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# 2SC535

Silicon NPN Epitaxial Planar

# HITACHI

ADE-208-1047 (Z)  
1st. Edition  
Mar. 2001

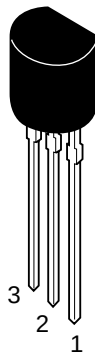
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## Application

VHF amplifier, mixer, local oscillator

## Outline

TO-92 (2)



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

2SC535

Absolute Maximum Ratings (Ta = 25°C)

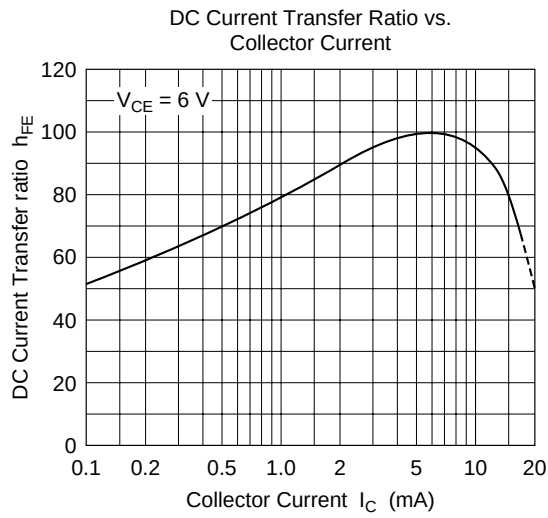
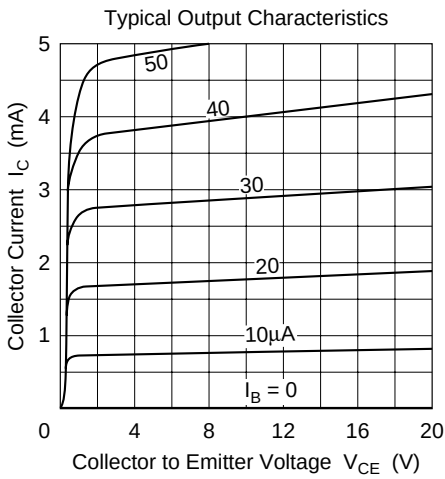
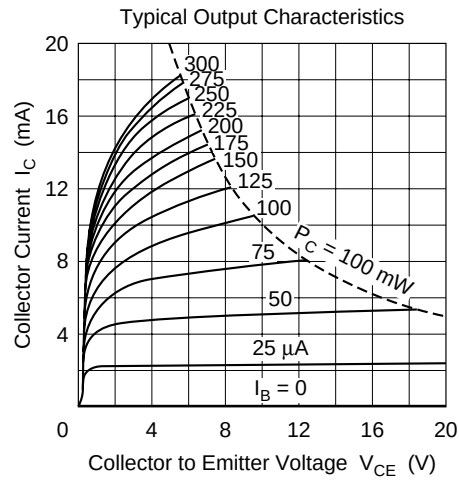
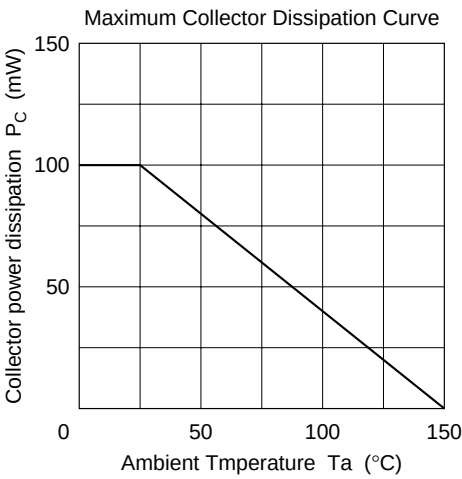
| Item                         | Symbol           | Ratings     | Unit |
|------------------------------|------------------|-------------|------|
| Collector to base voltage    | V <sub>CBO</sub> | 30          | V    |
| Collector to emitter voltage | V <sub>CEO</sub> | 20          | V    |
| Emitter to base voltage      | V <sub>EBO</sub> | 4           | V    |
| Collector current            | I <sub>C</sub>   | 20          | mA   |
| Collector power dissipation  | P <sub>C</sub>   | 100         | mW   |
| Junction temperature         | T <sub>j</sub>   | 150         | °C   |
| Storage temperature          | T <sub>stg</sub> | −55 to +150 | °C   |

