



## 2SA1417/2SC3647

### High-Voltage Switching Applications

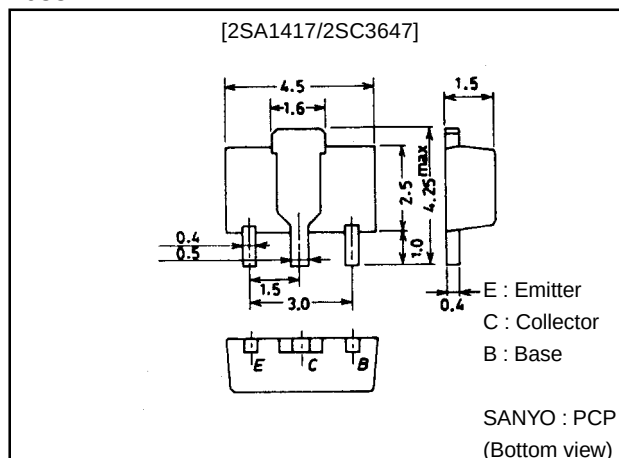
#### Features

- Adoption of FBET, MBIT processes.
- High breakdown voltage and large current capacity.
- Fast switching time.
- Very small size making it easy to provide high-density, small-sized hybrid ICs.

#### Package Dimensions

unit:mm

2038



() : 2SA1417

#### Specifications

##### Absolute Maximum Ratings at Ta = 25°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            | $I_C$     |                                                    | (-)2        | A    |
| Collector Current (Pulse)    | $I_{CP}$  |                                                    | (-)3        | A    |
| Collector Dissipation        | $P_C$     |                                                    | 500         | mW   |
|                              |           | Moutned on ceramic board (250 <sup>2</sup> ×0.8mm) | 1.5         | W    |
| Junction Temperature         | $T_j$     |                                                    | 150         | °C   |
| Storage Temperature          | $T_{stg}$ |                                                    | -55 to +150 | °C   |

##### Electrical Characteristics at Ta = 25°C

| Parameter                               | Symbol        | Conditions                    | Ratings |         |        | Unit |
|-----------------------------------------|---------------|-------------------------------|---------|---------|--------|------|
|                                         |               |                               | min     | typ     | max    |      |
| Collector Cutoff Current                | $I_{CBO}$     | $V_{CB}=(-)100V, I_E=0$       |         |         | (-)100 | nA   |
| Emitter Cutoff Current                  | $I_{EBO}$     | $V_{EB}=(-)4V, I_C=0$         |         |         | (-)100 | nA   |
| DC Current Gain                         | $h_{FE}$      | $V_{CE}=(-)5V, I_C=(-)100mA$  | 100*    |         | 400*   |      |
| Gain-Bandwidth Product                  | $f_T$         | $V_{CE}=(-)10V, I_C=(-)100mA$ |         | 120     |        | MHz  |
| Output Capacitance                      | $C_{ob}$      | $V_{CB}=(-)10V, f=1MHz$       |         | (25)    |        | pF   |
|                                         |               |                               |         | 16      |        | pF   |
| Collector-to-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C=(-)1A, I_B=(-)100mA$     |         | (-0.22) | (-0.6) | V    |
|                                         |               |                               |         | 0.13    | 0.4    | V    |
| Base-to-Emitter Saturation Voltage      | $V_{BE(sat)}$ | $I_C=(-)1A, I_B=(-)100mA$     |         | (-0.85) | (-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 Votage        | $V_{(BR)EBO}$ | $I_E=(-)10\mu A, I_C=0$       | (-)6    |         |        | V    |
| Turn-ON Time                            | $t_{on}$      | See specified Test Circuit.   |         | (80)    |        | ns   |
|                                         |               |                               |         | 80      |        | ns   |
| Stotage Time                            | $t_{stg}$     | See specified Test Circuit.   |         | (750)   |        | ns   |
|                                         |               |                               |         | 1000    |        | ns   |
| Fall Time                               | $t_f$         | See specified Test Circuit.   |         | (40)    |        | ns   |
|                                         |               |                               |         | 50      |        | ns   |

