



SANYO Semiconductors

DATA SHEET

An ON Semiconductor Company

2SB1203/2SD1803 — PNP/NPN Epitaxial Planar Silicon Transistor

High-Current Switching Applications

Applications

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

Features

- Low collector-to-emitter saturation voltage
- Excellent linearity of hFE
- Small and slim package making it easy to make 2SB1203/2SD1803-applied sets smaller
- High current and high fT
- Fast switching speed

Specifications () : 2SB1203

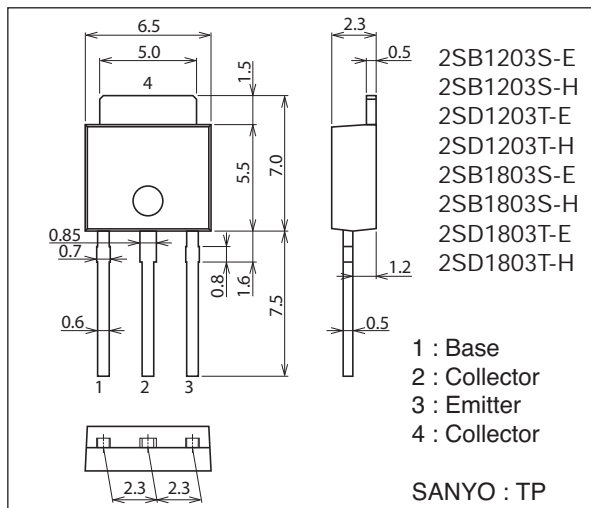
Absolute Maximum Ratings at Ta=25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|------------------------------|------------------|------------|---------|------|
| Collector-to-Base Voltage | V _{CB0} | | (-)60 | V |
| Collector-to-Emitter Voltage | V _{CE0} | | (-)50 | V |
| Emitter-to-Base Voltage | V _{EB0} | | (-)6 | V |
| Collector Current | I _C | | (-)5 | A |
| Collector Current (Pulse) | I _{CP} | | (-)8 | A |

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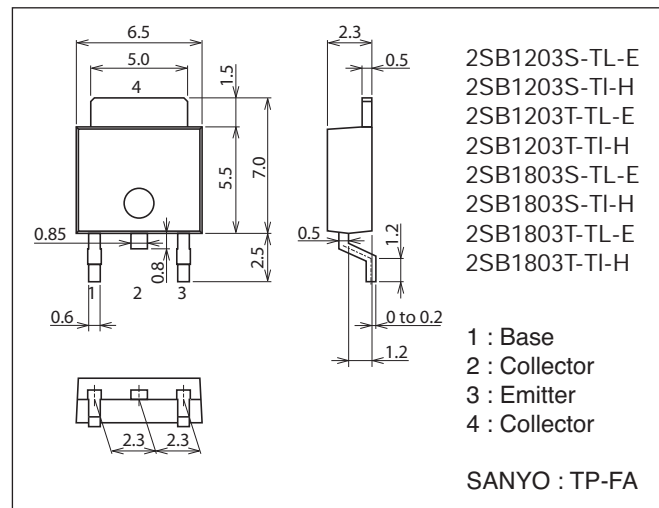
Package Dimensions unit : mm (typ)

7518-003



Package Dimensions unit : mm (typ)

7003-003

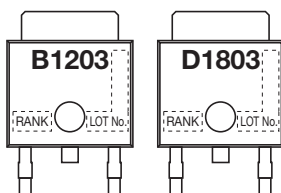


Product & Package Information

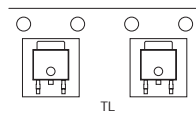
- Package : TP
- JEITA, JEDEC : SC-64, TO-251
- Minimum Packing Quantity : 500 pcs./bag

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

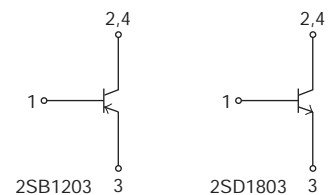
Marking (TP, TP-FA)



Packing Type (TP-FA) : TL



Electrical Connection



SANYO Semiconductor Co., Ltd.

