

# Power Transistor (50V, 3A)

## 2SD1760 / 2SD1864

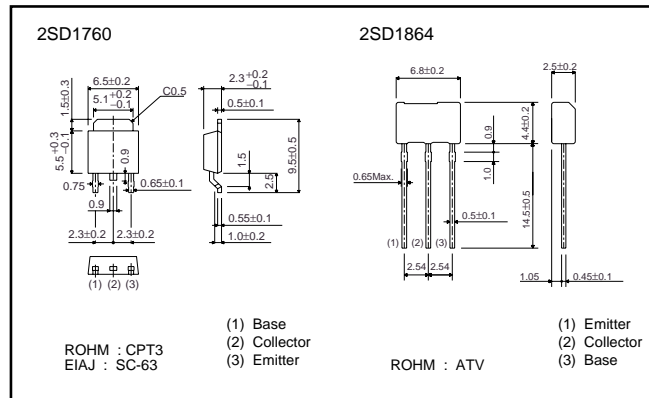
### ●Features

- 1) Low  $V_{CE(sat)}$ .  
 $V_{CE(sat)} = 0.5V$  (Typ.)  
 $(I_c/I_b = 2A / 0.2A)$
- 2) Complements the 2SB1184 / 2SB1243.

### ●Structure

Epitaxial planar type  
 NPN silicon transistor

### ●External dimensions (Units : mm)



### ●Absolute maximum ratings ( $T_a=25^\circ\text{C}$ )

| Parameter                   | Symbol    | Limits   | Unit                                       |
|-----------------------------|-----------|----------|--|
| Collector-base voltage      | $V_{CBO}$ | 60       | V  |
| Collector-emitter voltage   | $V_{CEO}$ | 50       | V  |
| Emitter-base voltage        | $V_{EBO}$ | 5        | V  |
| Collector current           | $I_c$     | 3        | A (DC)                                     |
|                             |           | 4.5      | A (Pulse) <sup>*1</sup>                    |
| Collector power dissipation | 2SD1760   | 15       | W ( $T_c=25^\circ\text{C}$ ) <sup>*2</sup> |
|                             | 2SD1864   | 1        | W  |
| Junction temperature        | $T_j$     | 150      | $^\circ\text{C}$                           |
| Storage temperature         | $T_{stg}$ | -55~+150 | $^\circ\text{C}$                           |

<sup>\*1</sup> Single pulse,  $P_w=100\text{ms}$

<sup>\*2</sup> Printed circuit board, 1.7mm thick, collector copper plating 100mm<sup>2</sup> or larger.

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●Electrical characteristics (Ta=25°C)

| Parameter                            | Symbol               | Min. | Typ. | Max. | Unit | Conditions  |
|--------------------------------------|----------------------|------|------|------|------|---|
| Collector-base breakdown voltage     | BV <sub>CB0</sub>    | 60   | -    | -    | V    | I <sub>c</sub> =50μA                                  |
| Collector-emitter breakdown voltage  | BV <sub>CE0</sub>    | 50   | -    | -    | V    | I <sub>c</sub> =1mA                                   |
| Emitter-base breakdown voltage       | BV <sub>EB0</sub>    | 5    | -    | -    | V    | I <sub>E</sub> =50μA                                  |
| Collector cutoff current             | I <sub>CB0</sub>     | -    | -    | 1    | μA   | V <sub>CB</sub> =40V                                  |
| Emitter cutoff current               | I <sub>EB0</sub>     | -    | -    | 1    | μA   | V <sub>EB</sub> =4V                                   |
| Collector-emitter saturation voltage | V <sub>CE(sat)</sub> | -    | 0.5  | 1    | V    | I <sub>c</sub> /I <sub>b</sub> =2A/0.2A *             |
| DC current transfer ratio            | h <sub>FE</sub>      | 82   | -    | 390  | -    | V <sub>CE</sub> =3V, I <sub>c</sub> =0.5A *           |
| Transition frequency                 | f <sub>T</sub>       | -    | 90   | -    | MHZ  | V <sub>CE</sub> =5V, I <sub>E</sub> =500mA, f=30MHZ * |
| Output capacitance                   | C <sub>ob</sub>      | -    | 40   | -    | pF   | V <sub>CB</sub> =10V, I <sub>E</sub> =0A, f=1MHZ      |

\* Measured using pulse current.

