

**HIGH-FREQUENCY LOW NOISE AMPLIFIER  
NPN SILICON EPITAXIAL TRANSISTOR  
(WITH BUILT-IN 2 ELEMENTS) MINI MOLD**

The  $\mu$ PA800T has built-in 2 low-voltage transistors which are designed to amplify low noise in the VHF band to the UHF band.

**FEATURES**

- Low Noise  
NF = 1.9 dB TYP. @ f = 2 GHz,  $V_{CE} = 1$  V,  $I_c = 3$  mA
- High Gain  
 $|S_{21e}|^2 = 6.5$  dB TYP. @ f = 2 GHz,  $V_{CE} = 1$  V,  $I_c = 3$  mA
- A Mini Mold Package Adopted
- Built-in 2 Transistors (2  $\times$  2SC4228)

**ORDERING INFORMATION**

| PART NUMBER     | QUANTITY                         | PACKING STYLE   |
|-----------------|----------------------------------|---|
| $\mu$ PA800T    | Loose products<br>(50 PCS)       | Embossed tape 8 mm wide. Pin 6 (Q1 Base), Pin 5 (Q2 Base), Pin 4 (Q2 Emitter) face to perforation side of the tape. |
| $\mu$ PA800T-T1 | Taping products<br>(3 KPCS/Reel) |   |

**Remark** If you require an evaluation sample, please contact an NEC Sales Representative. (Unit sample quantity is 50 pcs.)

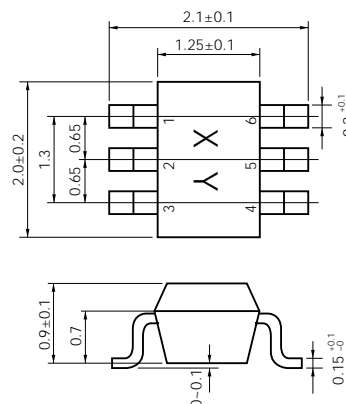
**ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25 °C)**

| PARAMETER                    | SYMBOL    | RATING  | UNIT |
|------------------------------|-----------|---|------|
| Collector to Base Voltage    | $V_{CBO}$ | 20  | V    |
| Collector to Emitter Voltage | $V_{CEO}$ | 10  | V    |
| Emitter to Base Voltage      | $V_{EBO}$ | 1.5   | V    |
| Collector Current            | $I_c$     | 35  | mA   |
| Total Power Dissipation      | $P_T$     | 150 in 1 element<br>200 in 2 elements <sup>Note</sup> | mW   |
| Junction Temperature         | $T_j$     | 150   | °C   |
| Storage Temperature          | $T_{stg}$ | -65 to +150   | °C   |

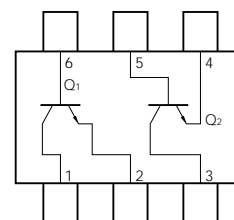
**Note** 110 mW must not be exceeded in 1 element.

**PACKAGE DRAWINGS**

(Unit: mm)



**PIN CONFIGURATION (Top View)**



**PIN CONNECTIONS**

- 1. Collector (Q1)
- 2. Emitter (Q1)
- 3. Collector (Q2)
- 4. Emitter (Q2)
- 5. Base (Q2)
- 6. Base (Q1)

The information in this document is subject to change without notice.

