0.191 | -29.2 | 0.660 | 103.2 |
| 13.0 | | 0.600 | 42.2 | 1.466 | -103.2 | 0.173 | -37.2 | 0.731 | 90.1 |
| 13.5 | | 0.516 | 39.5 | 1.172 | -120.4 | 0.145 | -42.4 | 0.834 | 78.2 |
| 14.0 | | 0.482 | 47.1 | 0.802 | -139.8 | 0.112 | -39.1 | 0.891 | 56.2 |

NE52418

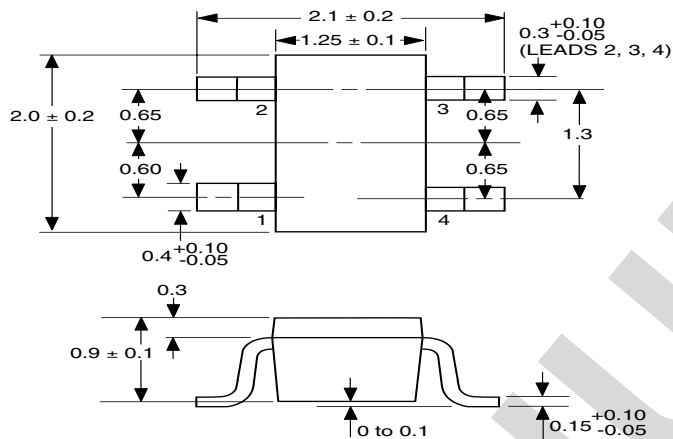
 $V_{CE} = 2.0\text{ V}$, $I_C = 20\text{ mA}$

| FREQUENCY | | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | |
|-----------|--|-----------------|--------|-----------------|--------|-----------------|-------|-----------------|--------|
| GHz | | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 2.0 | | 0.188 | -105.5 | 9.306 | 85.1 | 0.049 | 63.2 | 0.489 | -35.0 |
| 2.5 | | 0.140 | -124.6 | 7.618 | 76.9 | 0.061 | 63.4 | 0.453 | -37.3 |
| 3.0 | | 0.117 | -147.2 | 6.514 | 69.1 | 0.070 | 63.2 | 0.429 | -40.1 |
| 3.5 | | 0.116 | -170.3 | 5.708 | 62.5 | 0.081 | 61.0 | 0.415 | -44.6 |
| 4.0 | | 0.124 | 169.2 | 5.092 | 56.0 | 0.091 | 58.6 | 0.390 | -49.2 |
| 4.5 | | 0.146 | 150.9 | 4.595 | 49.1 | 0.102 | 56.2 | 0.349 | -55.5 |
| 5.0 | | 0.164 | 138.1 | 4.239 | 42.8 | 0.112 | 52.0 | 0.361 | -51.5 |
| 5.5 | | 0.184 | 129.5 | 3.929 | 36.2 | 0.121 | 49.2 | 0.350 | -67.5 |
| 6.0 | | 0.207 | 124.1 | 3.675 | 29.6 | 0.131 | 45.9 | 0.336 | -75.1 |
| 6.5 | | 0.238 | 116.7 | 3.470 | 22.8 | 0.145 | 42.3 | 0.323 | -81.2 |
| 7.0 | | 0.262 | 110.1 | 3.278 | 16.1 | 0.154 | 37.9 | 0.299 | -88.5 |
| 7.5 | | 0.292 | 102.7 | 3.108 | 9.5 | 0.165 | 33.5 | 0.267 | -96.6 |
| 8.0 | | 0.322 | 97.6 | 2.971 | 2.1 | 0.174 | 27.1 | 0.246 | -105.1 |
| 8.5 | | 0.362 | 91.4 | 2.857 | -5.7 | 0.183 | 24.6 | 0.221 | -124.7 |
| 9.0 | | 0.412 | 85.1 | 2.753 | -13.8 | 0.196 | 19.0 | 0.210 | -147.6 |
| 9.5 | | 0.471 | 79.6 | 2.641 | -22.4 | 0.203 | 13.6 | 0.243 | -171.7 |
| 10.0 | | 0.517 | 72.9 | 2.513 | -31.4 | 0.209 | 6.2 | 0.292 | 167.0 |
| 10.5 | | 0.565 | 68.3 | 2.387 | -40.7 | 0.219 | -0.8 | 0.359 | 151.4 |
| 11.0 | | 0.607 | 62.5 | 2.264 | -50.8 | 0.213 | -7.8 | 0.424 | 137.4 |
| 11.5 | | 0.630 | 58.3 | 2.091 | -60.7 | 0.212 | -14.5 | 0.476 | 124.7 |
| 12.0 | | 0.635 | 51.3 | 1.960 | -72.2 | 0.206 | -22.0 | 0.548 | 113.2 |
| 12.5 | | 0.616 | 44.7 | 1.783 | -85.7 | 0.196 | -31.7 | 0.619 | 101.4 |
| 13.0 | | 0.574 | 39.1 | 1.571 | -101.2 | 0.173 | -40.0 | 0.700 | 89.7 |
| 13.5 | | 0.476 | 37.7 | 1.265 | -119.6 | 0.143 | -45.5 | 0.815 | 78.0 |
| 14.0 | | 0.442 | 48.7 | 0.859 | -139.7 | 0.107 | -43.6 | 0.887 | 66.5 |

