



## 2SA1685/2SC4443

### High-Speed Switching Applications

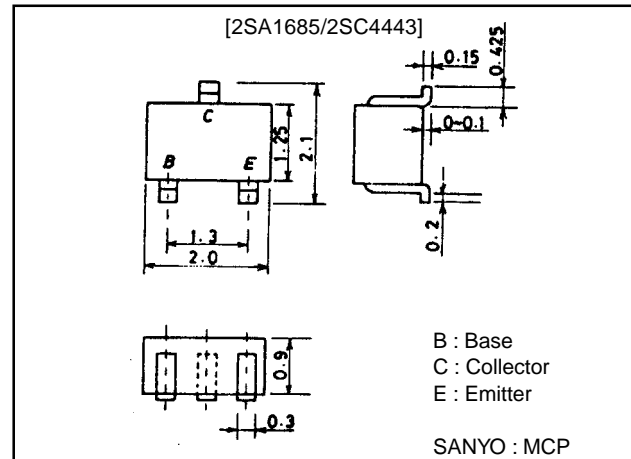
#### Features

- Fast switching speed.
- High gain-bandwidth product.
- Low saturation voltage.

#### Package Dimensions

unit:mm

2059



() : 2SA1685

#### Specifications

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

| Parameter                    | Symbol    | Conditions | Ratings     | Unit             |
|------------------------------|-----------|------------|-------------|------------------|
| Collector-to-Base Voltage    | $V_{CB0}$ |            | (-)40       | V                |
| Collector-to-Emitter Voltage | $V_{CEO}$ |            | (-)20       | V                |
| Emitter-to-Base Voltage      | $V_{EBO}$ |            | (-)5        | V                |
| Collector Current            | $I_C$     |            | (-)150      | mA               |
| Collector Current (Pulse)    | $I_{CP}$  |            | (-)300      | mA               |
| Base Current                 | $I_B$     |            | (-)30       | mA               |
| Collector Dissipation        | $P_C$     |            | 150         | mW               |
| 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 | $I_{CBO}$ | $V_{CB} = (-)30\text{V}, I_E = 0$              |         |       | (-)0.1 | $\mu\text{A}$ |
| Emitter Cutoff Current   | $I_{EBO}$ | $V_{EB} = (-)4\text{V}, I_C = 0$               |         |       | (-)0.1 | $\mu\text{A}$ |
| DC Current Gain          | $h_{FE}$  | $V_{CE} = (-)1\text{V}, I_C = (-)10\text{mA}$  | 60*     |       | 270*   |               |
| Gain-Bandwidth Product   | $f_T$     | $V_{CE} = (-)10\text{V}, I_C = (-)10\text{mA}$ |         | 700   |        | MHz           |
|                          |           |  |         | (400) |        | MHz           |

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# 2SA1685/2SC4443

Continued from preceding page.

| Parameter                               | Symbol        | Conditions                  | Ratings |         |        | Unit |
|---|---------------|-----------------------------|---------|---------|--------|------|
|   |               |                             | min     | typ     | max    |      |
| Output Capacitance                      | $C_{ob}$      | $V_{CB}=(-)10V, f=1MHz$     |         | (2.9)   |        | pF   |
| Collector-to-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C=(-)10mA, I_B=(-)1mA$   |         | 2.6     |        | pF   |
| Base-to-Emitter Saturation Voltage      | $V_{BE(sat)}$ | $I_C=(-)10mA, I_B=(-)1mA$   |         | 0.08    | (-0.2) | V    |
|   |               |                             |         | (-0.07) |        | V    |
| Collector-to-Base Breakdown Voltage     | $V_{(BR)CBO}$ | $I_C=(-)10\mu A, I_E=0$     |         | 0.72    | (-1.0) | V    |
|   |               |                             |         | (-0.75) |        | V    |
| Collector-to-Base Breakdown Voltage     | $V_{(BR)CBO}$ | $I_C=(-)10\mu A, I_E=0$     | (-40)   |         |        | V    |
| Collector-to-Base Breakdown Voltage     | $V_{(BR)CEO}$ | $I_C=(-)1mA, R_{BE}=\infty$ | (-20)   |         |        | V    |
| Emitter-to-Base Breakdown Voltage       | $V_{(BR)EBO}$ | $I_E=(-)10\mu A, I_C=0$     | (-5)    |         |        | V    |
| Delay Time                              | $t_d$         | See specified Test Circuit  |         | (14)11  | 20     | ns   |
| Rise Time                               | $t_r$         | See specified Test Circuit  |         | (11)10  | 20     | ns   |
| Storage Time                            | $t_{stg}$     | See specified Test Circuit  |         | (80)70  | 180    | ns   |
| Fall Time                               | $t_f$         | See specified Test Circuit  |         | (16)15  | 25     | ns   |

