

# High-speed Switching Transistor (−60V, −12A)

## 2SA1870

### ●Features

- 1) High speed switching, typically  $t_f=0.17 \mu\text{s}$  at  $I_c=-6\text{A}$ .
- 2) Low saturation voltage, typically  $V_{CE(sat)}=-0.2\text{V}$  at  $I_c/I_b=-6\text{A}/-0.3\text{A}$ .
- 3) Wide SOA (safe operating area)

### ●Packaging specifications and hfe

|                              |         |
|------------------------------|---------|
| Type                         | 2SA1870 |
| Package                      | PSD3    |
| h <sub>FE</sub>              | EF      |
| Code                         | TL      |
| Basic ordering unit (pieces) | 1000    |

### ●Absolute maximum ratings (Ta=25°C)

| Parameter                   | Symbol           | Limits   | Unit                     |
|-----------------------------|------------------|----------|--------------------------|
| Collector-base voltage      | V <sub>CEC</sub> | −100     | V                        |
| Collector-emitter voltage   | V <sub>CEO</sub> | −60      | V                        |
| Emitter-base voltage        | V <sub>EB0</sub> | −5       | V                        |
| Collector current           | I <sub>c</sub>   | −12      | A                        |
|                             |                  | −20      | A (Pulse) *              |
| Collector power dissipation | P <sub>c</sub>   | 1.5      | W                        |
|                             |                  | 35       | W (T <sub>c</sub> =25°C) |
| Junction temperature        | T <sub>J</sub>   | 150      | °C                       |
| Storage temperature         | T <sub>stg</sub> | −55~+150 | °C                       |

\* Single pulse, P<sub>w</sub>=100ms

### ●Electrical characteristics (Ta=25°C)

| Parameter                            | Symbol                 | Min. | Typ. | Max. | Unit | Conditions                                          |
|--------------------------------------|------------------------|------|------|------|------|-----------------------------------------------------|
| Collector-base breakdown voltage     | BV <sub>CE0</sub>      | −100 | —    | —    | V    | I <sub>c</sub> =−50 μA                              |
| Collector-emitter breakdown voltage  | BV <sub>CE0(SUS)</sub> | −60  | —    | —    | V    | I <sub>c</sub> =−6A, I <sub>b</sub> =−0.6A, L=1mH   |
| Collector-emitter breakdown voltage  | BV <sub>CE0</sub>      | −60  | —    | —    | V    | I <sub>c</sub> =−1mA                                |
| Emitter-base breakdown voltage       | BV <sub>EB0</sub>      | −5   | —    | —    | V    | I <sub>e</sub> =−50 μA                              |
| Collector cutoff current             | I <sub>CB0</sub>       | —    | —    | −10  | μA   | V <sub>CB</sub> =−100V                              |
| Emitter cutoff current               | I <sub>EB0</sub>       | —    | —    | −10  | μA   | V <sub>EB</sub> =−5V                                |
| Collector-emitter saturation voltage | V <sub>CE(sat)</sub>   | —    | −0.2 | −0.3 | V    | I <sub>c</sub> /I <sub>b</sub> =−6A/−0.3A           |
|                                      |                        | —    | —    | −0.5 | V    | I <sub>c</sub> /I <sub>b</sub> =−8A/−0.4A           |
| Base-emitter saturation voltage      | V <sub>BE(sat)</sub>   | —    | —    | −1.2 | V    | I <sub>c</sub> /I <sub>b</sub> =−6A/−0.3A           |
|                                      |                        | —    | —    | −1.5 | V    | I <sub>c</sub> /I <sub>b</sub> =−8A/−0.4A           |
| DC current transfer ratio            | h <sub>FE</sub>        | 100  | —    | 320  | —    | V <sub>CE</sub> =−2V, I <sub>c</sub> =−2A           |
| Transition frequency                 | f <sub>T</sub>         | —    | 80   | —    | MHz  | V <sub>CB</sub> =−10V, I <sub>e</sub> =−1A, f=30MHz |
| Output capacitance                   | C <sub>ob</sub>        | —    | 250  | —    | pF   | V <sub>CE</sub> =−10V, I <sub>e</sub> =0A, f=1MHz   |
| Turn-on time                         | t <sub>on</sub>        | —    | —    | 0.3  | μs   | I <sub>c</sub> =−6A                                 |
| Storage time                         | t <sub>stg</sub>       | —    | —    | 1.5  | μs   | I <sub>B1</sub> =−I <sub>B2</sub> =−0.3A            |
| Fall time                            | t <sub>f</sub>         | —    | 0.17 | 0.3  | μs   | V <sub>CE</sub> =−30V                               |

(96-113-A325)