



## 2SB1136/2SD1669

### 50V/12A Switching Applications

#### Applications

- Relay drivers, high-speed inverters, converters, and other general high-current switching applications.

#### Features

- Low-saturation collector-to-emitter voltage :  $V_{CE(sat)} = -0.5V$  (PNP),  $0.4V$  (NPN) max.
- Wide ASO leading to high resistance to breakdown.
- Micaless package facilitating mounting.

( ) : 2SB1136

#### Specifications

##### Absolute Maximum Ratings at $T_a = 25^\circ C$

| Parameter                    | Symbol    | Conditions         | Ratings     | Unit       |
|------------------------------|-----------|--------------------|-------------|------------|
| Collector-to-Base Voltage    | $V_{CBO}$ |                    | (-60)       | V          |
| Collector-to-Emitter Voltage | $V_{CEO}$ |                    | (-50)       | V          |
| Emitter-to-Base Voltage      | $V_{EBO}$ |                    | (-6)        | V          |
| Collector Current            | $I_C$     |                    | (-12)       | A          |
| Collector Current (Pulse)    | $I_{CP}$  |                    | (-15)       | A          |
| Collector Dissipation        | $P_C$     |                    | 2           | W          |
|                              |           | $T_c = 25^\circ C$ | 30          | W          |
| Junction Temperature         | $T_j$     |                    | 150         | $^\circ C$ |
| Storage Temperature          | $T_{stg}$ |                    | -55 to +150 | $^\circ C$ |

##### Electrical Characteristics at $T_a = 25^\circ C$

| Parameter                               | Symbol        | Conditions                   | Ratings |     | Unit   |     |
|---|---------------|------------------------------|---------|-----|--------|-----|
|   |               |                              | min     | typ |        | max |
| Collector Cutoff Current                | $I_{CBO}$     | $V_{CB} = (-40V, I_E = 0$    |         |     | (-0.1) | mA  |
| Emitter Cutoff Current                  | $I_{EBO}$     | $V_{EB} = (-4V, I_C = 0$     |         |     | (-0.1) | mA  |
| DC Current Gain                         | $h_{FE1}$     | $V_{CE} = (-2V, I_C = (-)1A$ | 70*     |     | 280*   |     |
|   | $h_{FE2}$     | $V_{CE} = (-2V, I_C = (-)5A$ | 30      |     |        |     |
| Gain-Bandwidth Product                  | $f_T$         | $V_{CE} = (-5V, I_C = (-)1A$ |         | 10  |        | MHz |
| Collector-to-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = (-)6A, I_B = (-)0.6A$ |         |     | (-0.4) | V   |

\* : The 2SB1136/2SD1669 are classified by 1A  $h_{FE}$  as follows :

|    |   |     |     |   |     |     |   |     |
|----|---|-----|-----|---|-----|-----|---|-----|
| 70 | Q | 140 | 100 | R | 200 | 140 | S | 280 |
|----|---|-----|-----|---|-----|-----|---|-----|

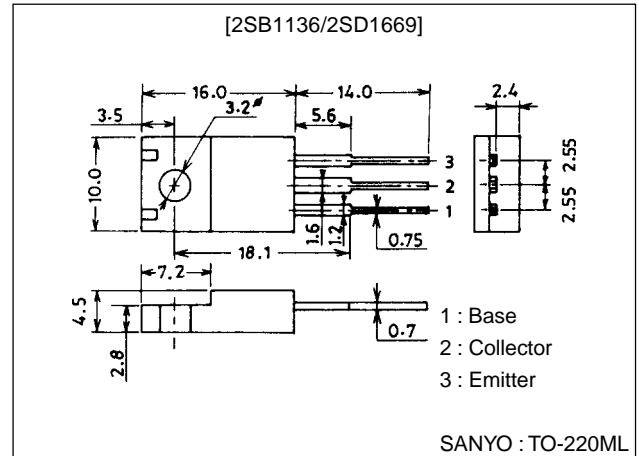
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#### Package Dimensions

