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SILICON TRANSISTOR

NE68033 / 2SC3585 JEITA Part No.

MICROWAVE LOW NOISE AMPLIFIER NPN SILICON EPITAXIAL TRANSISOR

DESCRIPTION

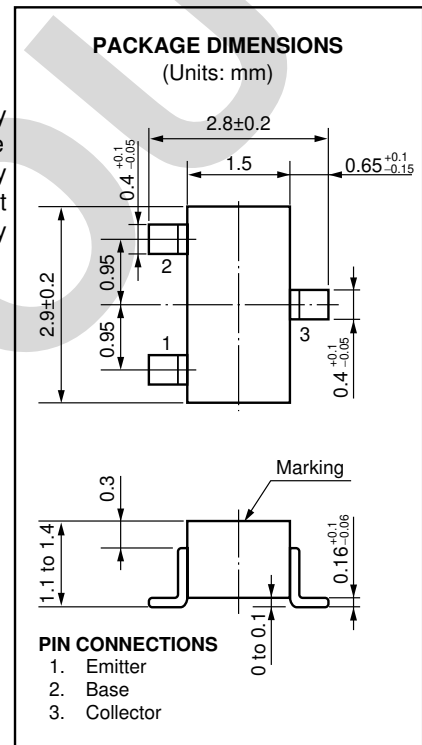
The NE68033 / 2SC3585 is an NPN epitaxial silicon transistor designed for use in low-noise and small signal amplifiers from VHF band to UHF band. The NE68033 / 2SC3585 features excellent power gain with very low-noise figures. The NE68033 / 2SC3585 employs direct nitride passivated base surface process (DNP process) which is a proprietary new fabrication technique which provides excellent noise figures at high current values. This allows excellent associated gain and very wide dynamic range.

FEATURES

- NF 1.8 dB TYP. @f = 2.0 GHz
- Ga 9 dB TYP. @f = 2.0 GHz

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

| | | | |
|------------------------------|------------------|-------------|----|
| 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 | 200 | mW |
| Junction Temperature | T _J | 150 | °C |
| Storage Temperature | T _{stg} | -65 to +150 | °C |



ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

| CHARACTERISTIC | SYMBOL | MIN. | TYP. | MAX. | UNIT | TEST CONDITIONS |
|--------------------------|---------------------------------|------|------|------|------|--|
| Collector Cutoff Current | I _{CBO} | | | 1.0 | μA | V _{CB} = 10 V, I _E = 0 |
| Emitter Cutoff Current | I _{EBO} | | | 1.0 | μA | V _{EB} = 1 V, I _C = 0 |
| DC Current Gain | h _{FE} * | 50 | 100 | 250 | | V _{CE} = 6 V, I _C = 10 mA |
| Gain Bandwidth Product | f _T | | 10 | | GHz | V _{CE} = 6 V, I _C = 10 mA |
| Feed-Back Capacitance | C _{re} ** | | 0.3 | 0.8 | pF | V _{CB} = 10 V, I _E = 0, f = 1.0 MHz |
| Insertion Power Gain | S _{21e} ² | 6.0 | 8.0 | | dB | V _{CE} = 6 V, I _C = 10 mA, f = 2.0 GHz |
| Maximum Available Gain | MAG | | 10 | | dB | V _{CE} = 6 V, I _C = 10 mA, f = 2.0 GHz |
| Noise Figure | NF | | 1.8 | 3.0 | dB | V _{CE} = 6 V, I _C = 5 mA, f = 2.0 GHz |