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**

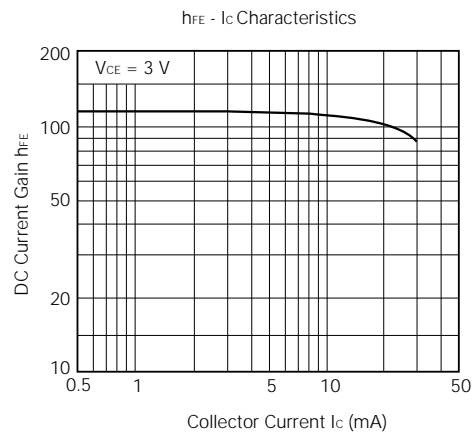
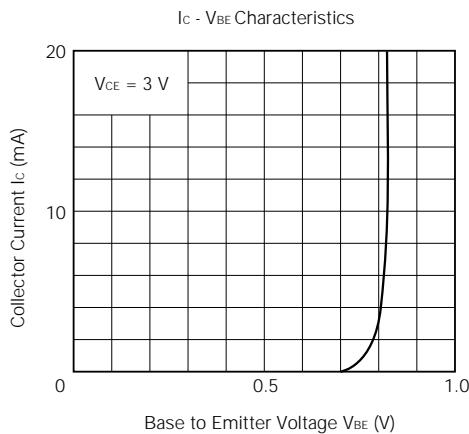
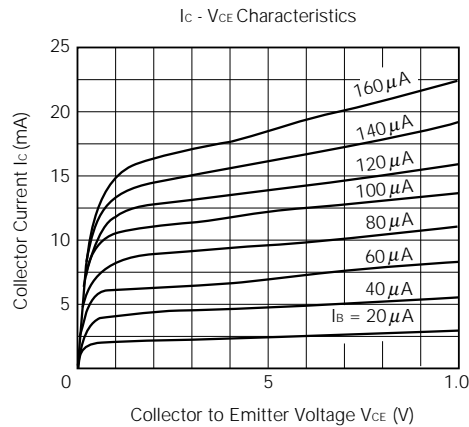
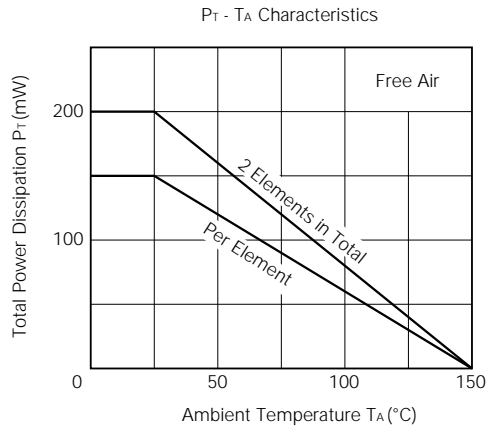
| PARAMETER                | SYMBOL                          | CONDITION  | MIN. | TYP. | MAX. | UNIT |
|--------------------------|---------------------------------|--|------|------|------|------|
| Collector Cutoff Current | I <sub>CB0</sub>                | V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0                             |      |      | 1.0  | μA   |
| Emitter Cutoff Current   | I <sub>EB0</sub>                | V <sub>EB</sub> = 1 V, I <sub>C</sub> = 0                              |      |      | 1.0  | μA   |
| DC Current Gain          | h <sub>FE</sub>                 | V <sub>CE</sub> = 3 V, I <sub>C</sub> = 5 mA <sup>Note 1</sup>         | 80   |      | 200  |      |
| Gain Bandwidth Product   | f <sub>T</sub>                  | V <sub>CE</sub> = 3 V, I <sub>C</sub> = 5 mA                           | 5.5  | 80   |      | GHz  |
| Feed-back Capacitance    | C <sub>re</sub>                 | V <sub>CB</sub> = 3 V, I <sub>E</sub> = 0, f = 1 MHz <sup>Note 2</sup> |      |      | 0.7  | pF   |
| Insertion Power Gain (1) | S <sub>21e</sub>   <sup>2</sup> | V <sub>CE</sub> = 1 V, I <sub>C</sub> = 3 mA, f = 2 GHz                | 4.5  | 6.5  |      | dB   |
| Insertion Power Gain (2) | S <sub>21e</sub>   <sup>2</sup> | V <sub>CE</sub> = 3 V, I <sub>C</sub> = 5 mA, f = 2 GHz                | 5.5  | 7.5  |      | dB   |
| Noise Figure (1)         | NF                              | V <sub>CE</sub> = 1 V, I <sub>C</sub> = 3 mA, f = 2 GHz                |      | 1.9  | 3.2  | dB   |
| Noise Figure (2)         | NF                              | V <sub>CE</sub> = 3 V, I <sub>C</sub> = 5 mA, f = 2 GHz                |      | 1.9  | 3.2  | dB   |