<http://semicon.sanyo.com/en/network>

2SB1203/2SD1803

Continued from preceding page.

| Parameter | Symbol | Conditions | Ratings | Unit |
|-----------------------|-----------|------------------------|-------------|------------------|
| Collector Dissipation | PC | | 1 | W |
| | | $T_c=25^\circ\text{C}$ | 20 | W |
| Junction Temperature | T_j | | 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | | -55 to +150 | $^\circ\text{C}$ |

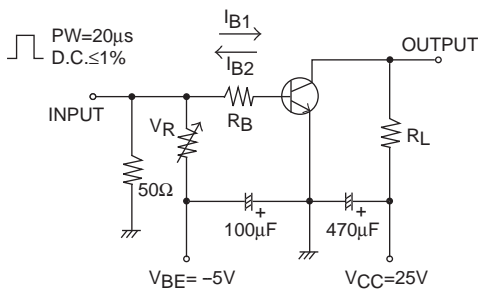
Electrical Characteristics at $T_a=25^\circ\text{C}$

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|-----------------------------------------|---------------|-------------------------------------------|----------|------------|-----------|---------------|
| | | | min | typ | max | |
| Collector Cutoff Current | I_{CBO} | $V_{CB}=(-)40\text{V}, I_E=0\text{A}$ | | | (-) 1 | μA |
| Emitter Cutoff Current | I_{EBO} | $V_{EB}=(-)4\text{V}, I_C=0\text{A}$ | | | (-) 1 | μA |
| DC Current Gain | h_{FE1} | $V_{CE}=(-)2\text{V}, I_C=(-)0.5\text{A}$ | 70* | | 400* | |
| | h_{FE2} | $V_{CE}=(-)2\text{V}, I_C=(-)4\text{A}$ | 35 | | | |
| Gain-Bandwidth Product | f_T | $V_{CE}=(-)5\text{V}, I_C=(-)1\text{A}$ | | (130)180 | | MHz |
| Output Capacitance | C_{ob} | $V_{CB}=(-)10\text{V}, f=1\text{MHz}$ | | (60)40 | | pF |
| Collector-to-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C=(-)3\text{A}, I_B=(-)0.15\text{A}$ | | (-280)220 | (-550)400 | mV |
| Base-to-Emitter Saturation Voltage | $V_{BE(sat)}$ | $I_C=(-)3\text{A}, I_B=(-)0.15\text{A}$ | | (-) 0.95 | (-) 1.3 | V |
| Collector-to-Base Breakdown Voltage | $V_{(BR)CBO}$ | $I_C=(-)10\mu\text{A}, I_E=0\text{A}$ | (-) 60 | | | V |
| Collector-to-Emitter Breakdown Voltage | $V_{(BR)CEO}$ | $I_C=(-)1\text{mA}, R_{BE}=\infty$ | (-) 50 | | | V |
| Emitter-to-Base Breakdown Voltage | $V_{(BR)EBO}$ | $I_E=(-)10\mu\text{A}, I_C=0\text{A}$ | (-) 6 | | | V |
| Turn-On Time | t_{on} | See specified Test Circuit. | | (50)50 | | ns |
| Storage Time | t_{stg} | | | (450)500 | | ns |
| Fall Time | t_f | | | (20)20 | | ns |

* : The 2SB1203/2SD1803 are classified by 0.5A h_{FE} as follows :

| Rank | Q | R | S | T |
|----------|-----------|------------|------------|------------|
| h_{FE} | 70 to 140 | 100 to 200 | 140 to 280 | 200 to 400 |

