



## 2SB1388/2SD2093

### Driver Applications

#### Applications

- Motor drivers, printer hammer drivers, relay drivers, voltage regulator control.

#### Features

- High DC current gain.
- Large current capacity and large ASO.
- Low saturation voltage.
- Micaless package facilitating mounting.

( ) : 2SB1388

#### Specifications

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

| Parameter                    | Symbol    | Conditions             | Ratings     | Unit             |
|------------------------------|-----------|------------------------|-------------|------------------|
| Collector-to-Base Voltage    | $V_{CB0}$ |                        | (-)110      | V                |
| Collector-to-Emitter Voltage | $V_{CEO}$ |                        | (-)100      | V                |
| Emitter-to-Base Voltage      | $V_{EBO}$ |                        | (-)6        | V                |
| Collector Current            | $I_C$     |                        | (-)10       | A                |
| Collector Current (Pulse)    | $I_{CP}$  |                        | (-)15       | A                |
| Collector Dissipation        | $P_C$     |                        | 3.0         | W                |
|                              |           | $T_c=25^\circ\text{C}$ | 45          | 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                | $I_{CB0}$     | $V_{CB} = (-)80\text{V}, I_E = 0$            |         |        | (-)0.1 | mA   |
| Emitter Cutoff Current                  | $I_{EBO}$     | $V_{CE} = (-)5\text{V}, I_C = 0$             |         |        | (-)3.0 | mA   |
| DC Current Gain                         | $h_{FE}$      | $V_{CE} = (-)3\text{V}, I_C = (-)5\text{mA}$ | 1500    | 4000   |        |      |
| Gain-Bandwidth Product                  | $f_T$         | $V_{CE} = (-)5\text{V}, I_C = (-)5\text{mA}$ |         | 20     |        | MHz  |
| Collector-to-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = (-)5\text{mA}, I_B = (-)10\text{mA}$  |         | (-)1.0 | (-)1.5 | V    |
|   |               |  |         | 0.9    |        | V    |
| Base-to-Emitter Saturation Voltage      | $V_{BE(sat)}$ | $I_C = (-)5\text{mA}, I_B = (-)10\text{mA}$  |         |        | (-)2.0 | V    |

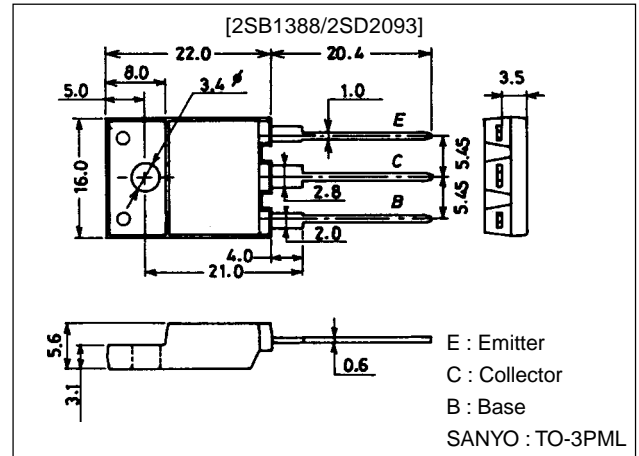
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#### Package Dimensions