●Packaging specifications and h<sub>FE</sub>

| Type    | h <sub>FE</sub> | Package                      | Taping |      |
|---------|-----------------|------------------------------|--------|------|
|         |                 | Code                         | TL     | TV2  |
|         |                 | Basic ordering unit (pieces) | 2500   | 2500 |
| 2SD1760 | PQR             |                              | ○      | -    |
| 2SD1864 | PQR             |                              | -      | ○    |

h<sub>FE</sub> values are classified as follows:

| Item            | P      | Q       | R       |
|-----------------|--------|---------|---------|
| h <sub>FE</sub> | 82~180 | 120~270 | 180~390 |

●Electrical characteristic curves

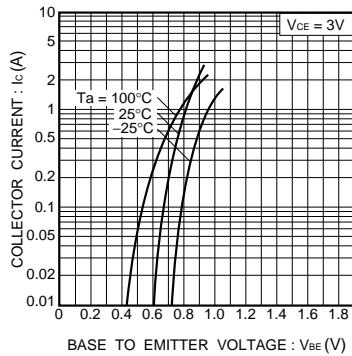


Fig.1 Grounded emitter propagation characteristics

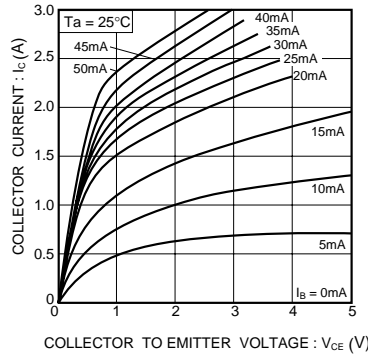


Fig.2 Grounded emitter output characteristics ( I )

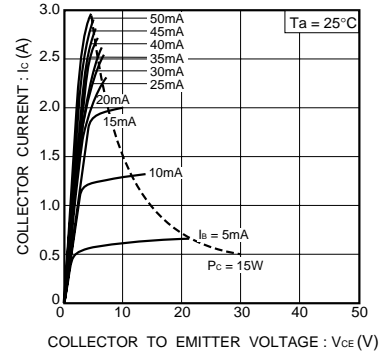


Fig.3 Grounded-emitter output characteristics( II )

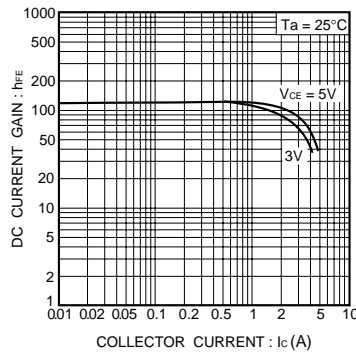


Fig.4 DC current gain vs. collector current( I )

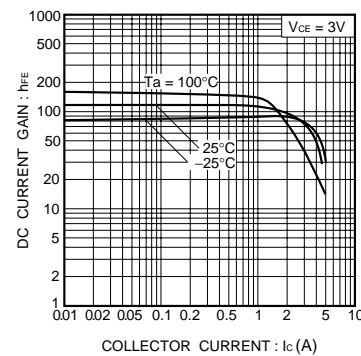


Fig.5 DC current gain vs. collector current( II )

