

To all our customers

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Renesas Technology Corp.  
Customer Support Dept.  
April 1, 2003

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Keep safety first in your circuit designs!

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# 2SD970(K)

Silicon NPN Triple Diffused

RENESAS

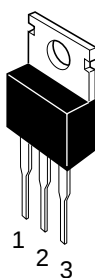
ADE-208-901 (Z)  
1st. Edition  
September 2000

## Application

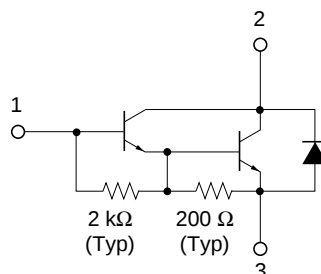
Medium speed and power switching complementary pair with 2SB791(K)

## Outline

TO-220AB



1. Base
2. Collector (Flange)
3. Emitter



## Absolute Maximum Ratings (Ta = 25°C)

| Item                         | Symbol        | Ratings     | Unit |
|------------------------------|---------------|-------------|------|
| Collector to base voltage    | $V_{CBO}$     | 120         | V    |
| Collector to emitter voltage | $V_{CEO}$     | 120         | V    |
| Emitter to base voltage      | $V_{EBO}$     | 7           | V    |
| Collector current            | $I_C$         | 8           | A    |
| Collector peak current       | $I_{C(peak)}$ | 12          | A    |
| Collector power dissipation  | $P_C^{*1}$    | 40          | W    |
| Junction temperature         | $T_j$         | 150         | °C   |
| Storage temperature          | $T_{stg}$     | -55 to +150 | °C   |

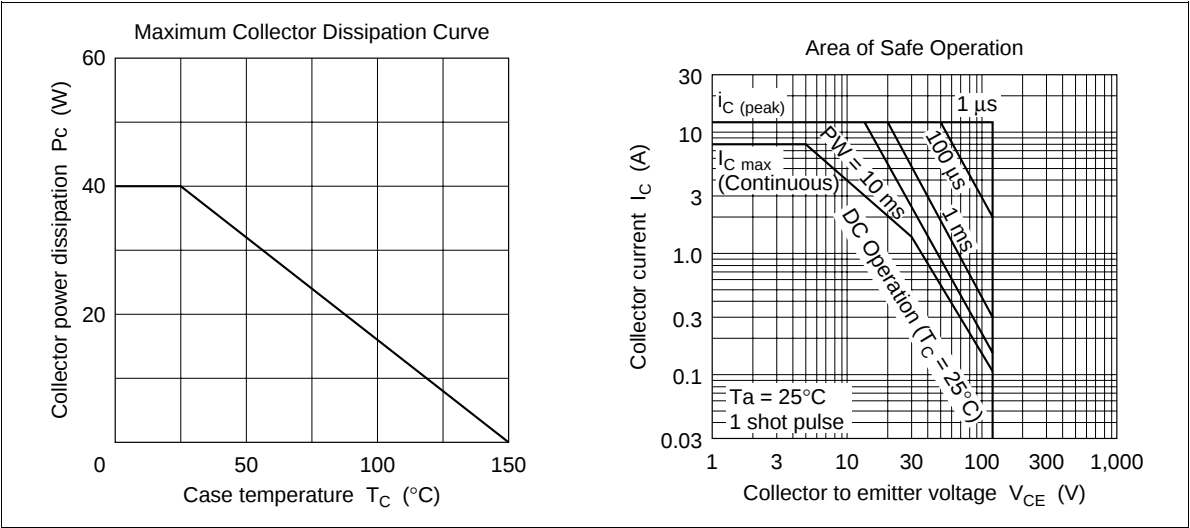
2SD970(K)

Note: 1. Value at T<sub>C</sub> = 25°C.

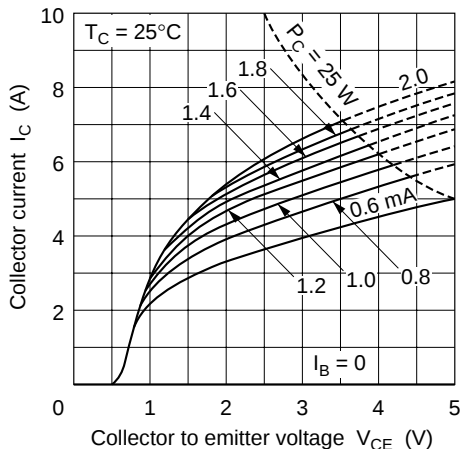
Electrical Characteristics (Ta = 25°C)

