

# Medium Power Transistor (32V, 2A)

## 2SD1766/2SD1758/2SD1862/2SD1189F/ 2SD1055/2SD1919/2SD1227M

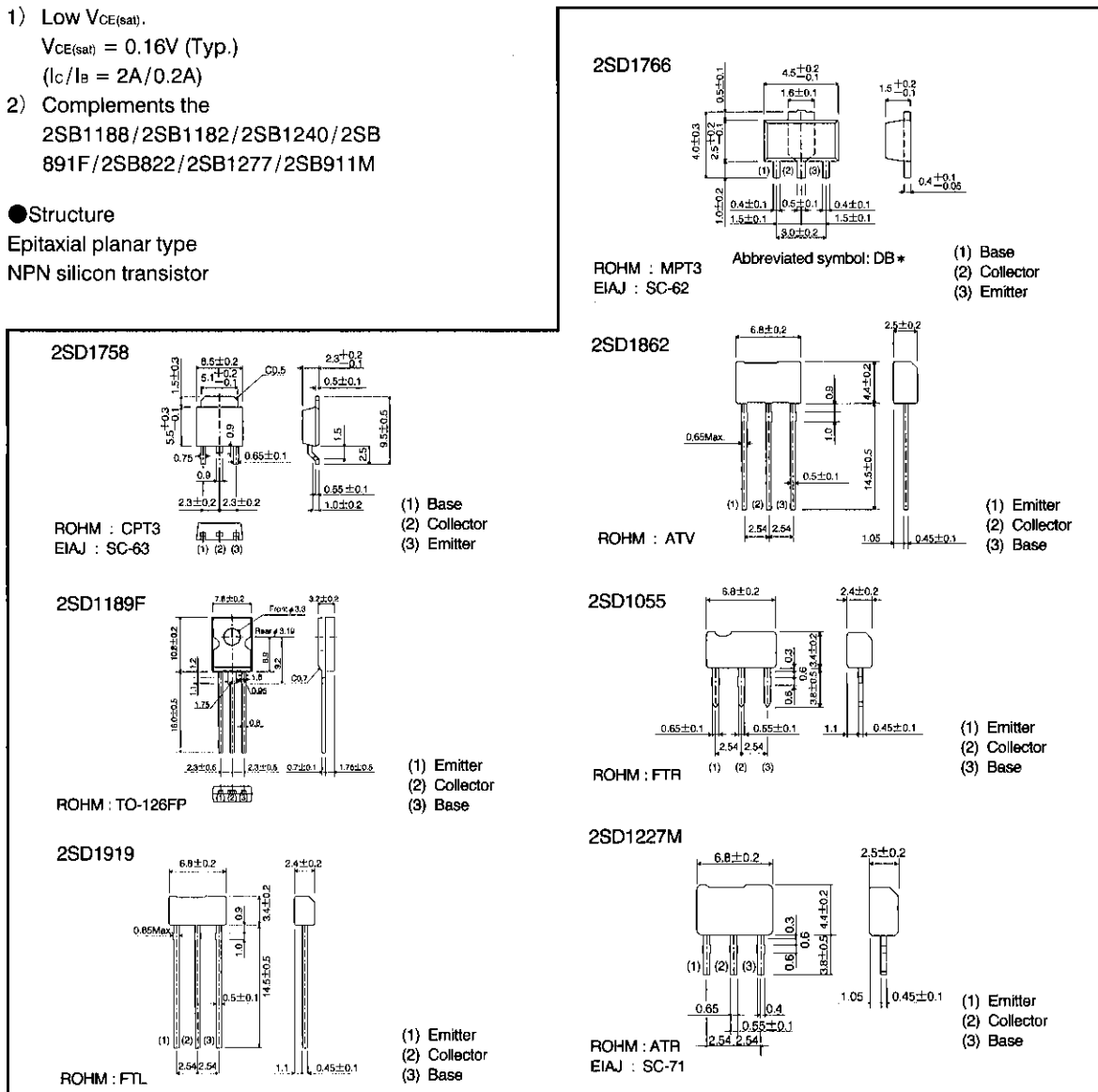
●Features

- 1) LOW  $V_{CE(sat)}$ ,  
 $V_{CE(sat)} = 0.16V$  (Typ.)  
( $I_c/I_b = 2A/0.2A$ )
- 2) Complements the  
2SB1188/2SB1182/2SB1240/2SB  
891F/2SB822/2SB1277/2SB911M