unit:mm

2039A

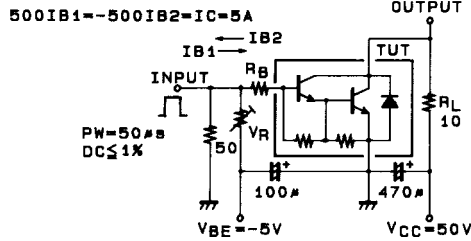


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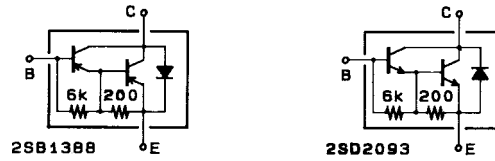
| Parameter                              | Symbol        | Conditions                   | Ratings |       |     | Unit    |
|--|---------------|------------------------------|---------|-------|-----|---------|
|  |               |                              | min     | typ   | max |         |
| Collector-to-Base Breakdown Voltage    | $V_{(BR)CBO}$ | $I_C=(-)5mA, I_E=0$          | (-)110  |       |     | V       |
| Collector-to-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | $I_C=(-)50mA, R_{BE}=\infty$ | (-)100  |       |     | V       |
| Turn-ON Time                           | $t_{on}$      | See specified test circuit.  |         | (0.7) |     | $\mu s$ |
| Storage Time                           | $t_{stg}$     | See specified test circuit.  |         | 0.6   |     | $\mu s$ |
|  |               |                              |         | (1.4) |     | $\mu s$ |
| Fall Time                              | $t_f$         | See specified test circuit.  |         | 4.8   |     | $\mu s$ |
|  |               |                              |         | (1.5) |     | $\mu s$ |
|  |               |                              |         | 1.6   |     | $\mu s$ |

## Switching Time Test Circuit

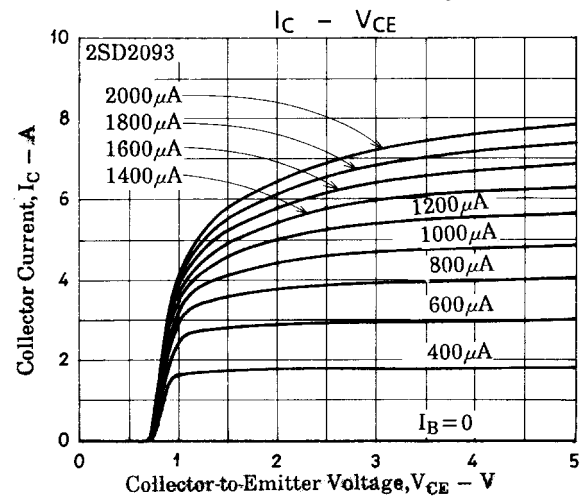
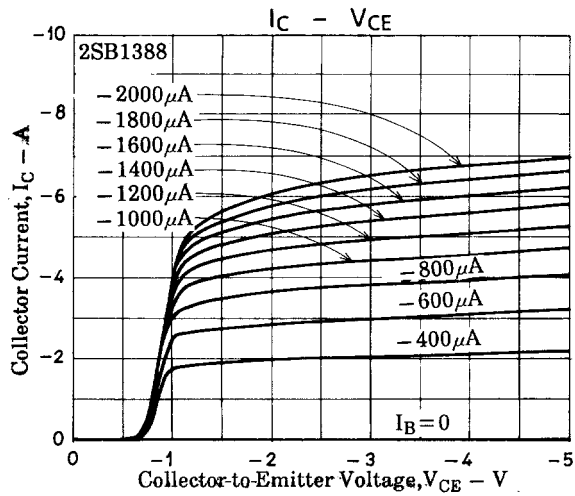
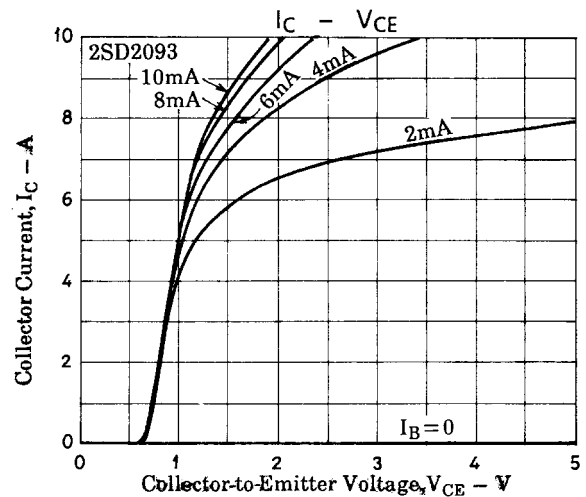
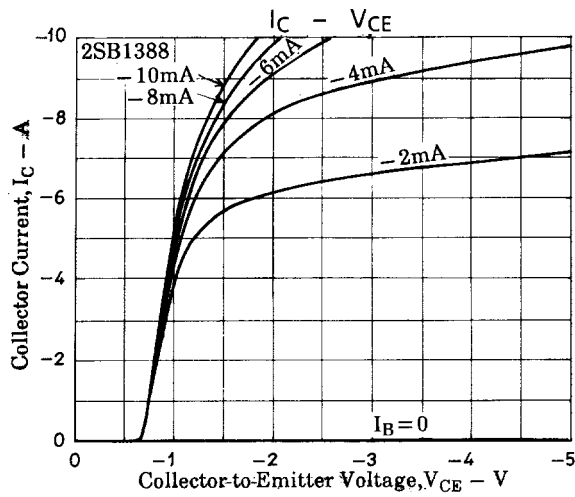
(For PNP, the polarity is reversed)