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## 2SA1417/2SC3647

\* : The 2SA1417/2SC3647 are classified by 100mA  $h_{FE}$  as follows :

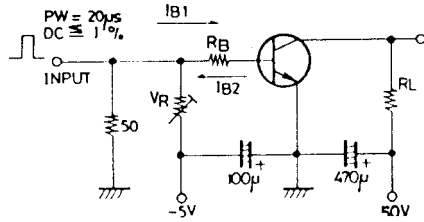
|     |   |     |     |   |     |     |   |     |
|-----|---|-----|-----|---|-----|-----|---|-----|
| 100 | R | 200 | 140 | S | 280 | 200 | T | 400 |
|-----|---|-----|-----|---|-----|-----|---|-----|

Marking 2SA1417 : AC

$h_{FE}$  rank : R, S, T

2SC3647 : CC

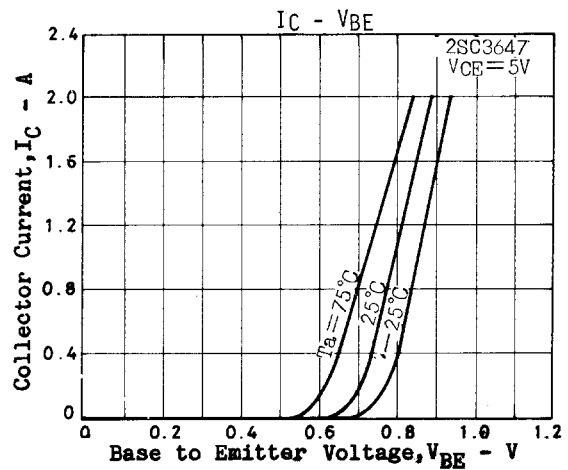
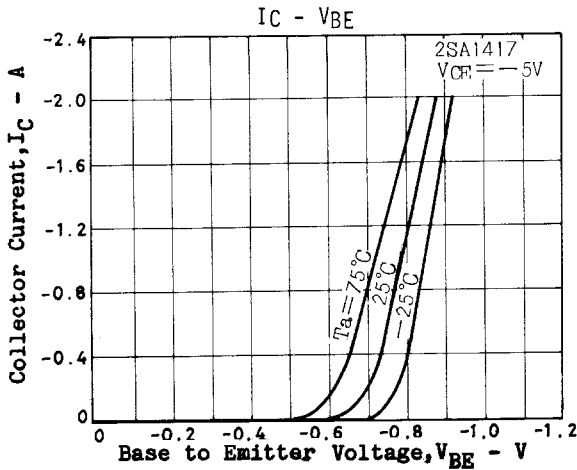
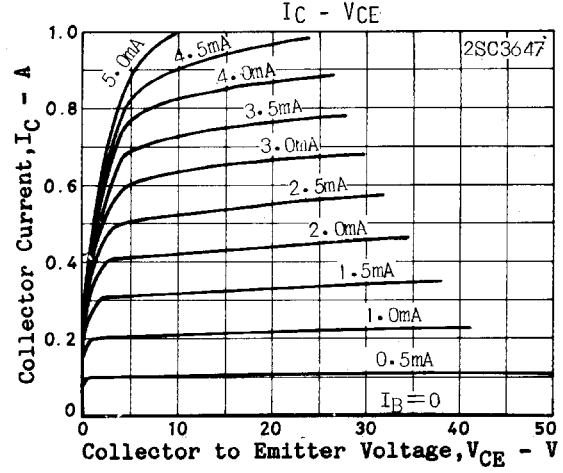
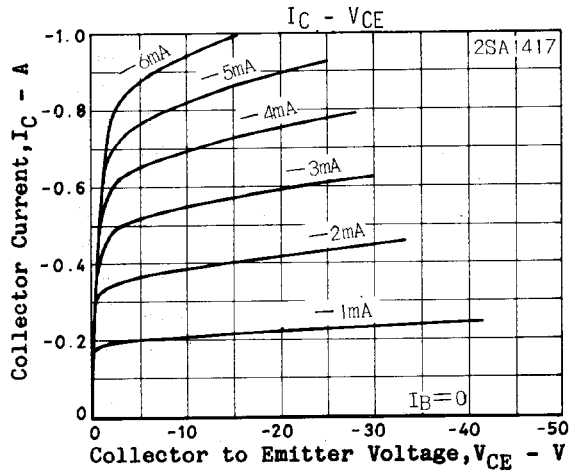
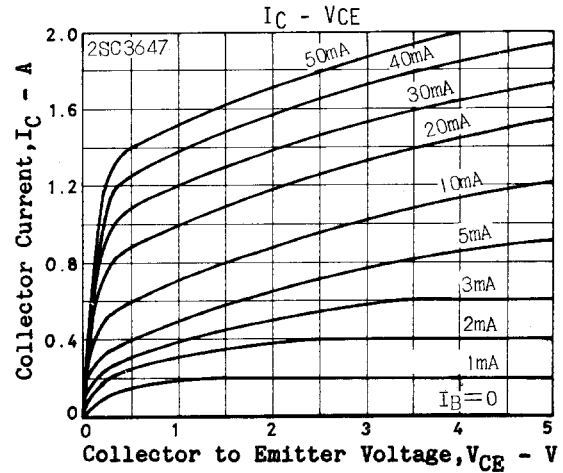
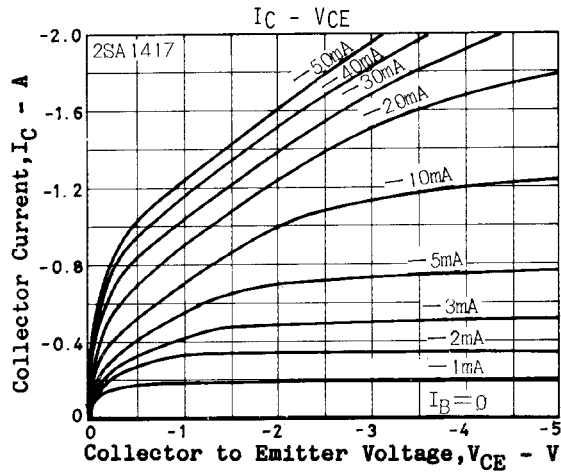
### Switching Time Test Circuit

