



# 2SB1203/2SD1803

## Bipolar Transistor (-50V, (-)5A, Low $V_{CE(sat)}$ , (PNP)NPN Single TP/TP-FA

ON Semiconductor®

<http://onsemi.com>

### Applications

- Relay drivers, high-speed inverters, converters, and other general high-current switching applications

### Features

- Low collector-to-emitter saturation voltage
- Excellent linearity of  $h_{FE}$
- Small and slim package making it easy to make 2SB1203/2SD1803-applied sets smaller
- High current and high  $f_T$
- Fast switching speed

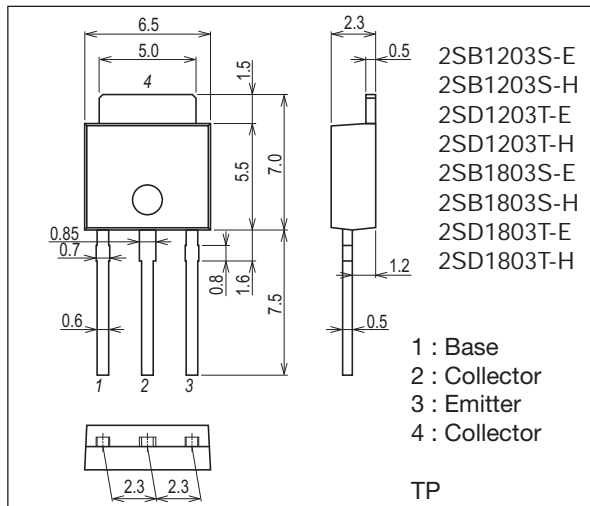
### Specifications ( ) : 2SB1203

#### Absolute Maximum Ratings at $T_a=25^\circ\text{C}$

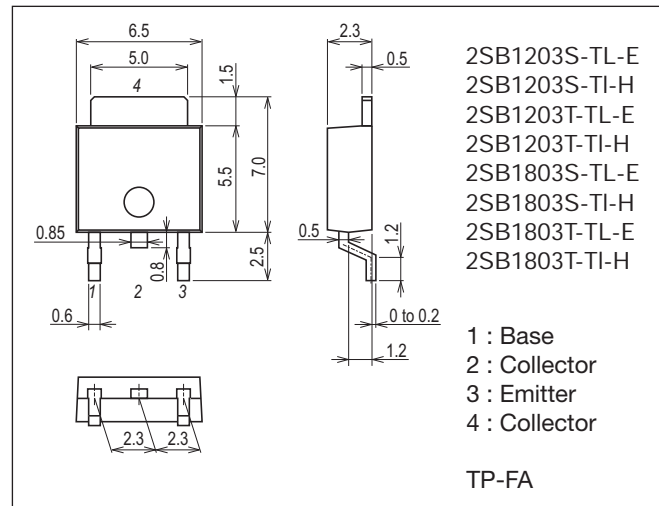
Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	$V_{CBO}$		(-)60	V
Collector-to-Emitter Voltage	$V_{CEO}$		(-)50	V
Emitter-to-Base Voltage	$V_{EBO}$		(-)6	V
Collector Current	$I_C$		(-)5	A
Collector Current (Pulse)	$I_{CP}$		(-)8	A

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#### Package Dimensions unit : mm (typ) 7518-003



#### Package Dimensions unit : mm (typ) 7003-003

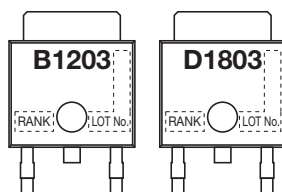


### Product & Package Information

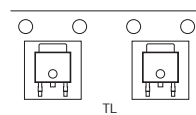
- Package : TP
- JEITA, JEDEC : SC-64, TO-251
- Minimum Packing Quantity : 500 pcs./bag

- Package : TP-FA
- JEITA, JEDEC : SC-63, TO-252
- Minimum Packing Quantity : 700 pcs./reel

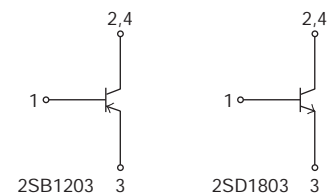
### Marking (TP, TP-FA)



### Packing Type (TP-FA) : TL



### Electrical Connection



## 2SB1203 / 2SD1803

Continued from preceding page.