●Structure

Epitaxial planar type  
NPN silicon transistor

●External dimensions (Units: mm)



\*Denotes hrc

(96-217-B24)

## ● Absolute maximum ratings (Ta = 25°C)

| Parameter                   |                  | Symbol                   | Limits  | Unit                     |
|-----------------------------|------------------|--------------------------|---------|--------------------------|
| Collector-base voltage      |                  | V <sub>CB0</sub>         | 40      | V                        |
| Collector-emitter voltage   |                  | V <sub>CEO</sub>         | 32      | V                        |
| Emitter-base voltage        |                  | V <sub>EB0</sub>         | 5       | V                        |
| Collector current           |                  | I <sub>c</sub>           | 2       | A (DC)                   |
|                             |                  |                          | 2.5     | A (Pulse) *1             |
| Collector power dissipation | 2SD1766          | P <sub>c</sub>           | 0.5     | W *2                     |
|                             |                  |                          | 2       |                          |
|                             | 2SD1758          |                          | 10      | W (T <sub>c</sub> =25°C) |
|                             | 2SD1862,2SD1227M |                          | 1       | W *3                     |
|                             |                  |                          | 1.2     |                          |
| 2SD1189F                    | 5                | W (T <sub>c</sub> =25°C) |         |                          |
| 2SD1055,2SD1919             | 0.75             | W                        |         |                          |
| Junction temperature        |                  | T <sub>j</sub>           | 150     | °C                       |
| Storage temperature         |                  | T <sub>stg</sub>         | -55~150 | °C                       |

\*1 Single pulse P<sub>w</sub>=20ms

\*2 On 40 x 40 x 0.7 mm ceramic board.

\*3 Printed circuit board: 1.7 mm thick, collector copper plating 1 cm<sup>2</sup> or more.

## ● Electrical characteristics (Ta = 25°C)

| Parameter                            |                          | Symbol               | Min. | Typ. | Max. | Unit | Conditions   |
|--------------------------------------|--------------------------|----------------------|------|------|------|------|--|
| Collector-base breakdown voltage     |                          | BV <sub>CB0</sub>    | 40   | —    | —    | V    | I <sub>c</sub> =50 μA                                  |
| Collector-emitter breakdown voltage  |                          | BV <sub>CEO</sub>    | 32   | —    | —    | V    | I <sub>c</sub> =1mA                                    |
| Emitter-base breakdown voltage       |                          | BV <sub>EB0</sub>    | 5    | —    | —    | V    | I <sub>E</sub> =50 μA                                  |
| Collector cutoff current             |                          | I <sub>CB0</sub>     | —    | —    | 1    | μA   | V <sub>CB</sub> =20V                                   |
| Emitter cutoff current               |                          | I <sub>EB0</sub>     | —    | —    | 1    | μA   | V <sub>EB</sub> =4V                                    |
| DC current transfer ratio            | 2SD1766,2SD1758,2SD1189F | h <sub>FE</sub>      | 82   | —    | 390  | —    | V <sub>CE</sub> =3V, I <sub>c</sub> =0.5A *<br>*       |
|                                      | 2SD1862                  |                      | 120  | —    | 390  |      |  |
|                                      | 2SD1055                  |                      | 180  | —    | 390  |      |  |
|                                      | 2SD1919,2SD1227M         |                      | 120  | —    | 270  |      |  |
| Collector-emitter saturation voltage |                          | V <sub>CE(sat)</sub> | —    | 0.5  | 0.8  | V    | I <sub>c</sub> /I <sub>B</sub> =2A/0.2A *              |
| Transition frequency                 |                          | f <sub>T</sub>       | —    | 100  | —    | MHz  | V <sub>CE</sub> =5V, I <sub>E</sub> =-50mA, f=100MHz * |
| Output capacitance                   |                          | C <sub>ob</sub>      | —    | 30   | —    | pF   | V <sub>CB</sub> =10V, I <sub>E</sub> =0A, f=1MHz       |

\* Measured using pulse current.

