



# 2SB1216/2SD1816

## Bipolar Transistor (-100V, (-)4A, Low VCE(sat), (PNP)NPN Single TP/TP-FA

ON Semiconductor®

<http://onsemi.com>

### Applications

- Suitable for relay drivers, high-speed inverters, converters, and other general high-current switching applications

### Features

- Low collector-to-emitter saturation voltage
- Small and slim package facilitating compactness of sets
- High  $f_T$
- Good linearity of  $h_{FE}$
- Fast switching time

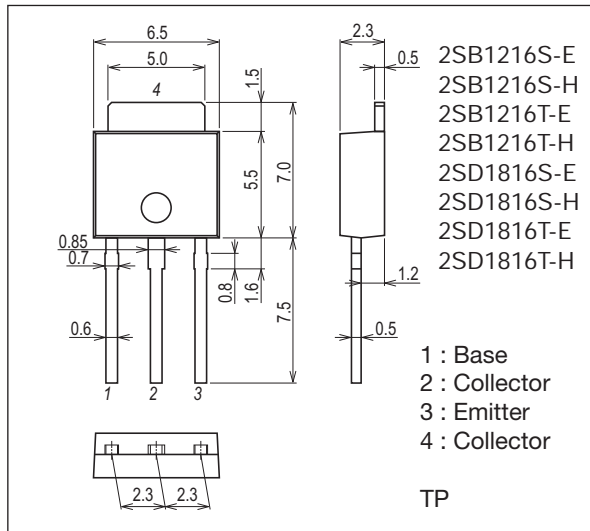
### Specifications ( ) : 2SB1216

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

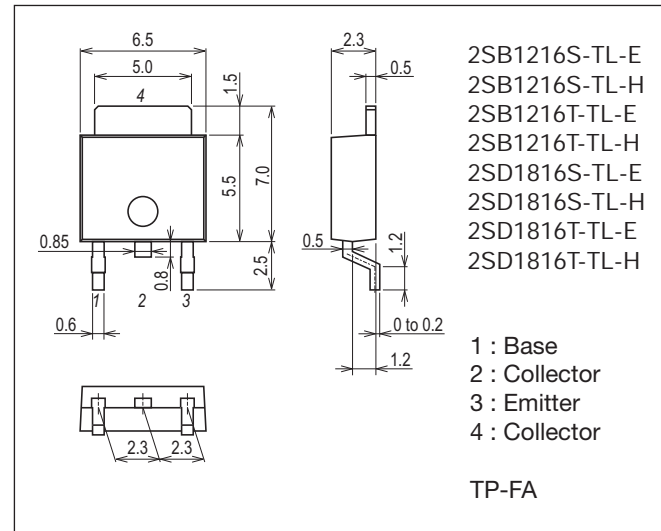
| Parameter                    | Symbol    | Conditions | Ratings | Unit |
|------------------------------|-----------|------------|---------|------|
| Collector-to-Base Voltage    | $V_{CBO}$ |            | (-120   | V    |
| Collector-to-Emitter Voltage | $V_{CEO}$ |            | (-100   | V    |
| Emitter-to-Base Voltage      | $V_{EBO}$ |            | (-6     | V    |
| Collector Current            | $I_C$     |            | (-4     | A    |
| Collector Current (Pulse)    | $I_{CP}$  |            | (-8     | A    |

Continued on next page.

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



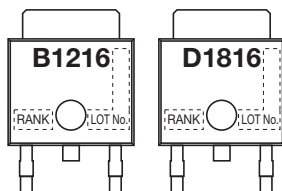
#### Package Dimensions unit : mm (typ) 7003-003



### Product & Package Information

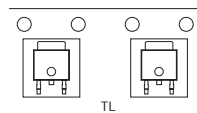
- Package : TP
- JEITA, JEDEC : SC-64, TO-251
- Minimum Packing Quantity : 500 pcs./bag

### Marking (TP, TP-FA)

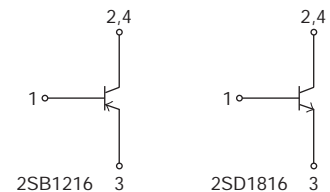


- Package : TP-FA
- JEITA, JEDEC : SC-63, TO-252
- Minimum Packing Quantity : 700 pcs./reel

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



### Electrical Connection



## 2SB1216 / 2SD1816

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.

