



## 2SB1167/2SD1724

### 100V/3A Switching Applications

#### Features

- Relay drivers, high-speed inverters, converters.

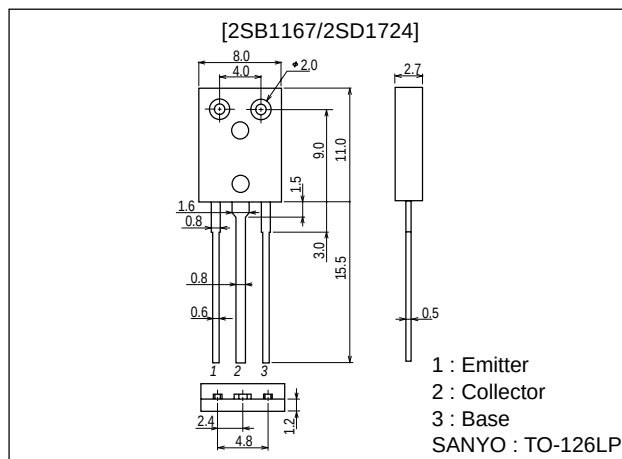
#### Features

- Low collector-to-emitter saturation voltage.
- High  $f_T$ .
- Excellent linearity of  $h_{FE}$ .
- Fast switching time.

#### Package Dimensions

unit:mm

2043B



() : 2SB1167

#### Specifications

Absolute Maximum Ratings at  $T_a = 25^\circ\text{C}$ 

| Parameter                    | Symbol    | Conditions             | Ratings     | Unit             |
|------------------------------|-----------|------------------------|-------------|------------------|
| Collector-to-Base Voltage    | $V_{CBO}$ |                        | (-)120      | V                |
| Collector-to-Emitter Voltage | $V_{CEO}$ |                        | (-)100      | V                |
| Emitter-to-Base Voltage      | $V_{EBO}$ |                        | (-)6        | V                |
| Collector Current            | $I_C$     |                        | (-)3        | A                |
| Collector Current (Pulse)    | $I_{CP}$  |                        | (-)6        | A                |
| Collector Dissipation        | $P_C$     |                        | 1.2         | W                |
|                              |           | $T_c=25^\circ\text{C}$ | 20          | W                |
| Junction Temperature         | $T_j$     |                        | 150         | $^\circ\text{C}$ |
| Storage Temperature          | $T_{stg}$ |                        | -55 to +150 | $^\circ\text{C}$ |

Electrical Characteristics at  $T_a = 25^\circ\text{C}$ 

| Parameter                | Symbol    | Conditions                                 | Ratings |       |      | Unit          |
|--------------------------|-----------|--------------------------------------------|---------|-------|------|---------------|
|                          |           |                                            | min     | typ   | max  |               |
| Collector Cutoff Current | $I_{CBO}$ | $V_{CB}=(-)100\text{V}, I_E=0$             |         |       | (-)1 | $\mu\text{A}$ |
| Emitter Cutoff Current   | $I_{EBO}$ | $V_{EB}=(-)4\text{V}, I_C=0$               |         |       | (-)1 | $\mu\text{A}$ |
| DC Current Gain          | $h_{FE1}$ | $V_{CE}=(-)5\text{V}, I_C=(-)0.5\text{A}$  | 70*     |       | 400* |               |
|                          | $h_{FE2}$ | $V_{CE}=(-)5\text{V}, I_C=(-)2\text{A}$    | 40      |       |      |               |
| Gain-Bandwidth Product   | $f_T$     | $V_{CE}=(-)10\text{V}, I_C=(-)0.5\text{A}$ |         | (130) |      | MHz           |
|                          |           |                                            |         | 180   |      | MHz           |

\* : The 2SB1167/2SD1724 are classified by 0.5A  $h_{FE}$  as follows :

Continued on next page.

| Rank     | Q         | R          | S          | T          |
|----------|-----------|------------|------------|------------|
| $h_{FE}$ | 70 to 140 | 100 to 200 | 140 to 280 | 200 to 400 |

