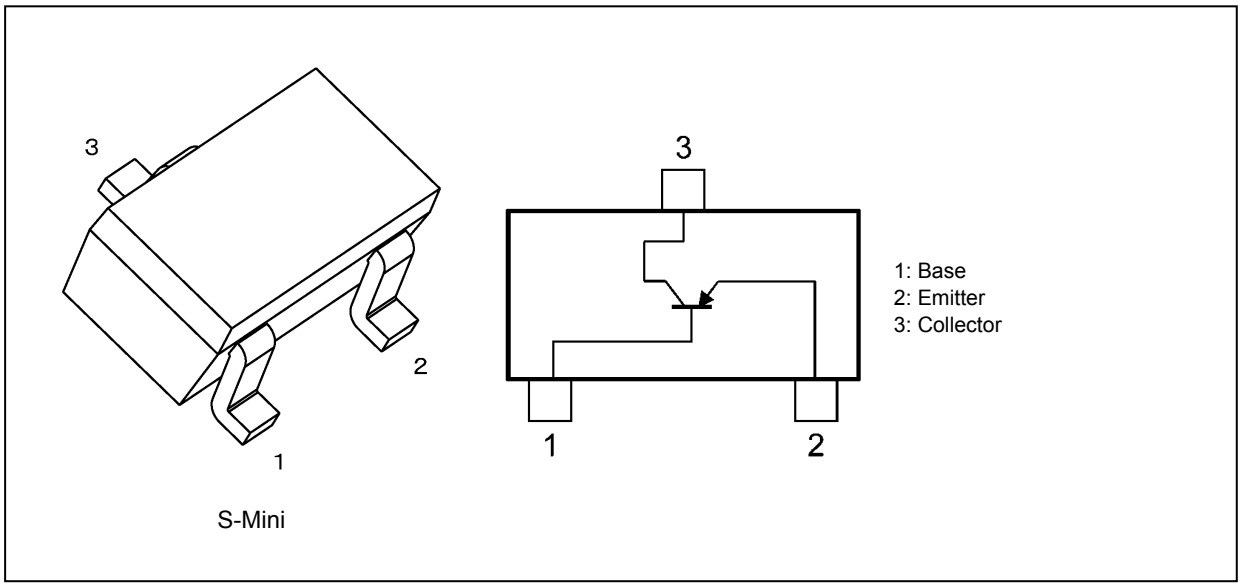
Bipolar Transistors Silicon PNP Epitaxial Type

# TTA1713

## 1. Applications

- Low-Frequency Power Amplifiers

## 2. Packaging and Internal Circuit




## 3. Absolute Maximum Ratings (Note) (Unless otherwise specified, $T_a$ = 25 °C)

| Characteristics | Symbol | Rating | Unit |
|---|---|---|---|
| Collector-base voltage | $V_{CBO}$ | -50 | V |
| Collector-emitter voltage | $V_{CEO}$ | -45 | V |
| Emitter-base voltage | $V_{EBO}$ | -5 | V |
| Collector current | $I_C$ | -500 | mA |
| Base current | $I_B$ | -50 | mA |
| Collector power dissipation (Note 1) | $P_C$ | 200 | mW |
| Junction temperature | $T_j$ | 150 | °C |
| Storage temperature | $T_{stg}$ | - 55 to 150 | °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 $mm^2$ × 3)