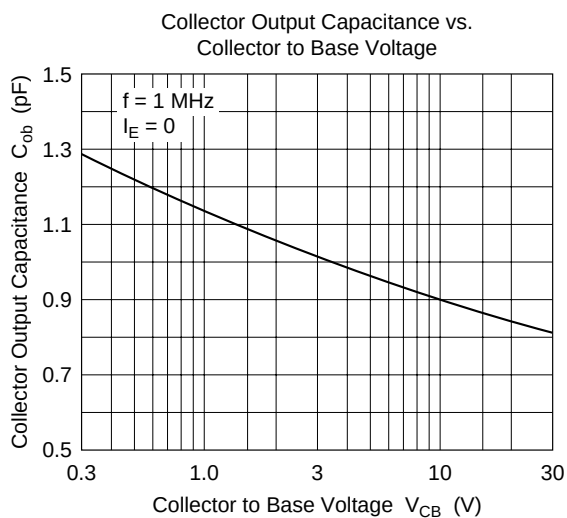
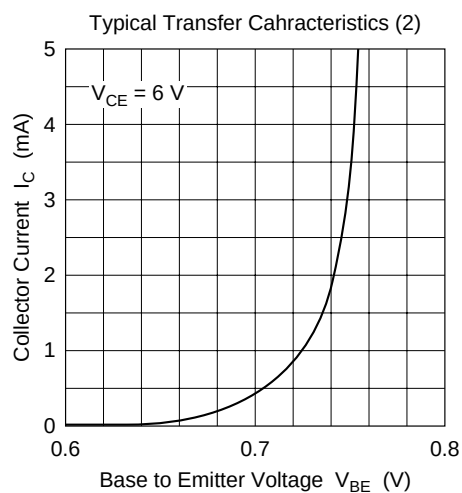
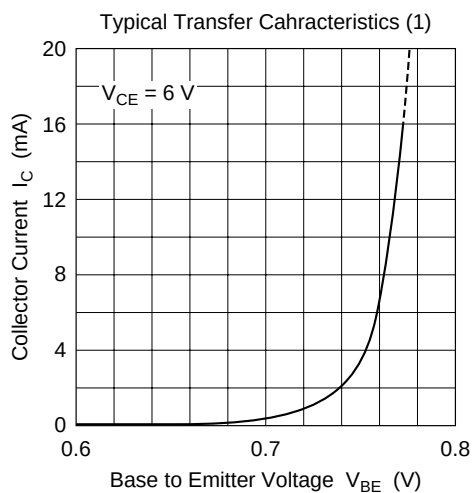
**Electrical Characteristics** ( $T_a = 25^\circ\text{C}$ )