\* : 2SA1685/2SC4443 are classified by 10mA  $h_{FE}$  as follows :

|         |    |   |     |    |   |     |     |   |     |
|---------|----|---|-----|----|---|-----|-----|---|-----|
| 2SA1685 | 60 | 3 | 120 | 90 | 4 | 180 |     |   |     |
| 2SC4443 | 60 | 3 | 120 | 90 | 4 | 180 | 135 | 5 | 270 |

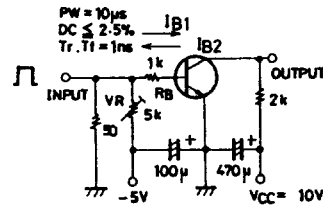
Marking 2SA1685 : YL

2SC4443 : GT

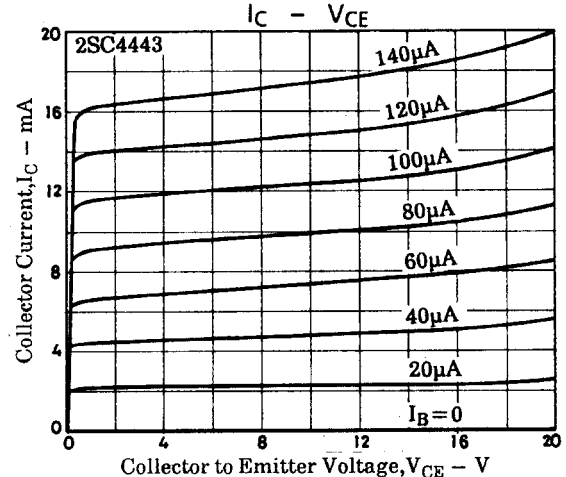
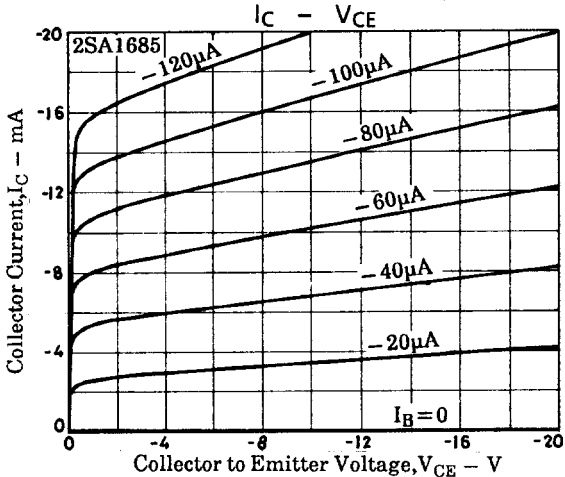
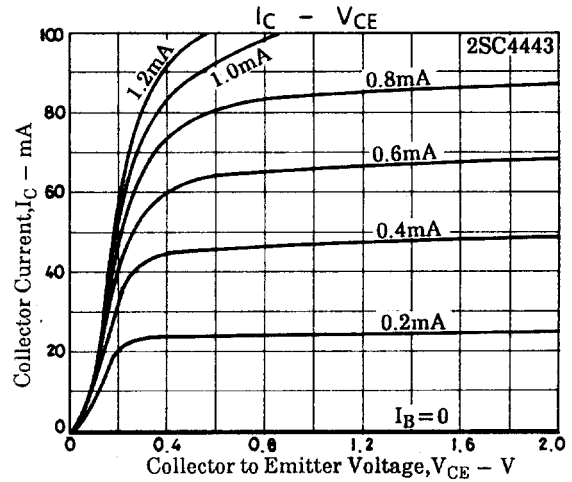
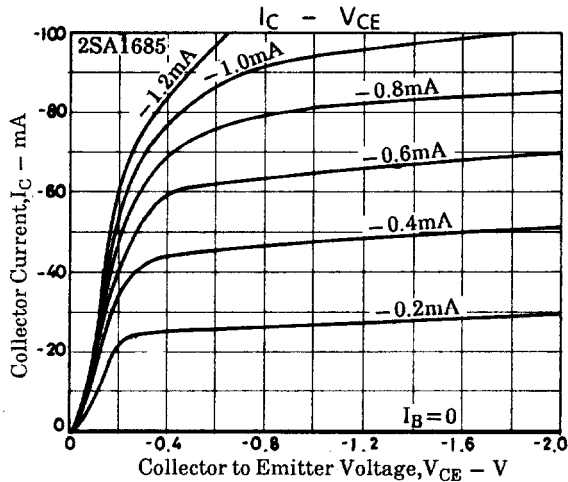
$h_{FE}$  rank 2SA1685 : 3, 4