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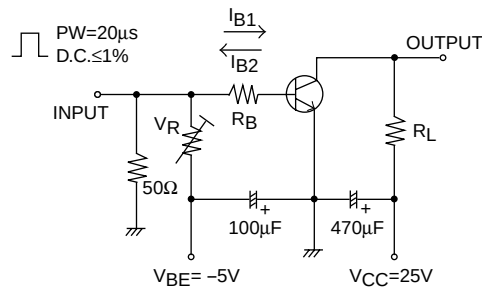
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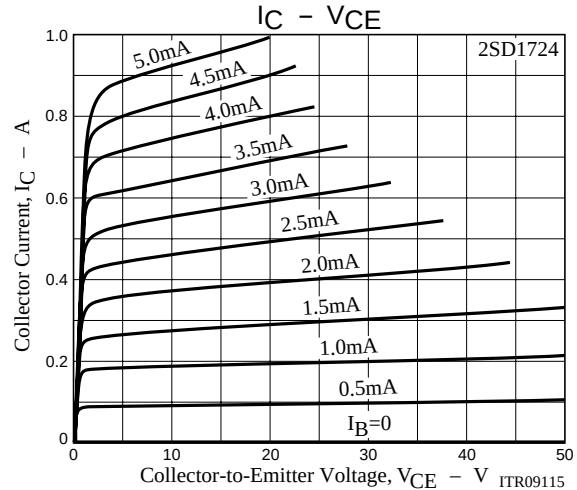
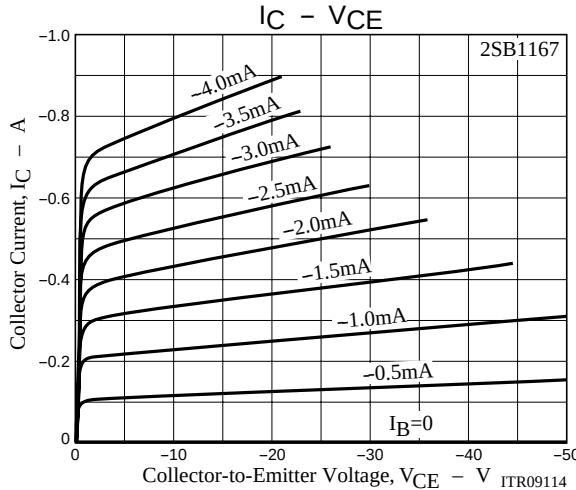
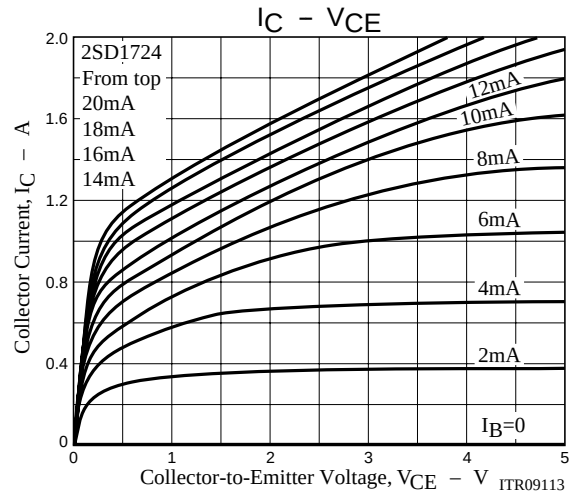
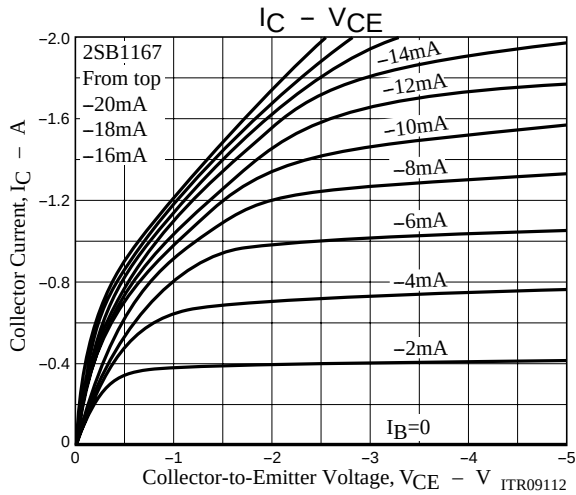
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| Parameter                               | Symbol        | Conditions                  | Ratings |        |        | Unit |
|-----------------------------------------|---------------|-----------------------------|---------|--------|--------|------|
|                                         |               |                             | min     | typ    | max    |      |
| Output Capacitance                      | $C_{ob}$      | $V_{CB}=(-)10V, f=1MHz$     |         | 25(40) |        | pF   |
| Collector-to-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C=(-)1.5A, I_B=(-)0.15A$ |         | (-200) | (-500) | mV   |
|                                         |               |                             |         | 150    | 400    | mV   |
| Base-to-Emitter Saturation Voltage      | $V_{BE(sat)}$ | $I_C=(-)1.5A, I_B=(-)0.15A$ |         | (-)0.9 | (-)1.2 | V    |
| Collector-to-Base Breakdown Voltage     | $V_{(BR)CBO}$ | $I_C=(-)10\mu A, I_E=0$     | (-)120  |        |        | V    |
| Collector-to-Emitter Breakdown Voltage  | $V_{(BR)CEO}$ | $I_C=(-)1mA, R_{BE}=\infty$ | (-)100  |        |        | V    |
| Emitter-to-Base Breakdown Voltage       | $V_{(BR)EBO}$ | $I_E=(-)10\mu A, I_C=0$     | (-)6    |        |        | V    |
| Turn-ON Time                            | $t_{on}$      | See specified Test Circuit  |         | (100)  |        | ns   |
|                                         |               |                             |         | 100    |        | ns   |
| Storage Time                            | $t_{stg}$     | See specified Test Circuit  |         | 900    |        | ns   |
|                                         |               |                             |         | (800)  |        | ns   |
| Fall Time                               | $t_f$         | See specified Test Circuit  |         | 50(50) |        | ns   |

