

**2SA2099 / 2SC5888****High-Current Switching Applications****Applications**

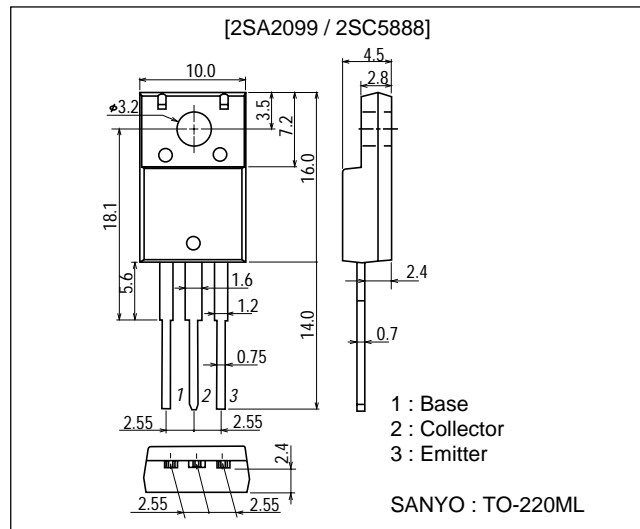
- Relay drivers, lamp drivers, motor drivers.

**Features**

- Adoption of MBIT processes.
- Large current capacitance.
- Low collector-to-emitter saturation voltage.
- High-speed switching.

**Package Dimensions**

unit : mm  
2041A

**Specifications**

( ) : 2SA2099

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

| Parameter                    | Symbol    | Conditions             | Ratings     | Unit             |
|------------------------------|-----------|------------------------|-------------|------------------|
| Collector-to-Base Voltage    | $V_{CB0}$ |                        | (-)/60      | V                |
| Collector-to-Emitter Voltage | $V_{CEO}$ |                        | (-)/50      | V                |
| Emitter-to-Base Voltage      | $V_{EBO}$ |                        | (-)/6       | V                |
| Collector Current            | $I_C$     |                        | (-)/10      | A                |
| Collector Current (Pulse)    | $I_{CP}$  |                        | (-)/13      | A                |
| Base Current                 | $I_B$     |                        | (-)/2       | A                |
| Collector Dissipation        | $P_C$     |                        | 2           | W                |
|                              |           | $T_c=25^\circ\text{C}$ | 25          | 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 | $I_{CBO}$ | $V_{CB}=-40\text{V}, I_E=0$ |         |     | (-)/10 | $\mu\text{A}$ |
| Emitter Cutoff Current   | $I_{EBO}$ | $V_{EB}=-4\text{V}, I_C=0$  |         |     | (-)/10 | $\mu\text{A}$ |

