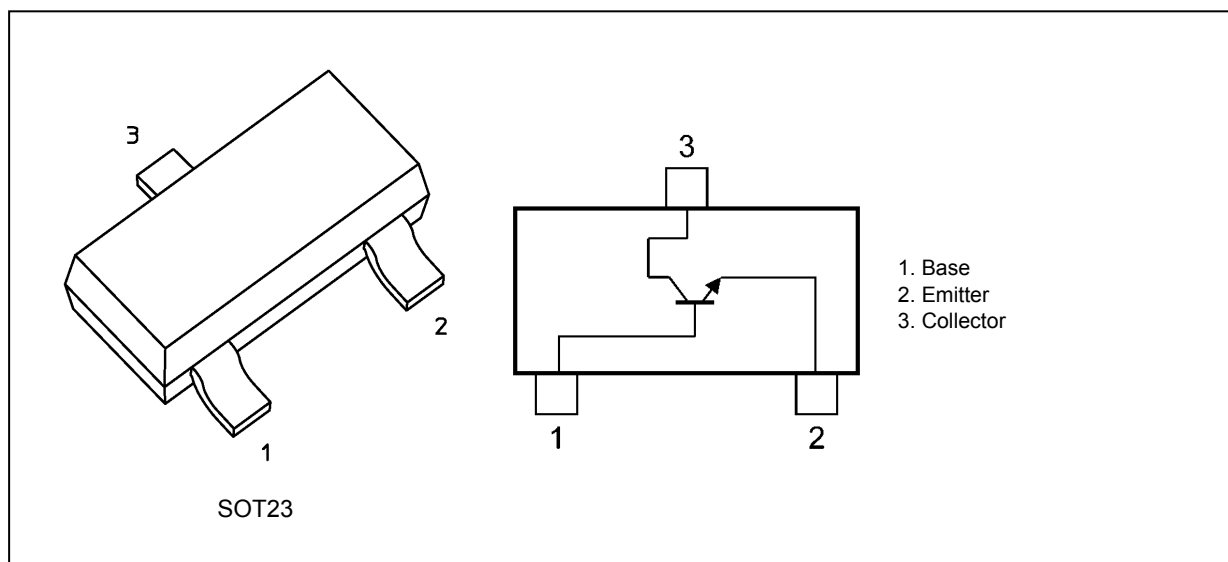


# TBC847

## 1. Applications

- Low-Frequency Amplifiers

## 2. Packaging and Internal Circuit



## 3. Absolute Maximum Ratings (Note) (Unless otherwise specified, $T_a = 25\text{ }^{\circ}\text{C}$ )

| Characteristics                      | Symbol    | Rating     | Unit               |
|--------------------------------------|-----------|------------|--------------------|
| Collector-base voltage               | $V_{CBO}$ | 60         | V                  |
| Collector-emitter voltage            | $V_{CEO}$ | 50         | V                  |
| Emitter-base voltage                 | $V_{EBO}$ | 6          | V                  |
| Collector current (DC)               | $I_C$     | 150        | mA                 |
| Collector current (pulsed)           | $I_{CP}$  | 200        |                    |
| Base current                         | $I_B$     | 30         | mA                 |
| Collector power dissipation (Note 1) | $P_C$     | 320        | mW                 |
| Junction temperature                 | $T_j$     | 150        | $^{\circ}\text{C}$ |
| Storage temperature                  | $T_{stg}$ | -55 to 150 | $^{\circ}\text{C}$ |

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: Device mounted on a 25.4 mm × 25.4 mm × 1.6 mm FR4 glass epoxy board (Cu pad: 0.42 mm<sup>2</sup> × 3)