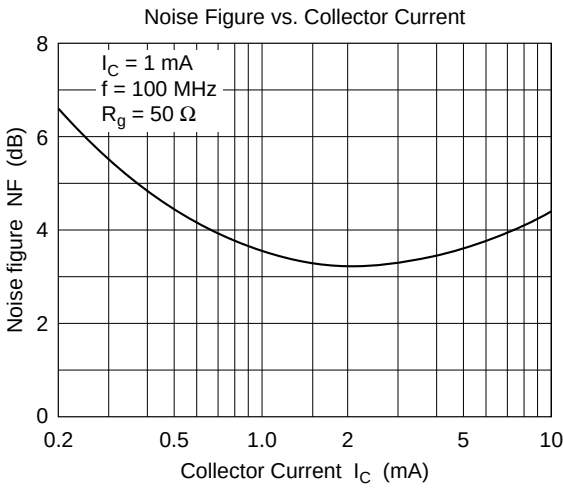
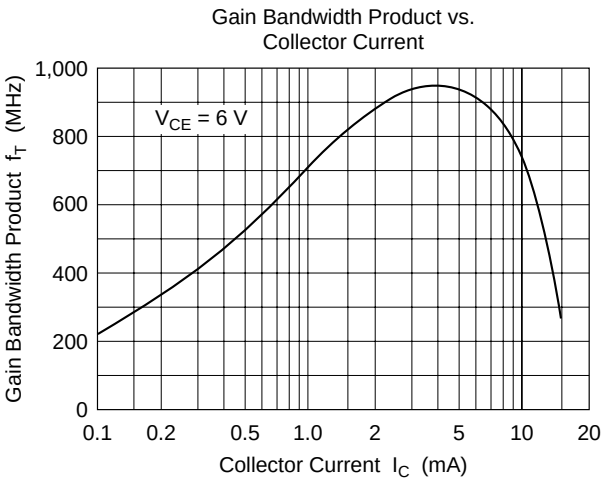
| Item                                    | Symbol        | Min            | Typ  | Max | Unit          | Test conditions                                                                               |
|-----------------------------------------|---------------|----------------|------|-----|---------------|-----------------------------------------------------------------------------------------------|
| Collector to base breakdown voltage     | $V_{(BR)CBO}$ | 30             | —    | —   | V             | $I_C = 10\ \mu\text{A}$ , $I_E = 0$                                                           |
| Collector to emitter breakdown voltage  | $V_{(BR)CEO}$ | 20             | —    | —   | V             | $I_C = 1\ \text{mA}$ , $R_{BE} = \infty$                                                      |
| Emitter to base breakdown voltage       | $V_{(BR)EBO}$ | 4              | —    | —   | V             | $I_E = 10\ \mu\text{A}$ , $I_C = 0$                                                           |
| Collector cutoff current                | $I_{CBO}$     | —              | —    | 0.5 | $\mu\text{A}$ | $V_{CB} = 10\ \text{V}$ , $I_E = 0$                                                           |
| DC current transfer ratio               | $h_{FE}^{*1}$ | 60             | —    | 200 |               | $V_{CE} = 6\ \text{V}$ , $I_C = 1\ \text{mA}$                                                 |
| Base to emitter voltage                 | $V_{BE}$      | —              | 0.72 | —   | V             | $V_{CE} = 6\ \text{V}$ , $I_C = 1\ \text{mA}$                                                 |
| Collector to emitter saturation voltage | $V_{CE(sat)}$ | —              | 0.17 | —   | V             | $I_C = 20\ \text{mA}$ , $I_B = 4\ \text{mA}$                                                  |
| Gain bandwidth product                  | $f_T$         | 450            | 940  | —   | MHz           | $V_{CE} = 6\ \text{V}$ , $I_C = 5\ \text{mA}$                                                 |
| Collector output capacitance            | $C_{ob}$      | —              | 0.9  | 1.2 | pF            | $V_{CB} = 10\ \text{V}$ , $I_E = 0$ , $f = 1\ \text{MHz}$                                     |
| Power gain                              | PG            | 17             | 20   | —   | dB            | $V_{CE} = 6\ \text{V}$ , $I_C = 1\ \text{mA}$ ,<br>$f = 100\ \text{MHz}$                      |
| Noise figure                            | NF            | —              | 3.5  | 5.5 | dB            | $V_{CE} = 6\ \text{V}$ , $I_C = 1\ \text{mA}$ ,<br>$f = 100\ \text{MHz}$ , $R_g = 50\ \Omega$ |
| Input admittance (typ)                  | $y_{ie}$      | 1.3 + j5.3     |      |     | mS            | $V_{CE} = 6\ \text{V}$ , $I_C = 1\ \text{mA}$ ,<br>$f = 100\ \text{MHz}$                      |
| Reverse transfer admittance (typ)       | $y_{re}$      | -0.078 - j0.41 |      |     | mS            |                                                                                               |
| Foward transfer admittance (typ)        | $y_{fe}$      | 32 - j10       |      |     | mS            |                                                                                               |
| Output admittance (typ)                 | $y_{oe}$      | 0.08 + j0.82   |      |     | mS            |                                                                                               |

Note: 1. The 2SC535 is grouped by  $h_{FE}$  as follows.