Parameter	Symbol	Conditions	Ratings	Unit
Collector Dissipation	PC		1	W
		T <sub>c</sub> =25°C	20	W
Junction Temperature	T <sub>j</sub>		150	°C
Storage Temperature	T <sub>stg</sub>		-55 to +150	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

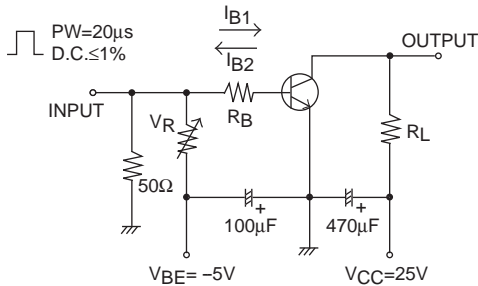
### Electrical Characteristics at T<sub>a</sub>=25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I <sub>CBO</sub>	V <sub>CB</sub> =(-)40V, I <sub>E</sub> =0A			(-)1	μA
Emitter Cutoff Current	I <sub>EBO</sub>	V <sub>EB</sub> =(-)4V, I <sub>C</sub> =0A			(-)1	μA
DC Current Gain	h <sub>FE1</sub>	V <sub>CE</sub> =(-)2V, I <sub>C</sub> =(-)0.5A	70*		400*	
	h <sub>FE2</sub>	V <sub>CE</sub> =(-)2V, I <sub>C</sub> =(-)4A	35			
Gain-Bandwidth Product	f <sub>T</sub>	V <sub>CE</sub> =(-)5V, I <sub>C</sub> =(-)1A		(130)180		MHz
Output Capacitance	C <sub>ob</sub>	V <sub>CB</sub> =(-)10V, f=1MHz		(60)40		pF
Collector-to-Emitter Saturation Voltage	V <sub>CE(sat)</sub>	I <sub>C</sub> =(-)3A, I <sub>B</sub> =(-)0.15A		(-280)220	(-550)400	mV
Base-to-Emitter Saturation Voltage	V <sub>BE(sat)</sub>	I <sub>C</sub> =(-)3A, I <sub>B</sub> =(-)0.15A		(-)0.95	(-)1.3	V
Collector-to-Base Breakdown Voltage	V(BR)CBO	I <sub>C</sub> =(-)10μA, I <sub>E</sub> =0A	(-)60			V
Collector-to-Emitter Breakdown Voltage	V(BR)CEO	I <sub>C</sub> =(-)1mA, R <sub>BE</sub> =∞	(-)50			V
Emitter-to-Base Breakdown Voltage	V(BR)EBO	I <sub>E</sub> =(-)10μA, I <sub>C</sub> =0A	(-)6			V
Turn-On Time	t <sub>on</sub>	See specified Test Circuit.		(50)50		ns
Storage Time	t <sub>stg</sub>			(450)500		ns
Fall Time	t <sub>f</sub>			(20)20		ns

\* : The 2SB1203/2SD1803 are classified by 0.5A h<sub>FE</sub> as follows :