●Packaging specifications and  $h_{FE}$

| Type     | $h_{FE}$ | Package<br>Symbol<br>Basic ordering<br>unit (pieces) | Taping |      |      | Bulk |      |      |
|----------|----------|--|--------|------|------|------|------|------|
|          |          |  | T100   | TL   | TV2  | —    | —    | TL2  |
|          |          |  | 1000   | 2500 | 2500 | 1000 | 2000 | 2500 |
| 2SD1766  | PQR      | ○  | —      | —    | —    | —    | —    |      |
| 2SD1758  | PQR      | —  | ○      | —    | —    | —    | —    |      |
| 2SD1862  | QR       | —  | —      | ○    | —    | —    | —    |      |
| 2SD1189F | PQR      | —  | —      | —    | ○    | —    | —    |      |
| 2SD1055  | R        | —  | —      | —    | —    | ○    | —    |      |
| 2SD1919  | Q        | —  | —      | —    | —    | —    | ○    |      |
| 2SD1227M | Q        | —  | —      | —    | —    | ○    | —    |      |

$h_{FE}$  values are classified as follows :

| Item     | P      | Q       | R       |
|----------|--------|---------|---------|
| $h_{FE}$ | 82~180 | 120~270 | 180~390 |

●Electrical characteristic curves

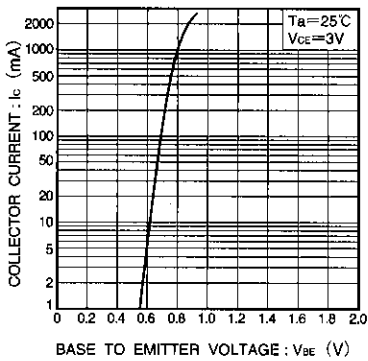


Fig.1 Grounded emitter propagation characteristics