unit:mm

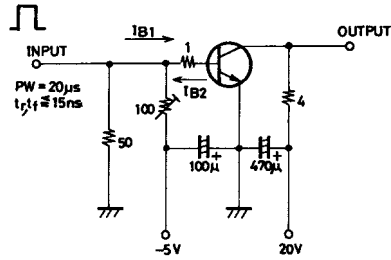
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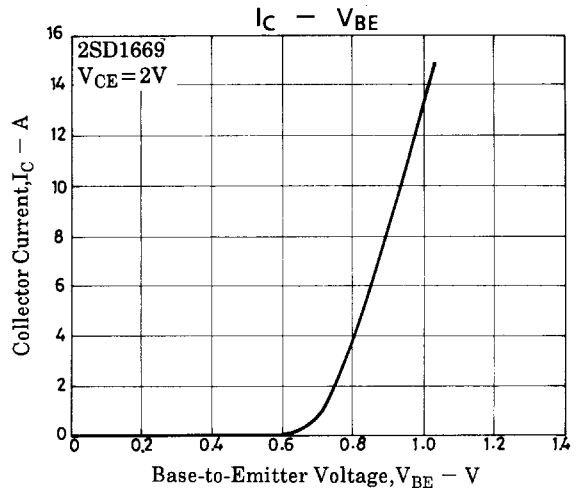
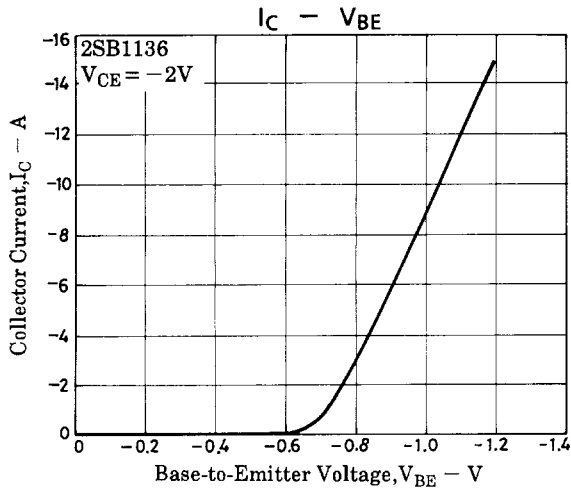
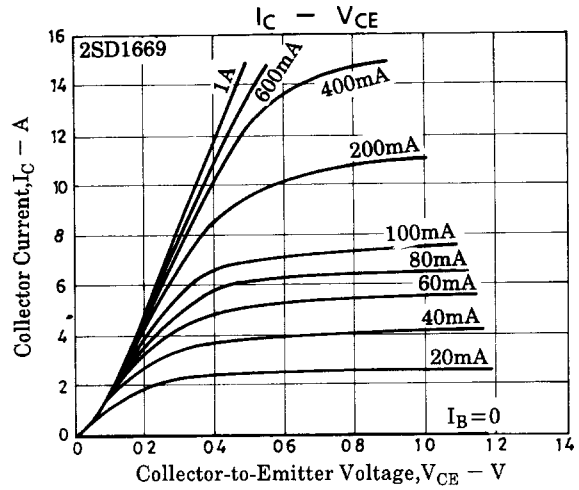
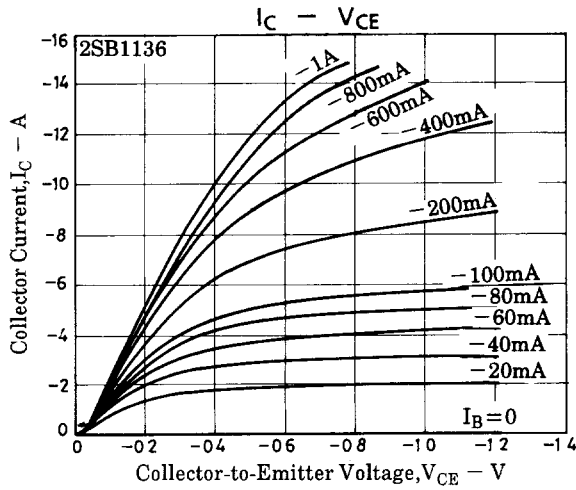
## 2SB1136/2SD1669