2SC4443 : 3, 4, 5

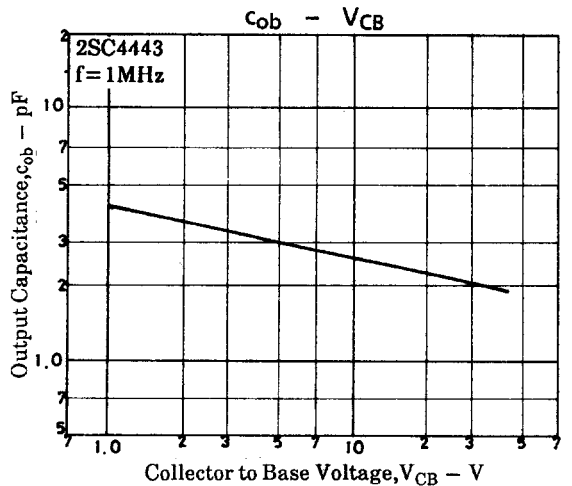
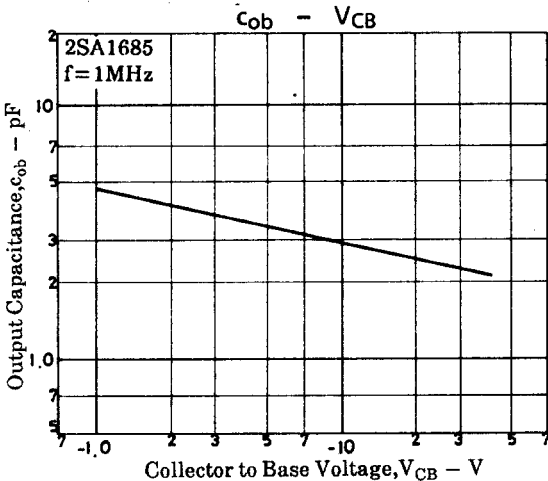
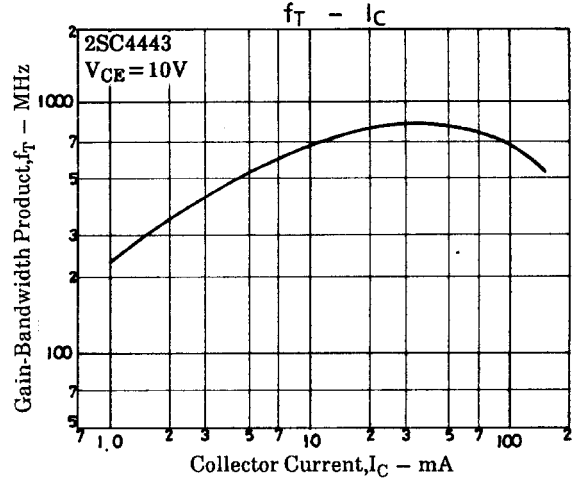
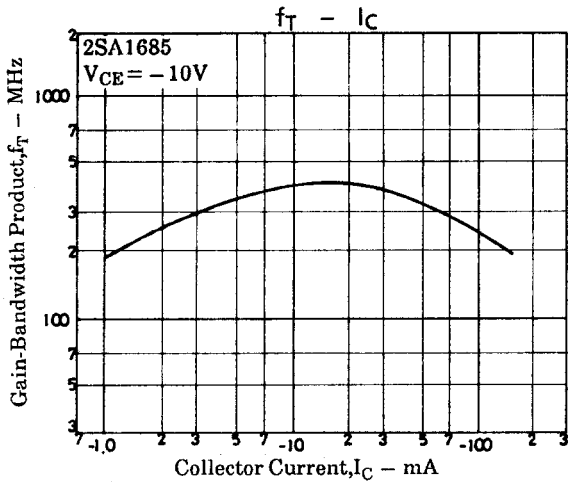