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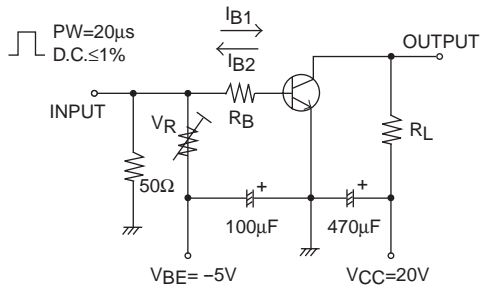
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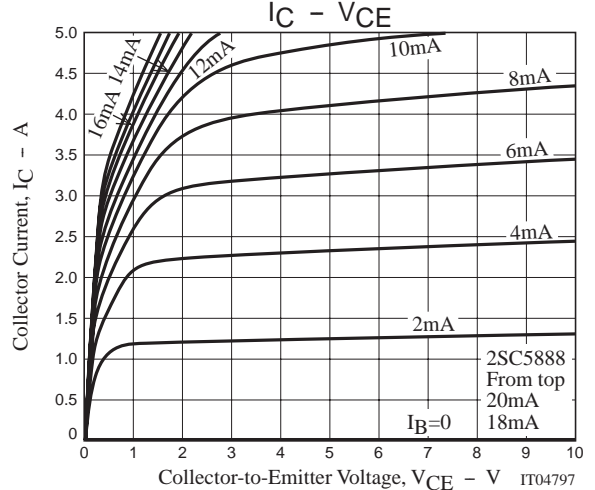
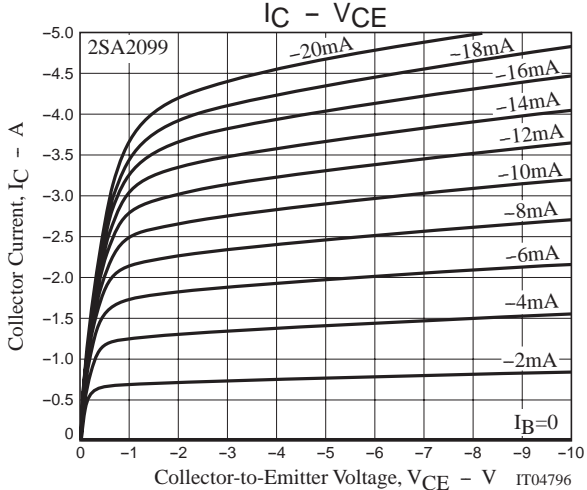
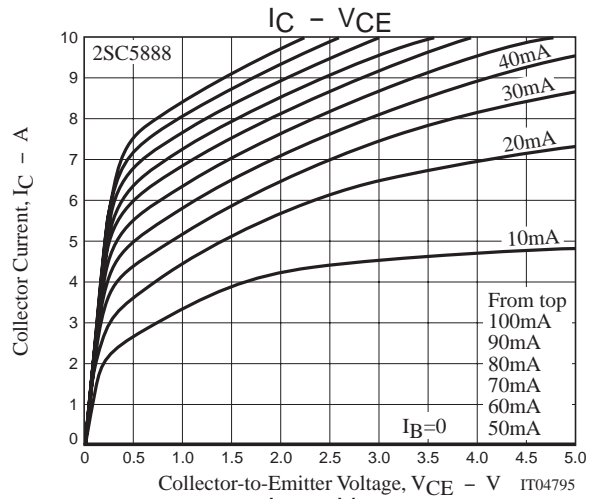
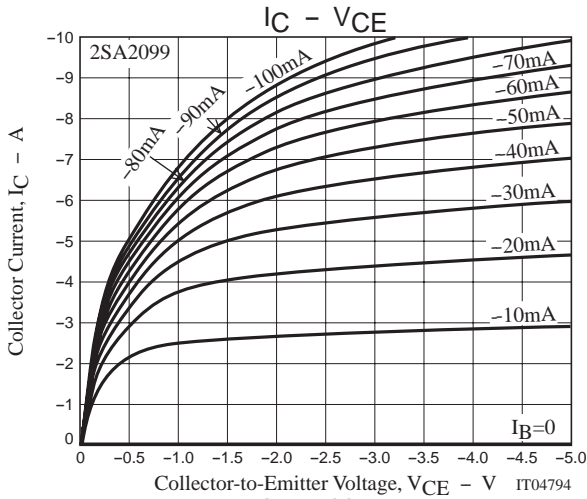
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| Parameter                               | Symbol        | Conditions                  | Ratings |           |           | Unit |
|---|---------------|-----------------------------|---------|-----------|-----------|------|
|   |               |                             | min     | typ       | max       |      |
| DC Current Gain                         | $h_{FE}$      | $V_{CE}=(-)2V, I_C=(-)1A$   | 200     |           | (560)700  |      |
| Gain-Bandwidth Product                  | $f_T$         | $V_{CE}=(-)5V, I_C=(-)1A$   |         | (130)200  |           | MHz  |
| Output Capacitance                      | $C_{ob}$      | $V_{CB}=(-)10V, f=1MHz$     |         | 90(60)    |           | pF   |
| Collector-to-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C=(-)5A, I_B=(-)250mA$   |         | (-250)180 | (-500)360 | mV   |
| Base-to-Emitter Saturation Voltage      | $V_{BE(sat)}$ | $I_C=(-)5A, I_B=(-)250mA$   |         | (- )0.93  | (- )1.4   | V    |
| Collector-to-Base Breakdown Voltage     | $V_{(BR)CBO}$ | $I_C=(-)100\mu A, I_E=0$    | (-50)60 |           |           | V    |
| Collector-to-Emitter Breakdown Voltage  | $V_{(BR)CEO}$ | $I_C=(-)1mA, R_{BE}=\infty$ | (- )50  |           |           | V    |
| Emitter-to-Base Breakdown Voltage       | $V_{(BR)EBO}$ | $I_E=(-)100\mu A, I_C=0$    | (- )6   |           |           | V    |
| Turn-ON Time                            | $t_{on}$      | See specified Test Circuit. |         | (70)40    |           | ns   |
| Storage Time                            | $t_{stg}$     | See specified Test Circuit. |         | (650)1000 |           | ns   |
| Fall Time                               | $t_f$         | See specified Test Circuit. |         | (60)80    |           | ns   |