* Pulse Measurement PW ≤ 350 μs, Duty Cycle ≤ 2 %

** The emitter terminal and the case shall be connected to the guard terminal of the three-terminal capacitance bridge.

h_{FE} Classification

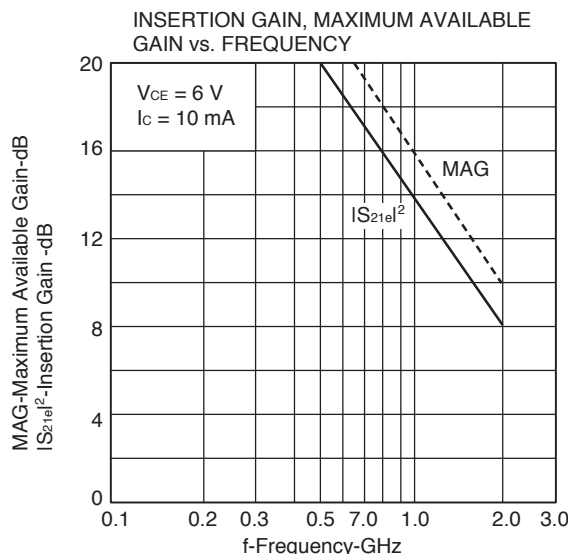
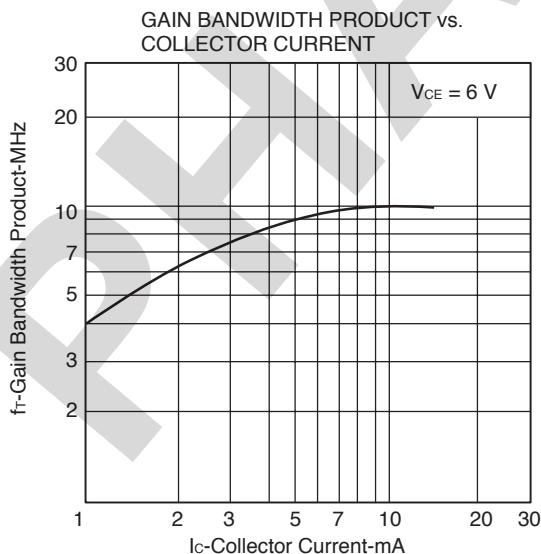
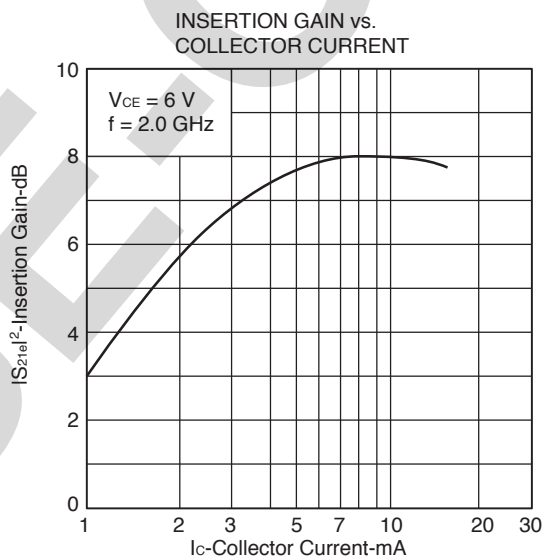
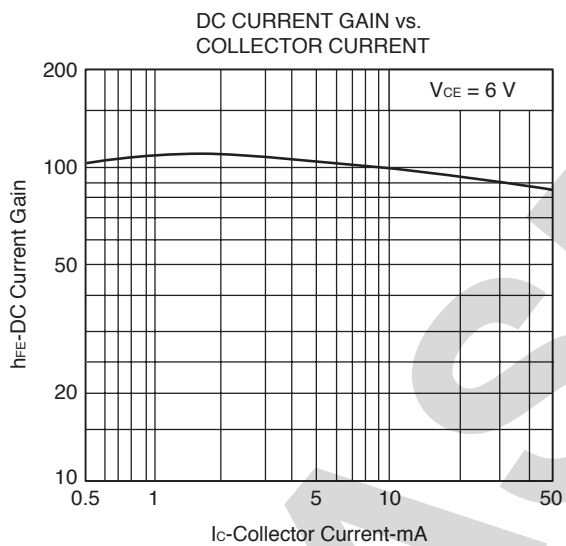
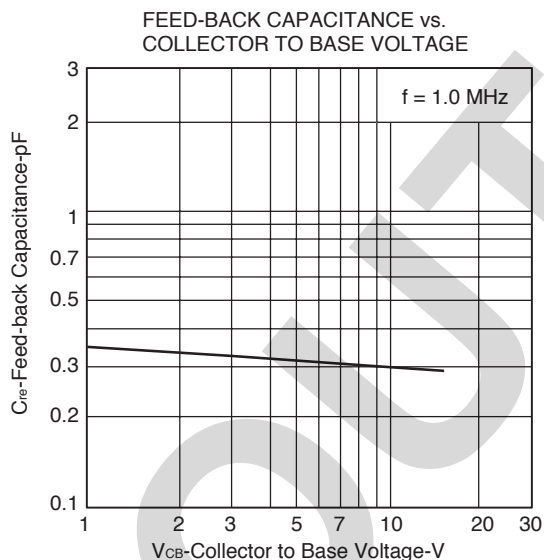
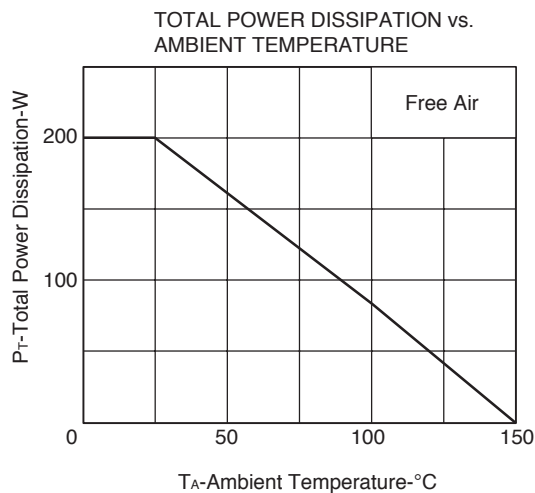
| Class | R43/Q * | R44/R * | R45/S * |
|-----------------|-----------|-----------|------------|
| Marking | R43 | R44 | R45 |
| h _{FE} | 50 to 100 | 80 to 160 | 125 to 250 |