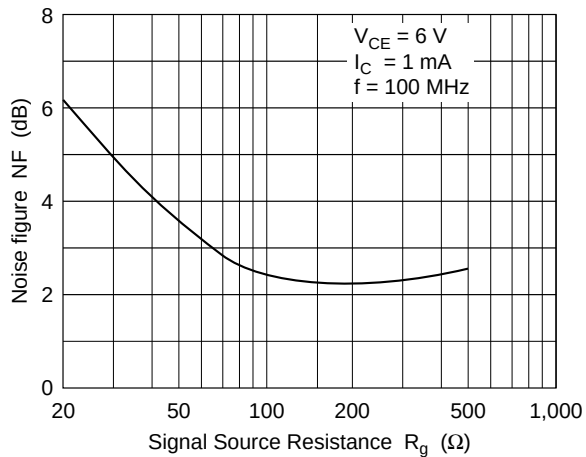
| B         | C          |
|-----------|------------|
| 60 to 120 | 100 to 200 |



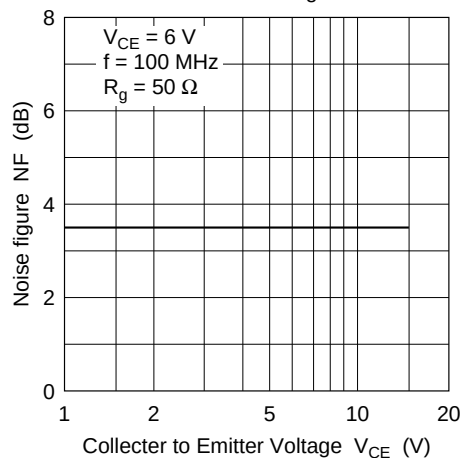




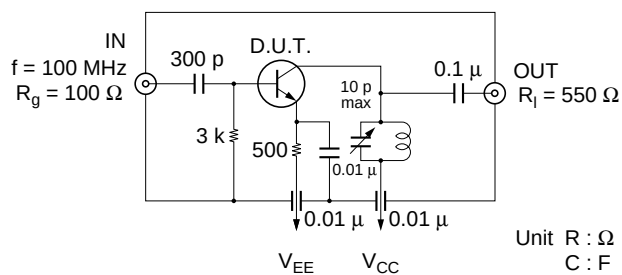
Noise Figure vs. Signal Source Resistance



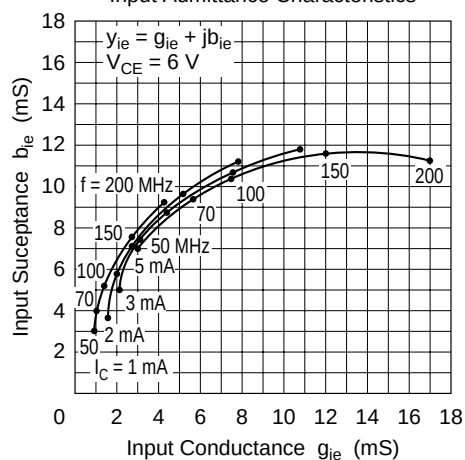
Noise Figure vs. Collector to Emitter Voltage