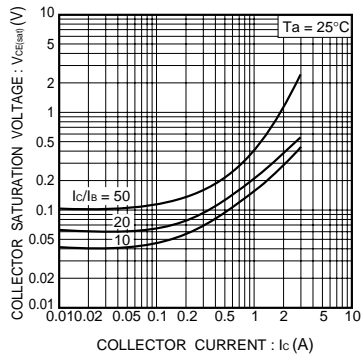


Fig.6 Collector-emitter saturation voltage vs. collector current

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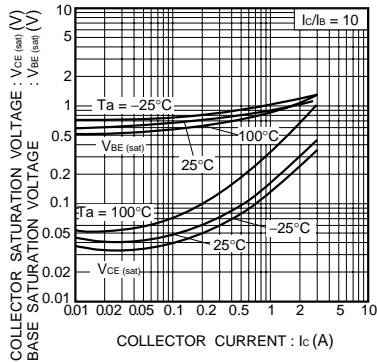


Fig.7 Collector-emitter saturation voltage vs. collector current  
Base-emitter saturation voltage vs. collector current

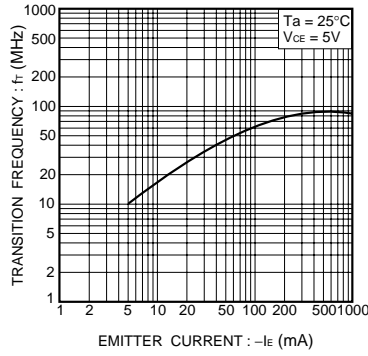


Fig.8 Gain bandwidth product vs. emitter current

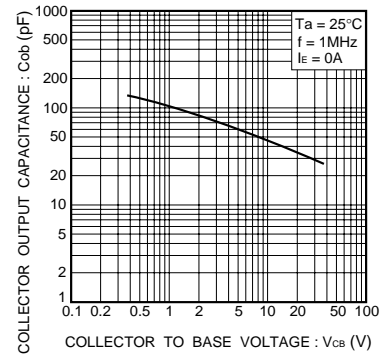


Fig.9 Collector output capacitance vs. collector-base voltage

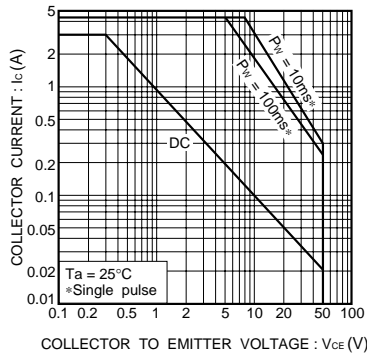


Fig.10 Safe operating area (2SD1760)

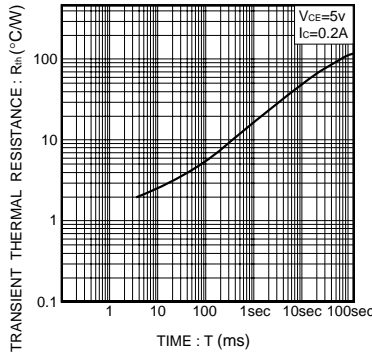


Fig.11 Transient thermal resistance (2SD1760)

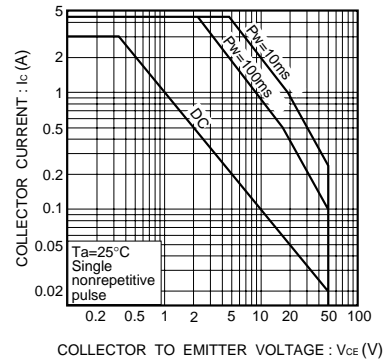


Fig.12 Safe operating area (2SD1864)

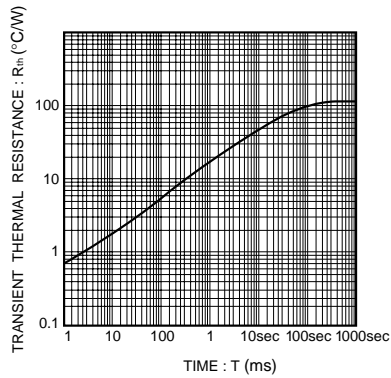


Fig.13 Transient thermal resistance (2SD1864)