Rank	Q	R	S	T
h <sub>FE</sub>	70 to 140	100 to 200	140 to 280	200 to 400

### Switching Time Test Circuit



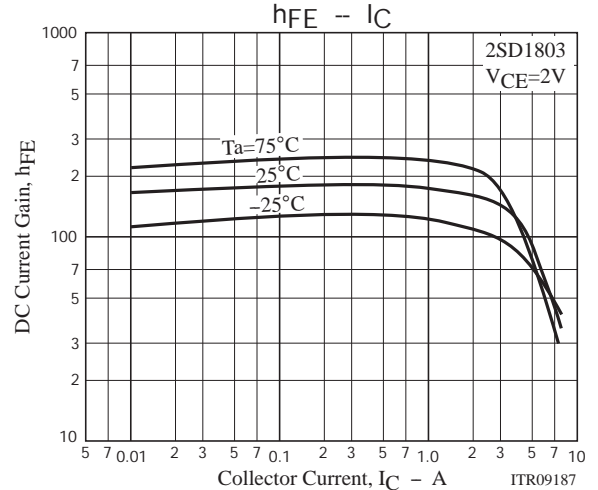
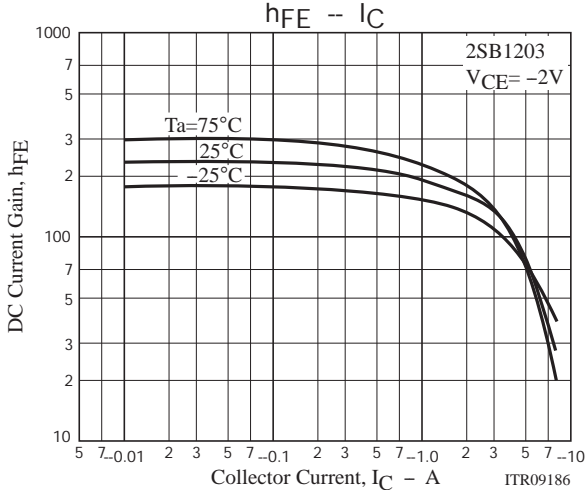
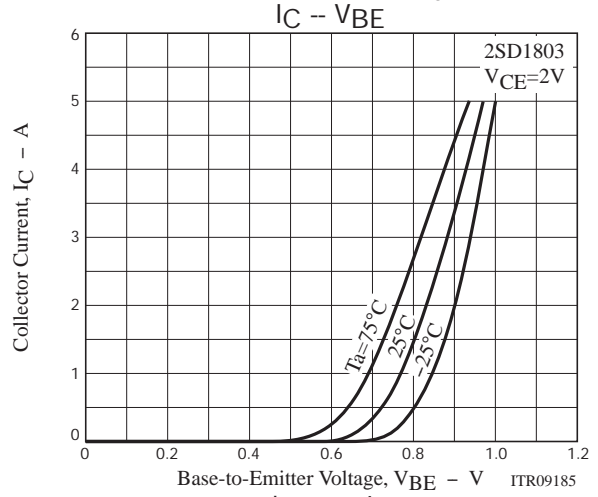