Start of commercial production

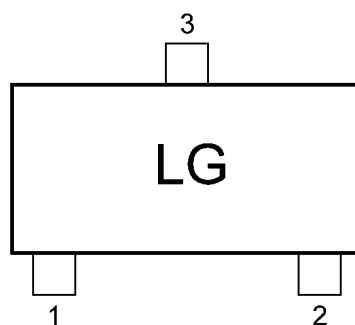
2016-05

#### 4. Electrical Characteristics (Unless otherwise specified, $T_a = 25\text{ }^{\circ}\text{C}$ )

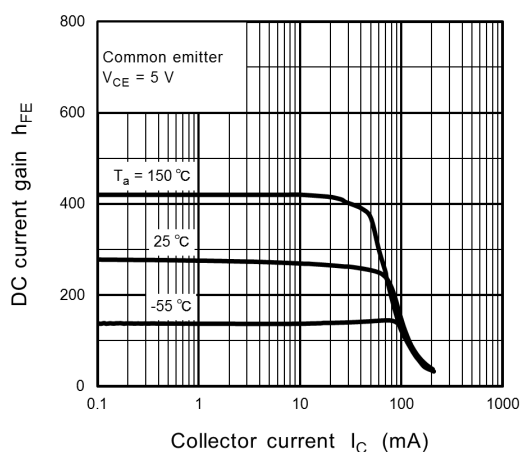
| Characteristics                      | Symbol        | Note     | Test Condition   | Min  | Typ. | Max  | Unit          |
|--------------------------------------|---------------|----------|--|------|------|------|---------------|
| Collector cut-off current            | $I_{CBO}$     |          | $V_{CB} = 30\text{ V}$ , $I_E = 0\text{ mA}$   | —    | —    | 30   | nA            |
| Emitter cut-off current              | $I_{EBO}$     |          | $V_{EB} = 6\text{ V}$ , $I_C = 0\text{ mA}$  | —    | —    | 0.1  | $\mu\text{A}$ |
| DC current gain                      | $h_{FE}$      | (Note 1) | $V_{CE} = 5\text{ V}$ , $I_C = 10\text{ }\mu\text{A}$  | —    | 280  | —    | —             |
|                                      |               |          | $V_{CE} = 5\text{ V}$ , $I_C = 2\text{ mA}$  | 200  | 290  | 450  |               |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ |          | $I_C = 10\text{ mA}$ , $I_B = 0.5\text{ mA}$   | —    | 0.06 | 0.2  | V             |
|                                      |               |          | $I_C = 100\text{ mA}$ , $I_B = 5\text{ mA}$  | —    | 0.17 | 0.4  |               |
| Base-emitter saturation voltage      | $V_{BE(sat)}$ |          | $I_C = 10\text{ mA}$ , $I_B = 0.5\text{ mA}$   | —    | 0.7  | —    | V             |
|                                      |               |          | $I_C = 100\text{ mA}$ , $I_B = 5\text{ mA}$  | —    | 0.9  | —    |               |
| Base-emitter voltage                 | $V_{BE}$      |          | $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$  | 0.58 | 0.66 | 0.7  | V             |
|                                      |               |          | $I_C = 10\text{ mA}$ , $V_{CE} = 5\text{ V}$   | —    | —    | 0.77 |               |
| Transition frequency                 | $f_T$         |          | $V_{CE} = 5\text{ V}$ , $I_C = 10\text{ mA}$ ,<br>$f = 100\text{ MHz}$                                     | 100  | —    | —    | MHz           |
| Collector output capacitance         | $C_{ob}$      |          | $V_{CB} = 10\text{ V}$ , $I_E = 0\text{ mA}$ , $f = 1\text{ MHz}$  | —    | —    | 3.5  | pF            |
| Emitter input capacitance            | $C_{ib}$      |          | $V_{EB} = 0.5\text{ V}$ , $I_C = 0\text{ mA}$ , $f = 1\text{ MHz}$   | —    | 11   | —    | pF            |
| Noise figure                         | NF            |          | $V_{CE} = 6\text{ V}$ , $I_C = 100\text{ }\mu\text{A}$ ,<br>$f = 1\text{ kHz}$ , $R_G = 10\text{ k}\Omega$ | —    | 1.0  | 10   | dB            |

