

# NEC®

## SUPER MINI-MOLD

**30**  
**PACKAGE**

T.33-13

## FEATURES

- **40 % REDUCTION IN FOOTPRINT AREA**  
(from SOT-23)
- **30 % REDUCTION IN HEIGHT**  
(from SOT-23)
- **50% REDUCTION IN WEIGHT**  
(from SOT-23)
- **SIX DEVICE TYPES OFFERED**
- **AVAILABLE IN TAPE AND REEL**

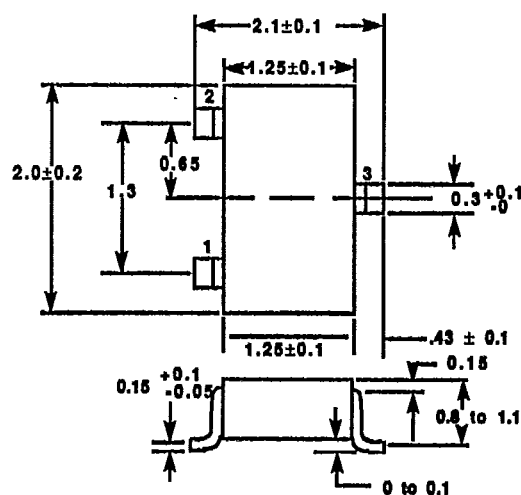
## DESCRIPTION AND APPLICATIONS

For your microwave designs where size and performance are important considerations, the NEC Super Mini-Mold family of devices is well suited. Reduction in size brings reductions in both parasitic and load inductances to maximize performance in higher frequency applications.

Six devices are being offered in the Super Mini-Mold package. The NE85630 can be used in slots where low noise, high gain, and high dynamic range are important. The NE68183 and NE68030 are the devices with the highest fT in this package, for the highest gains and the highest frequency oscillator designs. Finally, the NE68330 is suitable for very low current-low voltage, low noise applications.

### OUTLINE DIMENSIONS (Units in mm)

## OUTLINE 30



1. Emitter
2. Base
3. Collector

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

| PART NUMBERS     |                              |       | NE68030     | NE68130     | NE68330     | NE68530     |
|------------------|------------------------------|-------|-------------|-------------|-------------|-------------|
| SYMBOLS          | PARAMETERS                   | UNITS | RATINGS     | RATINGS     | RATINGS     | RATINGS     |
| V <sub>CB0</sub> | Collector to Base Voltage    | V     | 20          | 20          | 15          | 20          |
| V <sub>CE0</sub> | Collector to Emitter Voltage | V     | 10          | 10          | 8           | 12          |
| V <sub>EB0</sub> | Emitter to Base Voltage      | V     | 1.5         | 1.5         | 2           | 3           |
| I <sub>CO</sub>  | Collector Current            | mA    | 35          | 65          | 5           | 100         |
| P <sub>T</sub>   | Total Power Dissipation      | W     | 150         | 150         | 50          | 150         |
| T <sub>J</sub>   | Junction Temperature         | °C    | 150         | 150         | 150         | 150         |
| T <sub>STG</sub> | Storage Temperature          | °C    | -65 to +150 | -65 to +150 | -65 to +150 | -65 to +150 |

