

TOSHIBA Transistor Silicon PNP Epitaxial (PCT process)

## 2SA1588

Audio Frequency Low Power Amplifier Applications

Driver Stage Amplifier Applications

Switching Applications

Unit: mm

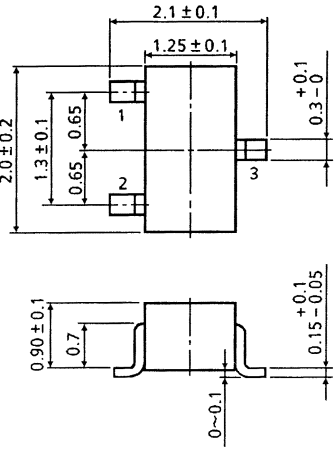
- Excellent  $h_{FE}$  linearity:  $h_{FE} (2) = 25$  (min)  
at  $V_{CE} = -6$  V,  $I_C = -400$  mA
- Complementary to 2SC4118

Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

| Characteristics             | Symbol    | Rating     | Unit             |
|-----------------------------|-----------|------------|------------------|
| Collector-base voltage      | $V_{CBO}$ | -35        | V                |
| Collector-emitter voltage   | $V_{CEO}$ | -30        | V                |
| Emitter-base voltage        | $V_{EBO}$ | -5         | V                |
| Collector current           | $I_C$     | -500       | mA               |
| Base current                | $I_B$     | -50        | mA               |
| Collector power dissipation | $P_C$     | 100        | mW               |
| Junction temperature        | $T_j$     | 125        | $^\circ\text{C}$ |
| Storage temperature range   | $T_{stg}$ | -55 to 125 | $^\circ\text{C}$ |

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).

|                                                                                     |            |              |
|-------------------------------------------------------------------------------------|------------|--------------|
|  |            | USM          |
| 1. BASE                                                                             | 2. EMITTER | 3. COLLECTOR |
| JEDEC                                                                               | —          |              |
| JEITA                                                                               | SC-70      |              |
| TOSHIBA                                                                             | 2-2E1A     |              |

Weight: 0.006 g (typ.)

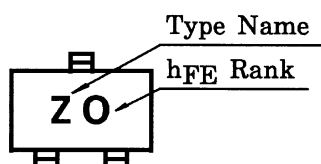
Electrical Characteristics ( $T_a = 25^\circ\text{C}$ )

| Characteristics                      | Symbol        | Test Condition                           | Min | Typ. | Max   | Unit          |
|--------------------------------------|---------------|------------------------------------------|-----|------|-------|---------------|
| Collector cut-off current            | $I_{CBO}$     | $V_{CB} = -35$ V, $I_E = 0$              | —   | —    | -0.1  | $\mu\text{A}$ |
| Emitter cut-off current              | $I_{EBO}$     | $V_{EB} = -5$ V, $I_C = 0$               | —   | —    | -0.1  | $\mu\text{A}$ |
| DC current gain (Note)               | $h_{FE} (1)$  | $V_{CE} = -1$ V, $I_C = -100$ mA         | 70  | —    | 400   |               |
|                                      | $h_{FE} (2)$  | $V_{CE} = -6$ V, $I_C = -400$ mA         | 25  | —    | —     |               |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C = -100$ mA, $I_B = -10$ mA          | —   | -0.1 | -0.25 | V             |
| Base-emitter voltage                 | $V_{BE}$      | $V_{CE} = -1$ V, $I_C = -100$ mA         | —   | -0.8 | -1.0  | V             |
| Transition frequency                 | $f_T$         | $V_{CE} = -6$ V, $I_C = -20$ mA          | —   | 200  | —     | MHz           |
| Collector output capacitance         | $C_{ob}$      | $V_{CB} = -6$ V, $I_E = 0$ , $f = 1$ MHz | —   | 13   | —     | pF            |