Note 1:  $h_{FE}$  classification: B rank

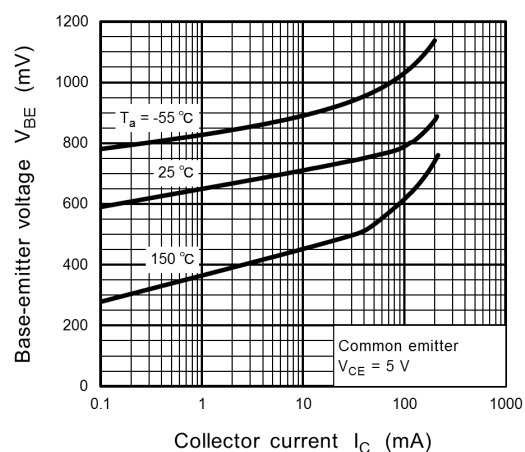
#### 5. Marking



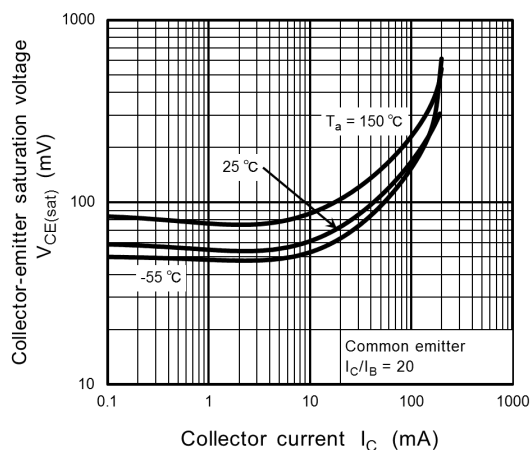
## 6. Characteristics Curves (Note)