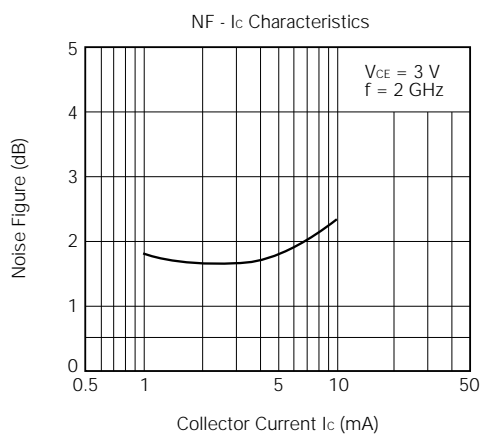
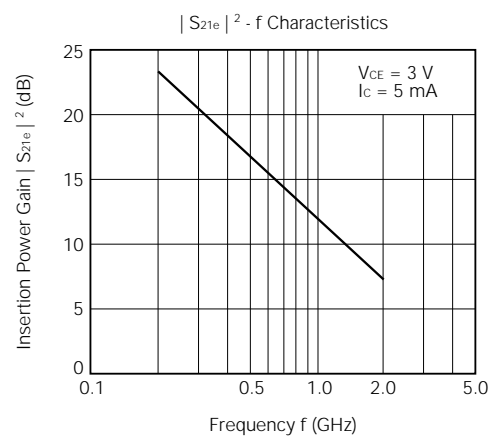
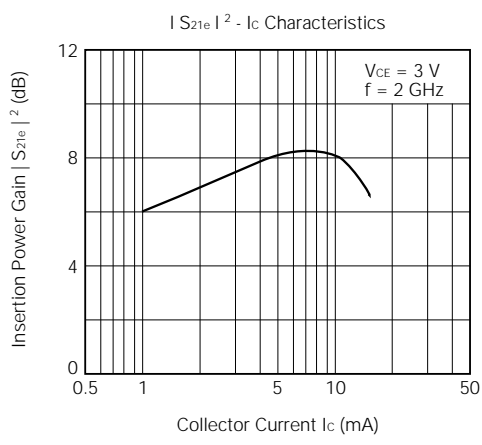
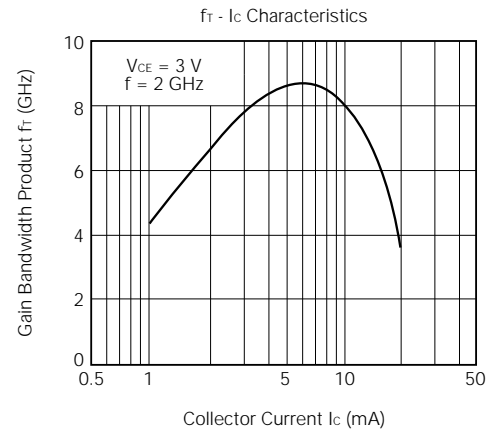
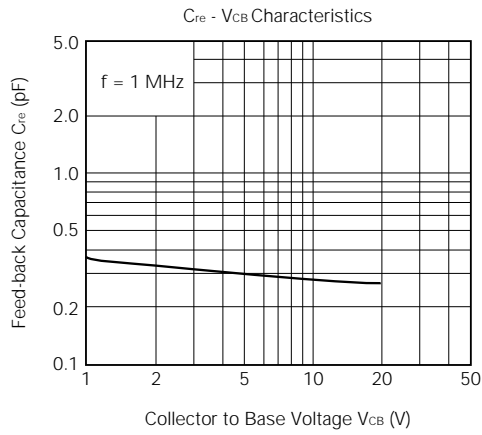
- Notes**
1. Pulse Measurement: P<sub>w</sub> ≤ 350 μs, Duty cycle ≤ 2 %
  2. Measured with 3-pin bridge, emitter and case should be connected to guard pin of bridge.

**h<sub>FE</sub> CLASSIFICATION**

|                       |           |
|-----------------------|-----------|
| Rank                  | KB        |
| Marking               | RL        |
| h <sub>FE</sub> Value | 80 to 200 |

