



SANYO Semiconductors

## DATA SHEET

An ON Semiconductor Company

# 2SA1417 / 2SC3647 — PNP / NPN Epitaxial Planar Silicon Transistors

## High-Voltage Switching Applications

### Features

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

### Specifications ( ) : 2SA1417

Absolute Maximum Ratings at Ta=25°C

| Parameter                    | Symbol           | Conditions                                             | Ratings     | Unit |
|------------------------------|------------------|--------------------------------------------------------|-------------|------|
| Collector-to-Base Voltage    | V <sub>CBO</sub> |                                                        | (-)120      | V    |
| Collector-to-Emitter Voltage | V <sub>CEO</sub> |                                                        | (-)100      | V    |
| Emitter-to-Base Voltage      | V <sub>EBO</sub> |                                                        | (-)6        | V    |
| Collector Current            | I <sub>C</sub>   |                                                        | (-)2        | A    |
| Collector Current (Pulse)    | I <sub>CP</sub>  |                                                        | (-)3        | A    |
| Collector Dissipation        | P <sub>C</sub>   |                                                        | 500         | mW   |
|                              |                  | Mounted on a ceramic board (250mm <sup>2</sup> ×0.8mm) | 1.5         | W    |
| Junction Temperature         | T <sub>J</sub>   |                                                        | 150         | °C   |
| Storage Temperature          | T <sub>stg</sub> |                                                        | -55 to +150 | °C   |

### Electrical Characteristics at Ta=25°C

| Parameter                               | Symbol               | Conditions                                        | Ratings |             |           | Unit |
|-----------------------------------------|----------------------|---------------------------------------------------|---------|-------------|-----------|------|
|                                         |                      |                                                   | min     | typ         | max       |      |
| Collector Cutoff Current                | I <sub>CBO</sub>     | V <sub>CB</sub> =(-)100V, I <sub>E</sub> =0A      |         |             | (-)100    | nA   |
| Emitter Cutoff Current                  | I <sub>EBO</sub>     | V <sub>EB</sub> =(-)4V, I <sub>C</sub> =0A        |         |             | (-)100    | nA   |
| DC Current Gain                         | h <sub>FE</sub>      | V <sub>CE</sub> =(-)5V, I <sub>C</sub> =(-)100mA  | 100*    |             | 400*      |      |
| Gain-Bandwidth Product                  | f <sub>T</sub>       | V <sub>CE</sub> =(-)10V, I <sub>C</sub> =(-)100mA |         | 120         |           | MHz  |
| Output Capacitance                      | C <sub>ob</sub>      | V <sub>CB</sub> =(-)10V, f=1MHz                   |         | (25)16      |           | pF   |
| Collector-to-Emitter Saturation Voltage | V <sub>CE(sat)</sub> | I <sub>C</sub> =(-)1A, I <sub>B</sub> =(-)100mA   |         | (-0.22)0.13 | (-0.6)0.4 | V    |
| Base-to-Emitter Saturation Voltage      | V <sub>BE(sat)</sub> | I <sub>C</sub> =(-)1A, I <sub>B</sub> =(-)100mA   |         | (-)0.85     | (-)1.2    | V    |

Continued on next page.

\* ; The 2SA1417 / 2SC3647 are classified by 100mA h<sub>FE</sub> as follows:

| Rank            | R          | S          | T          |
|-----------------|------------|------------|------------|
| h <sub>FE</sub> | 100 to 200 | 140 to 280 | 200 to 400 |

Marking 2SA1417: AC

2SC3647: CC

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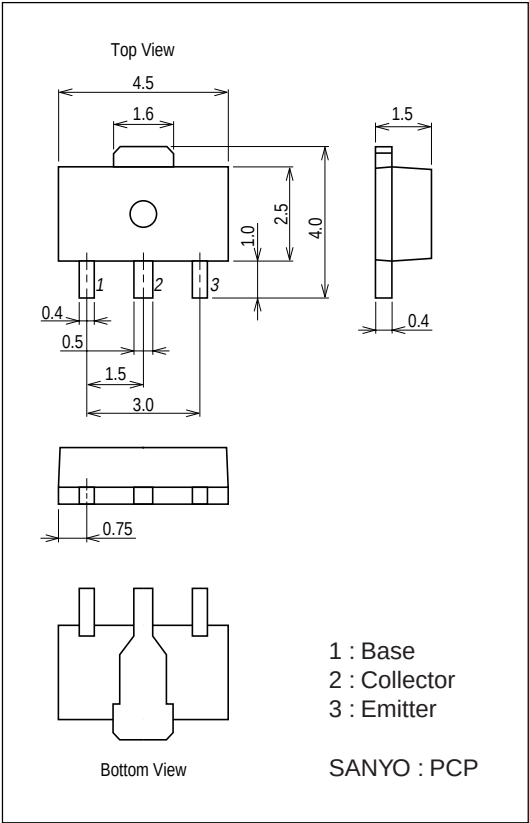
2SA1417 / 2SC3647