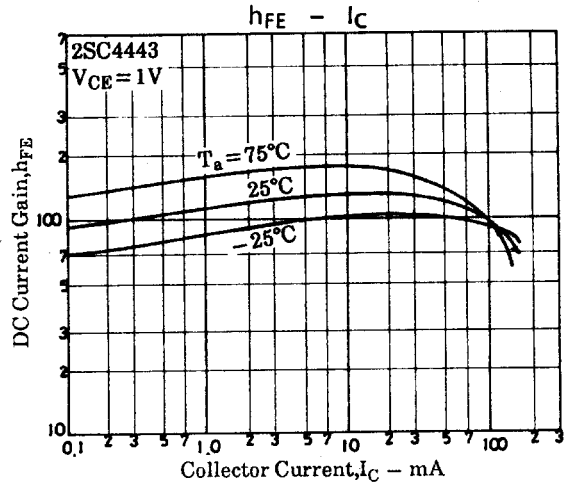
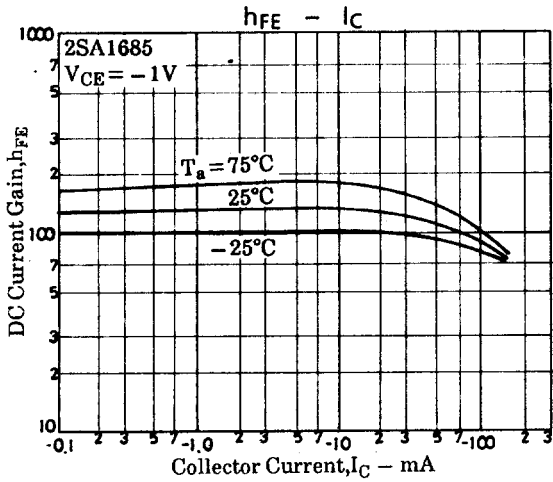
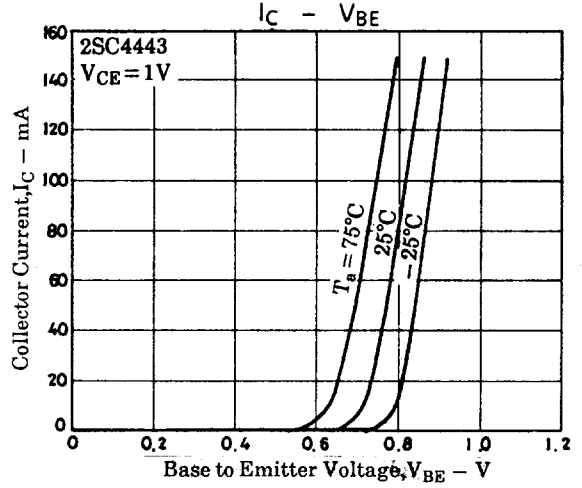
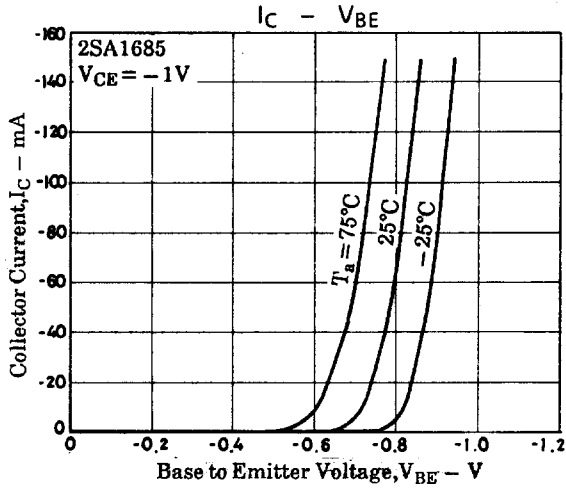
## Switching Time Test Circuit