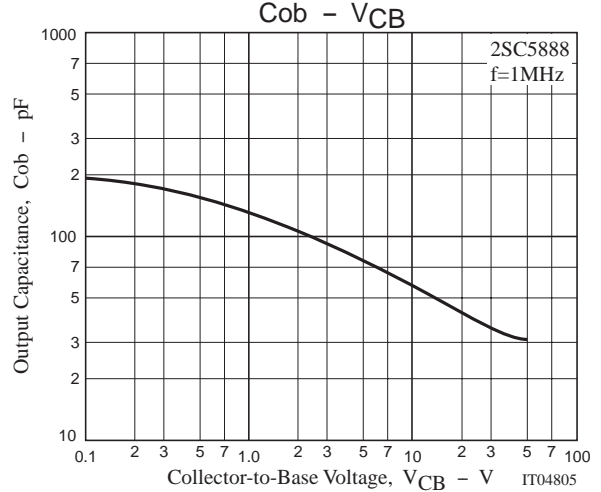
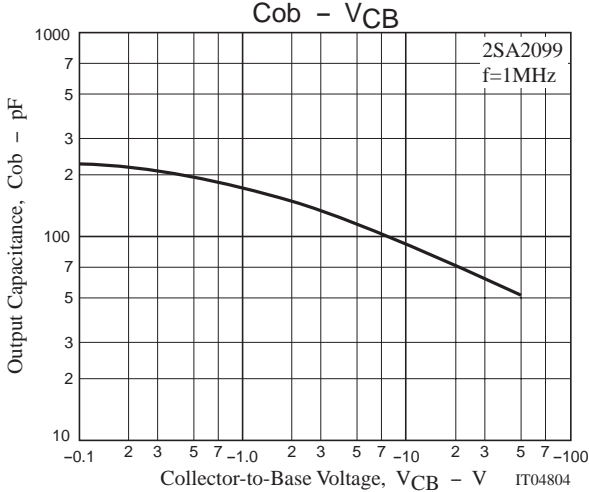
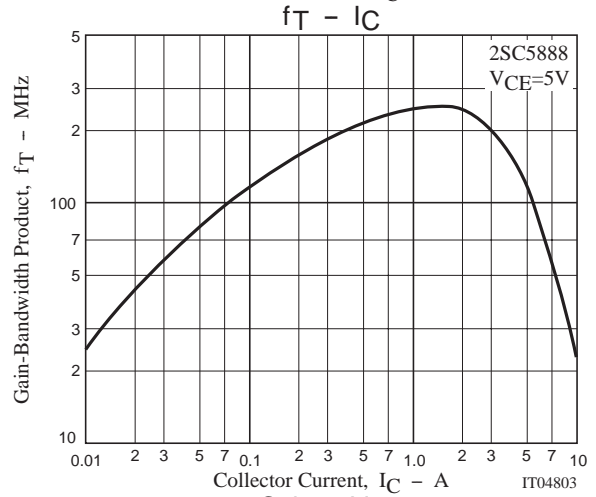
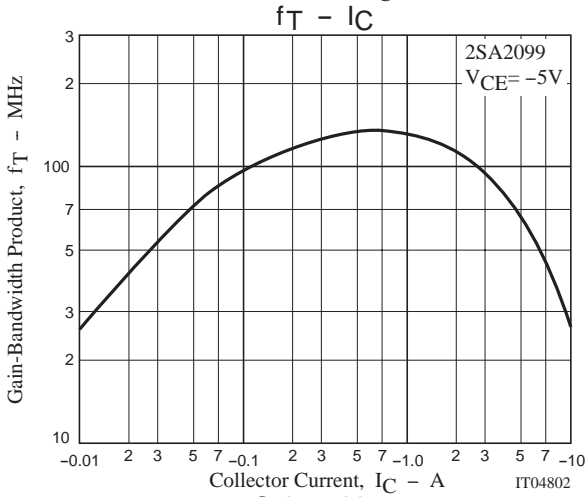