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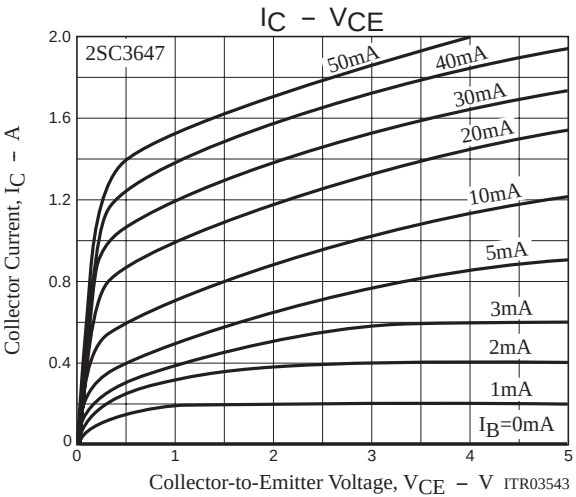
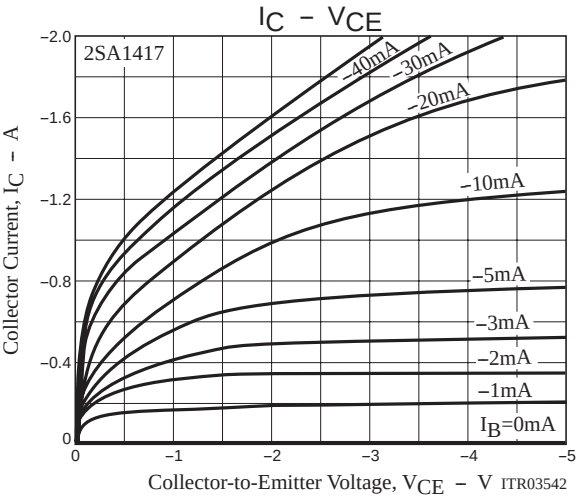
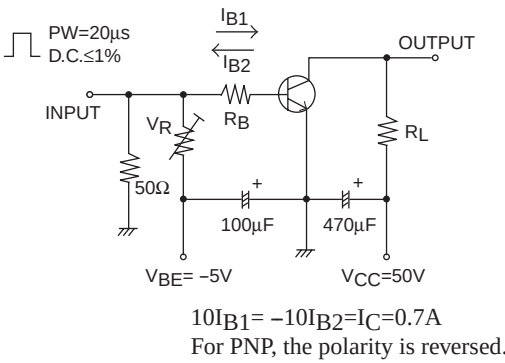
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|----------------------------------------|---------------|-----------------------------|----------|-----------|-----|------|
|                                        |               |                             | min      | typ       | max |      |
| Collector-to-Base Breakdown Voltage    | $V_{(BR)CBO}$ | $I_C=(-)10\mu A, I_E=0A$    | $(-)120$ |           |     | V    |
| Collector-to-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | $I_C=(-)1mA, R_{BE}=\infty$ | $(-)100$ |           |     | V    |
| Emitter-to-Base Breakdown Voltage      | $V_{(BR)EBO}$ | $I_E=(-)10\mu A, I_C=0A$    | $(-)6$   |           |     | V    |
| Turn-On Time                           | $t_{on}$      | See specified Test Circuit. |          | (80)80    |     | ns   |
| Storage Time                           | $t_{stg}$     | See specified Test Circuit. |          | (750)1000 |     | ns   |
| Fall Time                              | $t_f$         | See specified Test Circuit. |          | (40)50    |     | ns   |

