

# 2SA1943N

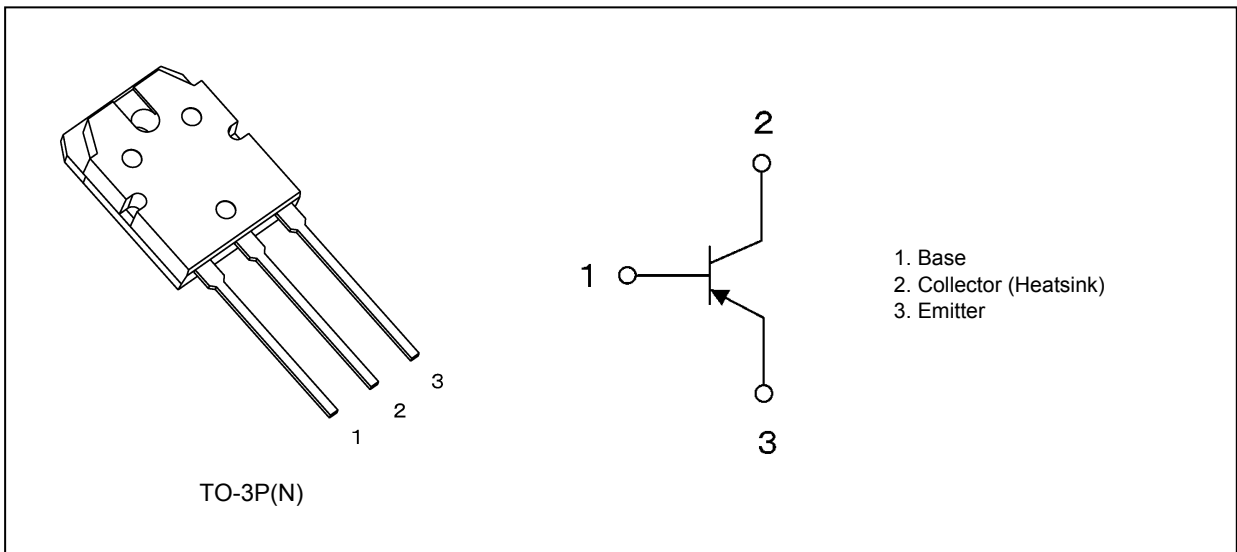
## 1. Applications

- Power Amplifiers

## 2. Features

- (1) High collector voltage:  $V_{CEO} = -230$  V (min)
- (2) Complementary to 2SC5200N
- (3) Recommended for 100-W high-fidelity audio frequency amplifier output stage

## 3. Packaging and Internal Circuit



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

Characteristics	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	-230	V
Collector-emitter voltage	$V_{CEO}$	-230	
Emitter-base voltage	$V_{EBO}$	-5	
Collector current (DC)	(Note 1) $I_C$	-15	A
Base current	$I_B$	-1.5	
Collector power dissipation	$P_C$	150	W
Junction temperature	$T_j$	150	°C
Storage temperature	$T_{stg}$	-55 to 150	

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: Ensure that the junction temperature does not exceed 150°C.

## 5. Thermal Characteristics

Characteristics	Symbol	Max	Unit
Junction-to-case thermal resistance	$R_{th(j-c)}$	0.83	°C/W

**6. Electrical Characteristics**

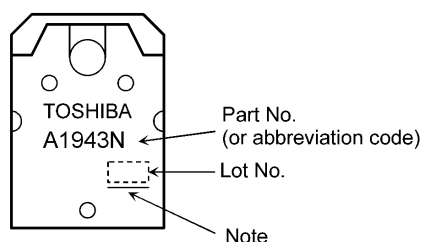
**6.1. Static Characteristics (Unless otherwise specified,  $T_c = 25^\circ\text{C}$ )**

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$	$V_{CB} = -230\text{ V}, I_E = 0\text{ A}$	—	—	-5.0	$\mu\text{A}$
Emitter cut-off current	$I_{EBO}$	$V_{EB} = -5\text{ V}, I_C = 0\text{ A}$	—	—	-5.0	
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = -50\text{ mA}, I_B = 0\text{ A}$	-230	—	—	V
DC current gain	$h_{FE(1)}$	$V_{CE} = -5\text{ V}, I_C = -1\text{ A}$	80	—	160	—
	$h_{FE(2)}$	$V_{CE} = -5\text{ V}, I_C = -7\text{ A}$	35	—	—	
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = -8\text{ A}, I_B = -0.8\text{ A}$	—	-1.1	-3.0	V
Base-emitter voltage	$V_{BE}$	$V_{CE} = -5\text{ V}, I_C = -7\text{ A}$	—	-0.97	-1.5	

**6.2. Dynamic Characteristics (Unless otherwise specified,  $T_c = 25^\circ\text{C}$ )**

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Transition frequency	$f_T$	$V_{CE} = -5\text{ V}, I_C = -1\text{ A}$	—	30	—	MHz
Collector output capacitance	$C_{ob}$	$V_{CB} = -10\text{ V}, I_E = 0\text{ A}, f = 1\text{ MHz}$	—	360	—	pF

**7. Marking (Note)**



**Fig. 7.1 Marking**

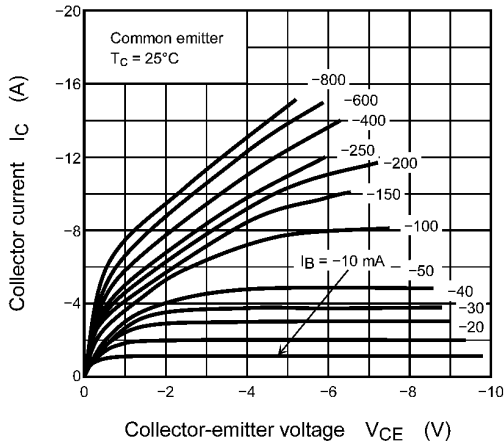
Note: A line under a Lot No. identifies the indication of product Labels.