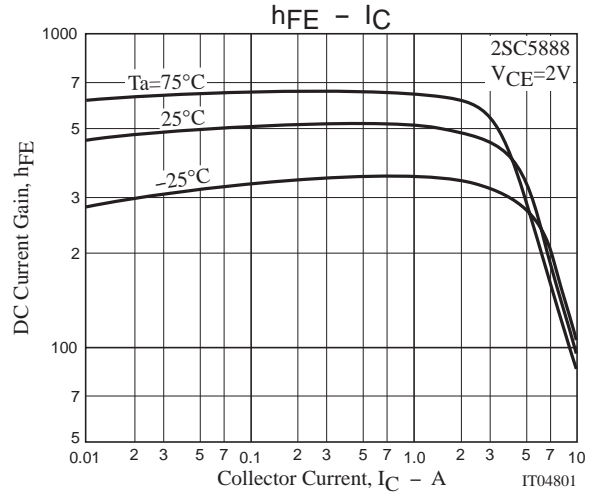
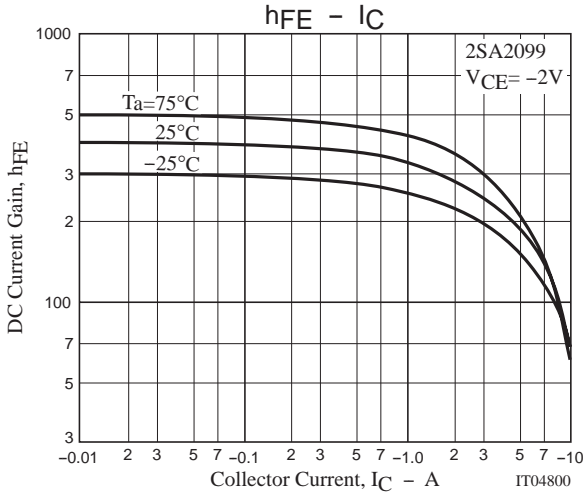
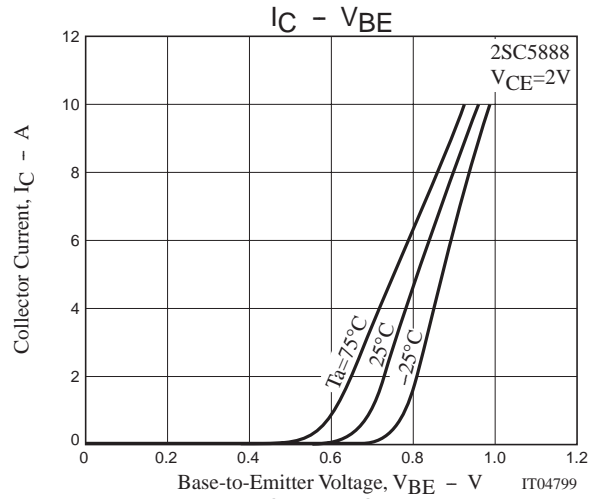
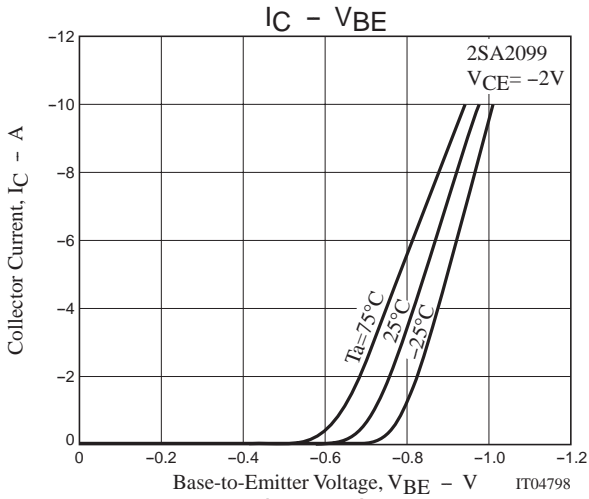
## Switching Time Test Circuit