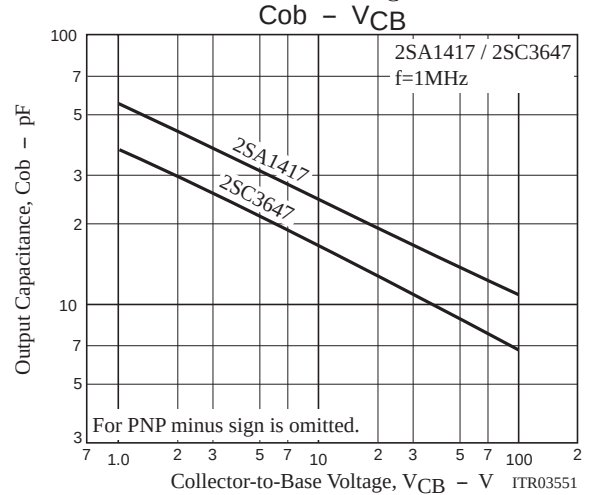
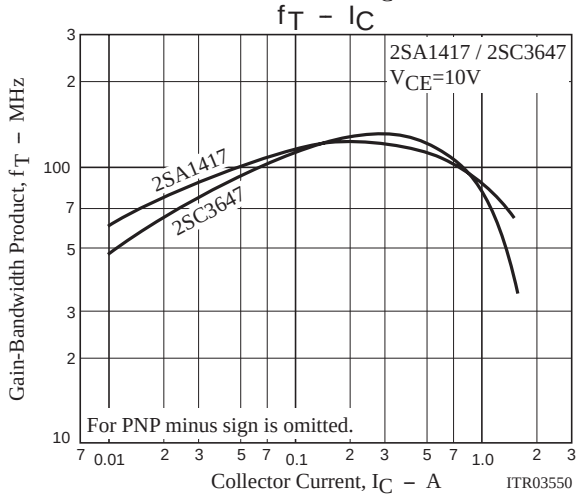
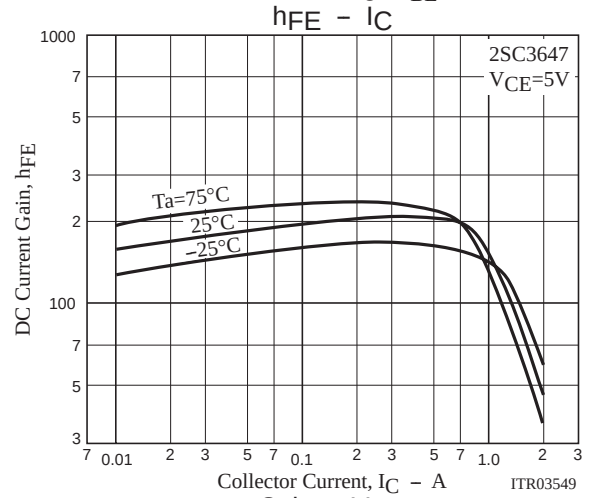
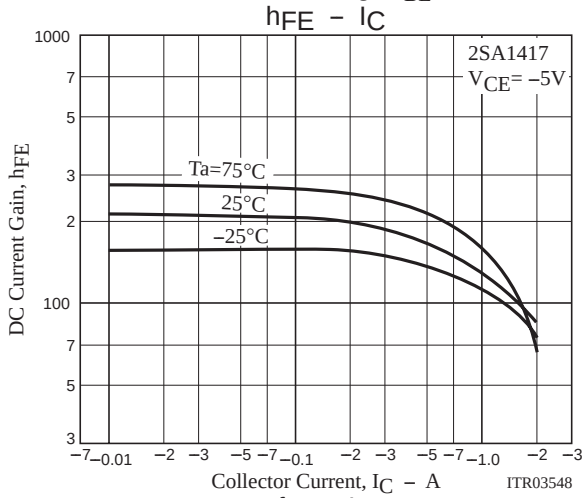
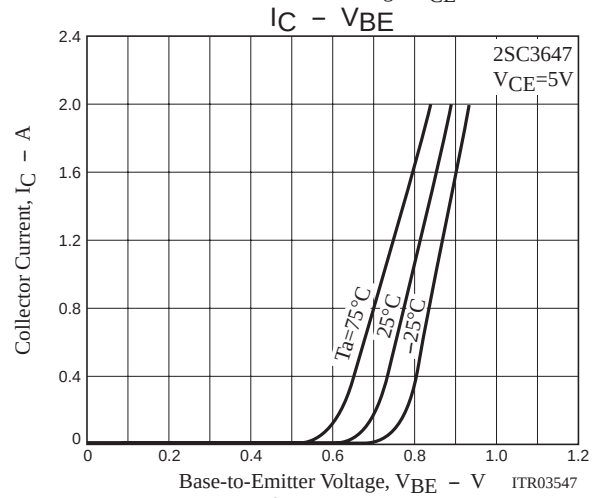
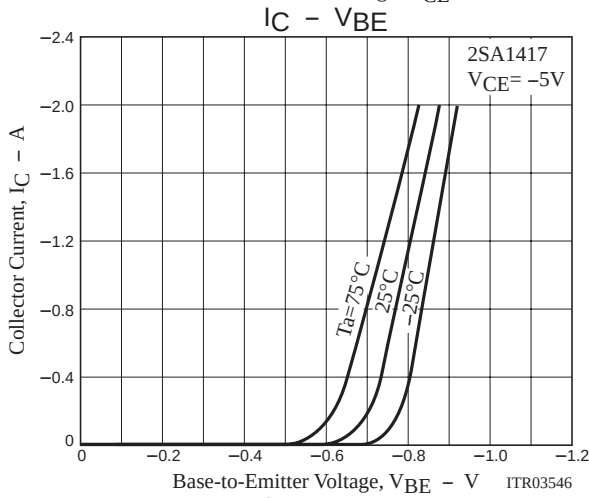