**TYPICAL CHARACTERISTICS (T<sub>A</sub> = 25 °C)**





S-PARAMETERS

V<sub>CE</sub> = 3 V, I<sub>c</sub> = 5 mA, Z<sub>o</sub> = 50 Ω

| FREQUENCY<br>MHz | S11  |        | S21    |       | S12  |      | S22  |       |
|------------------|------|--------|--------|-------|------|------|------|-------|
|                  | MAG  | ANG    | MAG    | ANG   | MAG  | ANG  | MAG  | ANG   |
| 100.00           | .875 | -18.6  | 14.087 | 161.1 | .018 | 78.2 | .958 | -10.1 |
| 200.00           | .762 | -35.0  | 12.290 | 145.1 | .034 | 68.6 | .888 | -17.7 |
| 300.00           | .677 | -47.2  | 10.888 | 133.6 | .048 | 66.6 | .800 | -24.4 |
| 400.00           | .565 | -59.4  | 9.275  | 123.6 | .055 | 65.8 | .719 | -26.7 |
| 500.00           | .495 | -67.5  | 8.300  | 115.7 | .063 | 63.5 | .669 | -28.7 |
| 600.00           | .425 | -76.1  | 7.184  | 108.9 | .074 | 61.1 | .610 | -30.3 |
| 700.00           | .372 | -81.6  | 6.454  | 104.8 | .084 | 63.8 | .600 | -30.6 |
| 800.00           | .327 | -88.5  | 5.818  | 99.5  | .089 | 62.7 | .560 | -31.3 |
| 900.00           | .289 | -93.6  | 5.231  | 95.5  | .092 | 64.6 | .543 | -30.1 |
| 1000.00          | .255 | -100.5 | 4.820  | 92.0  | .104 | 62.8 | .519 | -33.4 |
| 1100.00          | .236 | -105.2 | 4.444  | 88.8  | .105 | 64.2 | .512 | -31.8 |
| 1200.00          | .214 | -112.2 | 4.142  | 85.3  | .113 | 64.2 | .497 | -33.4 |
| 1300.00          | .195 | -117.6 | 3.842  | 83.2  | .122 | 63.6 | .476 | -33.2 |
| 1400.00          | .182 | -123.8 | 3.554  | 79.3  | .127 | 65.0 | .481 | -34.2 |
| 1500.00          | .165 | -129.9 | 3.343  | 77.4  | .139 | 64.1 | .467 | -34.6 |
| 1600.00          | .153 | -137.4 | 3.218  | 75.3  | .140 | 64.5 | .466 | -34.8 |
| 1700.00          | .145 | -144.3 | 3.091  | 73.6  | .152 | 65.4 | .458 | -37.2 |
| 1800.00          | .139 | -151.8 | 2.857  | 70.4  | .162 | 64.3 | .456 | -36.1 |
| 1900.00          | .134 | -157.0 | 2.764  | 68.7  | .168 | 62.3 | .451 | -38.4 |
| 2000.00          | .129 | -164.7 | 2.624  | 66.4  | .176 | 64.8 | .445 | -39.0 |

V<sub>CE</sub> = 3 V, I<sub>c</sub> = 3 mA, Z<sub>o</sub> = 50 Ω

| FREQUENCY<br>MHz | S11  |        | S21   |       | S12  |      | S22  |       |
|------------------|------|--------|-------|-------|------|------|------|-------|
|                  | MAG  | ANG    | MAG   | ANG   | MAG  | ANG  | MAG  | ANG   |
| 100.00           | .943 | -13.4  | 9.384 | 165.9 | .020 | 84.1 | .969 | -7.7  |
| 200.00           | .868 | -26.6  | 8.668 | 152.8 | .038 | 77.2 | .936 | -13.8 |
| 300.00           | .815 | -37.7  | 8.165 | 142.9 | .051 | 67.9 | .876 | -20.9 |
| 400.00           | .717 | -48.9  | 7.279 | 132.9 | .062 | 63.9 | .804 | -23.5 |
| 500.00           | .655 | -56.8  | 6.780 | 125.5 | .075 | 63.9 | .764 | -26.7 |
| 600.00           | .577 | -65.5  | 6.061 | 118.0 | .084 | 60.0 | .708 | -29.7 |
| 700.00           | .518 | -71.2  | 5.504 | 112.8 | .091 | 59.7 | .685 | -31.1 |
| 800.00           | .468 | -78.1  | 5.074 | 106.7 | .098 | 57.0 | .639 | -32.0 |
| 900.00           | .420 | -83.7  | 4.632 | 102.8 | .102 | 59.0 | .611 | -32.8 |
| 1000.00          | .380 | -90.6  | 4.340 | 98.3  | .105 | 56.6 | .592 | -35.0 |
| 1100.00          | .344 | -94.8  | 3.951 | 94.8  | .112 | 57.8 | .579 | -34.1 |
| 1200.00          | .321 | -101.6 | 3.717 | 90.5  | .121 | 59.0 | .551 | -35.0 |
| 1300.00          | .291 | -105.9 | 3.485 | 87.6  | .128 | 58.7 | .532 | -35.9 |
| 1400.00          | .273 | -111.7 | 3.306 | 84.3  | .135 | 59.8 | .535 | -36.6 |
| 1500.00          | .250 | -117.2 | 3.134 | 80.7  | .140 | 58.0 | .511 | -37.5 |
| 1600.00          | .228 | -122.4 | 2.959 | 79.0  | .145 | 59.5 | .516 | -37.7 |
| 1700.00          | .219 | -128.5 | 2.819 | 76.0  | .153 | 59.0 | .504 | -39.0 |
| 1800.00          | .199 | -135.3 | 2.699 | 73.9  | .161 | 58.4 | .493 | -39.9 |
| 1900.00          | .193 | -139.6 | 2.572 | 71.9  | .163 | 60.3 | .489 | -41.4 |
| 2000.00          | .182 | -146.9 | 2.474 | 68.3  | .175 | 59.8 | .482 | -41.4 |