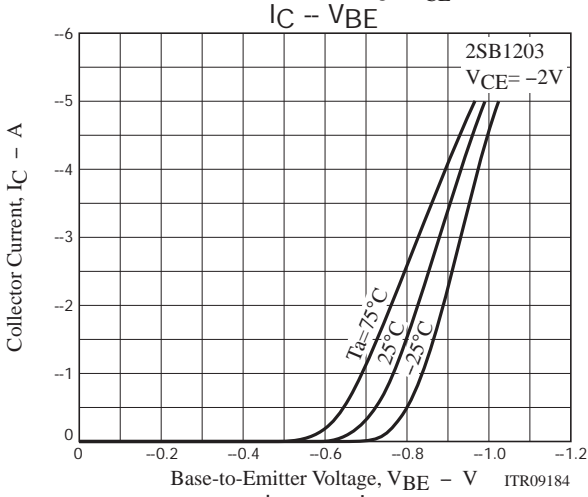
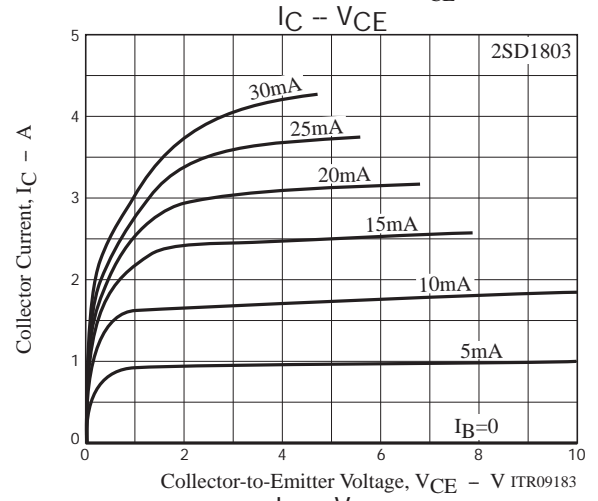
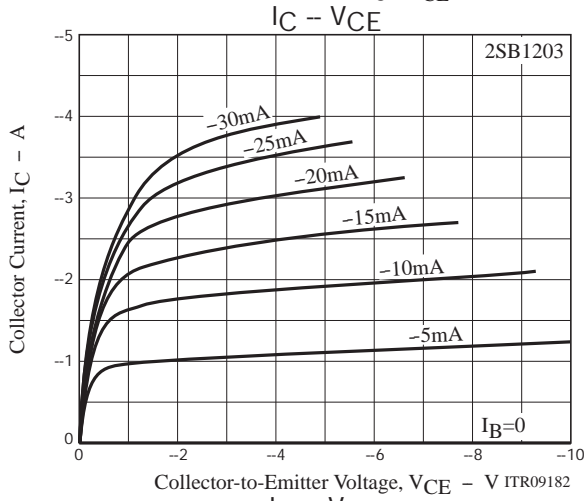
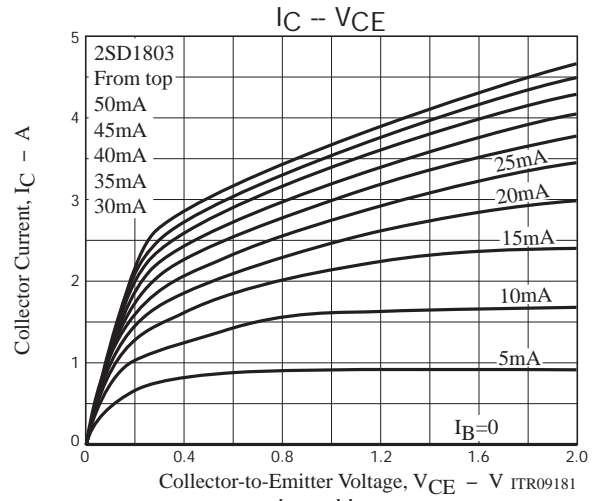
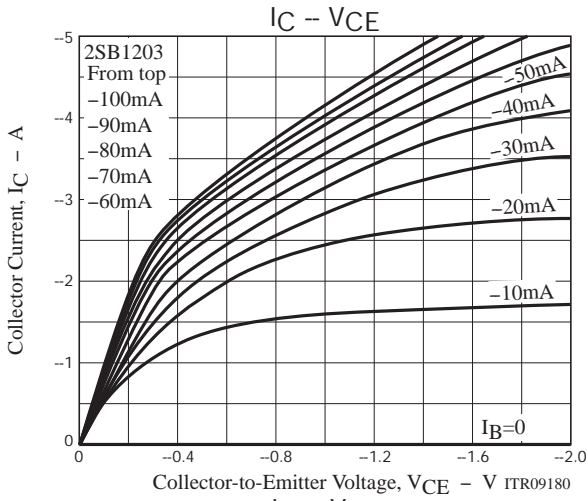
$$I_C = 10I_{B1} = -10I_{B2} = 2A$$