Switching Time Test Circuit



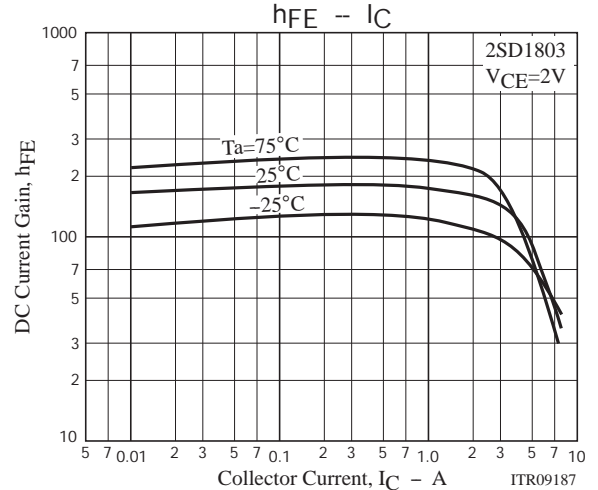
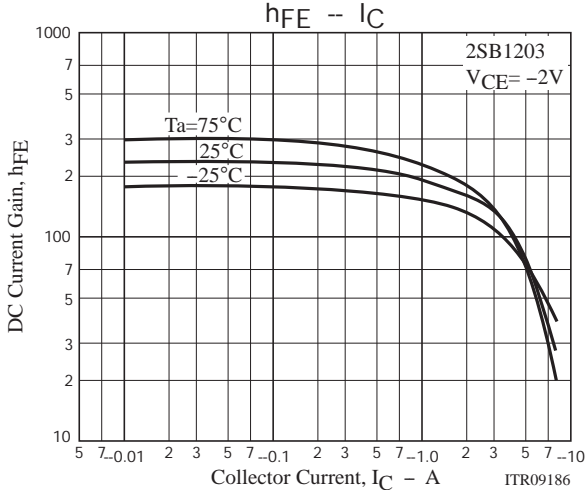
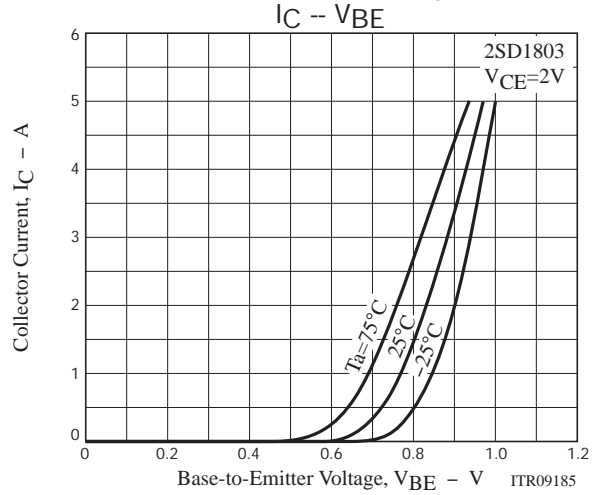
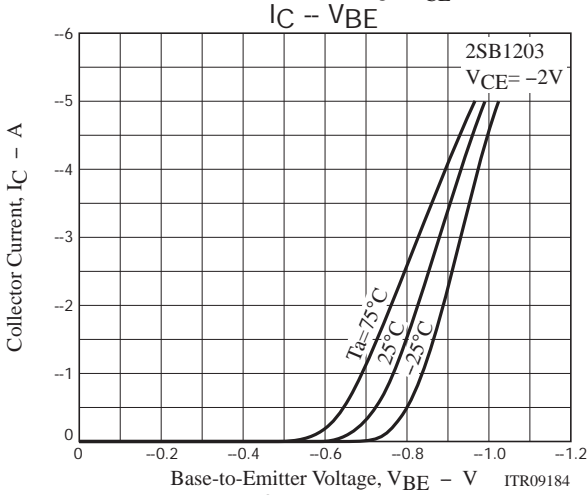