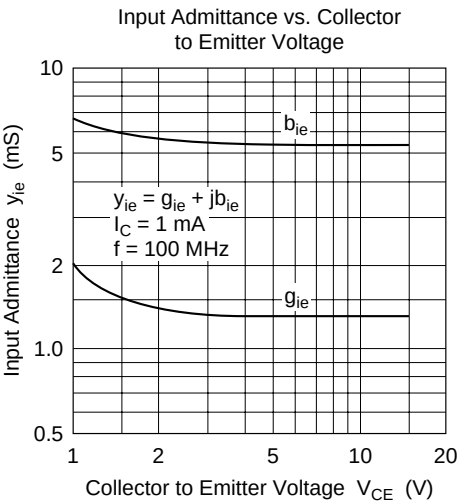
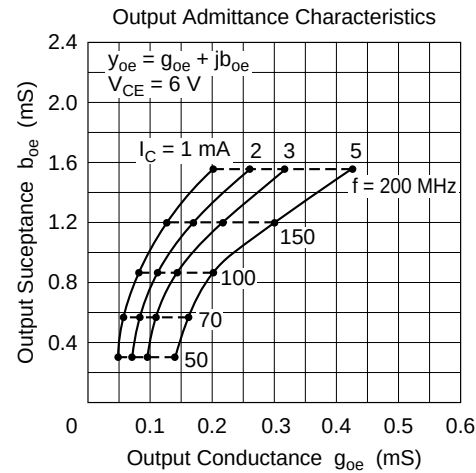
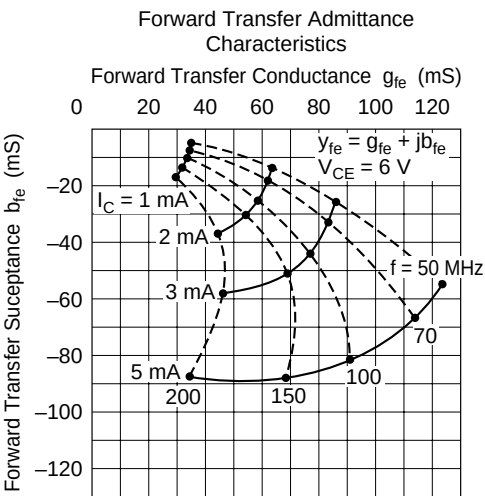
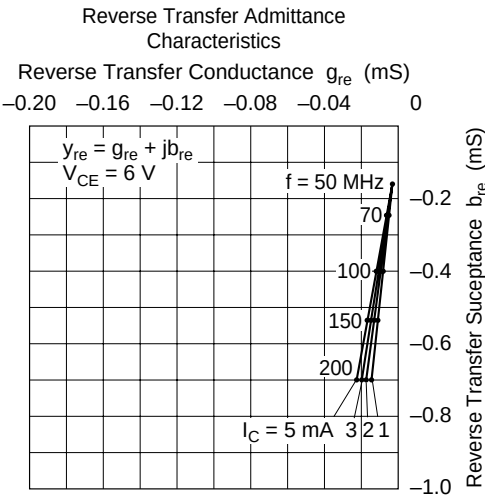