This product should be soldered under the following recommended conditions. For soldering methods and conditions other than those recommended below, contact your CEL Sales Representative.

NONLINEAR MODEL

SCHEMATIC



BJT NONLINEAR MODEL PARAMETERS ⁽¹⁾

| Parameters | Q1 | Parameters | Q1 |
|------------|-----------|------------|--------|
| IS | 7.8e-25 | MJC | 0.07 |
| BF | 158 | XCJC | 0.2 |
| NF | 1.006 | CJS | 0 |
| VAF | 1000 | VJS | 0.75 |
| IKF | 1.95 | MJS | 0 |
| ISE | 6.36e-18 | FC | 0.5 |
| NE | 1.92 | TF | 2e-12 |
| BR | 1 | XTF | 3 |
| NR | 1 | VTF | 1 |
| VAR | 1000 | ITF | 0.05 |
| IKR | 1000 | PTF | 0 |
| ISC | 0 | TR | 50e-12 |
| NC | 2.0 | EG | 1.51 |
| RE | 1.5 | XTB | 0 |
| RB | 7 | XTI | 3 |
| RBM | 1 | KF | 0 |
| IRB | 1000 | AF | 1 |
| RC | 1.2 | | |
| CJE | 0.27 | | |
| VJE | 0.99 | | |
| MJE | 0.21 | | |
| CJC | 0.065e-12 | | |
| VJC | 0.73 | | |

ADDITIONAL PARAMETERS

| Parameters | NE52418 |
|------------|-----------|
| CCB | 0.02e-12 |
| CCE | 0.19e-12 |
| LB | 0.83e-9 |
| Lc | 0.8e-9 |
| LE | 0.2e-9 |
| CCBPKG | 0.002e-12 |
| CCEPKG | 0.05e-12 |
| CBEPK | 0.15e-12 |
| LBX | 0.55e-9 |
| LCX | 0.1e-9 |
| LEX | 0.05e-9 |

MODEL RANGE

Frequency: 0.3 to 10 GHz
 Bias: $V_{CE} = 0.7 \text{ V}$ to 2 V , $I_C = 1 \text{ mA}$ to 10 mA
 Date: 02/2002

(1) Gummel-Poon Model

Life Support Applications

These NEC products are not intended for use in life support devices, appliances, or systems where the malfunction of these products can reasonably be expected to result in personal injury. The customers of CEL using or selling these products for use in such applications do so at their own risk and agree to fully indemnify CEL for all damages resulting from such improper use or sale.

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04/22/03

NEC

A Business Partner of NEC Compound Semiconductor Devices, Ltd.

Subject: Compliance with EU Directives

CEL certifies, to its knowledge, that semiconductor and laser products detailed below are compliant with the requirements of European Union (EU) Directive 2002/95/EC Restriction on Use of Hazardous Substances in electrical and electronic equipment (RoHS) and the requirements of EU Directive 2003/11/EC Restriction on Penta and Octa BDE.

CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL's understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

| Restricted Substance per RoHS | Concentration Limit per RoHS (values are not yet fixed) | Concentration contained in CEL devices | |
|----------------------------------|--|---|-----|
| | | -A | -AZ |
| Lead (Pb) | < 1000 PPM | Not Detected | (*) |
| Mercury | < 1000 PPM | Not Detected | |
| Cadmium | < 100 PPM | Not Detected | |
| Hexavalent Chromium | < 1000 PPM | Not Detected | |
| PBB | < 1000 PPM | Not Detected | |
| PBDE | < 1000 PPM | Not Detected | |

If you should have any additional questions regarding our devices and compliance to environmental standards, please do not hesitate to contact your local representative.

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