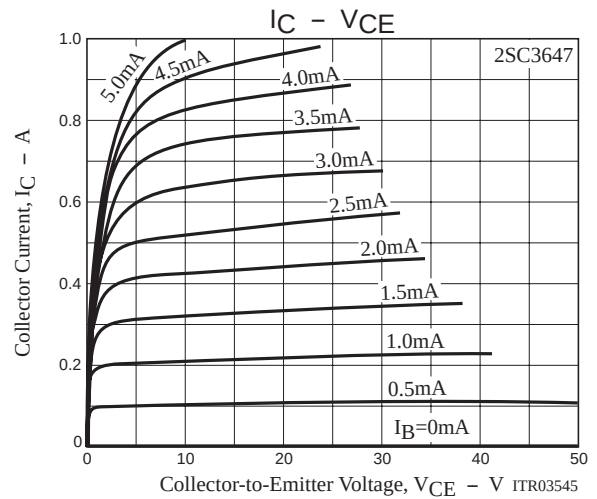
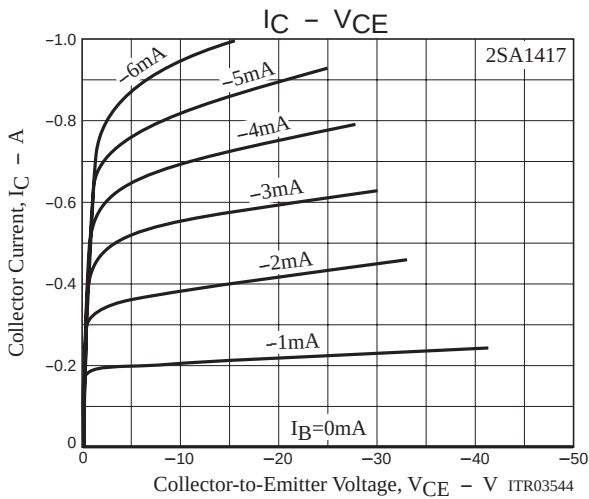
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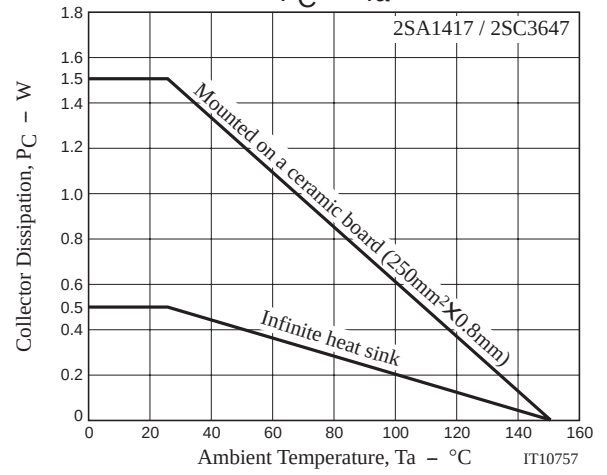
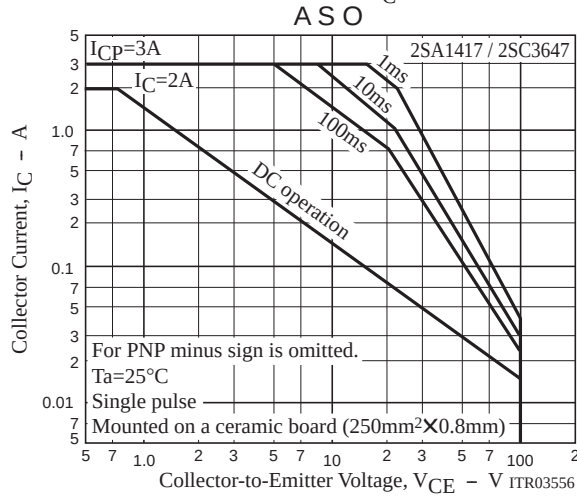
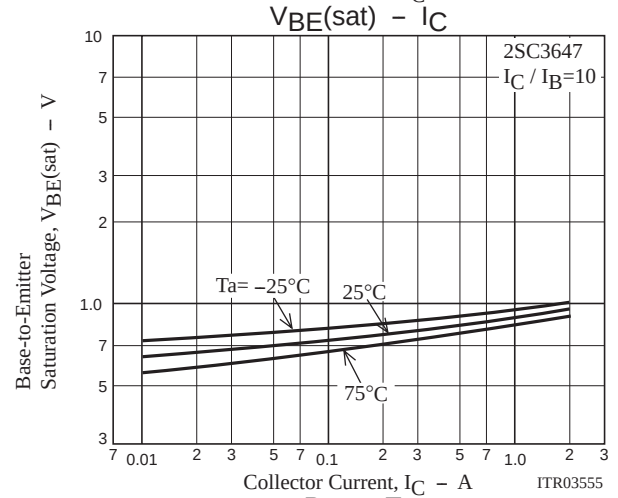