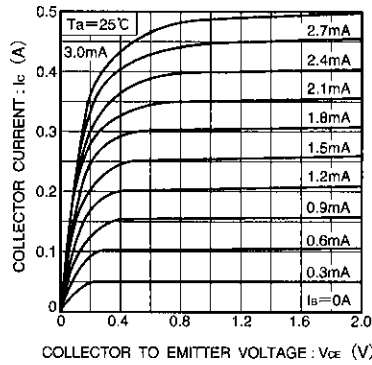


Fig.2 Grounded emitter output characteristics

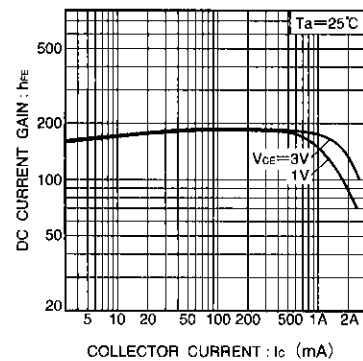


Fig.3 DC current gain vs. collector current

● Electrical characteristic curves

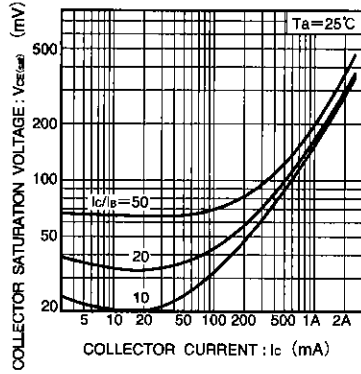


Fig. 4 Collector-emitter saturation voltage vs. collector current

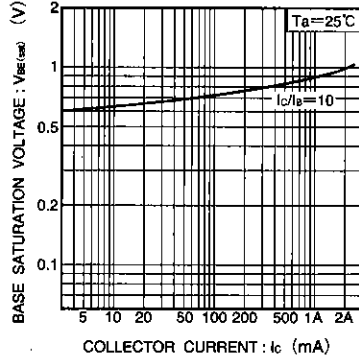


Fig. 5 Collector-emitter saturation voltage vs. collector current

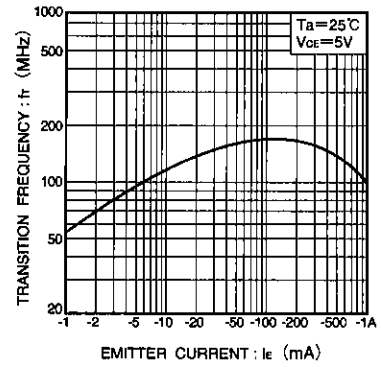


Fig. 6 Transition frequency vs. emitter current

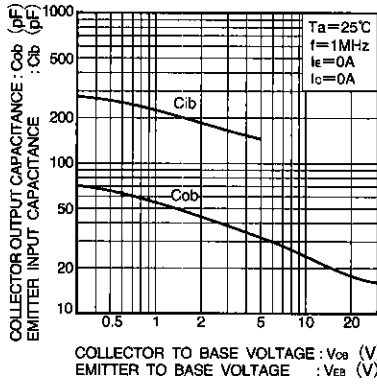


Fig. 7 Collector output capacitance vs. collector-base voltage  
Emitter input capacitance vs. emitter-base voltage

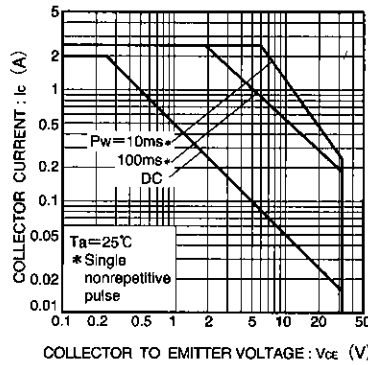


Fig. 8 Safe operating area (2SD1766)

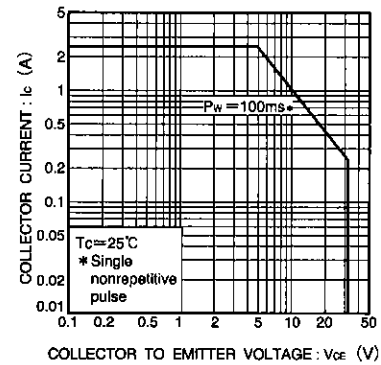


Fig. 9 Safe operating area (2SD1758)

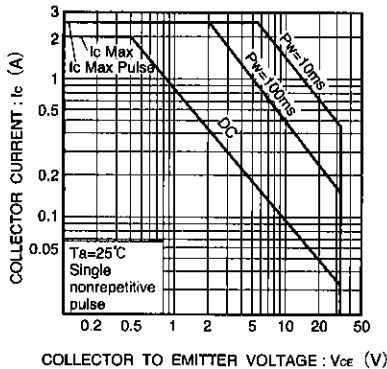


Fig. 10 Safe operating area (2SD1862, 2SD1227M)

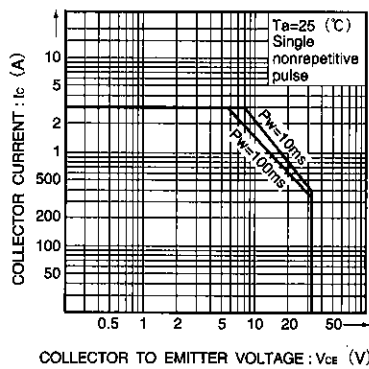


Fig. 11 Safe operating area (2SD1189F)

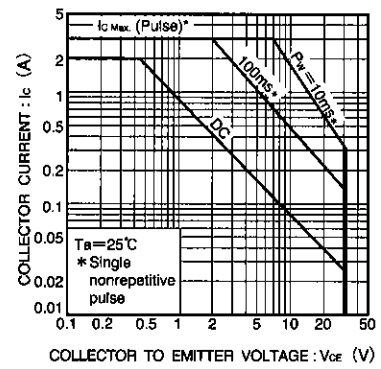


Fig. 12 Safe operating area (2SD1055, 2SD1919)

Bi-polar transistors

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