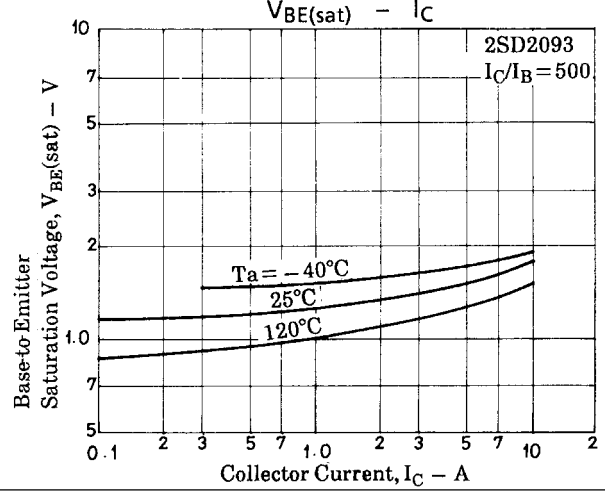
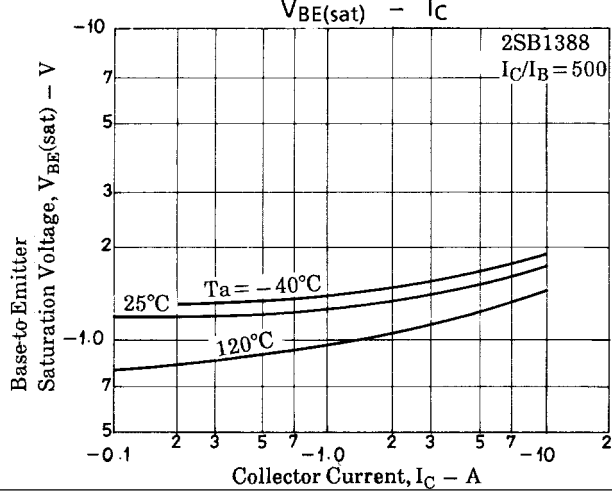
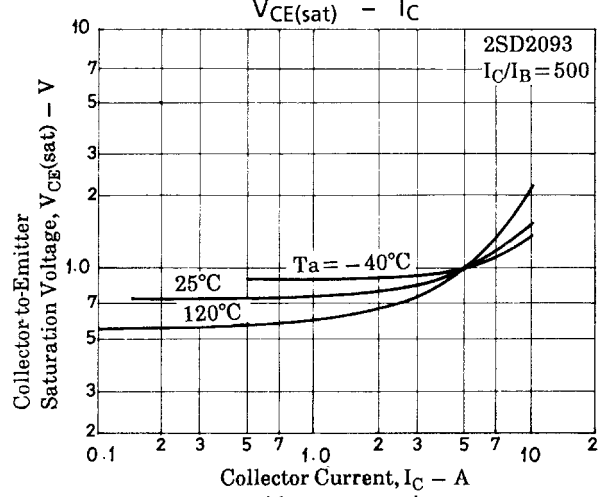
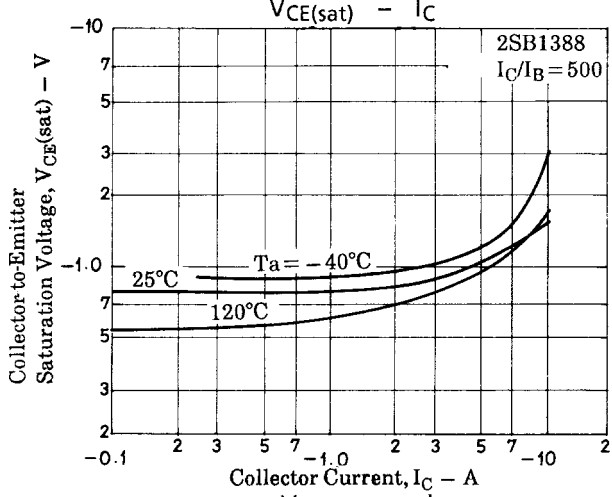