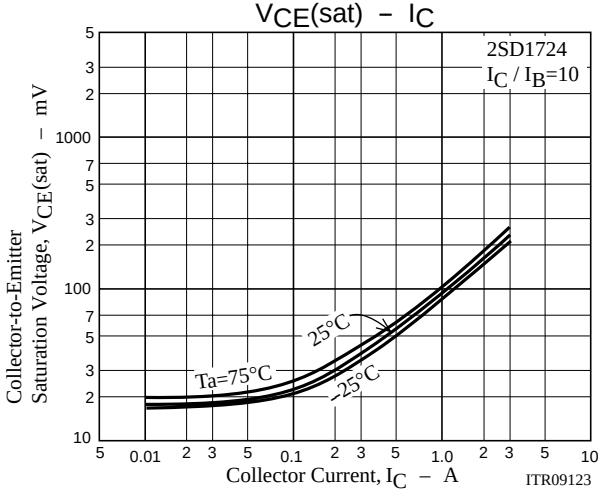
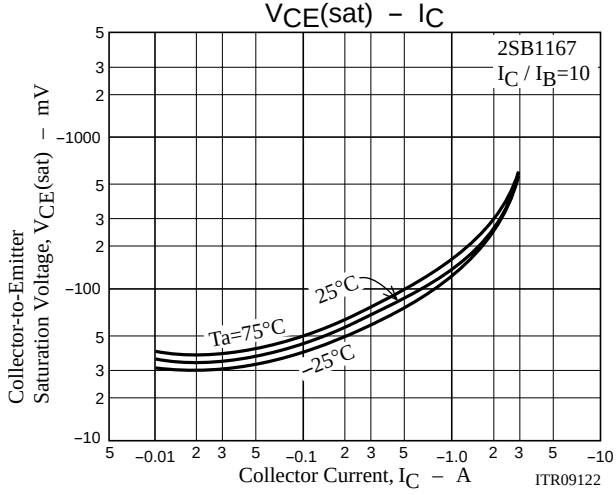
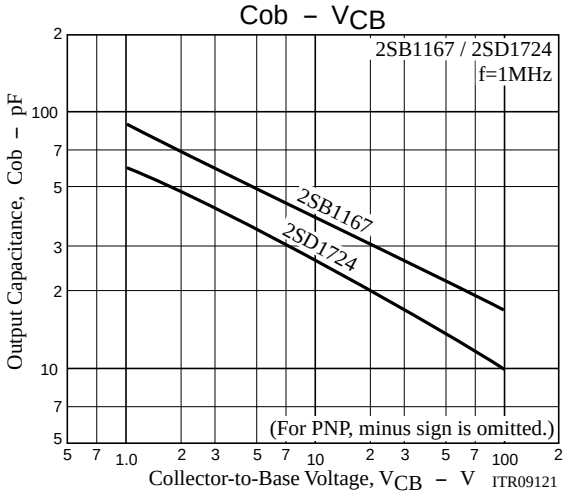
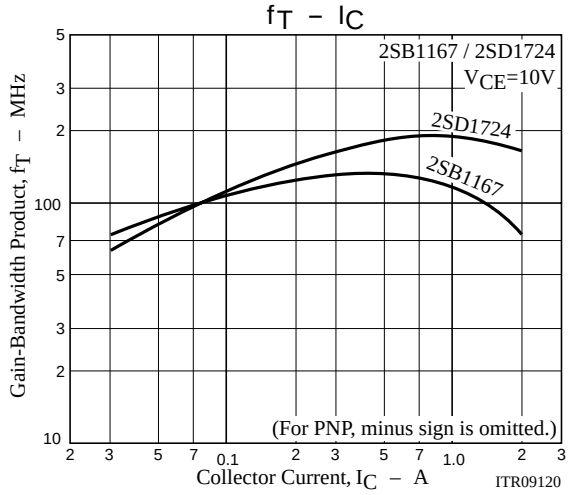