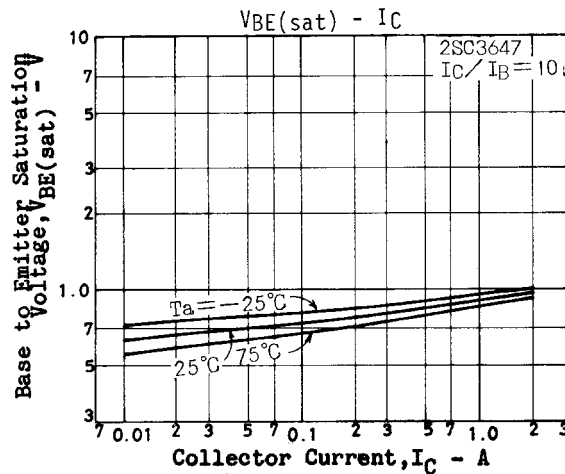
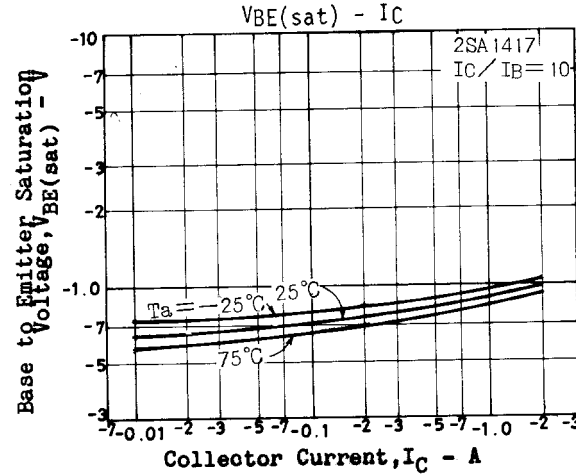
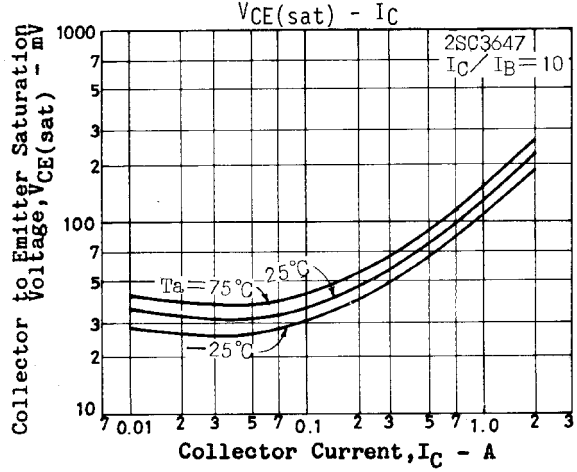
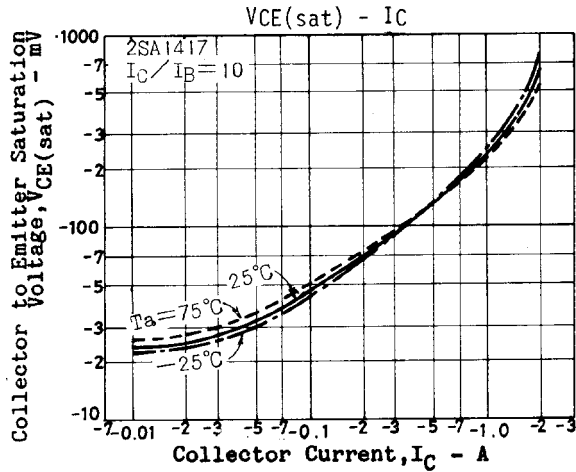