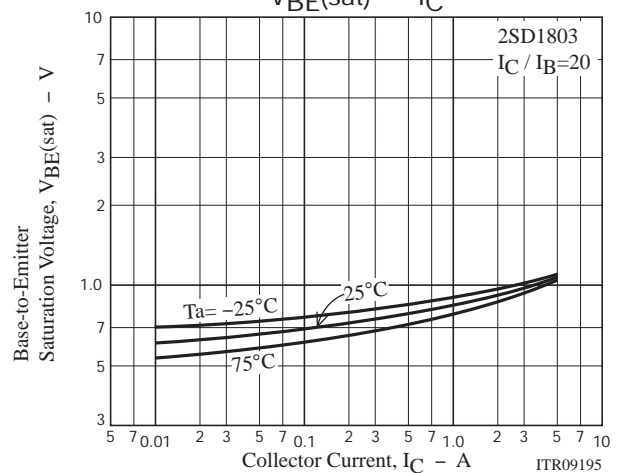
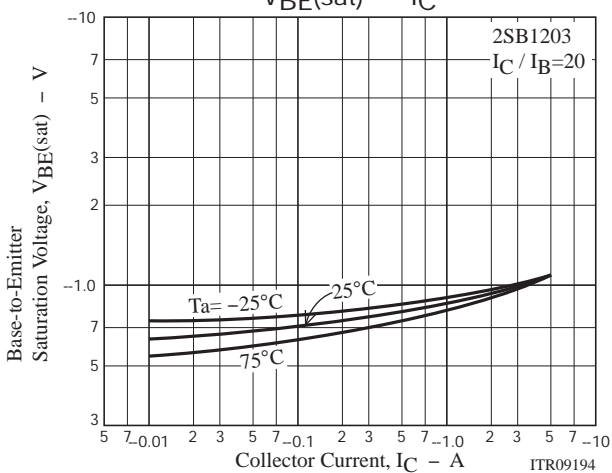
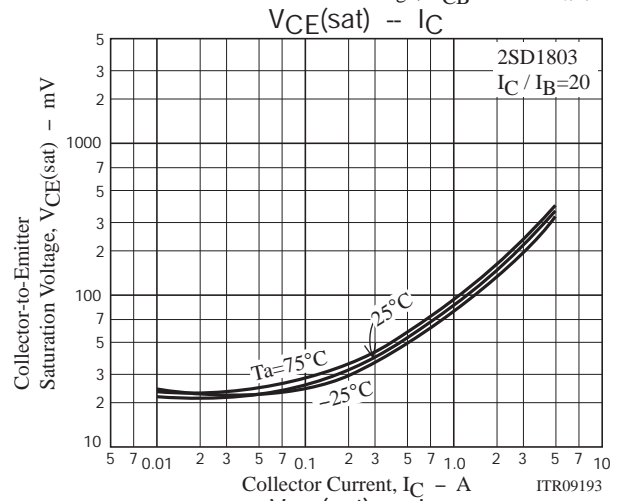
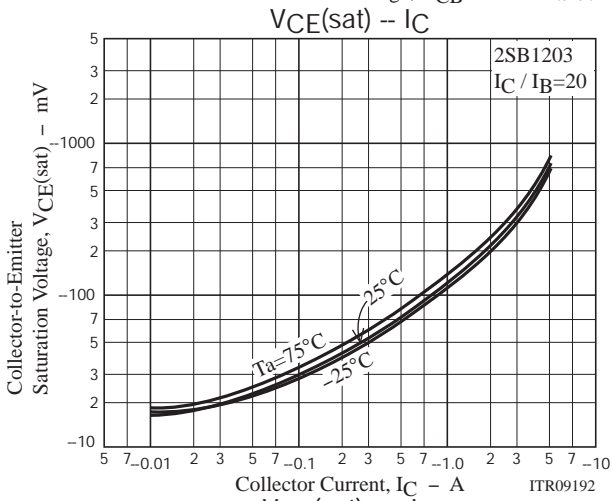