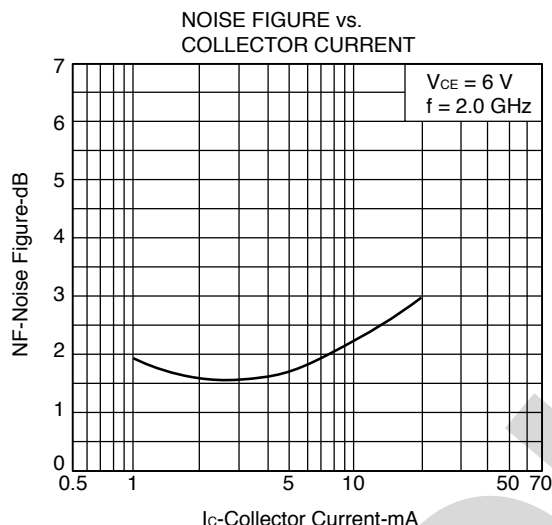
ORDERING INFORMATION

| Part Number | Order Number | Quantity |
|-------------|---------------|-------------|
| NE68033-T1B | NE68033-T1B-A | 3 kpcs/Reel |
| 2SC3585-T1B | 2SC3585-T1B-A | |

* Old Specification / New Specification

TYPICAL CHARACTERISTICS (T_A = 25 °C)