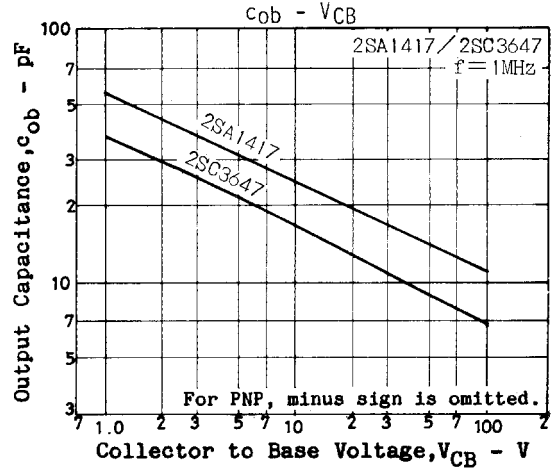
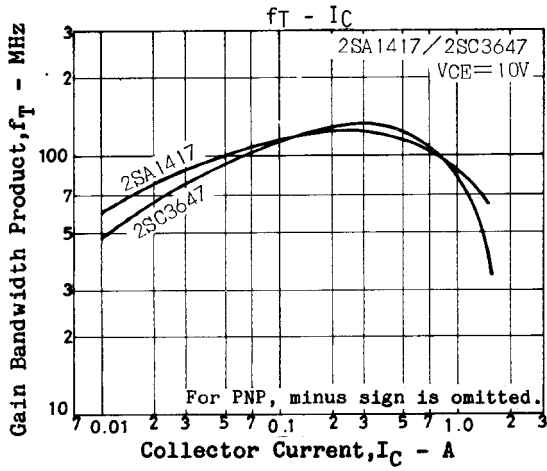
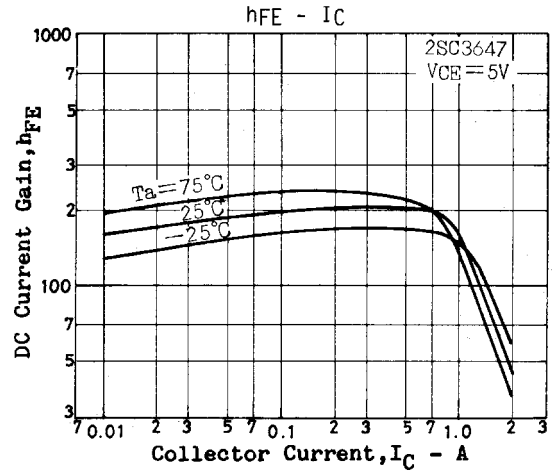
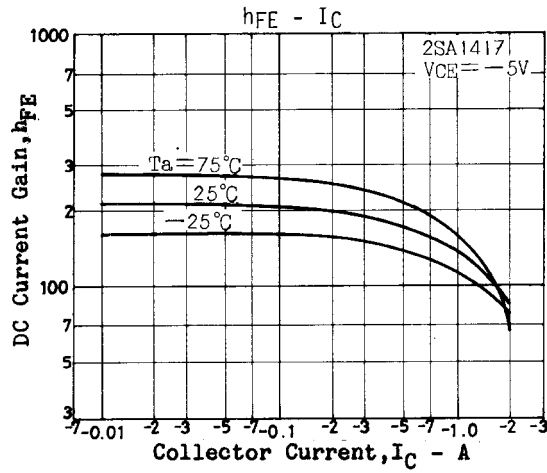