100 MHz Power Gain Test Circuit

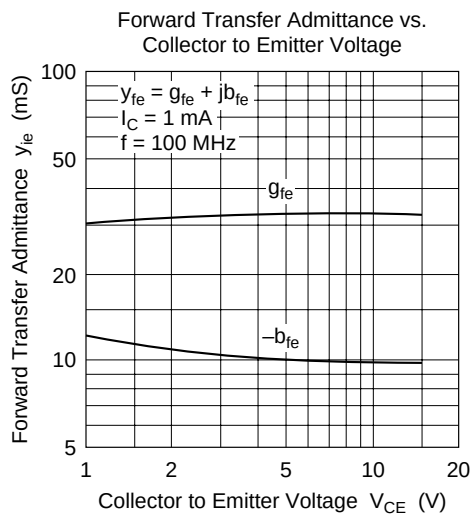
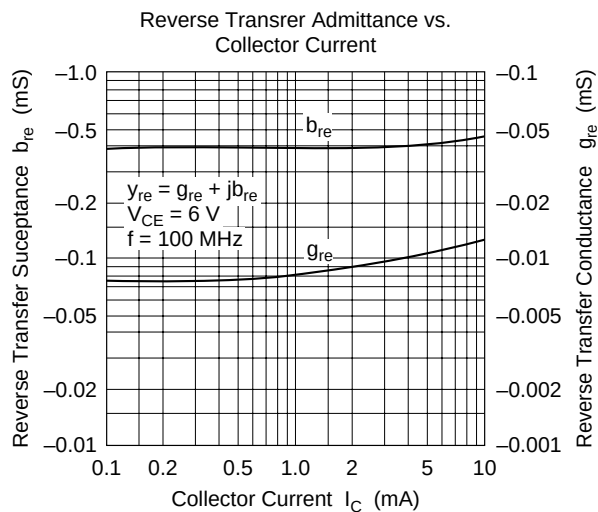
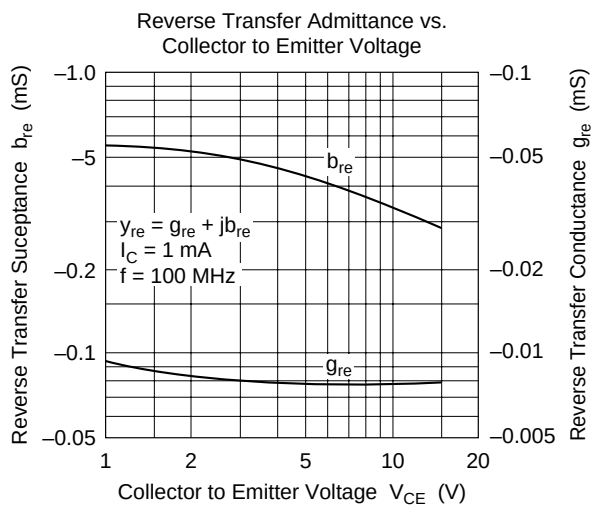
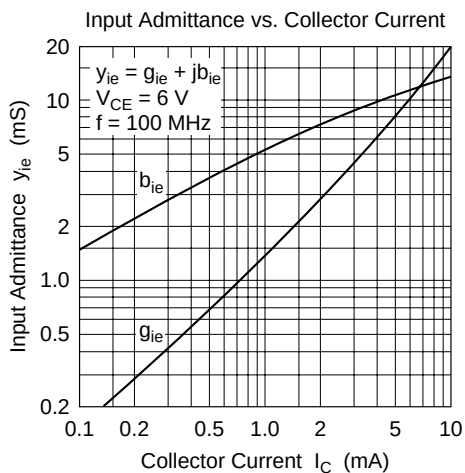