## ELECTRICAL CHARACTERISTICS

| PART NUMBER<br>EIAJ <sup>1</sup> REGISTERED NUMBER |                                                                                                                                                                                                                                                             |                          | NE68030<br>2SC4228 |     |     | NE68130<br>2SC4227 |      |     | NE68330<br>2SC4187 |     |     | NE85630<br>2SC4226 |     |     |
|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------|-----|-----|--------------------|------|-----|--------------------|-----|-----|--------------------|-----|-----|
| SYMBOLS                                            | PARAMETERS & CONDITIONS                                                                                                                                                                                                                                     | UNITS                    | MIN                | TYP | MAX | MIN                | TYP  | MAX | MIN                | TYP | MAX | MIN                | TYP | MAX |
| I <sub>CEO</sub>                                   | Collector Cutoff Current<br>V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0<br>V <sub>CB</sub> = 5 V, I <sub>E</sub> = 0<br>V <sub>CB</sub> = 15 V, I <sub>E</sub> = 0                                                                                           | μA<br>μA<br>μA           |                    |     | 1.0 |                    |      | 1.0 |                    |     | 0.1 |                    | 1.0 |     |
| I <sub>EO</sub>                                    | Emitter Cutoff Current<br>V <sub>EB</sub> = 1 V, I <sub>C</sub> = 0                                                                                                                                                                                         | μA                       |                    |     | 1.0 |                    |      | 1.0 |                    |     | 0.1 |                    | 1.0 |     |
| h <sub>FE</sub>                                    | Forward Current Gain<br>V <sub>CE</sub> = 3 V, I <sub>C</sub> = 5 mA<br>V <sub>CE</sub> = 3 V, I <sub>C</sub> = 7 mA<br>V <sub>CE</sub> = 1 V, I <sub>C</sub> = .25 mA<br>V <sub>CE</sub> = 3 V, I <sub>C</sub> = 5 mA                                      |                          | 50                 |     | 250 | 40                 |      | 240 | 50                 | 100 | 250 | 40                 | 110 | 250 |
| f <sub>T</sub>                                     | Gain Bandwidth Product<br>V <sub>CE</sub> = 3 V, I <sub>C</sub> = 5 mA<br>V <sub>CE</sub> = 3 V, I <sub>C</sub> = 7 mA<br>V <sub>CE</sub> = 1 V, I <sub>C</sub> = 1 mA<br>V <sub>CE</sub> = 3 V, I <sub>C</sub> = 7 mA                                      | GHz<br>GHz<br>GHz<br>GHz |                    | 8.5 |     |                    | 7.0  |     |                    | 4.0 |     |                    | 4.5 |     |
| C <sub>RE</sub>                                    | V <sub>CE</sub> = 3 V, I <sub>C</sub> = 0 mA, f = 1 MHz<br>V <sub>CE</sub> = 3 V, I <sub>C</sub> = 0 mA, f = 1 MHz<br>V <sub>CE</sub> = 3 V, I <sub>C</sub> = 0 mA, f = 1 MHz<br>V <sub>CE</sub> = 1 V, I <sub>C</sub> = 0 mA, f = 1 MHz                    | pf<br>pf<br>pf<br>pf     |                    | 0.3 | 0.7 |                    | 0.45 | 0.9 |                    | 0.5 | 0.7 |                    | 0.7 | 1.5 |
| NF                                                 | Noise Figure<br>V <sub>CE</sub> = 3 V, I <sub>C</sub> = 5 mA, f = 2 GHz<br>V <sub>CE</sub> = 3 V, I <sub>C</sub> = 7 mA, f = 1 GHz<br>V <sub>CE</sub> = 1 V, I <sub>C</sub> = 0.25 mA, f = 1 GHz<br>V <sub>CE</sub> = 3 V, I <sub>C</sub> = 7 mA, f = 1 GHz | dB<br>dB<br>dB<br>dB     | 1.9                | 3.2 |     |                    | 1.4  | 2.7 |                    | 3.0 | 4.5 | 1.2                | 2.5 |     |
| S <sub>21E</sub>                                   | V <sub>CE</sub> = 3 V, I <sub>C</sub> = 5 mA, f = 2 GHz<br>V <sub>CE</sub> = 3 V, I <sub>C</sub> = 7 mA, f = 1 GHz<br>V <sub>CE</sub> = 3 V, I <sub>C</sub> = 7 mA, f = 1 GHz<br>V <sub>CE</sub> = 1 V, I <sub>C</sub> = 1 mA, f = 1 GHz                    | dB<br>dB<br>dB<br>dB     | 5.5                | 7.5 |     | 10                 | 12   |     | 4.0                | 6.5 |     | 7                  | 9   |     |

## Note:

1. Electronic Industrial Association of Japan.