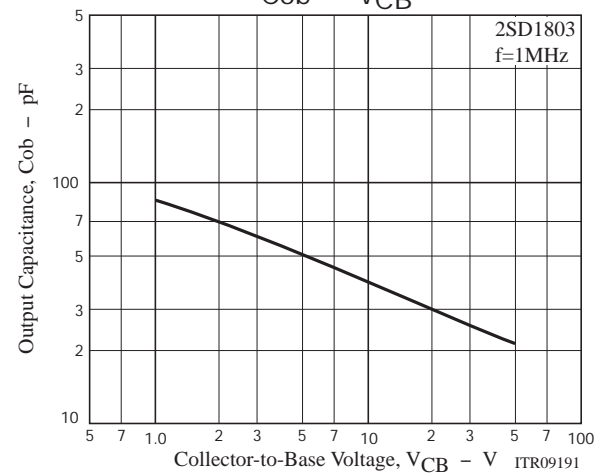
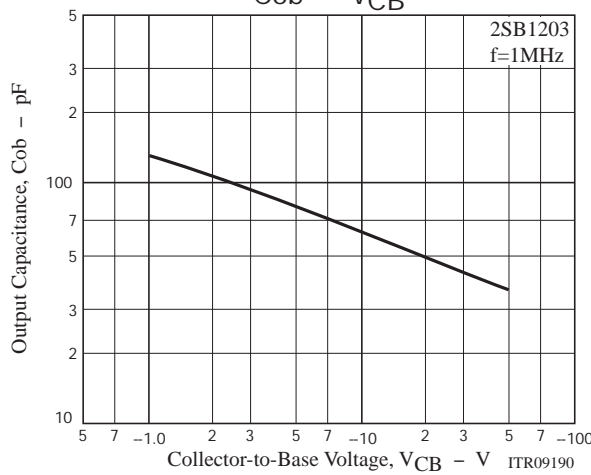
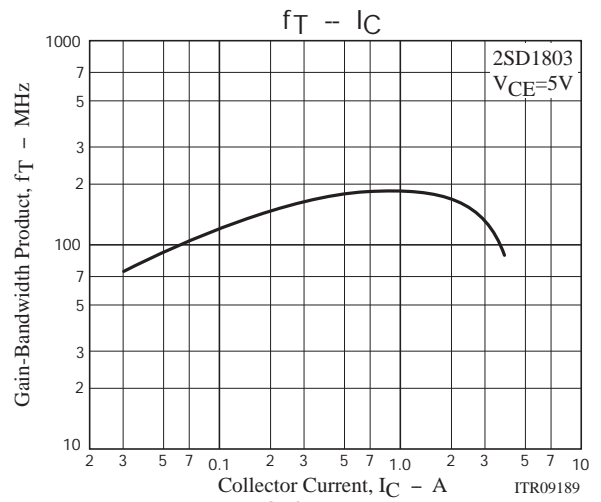
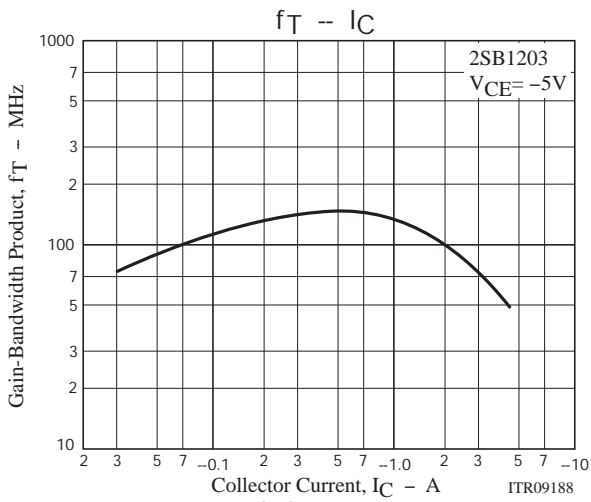
For PNP, the polarity is reversed.