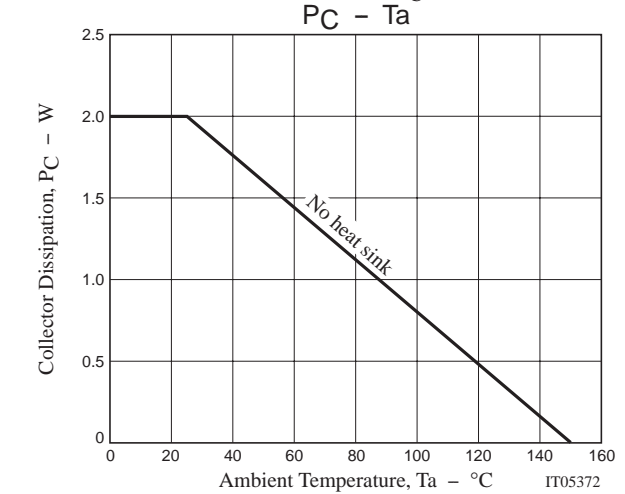
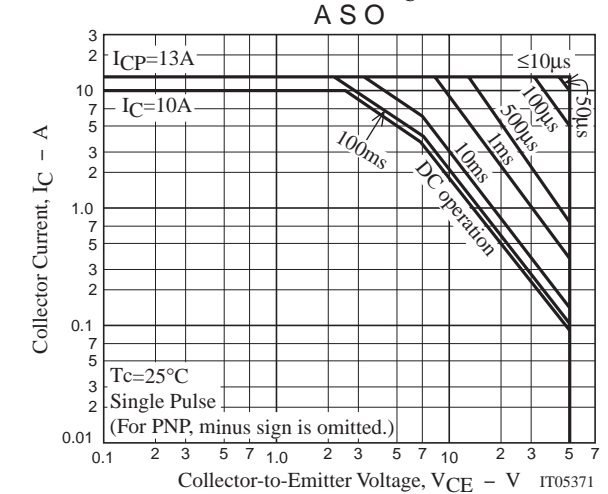
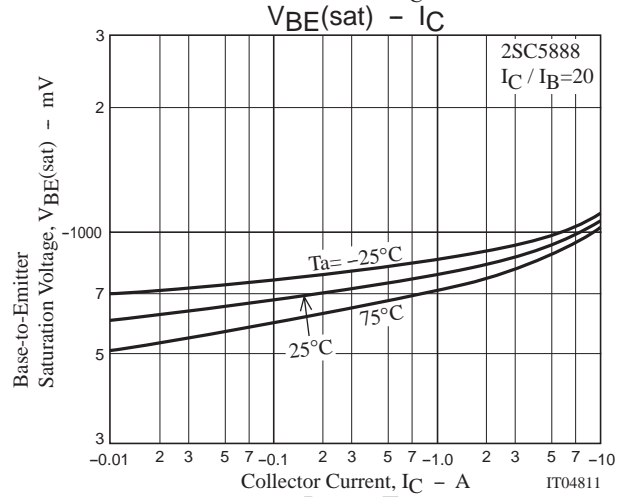
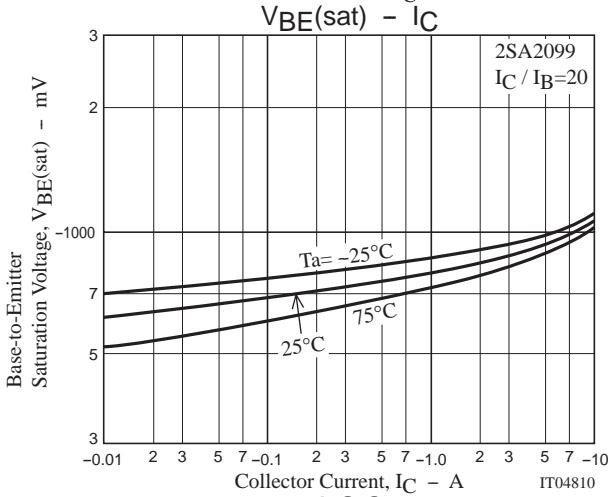
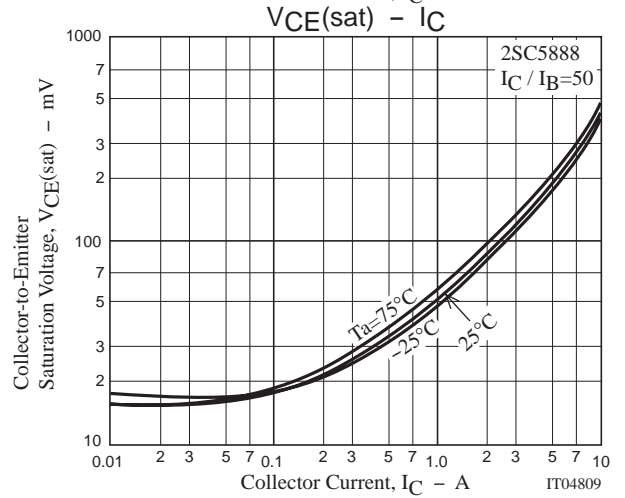
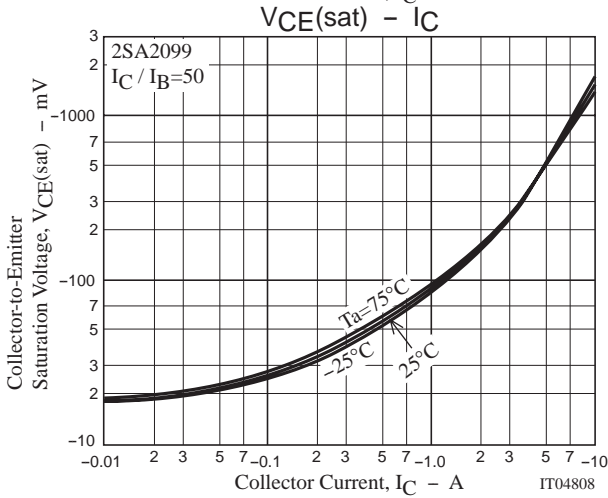