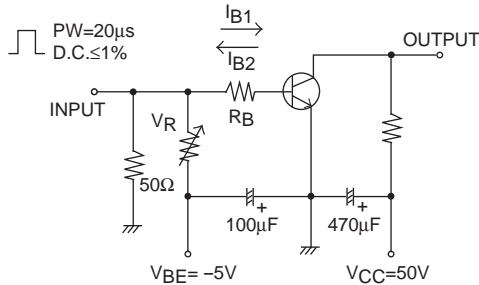
### Electrical Characteristics at T<sub>a</sub>=25°C

| Parameter                               | Symbol               | Conditions                                       | Ratings |           |           | Unit |
|---|----------------------|--|---------|-----------|-----------|------|
|   |                      |  | min     | typ       | max       |      |
| Collector Cutoff Current                | I <sub>CBO</sub>     | V <sub>CB</sub> =(-)100V, 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> =(-)5V, I <sub>C</sub> =(-)0.5A  | 70*     |           | 400*      |      |
|   | h <sub>FE2</sub>     | V <sub>CE</sub> =(-)5V, I <sub>C</sub> =(-)3A    | 40      |           |           |      |
| Gain-Bandwidth Product                  | f <sub>T</sub>       | V <sub>CE</sub> =(-)10V, I <sub>C</sub> =(-)0.5A |         | (130)180  |           | MHz  |
| Output Capacitance                      | C <sub>ob</sub>      | V <sub>CB</sub> =(-)10V, f=1MHz                  |         | (65)40    |           | pF   |
| Collector-to-Emitter Saturation Voltage | V <sub>CE(sat)</sub> | I <sub>C</sub> =(-)2A, I <sub>B</sub> =(-)0.2A   |         | (-200)150 | (-500)400 | mV   |
| Base-to-Emitter Saturation Voltage      | V <sub>BE(sat)</sub> | V <sub>CE</sub> =(-)2A, I <sub>C</sub> =(-)0.2A  |         | (-)0.9    | (-)1.2    | V    |
| Collector-to-Base Breakdown Voltage     | V(BR)CBO             | I <sub>C</sub> =(-)10μA, I <sub>E</sub> =0A      | (-)120  |           |           | V    |
| Collector-to-Emitter Breakdown Voltage  | V(BR)CEO             | I <sub>C</sub> =(-)1mA, R <sub>BE</sub> =∞       | (-)100  |           |           | 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.                      |         | 100       |           | ns   |
| Storage Time                            | t <sub>stg</sub>     |  |         | (800)900  |           | ns   |
| Fall Time                               | t <sub>f</sub>       |  |         | 50        |           | ns   |