$$10I_{B1} = -10I_{B2} = I_C = 0.7A$$

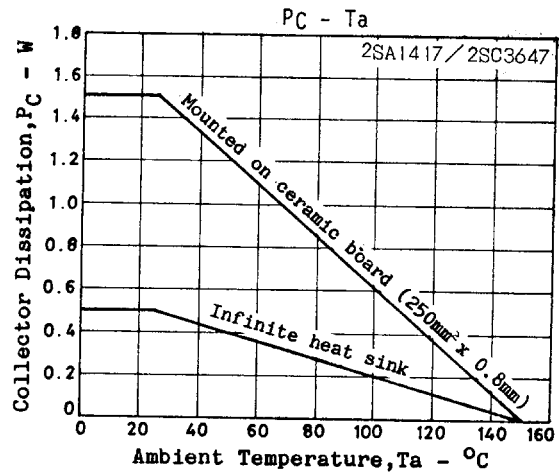
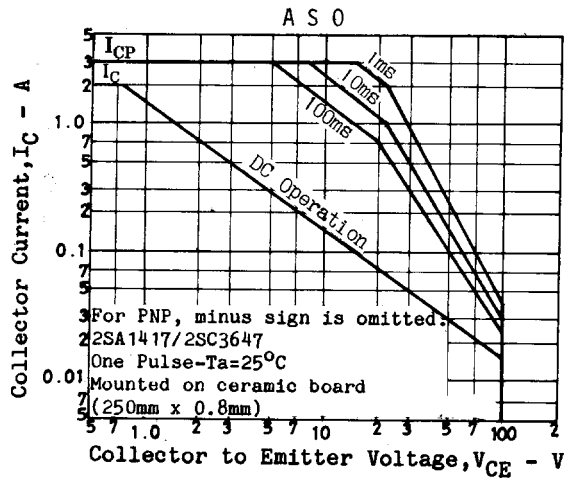
(For PNP, the polarity is reversed)

Unit (resistance :  $\Omega$ , capacitance : F)





## 2SA1417/2SC3647



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