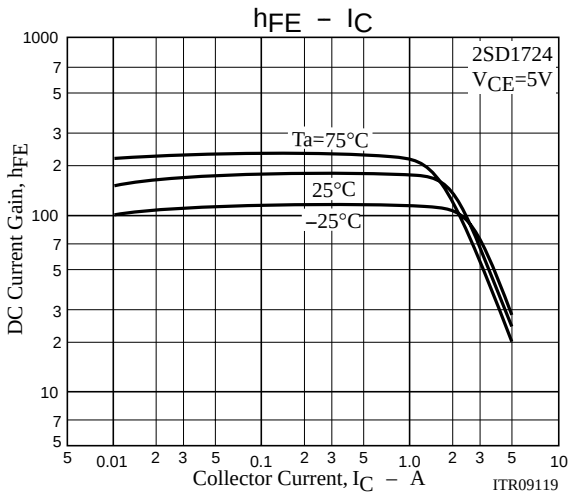
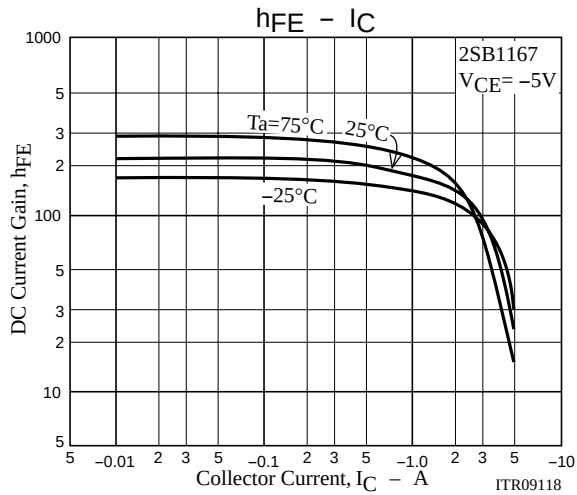
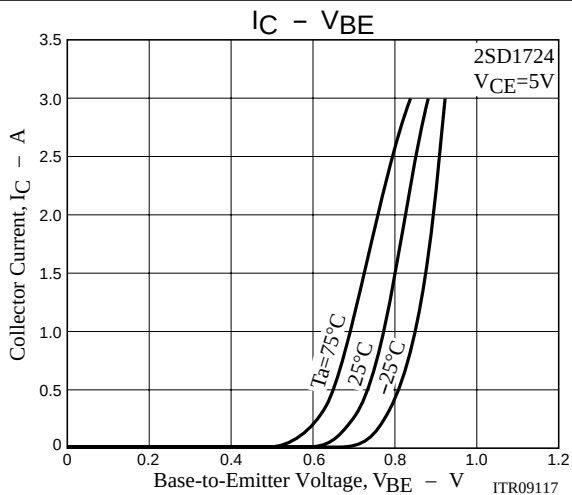
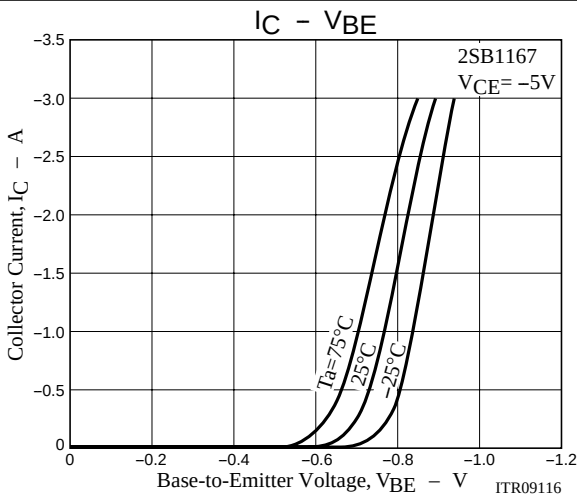
## Switching Time Test Circuit