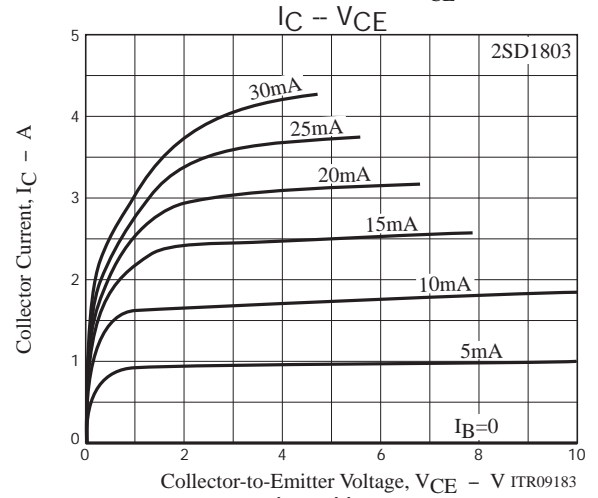
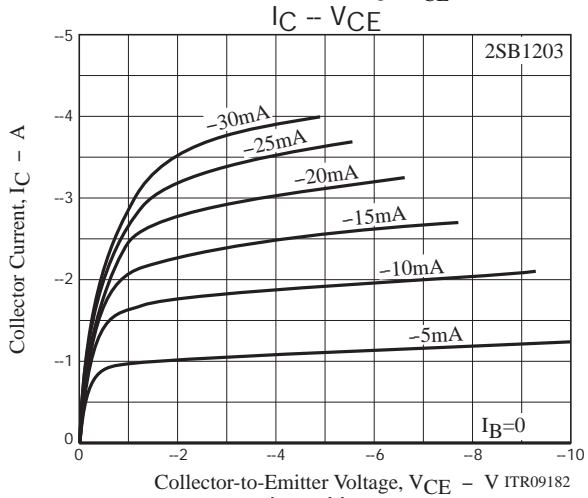
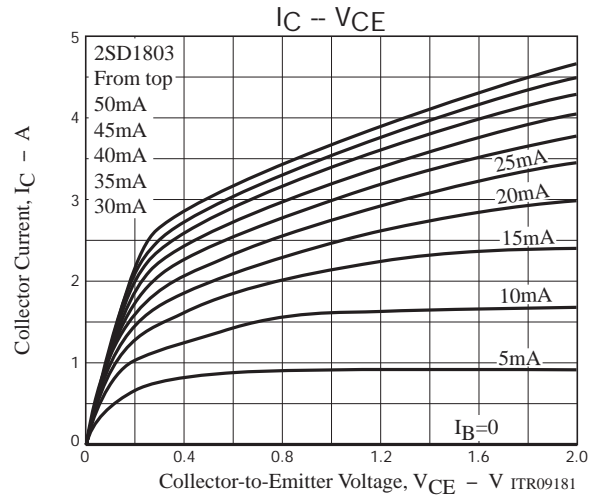
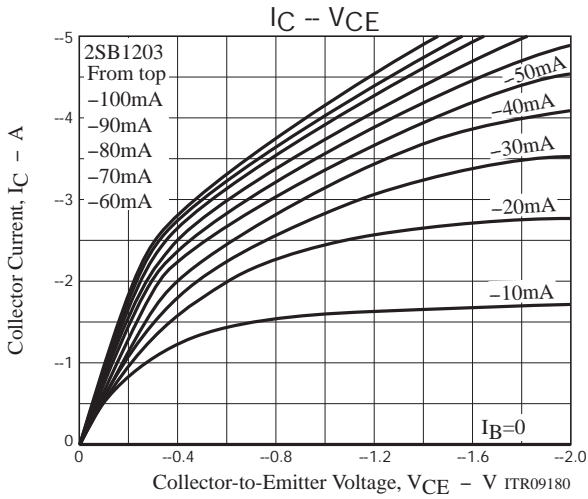
$$I_C = 10I_{B1} = -10I_{B2} = 2\text{A}$$