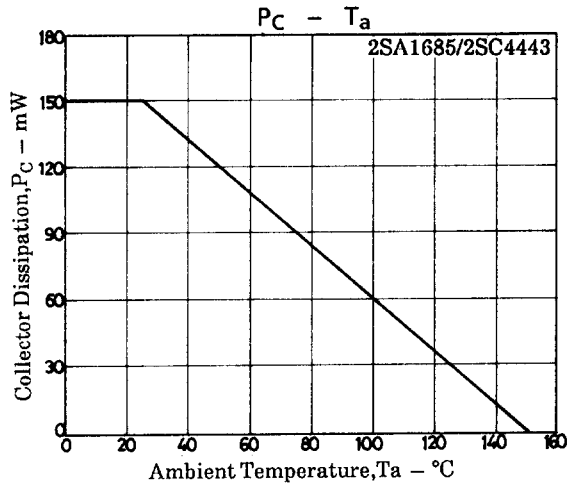
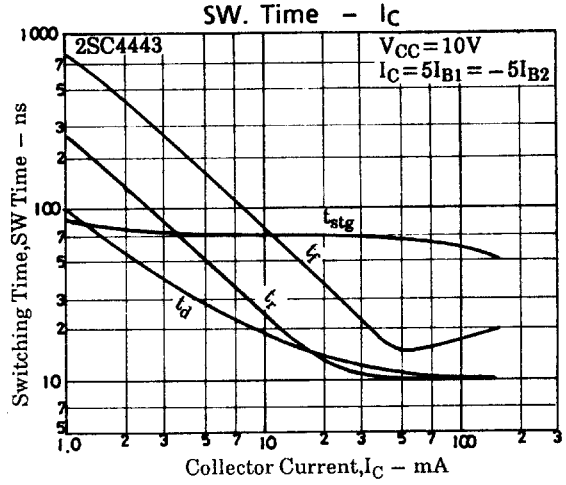
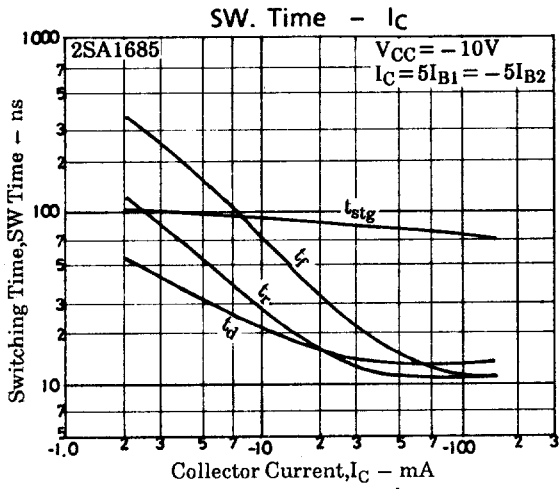
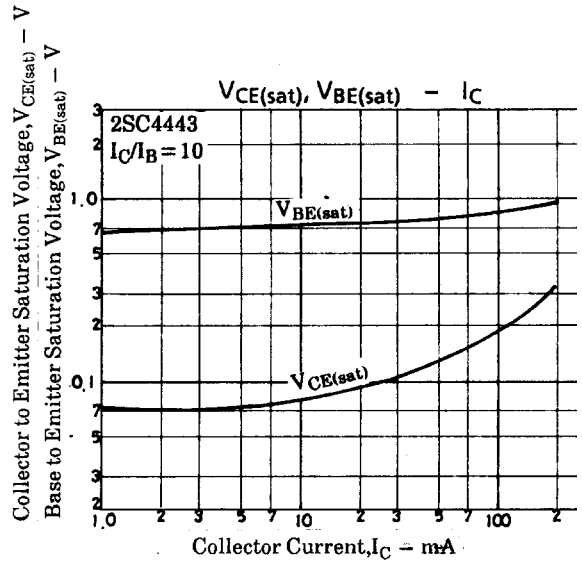
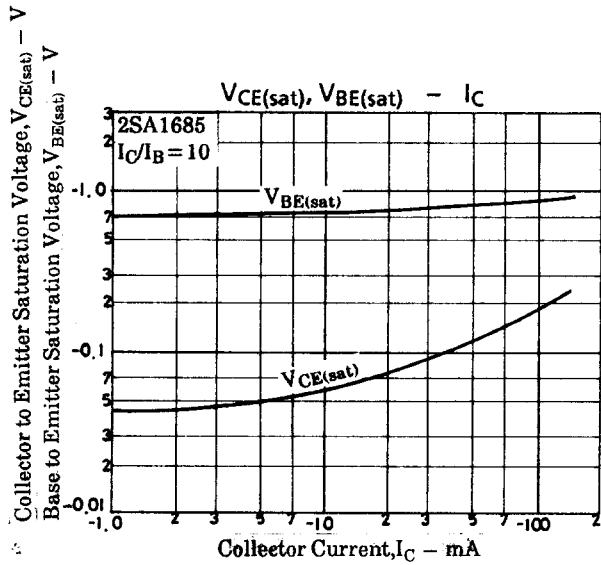
$5I_{B1} = -5I_{B2} = I_C = 50mA$   
 (For PNP, the polarity is reversed.)  
 Unit (resistance :  $\Omega$ , capacitance : F)



2SA1685/2SC4443



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