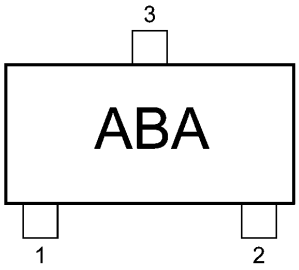
Start of commercial production
2017-06

## 4. Electrical Characteristics (Unless otherwise specified, $T_a$ = 25 °C)

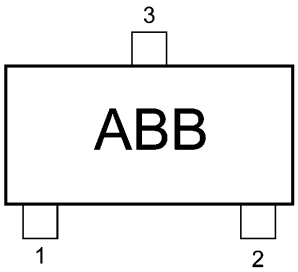
| Characteristics | Symbol | Note | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|
| Collector cut-off current | $I_{CBO}$ | | $V_{CB}$ = -50 V , $I_E$ = 0 mA | — | — | -100 | nA |
| Emitter cut-off current | $I_{EBO}$ | | $V_{EB}$ = -5 V, $I_C$ = 0 mA | — | — | -100 | nA |
| DC current gain | $h_{FE}$(1) | (Note 1) | $V_{CE}$ = -1 V, $I_C$ = -100 mA | 120 | — | 390 | — |
| | $h_{FE}$(2) | | $V_{CE}$ = -1 V, $I_C$ = -500 mA | 40 | — | — | — |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | | $I_C$ = -500 mA, $I_B$ = -50 mA | — | — | -0.4 | V |
| Base-emitter voltage | $V_{BE}$ | | $V_{CE}$ = -1 V, $I_C$ = -100 mA | — | — | -1.0 | V |
| Transition frequency | $f_T$ | | $V_{CE}$ = -5 V, $I_C$ = -10 mA, f = 100 MHz | 80 | — | — | MHz |
| Collector output capacitance | $C_{ob}$ | | $V_{CB}$ = -10 V , $I_E$ = 0 mA, f = 1 MHz | — | 4 | — | pF |