S-PARAMETER

V_{CE} = 6.0 V, I_c = 3.0 mA, Z_o = 50 Ω

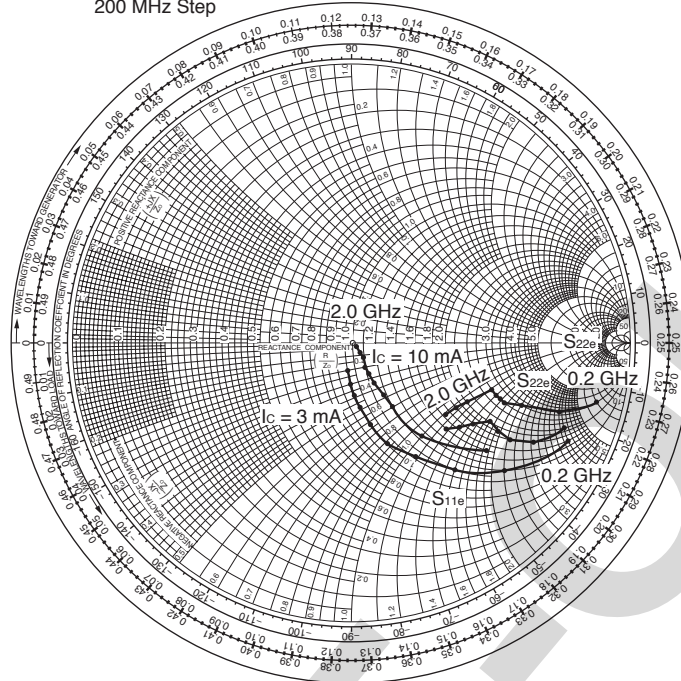
| f (MHz) | S ₁₁ | ∠ S ₁₁ | S ₂₁ | ∠ S ₂₁ | S ₁₂ | ∠ S ₁₂ | S ₂₂ | ∠ S ₂₂ |
|---------|-----------------|-------------------|-----------------|-------------------|-----------------|-------------------|-----------------|-------------------|
| 200 | 0.858 | -23.1 | 8.499 | 153.3 | 0.030 | 46.5 | 0.905 | -13.5 |
| 400 | 0.724 | -40.6 | 6.923 | 131.6 | 0.060 | 58.7 | 0.826 | -21.2 |
| 600 | 0.580 | -51.1 | 5.951 | 118.4 | 0.080 | 60.3 | 0.749 | -27.0 |
| 800 | 0.457 | -58.9 | 4.615 | 104.9 | 0.099 | 60.2 | 0.666 | -28.6 |
| 1000 | 0.362 | -65.6 | 4.134 | 98.0 | 0.106 | 61.2 | 0.614 | -30.1 |
| 1200 | 0.304 | -73.1 | 3.412 | 88.9 | 0.129 | 61.1 | 0.574 | -30.0 |
| 1400 | 0.232 | -82.2 | 3.180 | 82.0 | 0.148 | 60.1 | 0.542 | -31.7 |
| 1600 | 0.179 | -84.9 | 2.763 | 75.7 | 0.154 | 59.5 | 0.514 | -35.2 |
| 1800 | 0.147 | -88.2 | 2.726 | 70.5 | 0.188 | 58.7 | 0.483 | -40.1 |
| 2000 | 0.108 | -104.1 | 2.378 | 64.9 | 0.197 | 56.8 | 0.455 | -42.6 |