### Ordering Information

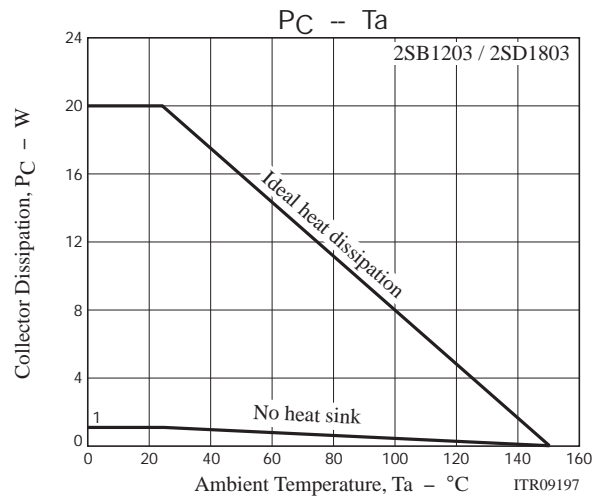
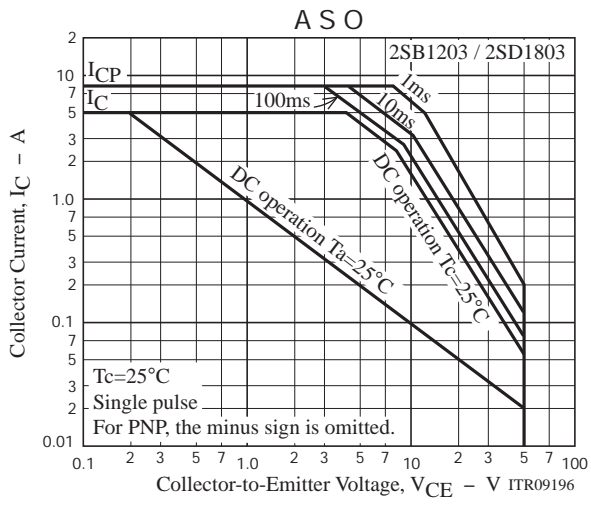
Device	Package	Shipping	memo
2SB1203S-E	TP	500pcs./bag	Pb Free
2SB1203S-H	TP	500pcs./bag	Pb Free and Halogen Free
2SD1203T-E	TP	500pcs./bag	Pb Free
2SD1203T-H	TP	500pcs./bag	Pb Free and Halogen Free
2SB1803S-E	TP	500pcs./bag	Pb Free
2SB1803S-H	TP	500pcs./bag	Pb Free and Halogen Free
2SD1803T-E	TP	500pcs./bag	Pb Free
2SD1803T-H	TP	500pcs./bag	Pb Free and Halogen Free
2SB1203S-TL-E	TP-FA	700pcs./reel	Pb Free
2SB1203S-TI-H	TP-FA	700pcs./reel	Pb Free and Halogen Free
2SB1203T-TL-E	TP-FA	700pcs./reel	Pb Free
2SB1203T-TI-H	TP-FA	700pcs./reel	Pb Free and Halogen Free
2SB1803S-TL-E	TP-FA	700pcs./reel	Pb Free
2SB1803S-TI-H	TP-FA	700pcs./reel	Pb Free and Halogen Free
2SB1803T-TL-E	TP-FA	700pcs./reel	Pb Free
2SB1803T-TI-H	TP-FA	700pcs./reel	Pb Free and Halogen Free

2SB1203 / 2SD1803





2SB1203 / 2SD1803





# 2SB1203 / 2SD1803

## Outline Drawing

## Land Pattern Example

2SB1203S-TL-E, 2SB1203S-TI-H, 2SB1203T-TL-E, 2SB1203T-TI-H, 2SB1803S-TL-E, 2SB1803S-TI-H, 2SB1803T-TL-E, 2SB1803T-TI-H



# 2SB1203 / 2SD1803

## Bag Packing Specification

2SB1203S-E, 2SB1203S-H, 2SD1203T-E, 2SD1203T-H, 2SB1803S-E, 2SB1803S-H, 2SD1803T-E, 2SD1803T-H

### 1. Packing Format

Package Name	Maximum Number of devices contained (pcs)			
	Bag	Inner box	Outer box	
TP	500	B-1	A-1	A-2
		10,000	50,000	30,000
	Packing format (Dimensions:mm (external))			
		Inner box	Outer box	
		B-1	A-1	A-2
		445×225×55	470×250×300	470×250×190

### 2. Bag dimensions (unit:mm)



### 3. Bag label, Inner box label (unit:mm)



### 4. Outer box label (unit:mm)

It is a label at the time of factory shipments.  
The form of a label may change in physical distribution process.

#### NOTE (1)

The LEAD FREE \* description shows that the surface treatment of the terminal is lead free.

Label	JEITA Phase
LEAD FREE 3	JEITA Phase 3A
LEAD FREE 4	JEITA Phase 3





# 2SB1203 / 2SD1803

## Outline Drawing

2SB1203S-E, 2SB1203S-H, 2SD1203T-E, 2SD1203T-H, 2SB1803S-E, 2SB1803S-H, 2SD1803T-E, 2SD1803T-H



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