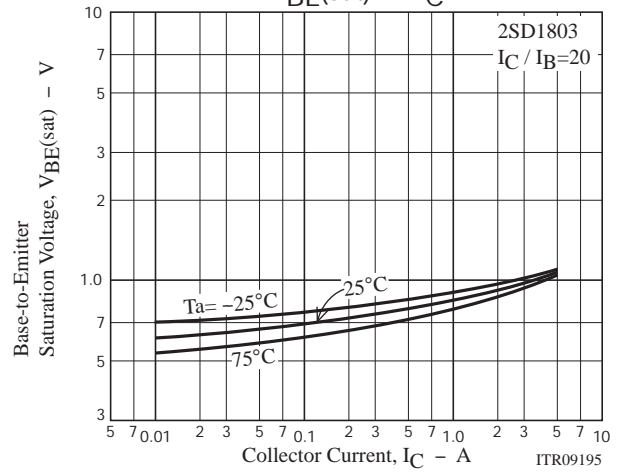
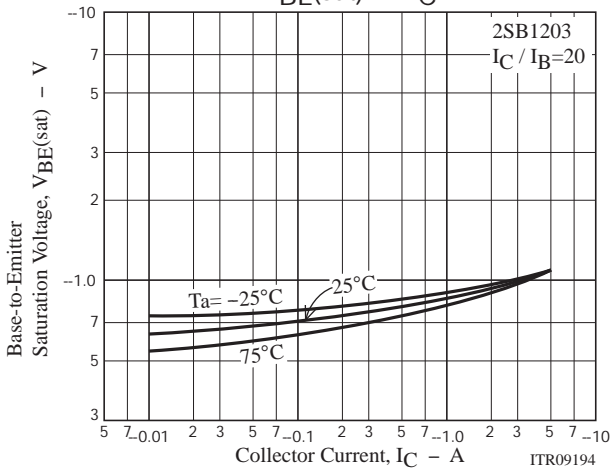
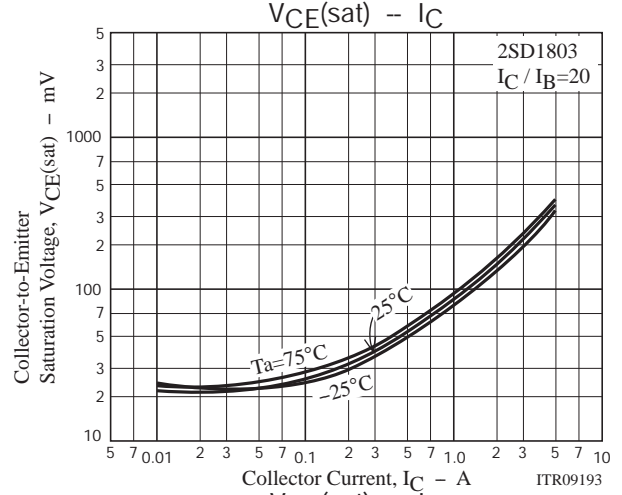
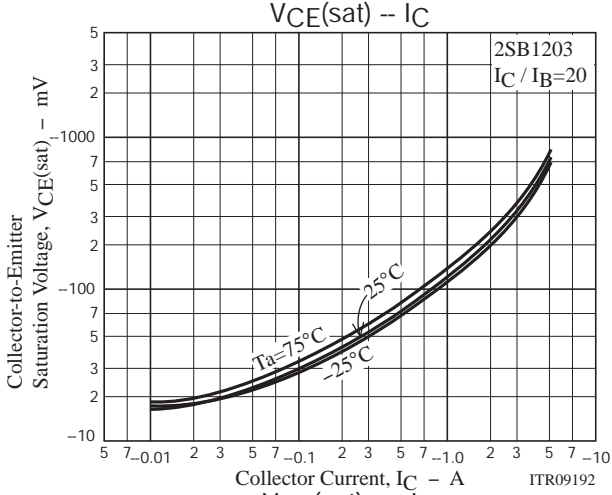
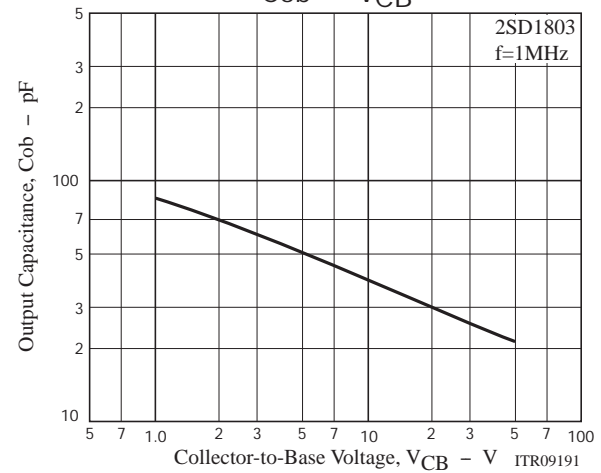
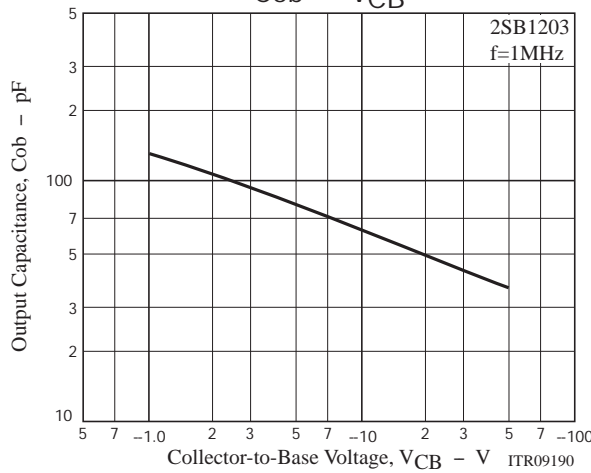
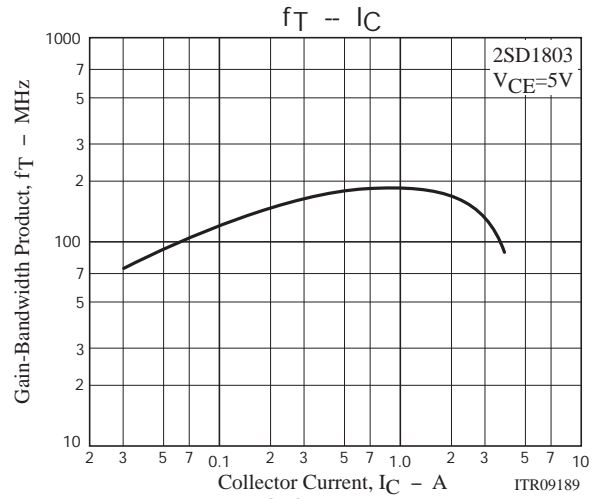
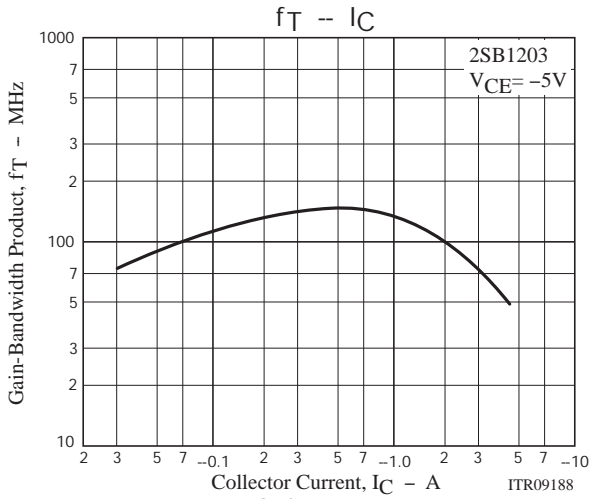
For PNP, the polarity is reversed.