V_{CE} = 6.0 V, I_c = 10.0 mA, Z_o = 50 Ω

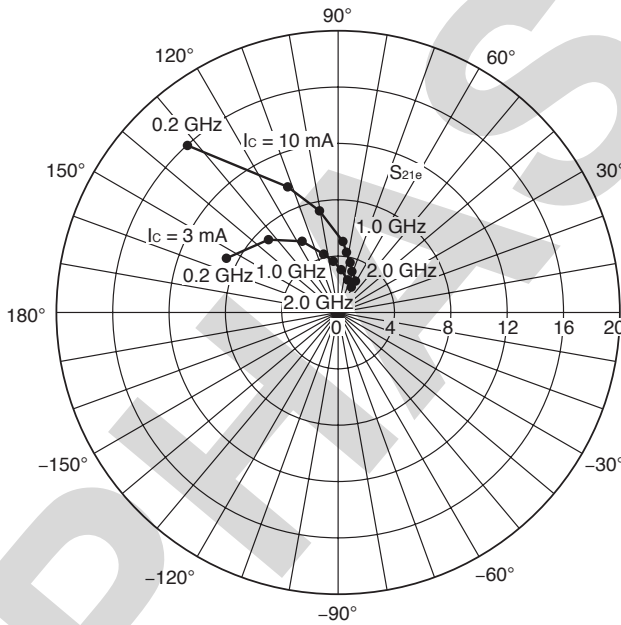
| f (MHz) | S ₁₁ | ∠ S ₁₁ | S ₂₁ | ∠ S ₂₁ | S ₁₂ | ∠ S ₁₂ | S ₂₂ | ∠ S ₂₂ |
|---------|-----------------|-------------------|-----------------|-------------------|-----------------|-------------------|-----------------|-------------------|
| 200 | 0.613 | -37.0 | 16.141 | 133.9 | 0.021 | 52.5 | 0.781 | -19.4 |
| 400 | 0.406 | -53.6 | 10.096 | 111.5 | 0.053 | 70.6 | 0.651 | -22.4 |
| 600 | 0.285 | -56.0 | 7.640 | 101.4 | 0.064 | 73.0 | 0.590 | -24.0 |
| 800 | 0.214 | -57.6 | 5.564 | 90.7 | 0.089 | 71.7 | 0.548 | -22.8 |
| 1000 | 0.156 | -58.1 | 4.787 | 86.0 | 0.095 | 70.6 | 0.526 | -23.3 |
| 1200 | 0.130 | -54.2 | 3.876 | 79.3 | 0.119 | 70.3 | 0.506 | -22.1 |
| 1400 | 0.105 | -56.5 | 3.573 | 74.0 | 0.141 | 68.3 | 0.489 | -24.8 |
| 1600 | 0.065 | -55.0 | 3.058 | 69.4 | 0.158 | 68.9 | 0.470 | -27.9 |
| 1800 | 0.042 | -48.9 | 2.997 | 65.3 | 0.178 | 66.5 | 0.439 | -31.4 |
| 2000 | 0.018 | -65.6 | 2.590 | 60.7 | 0.202 | 66.2 | 0.426 | -36.5 |

S-PARAMETER

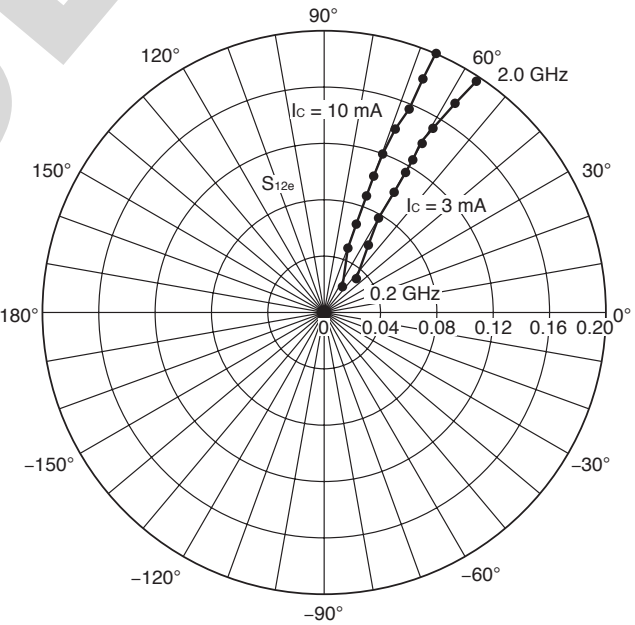
S_{11e} , S_{22e} -FREQUENCY CONDITION $V_{CE} = 6 V$
200 MHz Step



S_{21e} -FREQUENCY CONDITION $V_{CE} = 6 V$



S_{12e} -FREQUENCY CONDITION $V_{CE} = 6 V$



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