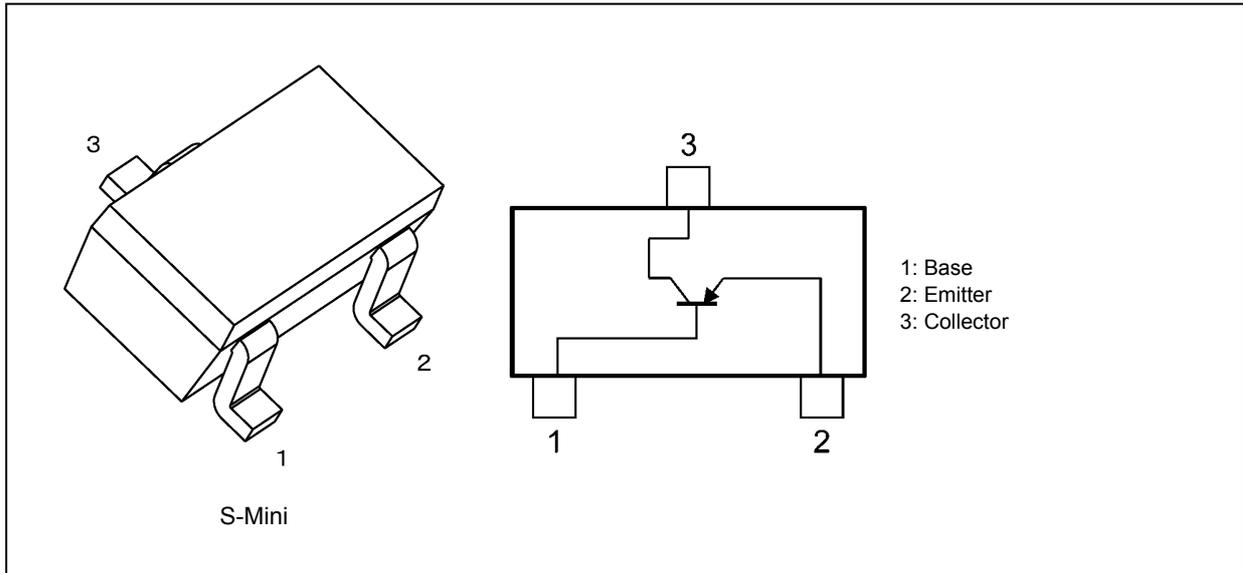


## TTA1713

### 1. Applications

- Low-Frequency Power 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	$V_{CBO}$	-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	$^\circ\text{C}$
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

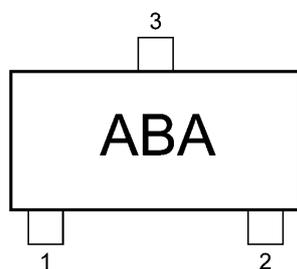
2017-06

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

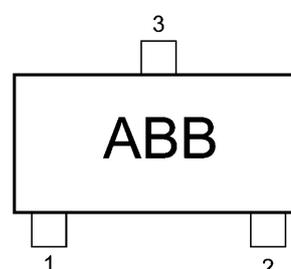
Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$		$V_{CB} = -50\text{ V}$ , $I_E = 0\text{ mA}$	—	—	-100	nA
Emitter cut-off current	$I_{EBO}$		$V_{EB} = -5\text{ V}$ , $I_C = 0\text{ mA}$	—	—	-100	nA
DC current gain	$h_{FE(1)}$	(Note 1)	$V_{CE} = -1\text{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

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

## 5. Marking

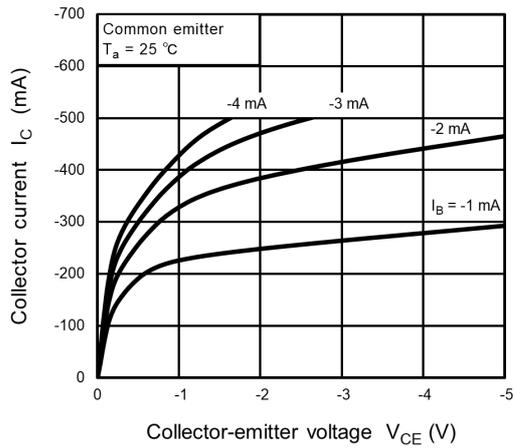


$h_{FE}$  rank: Y

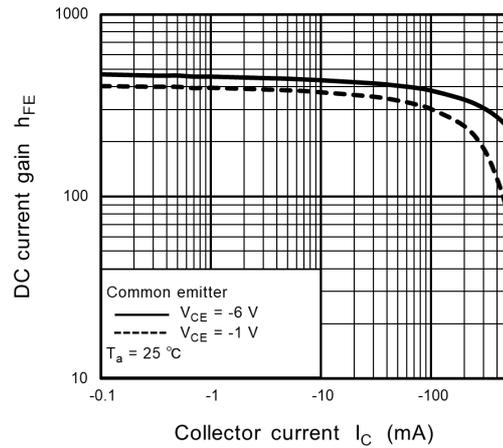


$h_{FE}$  rank: GR

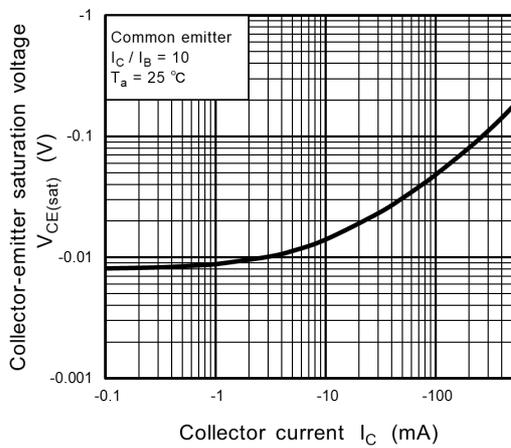
## 6. Characteristics Curves (Note)