| Item                                    | Symbol                | Min  | Typ | Max   | Unit | Test conditions                                                 |
|-----------------------------------------|-----------------------|------|-----|-------|------|-----------------------------------------------------------------|
| Collector to emitter breakdown voltage  | V <sub>(BR)CEO</sub>  | 120  | —   | —     | V    | I <sub>C</sub> = 25 mA, R <sub>BE</sub> = ∞                     |
| Emitter to base breakdown voltage       | V <sub>(BR)EBO</sub>  | 7    | —   | —     | V    | I <sub>E</sub> = 50 mA, I <sub>C</sub> = 0                      |
| Collector cutoff current                | I <sub>CBO</sub>      | —    | —   | 100   | μA   | V <sub>CB</sub> = 120 V, I <sub>E</sub> = 0                     |
|                                         | I <sub>CEO</sub>      | —    | —   | 10    | μA   | V <sub>CE</sub> = 100 V, R <sub>BE</sub> = ∞                    |
| DC current transfer ratio               | h <sub>FE</sub>       | 1000 | —   | 20000 |      | V <sub>CE</sub> = 3 V, I <sub>C</sub> = 4 A* <sup>1</sup>       |
| Collector to emitter saturation voltage | V <sub>CE(sat)1</sub> | —    | —   | 1.5   | V    | I <sub>C</sub> = 4 A, I <sub>B</sub> = 8 mA* <sup>1</sup>       |
|                                         | V <sub>CE(sat)2</sub> | —    | —   | 3.0   | V    | I <sub>C</sub> = 8 A, I <sub>B</sub> = 80 mA* <sup>1</sup>      |
| Base to emitter saturation voltage      | V <sub>BE(sat)1</sub> | —    | —   | 2.0   | V    | I <sub>C</sub> = 4 A, I <sub>B</sub> = 8 mA* <sup>1</sup>       |
|                                         | V <sub>BE(sat)2</sub> | —    | —   | 3.5   | V    | I <sub>C</sub> = 8 A, I <sub>B</sub> = 80 mA* <sup>1</sup>      |
| Turn on time                            | t <sub>on</sub>       | —    | 0.4 | —     | μs   | I <sub>C</sub> = 4 A, I <sub>B1</sub> = -I <sub>B2</sub> = 8 mA |
| Storage time                            | t <sub>stg</sub>      | —    | 5.4 | —     | μs   |                                                                 |
| Fall time                               | t <sub>f</sub>        | —    | 1.1 | —     | μs   |                                                                 |

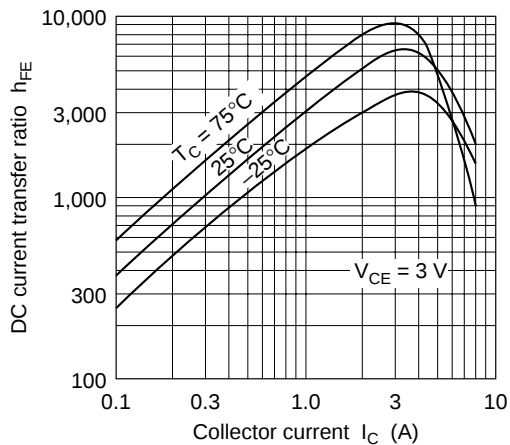
Note: 1. Pulse test.



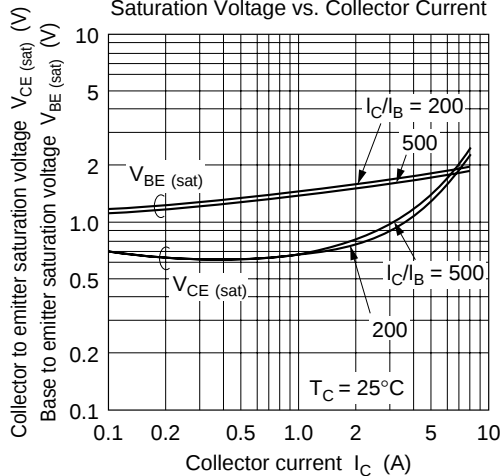
Typical Output Characteristics



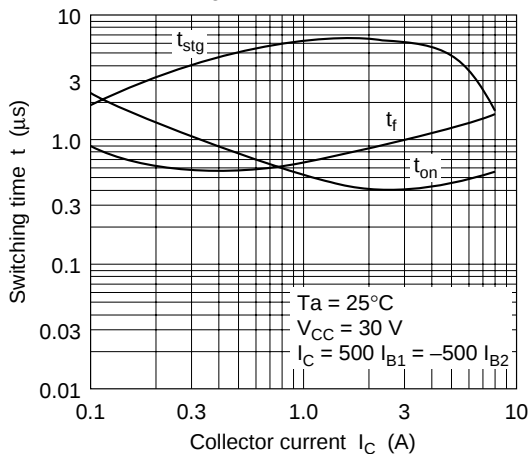
DC Current Transfer Ratio vs. Collector Current

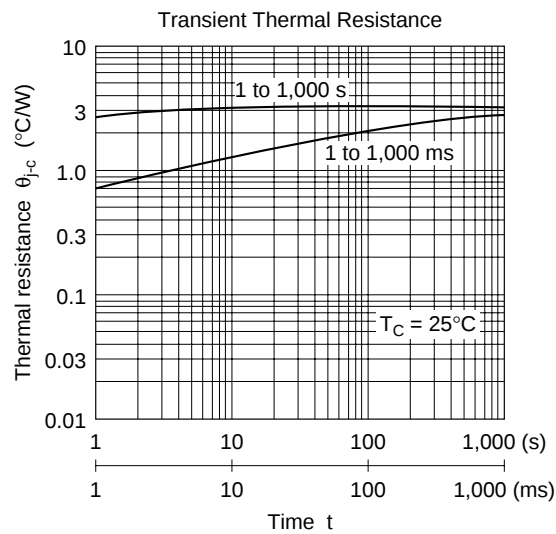


Saturation Voltage vs. Collector Current



Switching Time vs. Collector Current





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