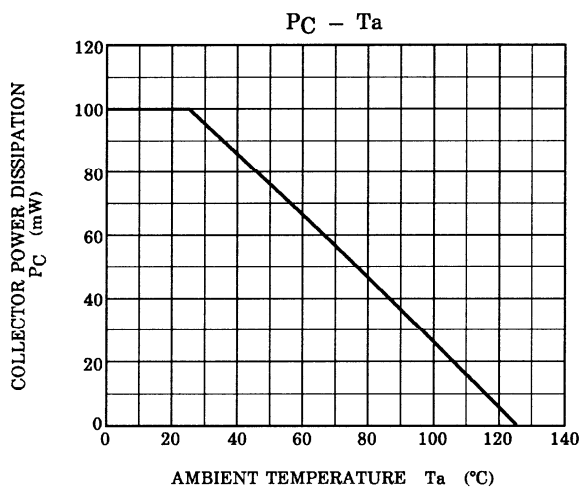
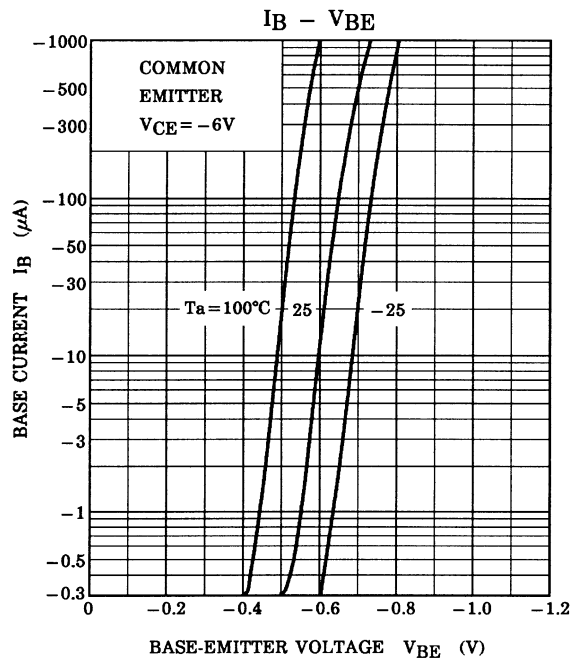
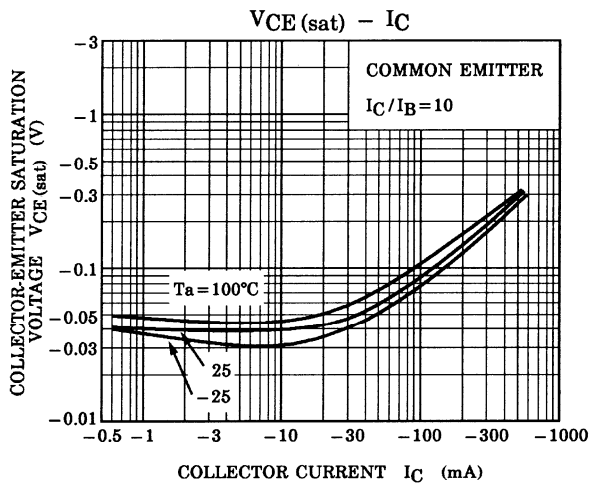
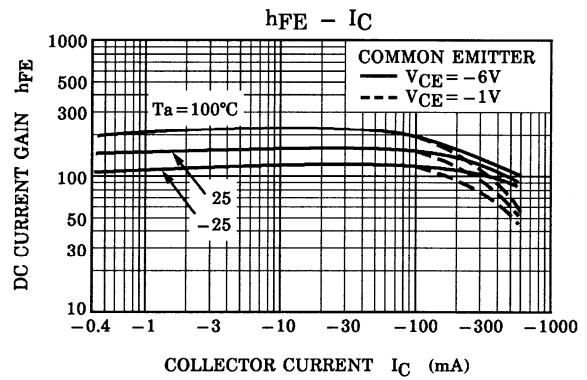
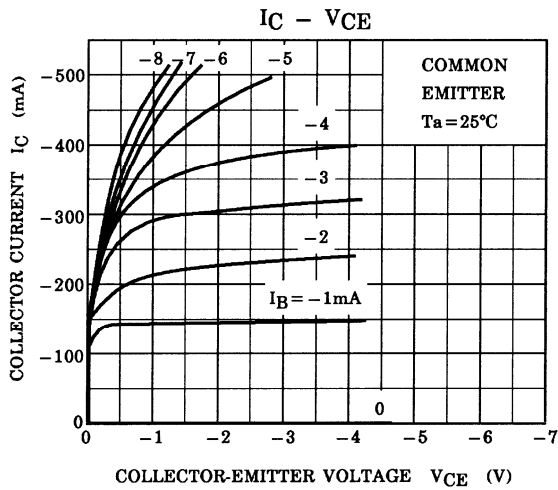
Note:  $h_{FE} (1)$  classification O(O): 70~140, Y(Y): 120~240, GR(G): 200~400 ( ) Marking Symbol

$h_{FE} (2)$  classification O: 25 (min), Y: 40 (min), GR: 75 (min)

## Marking



Start of commercial production  
1987-01



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