| Parameter                              | Symbol        | Conditions                      | Ratings |       |     | Unit    |
|--|---------------|---------------------------------|---------|-------|-----|---------|
|  |               |                                 | min     | typ   | max |         |
| Collector-to-Base Breakdown Voltage    | $V_{(BR)CBO}$ | $I_C = (-)1mA, I_E = 0$         | (-)60   |       |     | V       |
| Collector-to-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | $I_C = (-)1mA, R_{BE} = \infty$ | (-)50   |       |     | V       |
| Emitter-to-Base Breakdown Voltage      | $V_{(BR)EBO}$ | $I_E = (-)1mA, I_C = 0$         | (-)6    |       |     | V       |
| Rise Time                              | $t_{on}$      | See specified Test Circuit.     |         | (0.2) |     | $\mu s$ |
|  |               |                                 |         | 0.1   |     | $\mu s$ |
| Storage Time                           | $t_{stg}$     | See specified Test Circuit.     |         | (0.4) |     | $\mu s$ |
|  |               |                                 |         | 1.2   |     | $\mu s$ |
| Fall Time                              | $t_f$         | See specified Test Circuit.     |         | (0.1) |     | $\mu s$ |
|  |               |                                 |         | 0.05  |     | $\mu s$ |

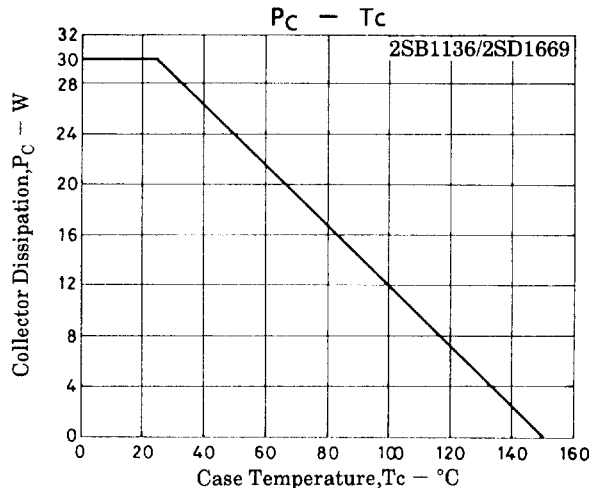
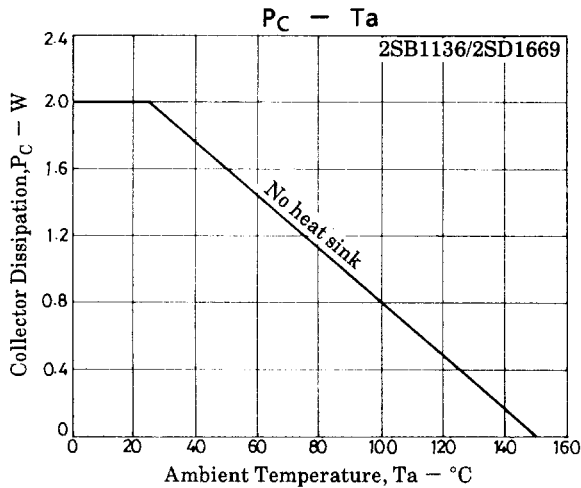
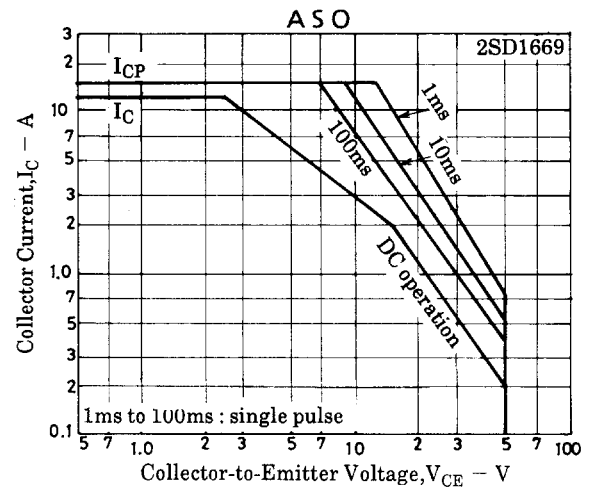
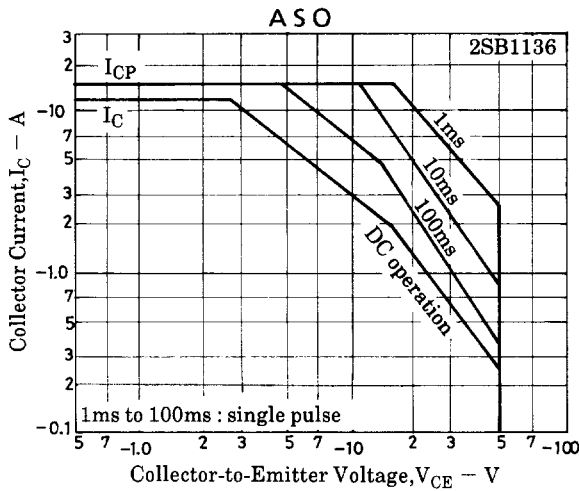
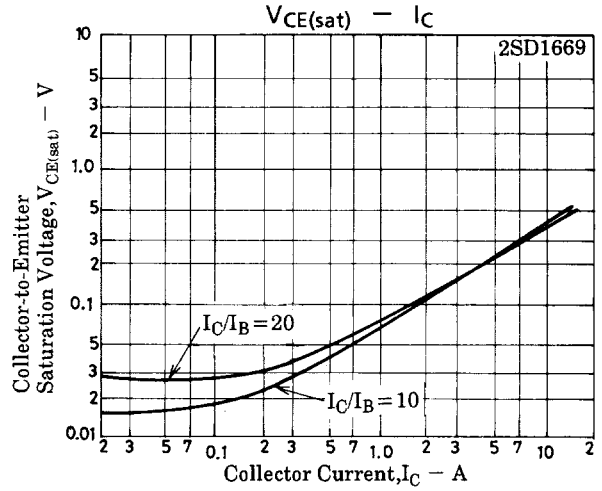
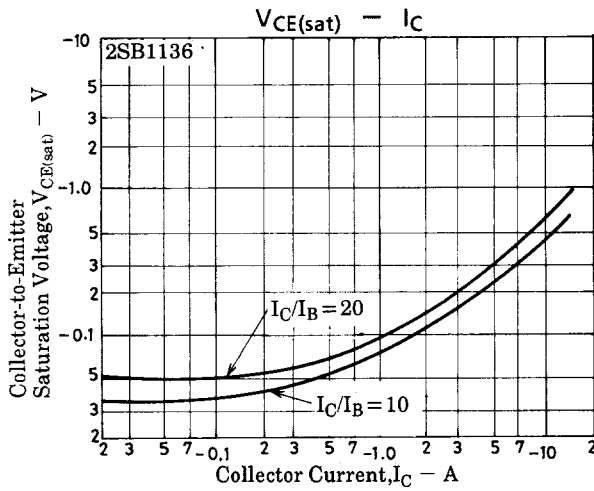
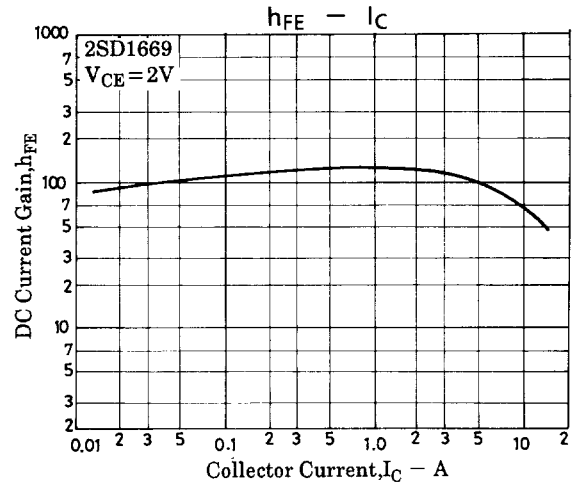
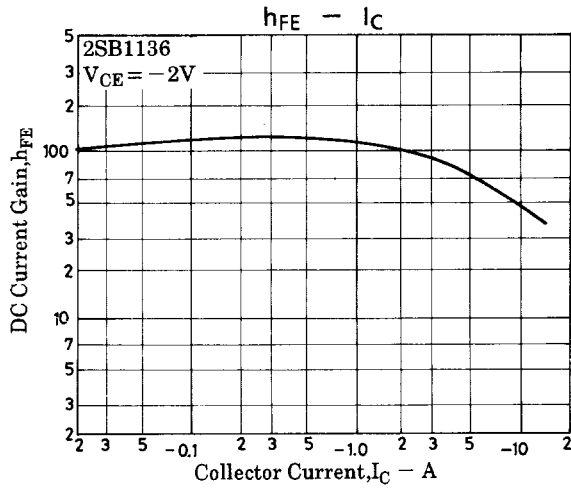
### Switching Time Test Circuit



$10I_{B1} = -10I_{B2} = I_C = 2A$   
 (For PNP, the polarity is reversed.)  
 Unit (resistance :  $\Omega$ , capacitance : F)



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