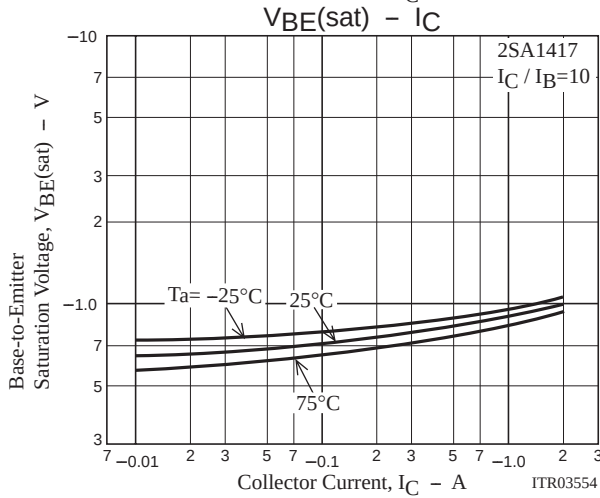
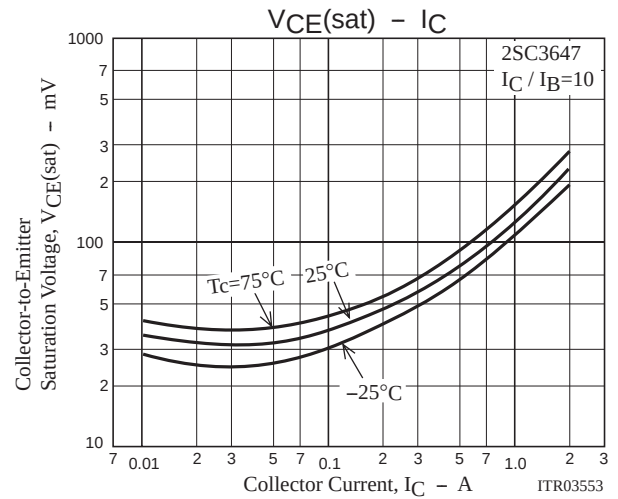
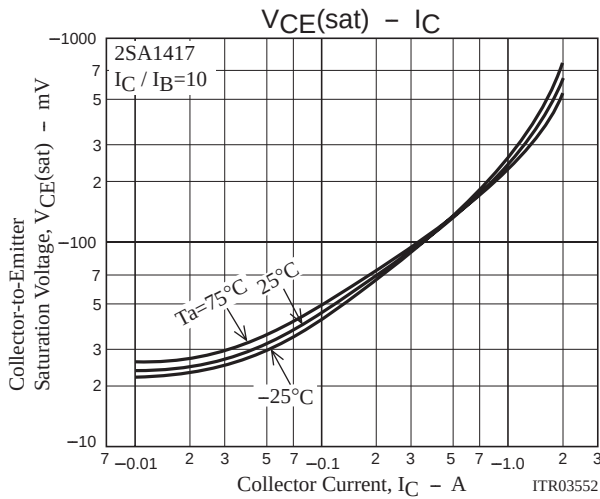
unit : mm  
7007A-004



Switching Time Test Circuit







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