Ordering Information

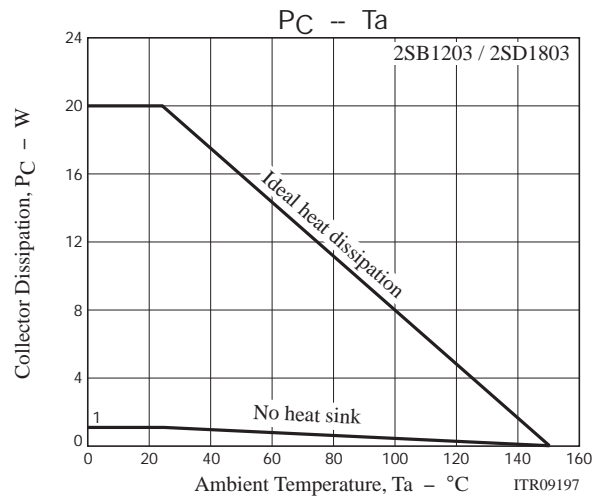
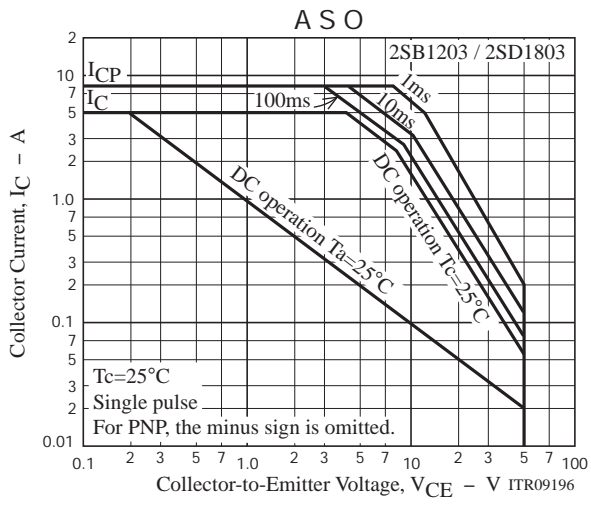
| Device | Package | Shipping | memo |
|---------------|---------|--------------|--------------------------|
| 2SB1203S-E | TP | 500pcs./bag | Pb Free |
| 2SB1203S-H | TP | 500pcs./bag | Pb Free and Halogen Free |
| 2SD1203T-E | TP | 500pcs./bag | Pb Free |
| 2SD1203T-H | TP | 500pcs./bag | Pb Free and 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