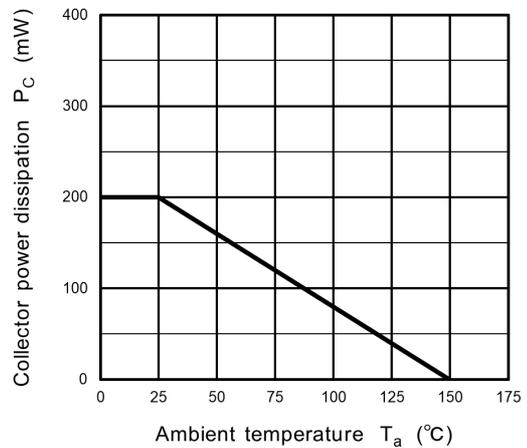
**Fig. 6.1**  $I_C - V_{CE}$



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



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

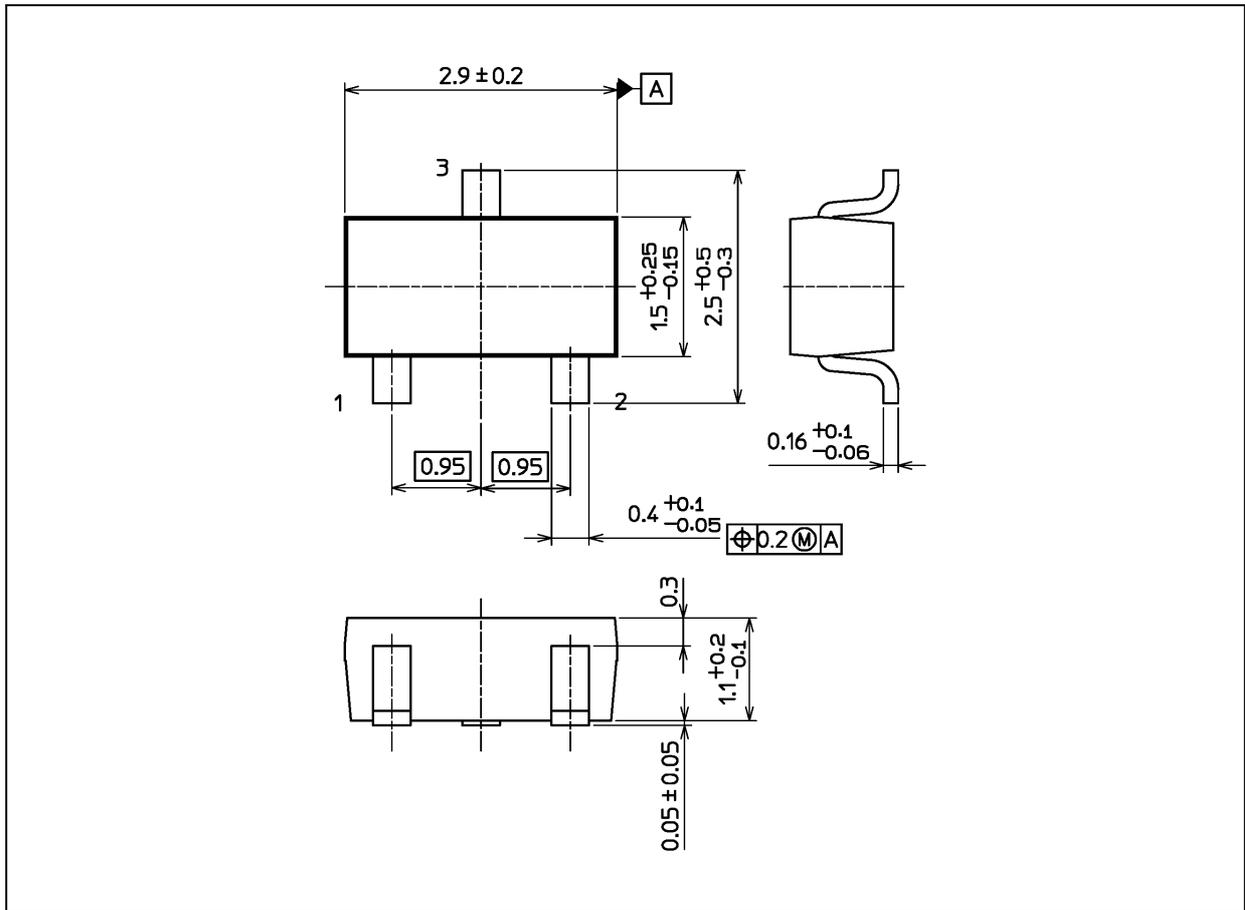


**Fig. 6.4**  $P_C - T_a$

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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