[[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

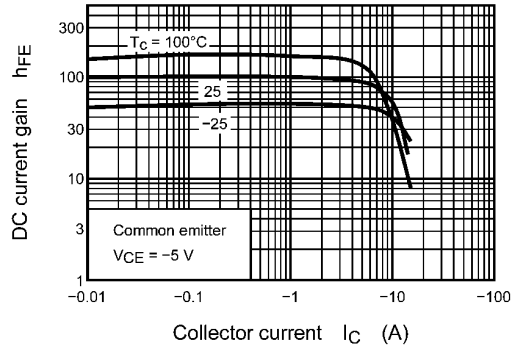
Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product.

The RoHS is the Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

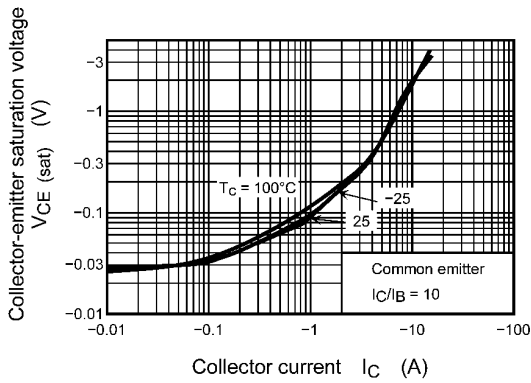
**8. Characteristics Curves (Note)**



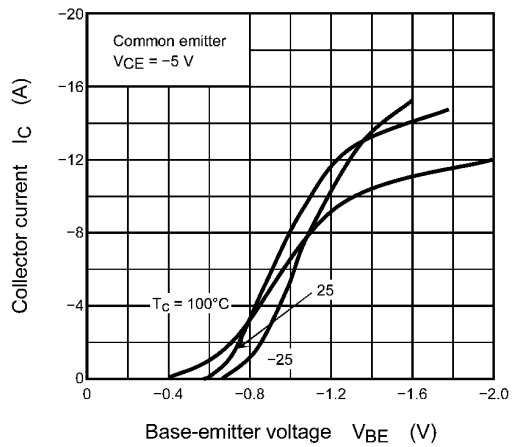
**Fig. 8.1  $I_C - V_{CE}$**



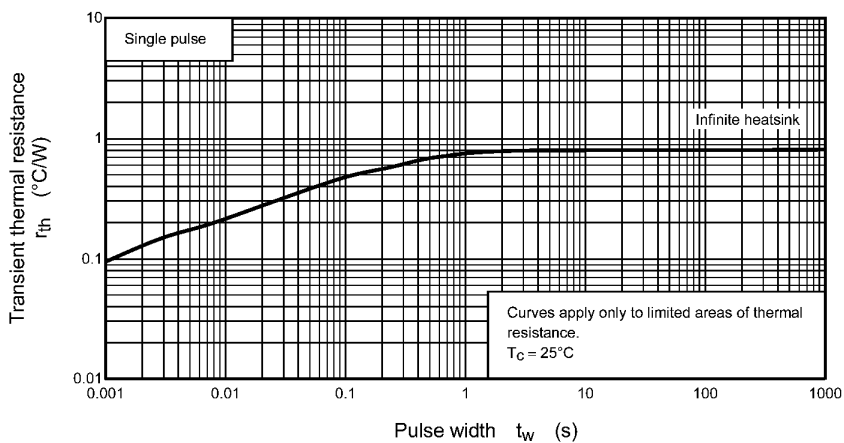
**Fig. 8.2  $h_{FE} - I_C$**



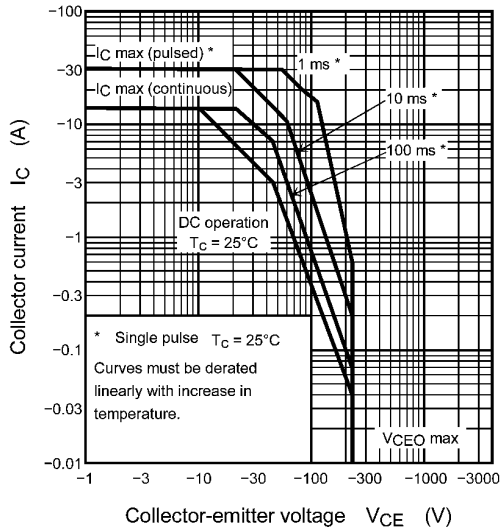
**Fig. 8.3  $V_{CE(sat)} - I_C$**



**Fig. 8.4  $I_C - V_{BE}$**



**Fig. 8.5  $r_{th(j-c)} - t_w$   
(Guaranteed Maximum)**



**Fig. 8.6 Safe Operating Area (Guaranteed Maximum)**

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



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