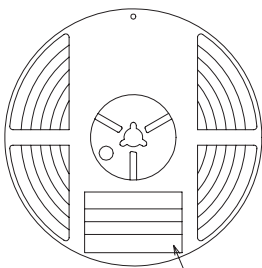
Taping Specification

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

Packing Format

| Package Name | Carrier Tape Type | Maximum Number of devices contained (pcs) | | | Packing format | |
|--------------|----------------------|----------------------------------------------|-----------|-----------|-------------------------------------------------------------|--------------------------------------------------------------------|
| | | Reel | Inner box | Outer box | Inner BOX (C-1) | Outer BOX (A-7) |
| TP-FA | TP | 700 | 2,100 | 12,600 | 3 reels contained Dimensions:mm (external) 183×72×185 | 6 inner boxes contained Dimensions:mm (external) 440×195×210 |

Packing method



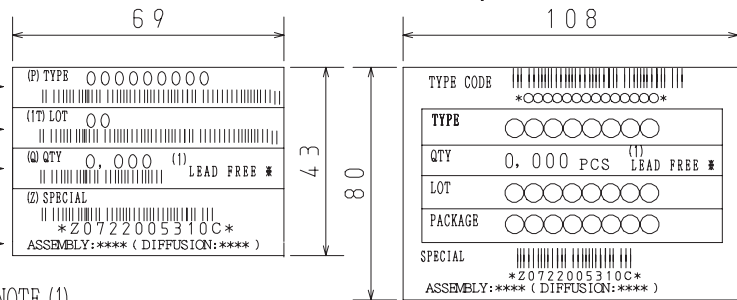
Type No.
LOT No.
Quantity
Origin

Reel label

Reel label, Inner box label
(unit: mm)

Outer box label

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 |

Taping configuration

1. Carrier tape size (unit:mm)



2. Device placement direction



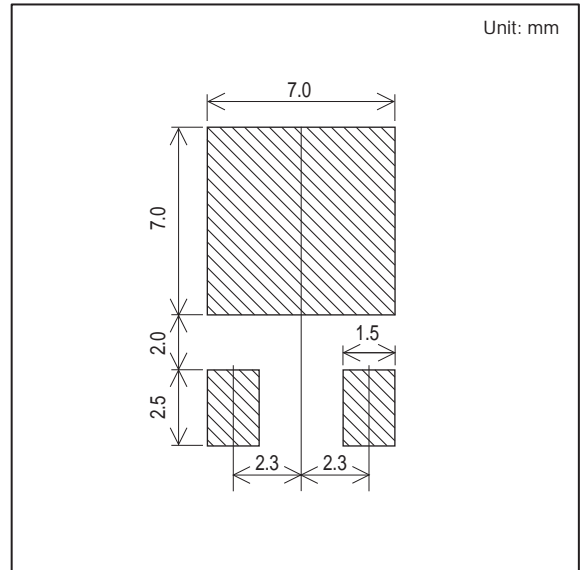
Those with one electrode terminal on the feed hole side.....TL

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)



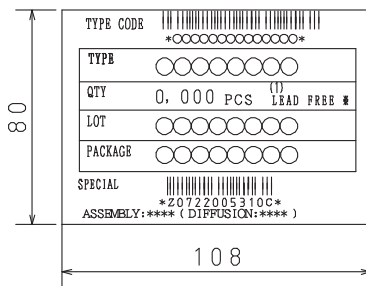
4. Outer box label (unit:mm)

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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