V<sub>CE</sub> = 3 V, I<sub>c</sub> = 1 mA, Z<sub>o</sub> = 50 Ω

| FREQUENCY<br>MHz | S11   |        | S21   |       | S12  |      | S22  |       |
|------------------|-------|--------|-------|-------|------|------|------|-------|
|                  | MAG   | ANG    | MAG   | ANG   | MAG  | ANG  | MAG  | ANG   |
| 100.00           | 1.023 | -7.6   | 3.505 | 172.1 | .025 | 86.4 | .995 | -4.6  |
| 200.00           | .983  | -16.1  | 3.400 | 163.3 | .039 | 79.3 | .986 | -7.8  |
| 300.00           | .975  | -22.4  | 3.368 | 157.3 | .061 | 74.6 | .976 | -12.8 |
| 400.00           | .922  | -31.8  | 3.219 | 149.1 | .075 | 70.7 | .936 | -15.1 |
| 500.00           | .899  | -36.9  | 3.186 | 143.3 | .093 | 66.4 | .922 | -18.8 |
| 600.00           | .849  | -44.7  | 3.046 | 135.7 | .105 | 62.2 | .885 | -22.5 |
| 700.00           | .812  | -50.6  | 2.905 | 131.1 | .113 | 61.7 | .880 | -24.4 |
| 800.00           | .774  | -57.1  | 2.830 | 124.4 | .128 | 55.7 | .846 | -27.2 |
| 900.00           | .727  | -62.9  | 2.694 | 119.2 | .134 | 55.6 | .808 | -28.8 |
| 1000.00          | .680  | -69.3  | 2.597 | 114.1 | .146 | 53.7 | .790 | -31.8 |
| 1100.00          | .651  | -74.1  | 2.479 | 109.3 | .146 | 50.3 | .766 | -32.8 |
| 1200.00          | .616  | -79.8  | 2.392 | 104.8 | .155 | 49.8 | .741 | -34.9 |
| 1300.00          | .575  | -85.2  | 2.302 | 101.1 | .155 | 46.2 | .714 | -35.9 |
| 1400.00          | .546  | -90.6  | 2.207 | 96.0  | .160 | 46.7 | .708 | -36.8 |
| 1500.00          | .512  | -95.8  | 2.110 | 92.1  | .168 | 43.6 | .685 | -38.4 |
| 1600.00          | .481  | -100.6 | 2.034 | 88.8  | .165 | 45.5 | .676 | -40.1 |
| 1700.00          | .463  | -106.3 | 1.989 | 85.5  | .176 | 45.3 | .667 | -41.8 |
| 1800.00          | .440  | -111.8 | 1.903 | 82.2  | .173 | 43.8 | .649 | -42.3 |
| 1900.00          | .419  | -116.4 | 1.854 | 78.9  | .174 | 43.5 | .633 | -44.2 |
| 2000.00          | .394  | -121.2 | 1.779 | 75.5  | .173 | 43.7 | .630 | -45.2 |

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