Input Admittance Characteristics

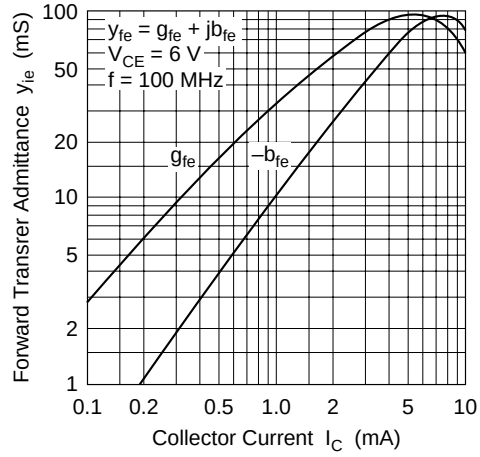




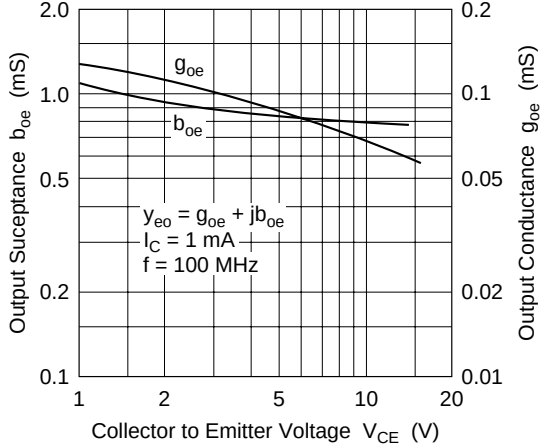




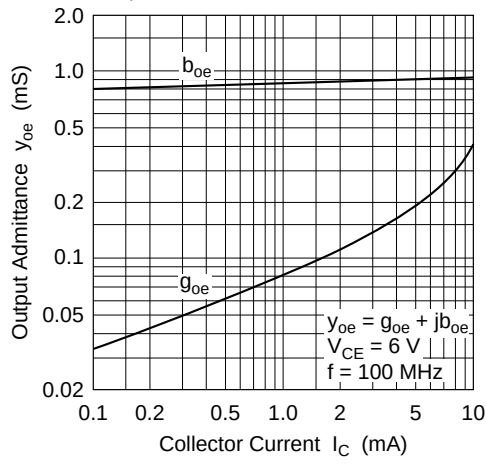
Forward Transer Admittance vs.  
Collector Current



Output Admittance vs. Collector  
to Emitter Voltage



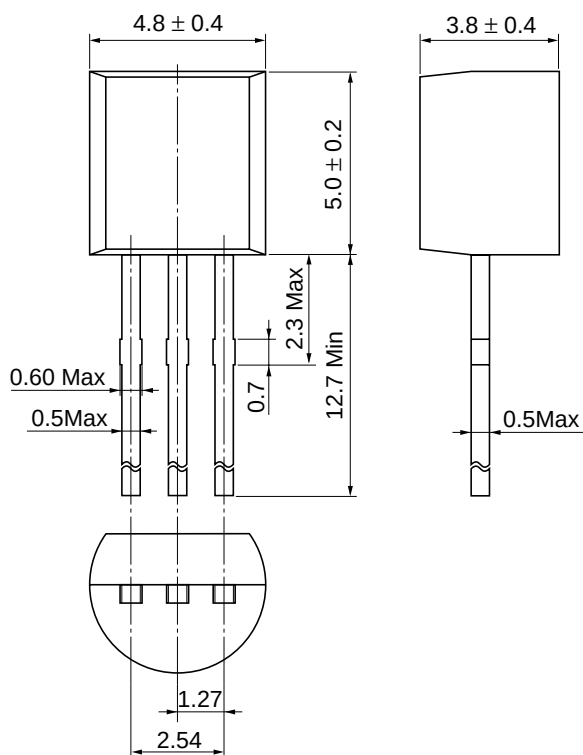
Output Admittance vs. Collector Current



## Package Dimensions

As of January, 2001

Unit: mm



|                        |           |
|------------------------|-----------|
| Hitachi Code           | TO-92 (2) |
| JEDEC                  | Conforms  |
| EIAJ                   | Conforms  |
| Mass (reference value) | 0.25 g    |

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## Hitachi, Ltd.

Semiconductor & Integrated Circuits.  
Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan  
Tel: Tokyo (03) 3270-2111 Fax: (03) 3270-5109

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### For further information write to:

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(America) Inc.  
179 East Tasman Drive,  
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Fax: <1> (408) 433-0223

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D-85622 Feldkirchen, Munich  
Germany  
Tel: <49> (89) 9 9180-0  
Fax: <49> (89) 9 29 30 00

Hitachi Europe Ltd.  
Electronic Components Group.  
Whitebrook Park  
Lower Cookham Road  
Maidenhead  
Berkshire SL6 8YA, United Kingdom  
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Fax: <44> (1628) 585160

Hitachi Asia Ltd.  
Hitachi Tower  
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Hitachi Asia (Hong Kong) Ltd.  
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