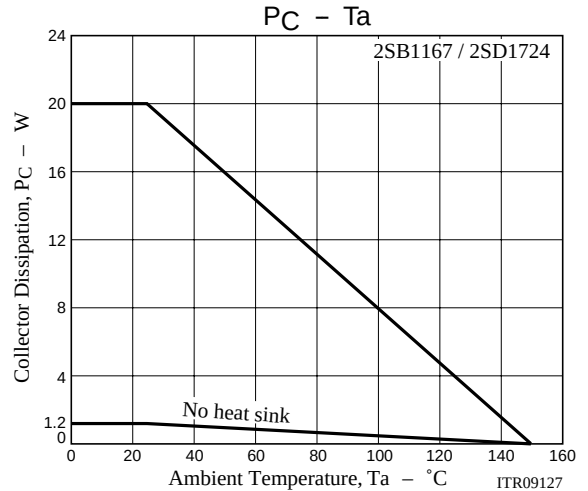
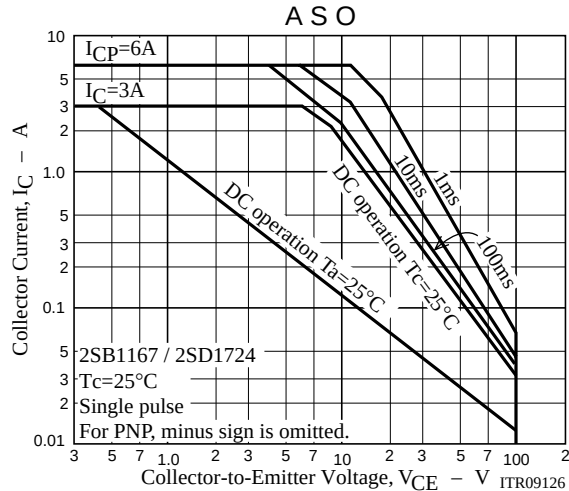
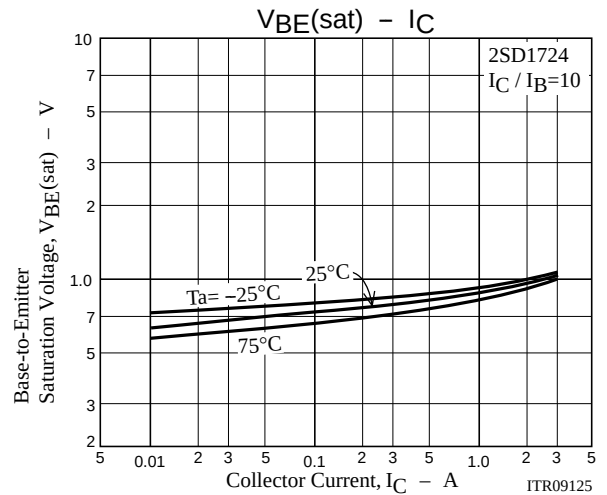
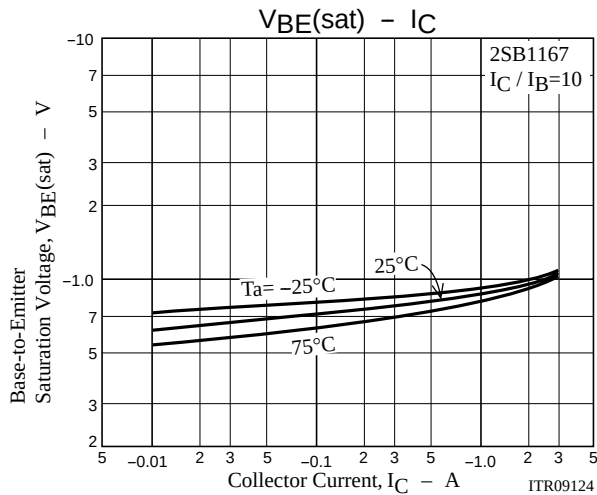
$I_C=10I_{B1}=-10I_{B2}=1.5A$   
(For PNP, the polarity is reversed.)



2SB1167/2SD1724



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