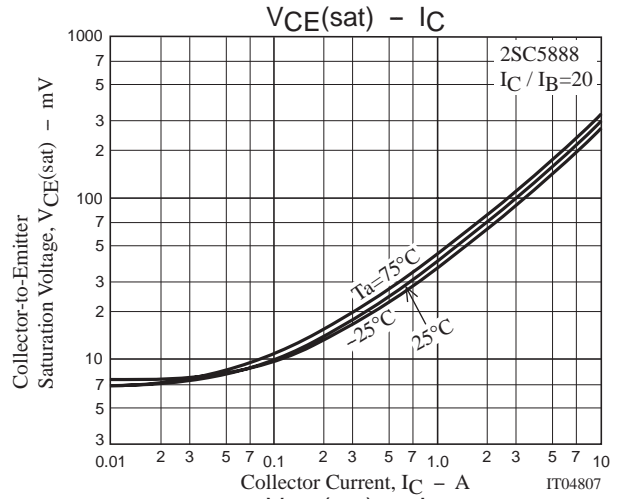
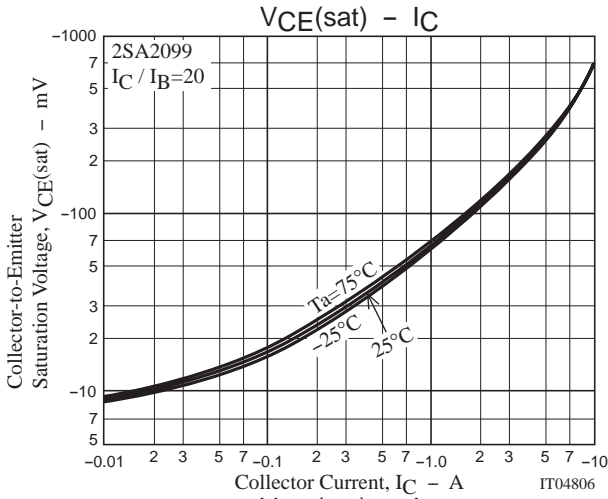
$I_C = 20I_{B1} = -20I_{B2} = 3A$   
(For PNP, the polarity is reversed.)

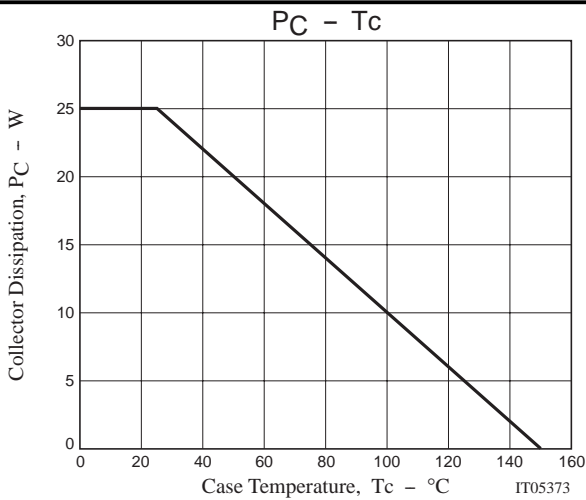


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