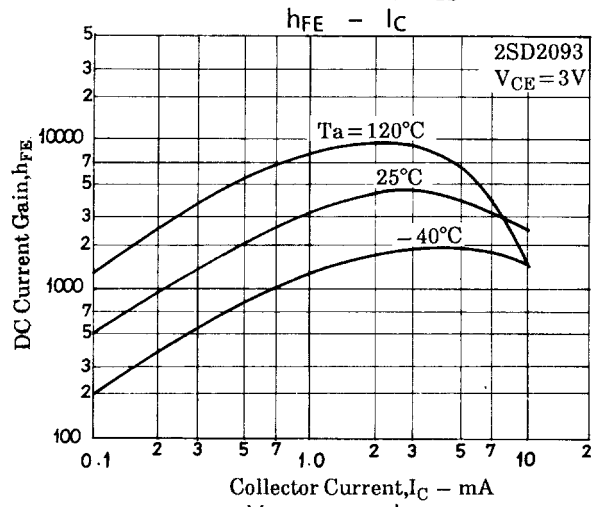
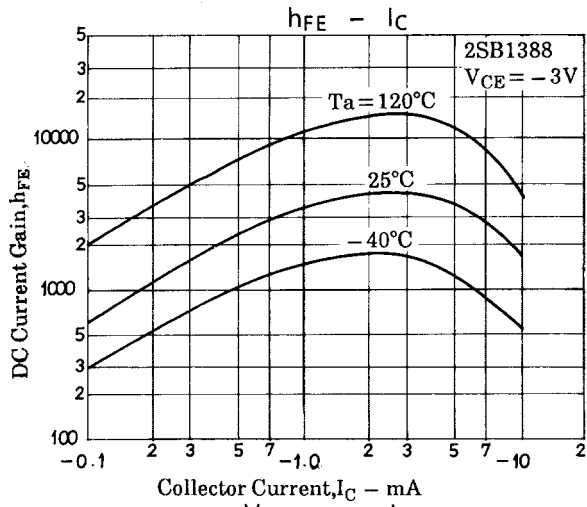
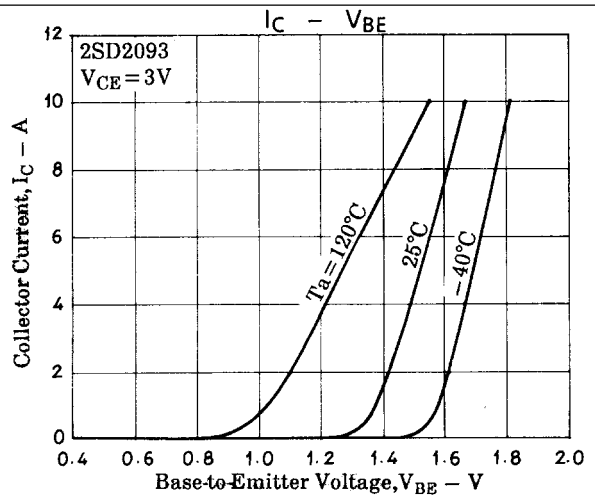
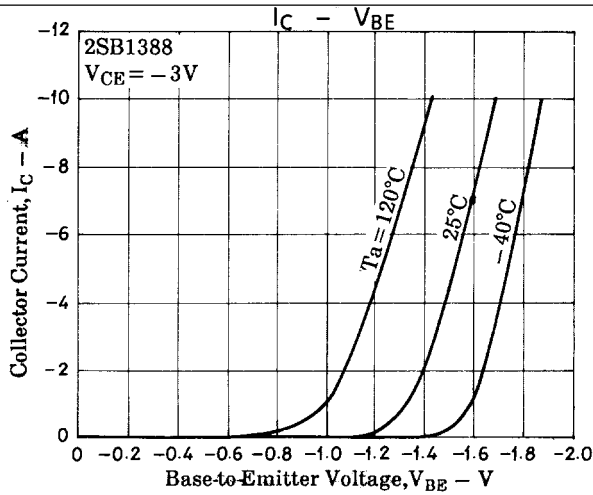
## Electrical Connection