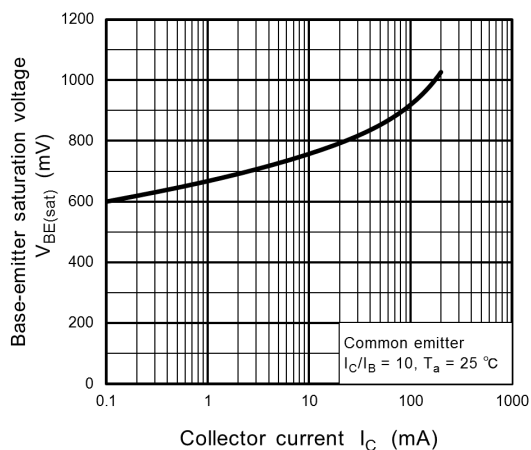
**Fig. 6.1  $h_{FE} - I_C$**



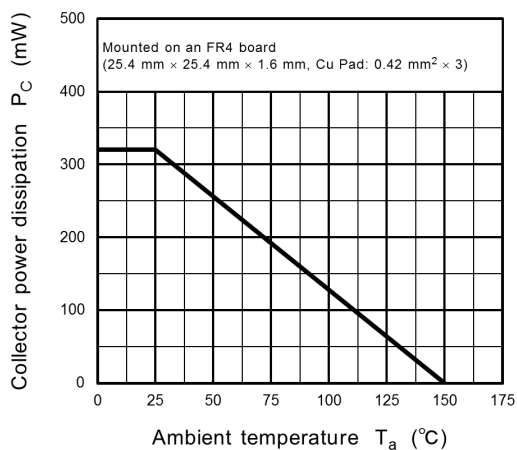
**Fig. 6.2  $V_{BE} - I_C$**



**Fig. 6.3  $V_{CE(sat)} - I_C$**



**Fig. 6.4  $V_{BE(sat)} - I_C$**

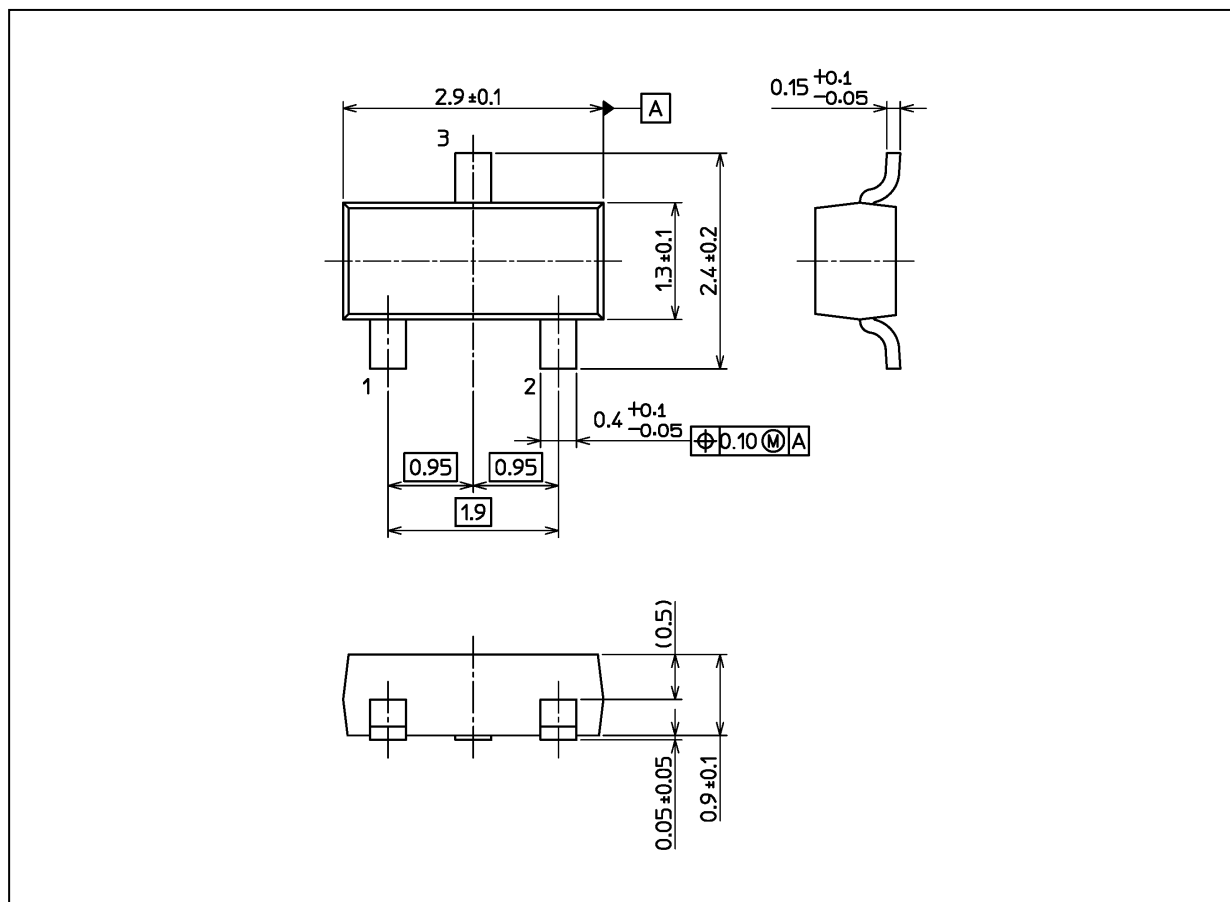


**Fig. 6.5  $P_C - T_a$**

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

## Package Dimensions

Unit: mm



Weight: 0.009 g (typ.)

| Package Name(s)  |
|------------------|
| TOSHIBA: 2-3AB1A |
| Nickname: SOT23  |

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