Note 1: $h_{FE}$ classification: Y rank 120 to 270, GR rank 180 to 390

## 5. Marking




**$h_{FE}$ rank: Y**




**$h_{FE}$ rank: GR**

## 6. Characteristics Curves (Note)

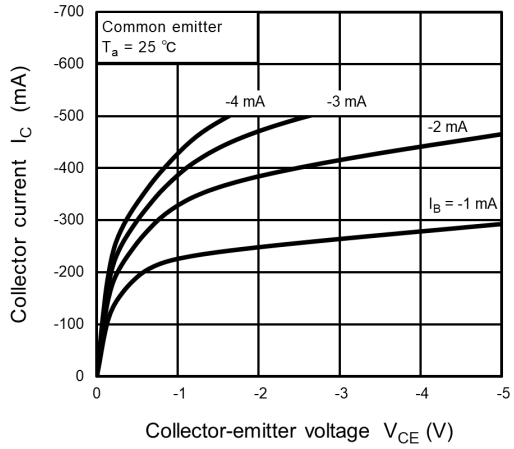



Fig. 6.1 $I_C$ - $V_{CE}$

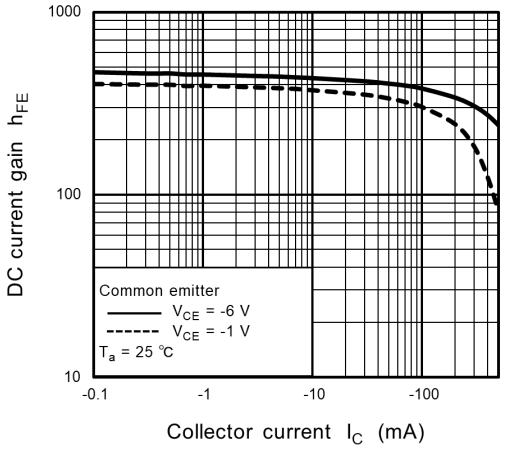



Fig. 6.2 $h_{FE}$ - $I_C$

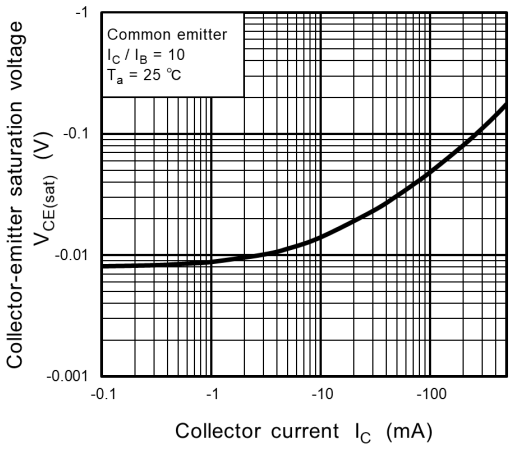



Fig. 6.3 $V_{CE(sat)}$ - $I_C$

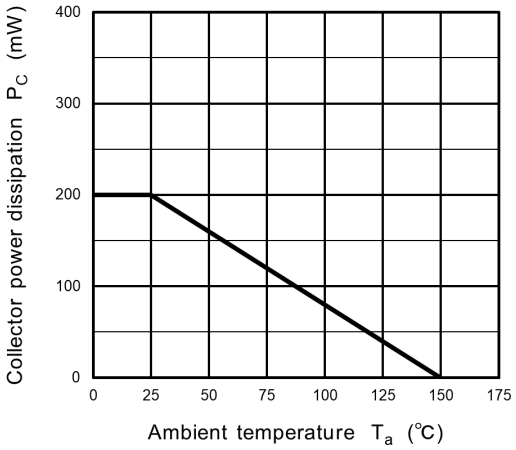
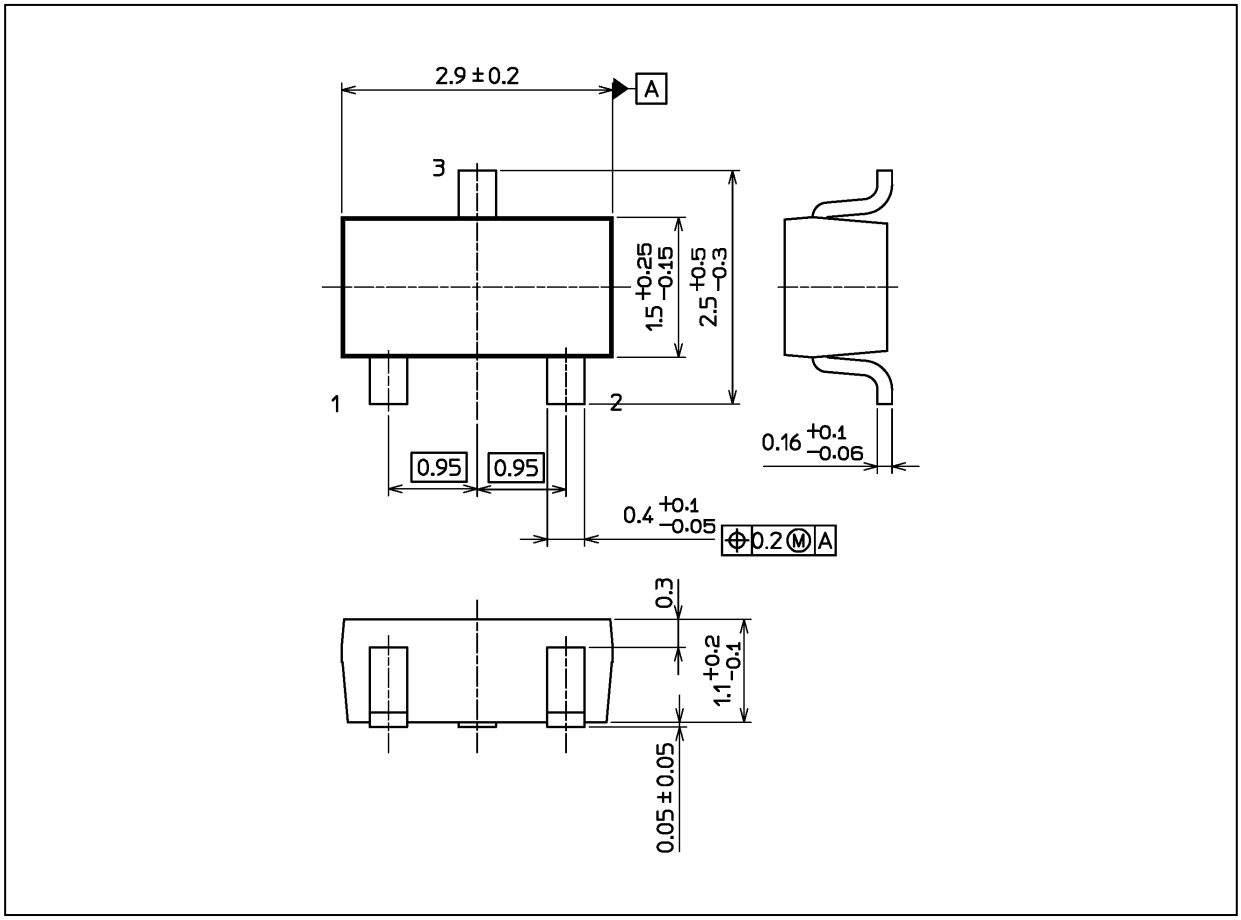



Fig. 6.4 $P_C$ - $T_a$

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

## Package Dimensions

Unit: mm




Weight: 12 mg (typ.)

| Package Name(s) |
| --- |
| Nickname: S-Mini |

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