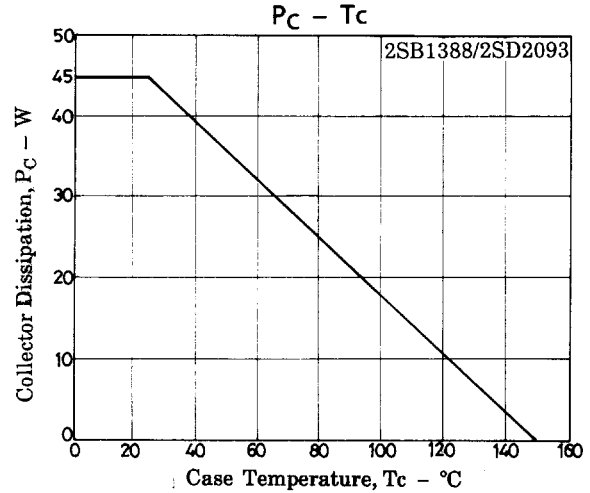
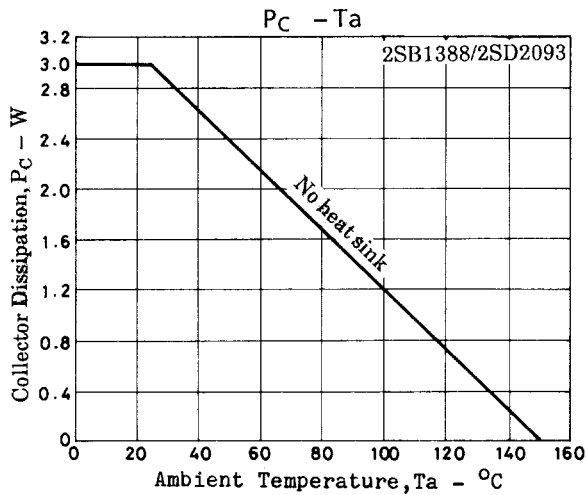
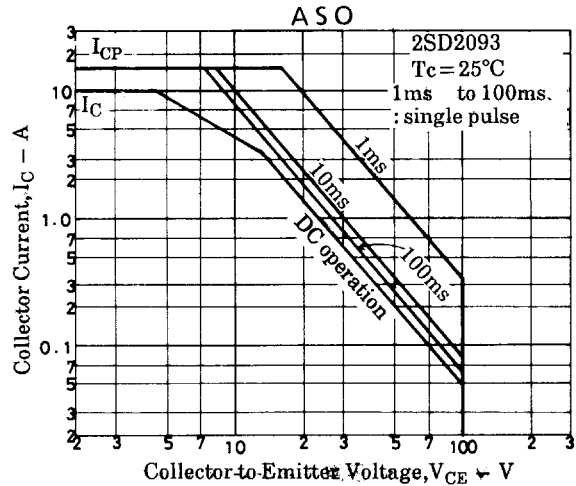
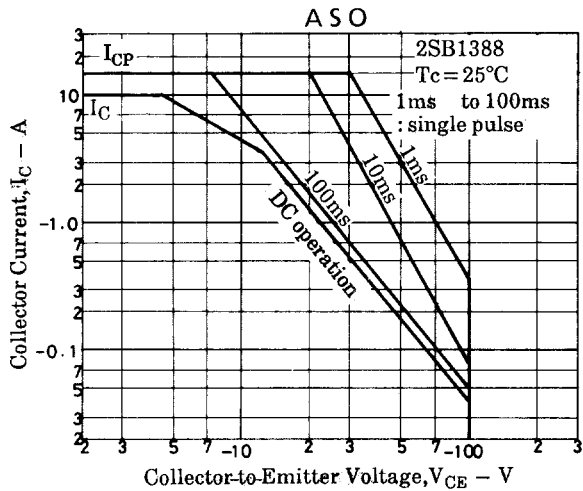
Unit (resistance : Ω, capacitance : F)



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