\* : The 2SB1216/2SD1816 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

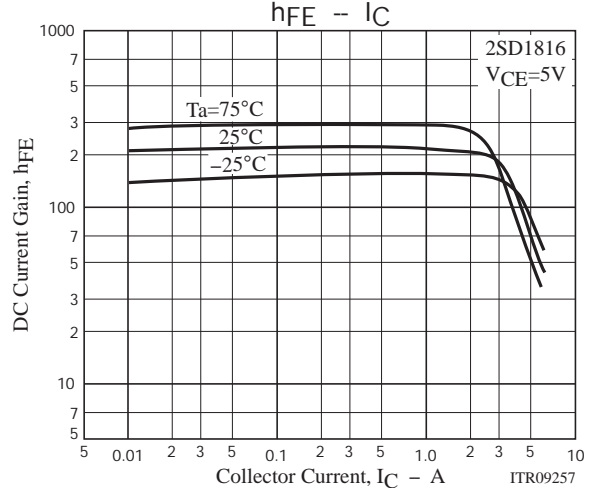
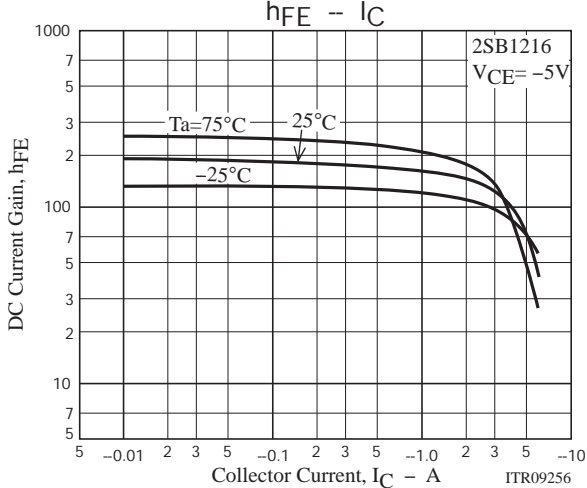
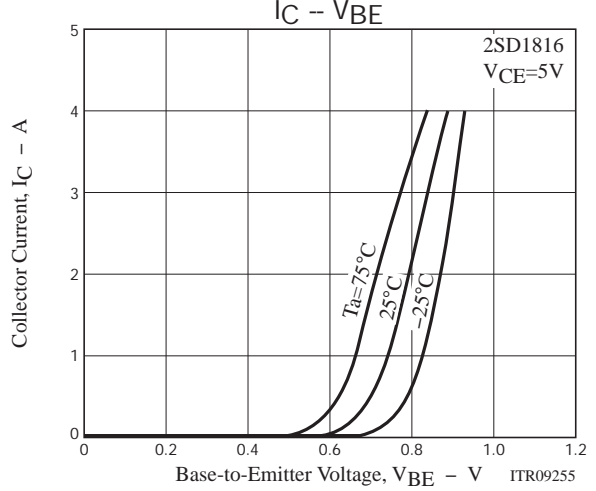
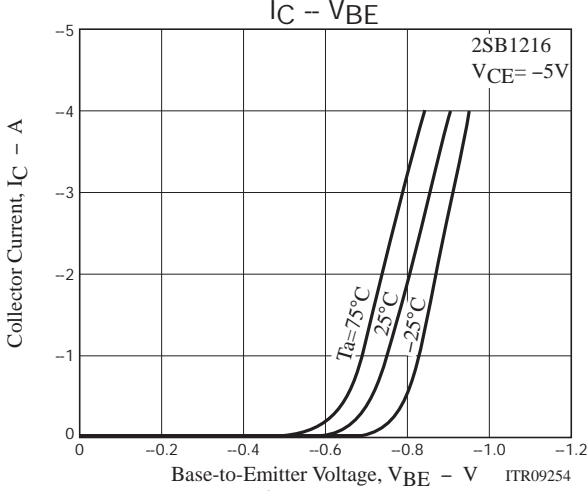
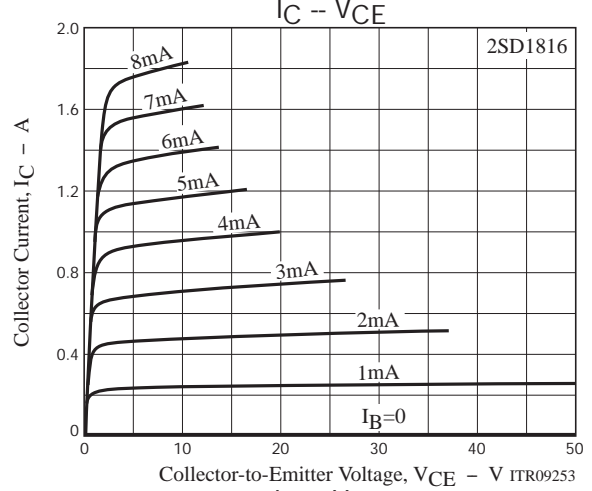
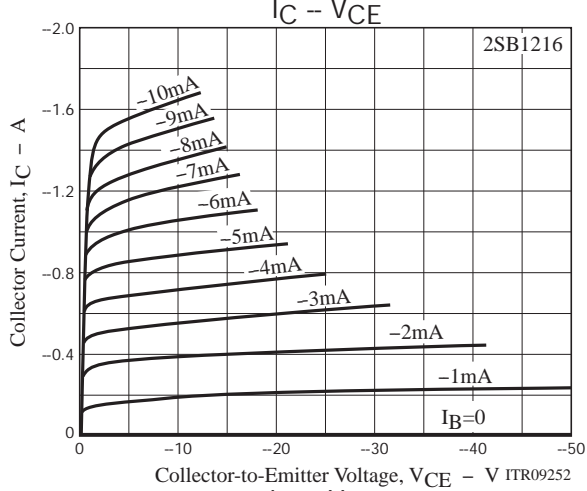
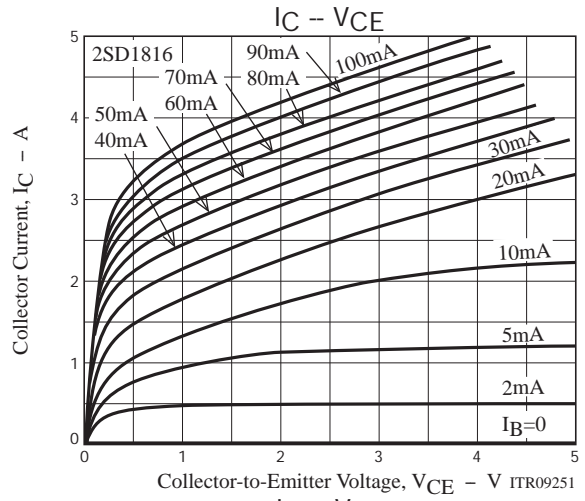
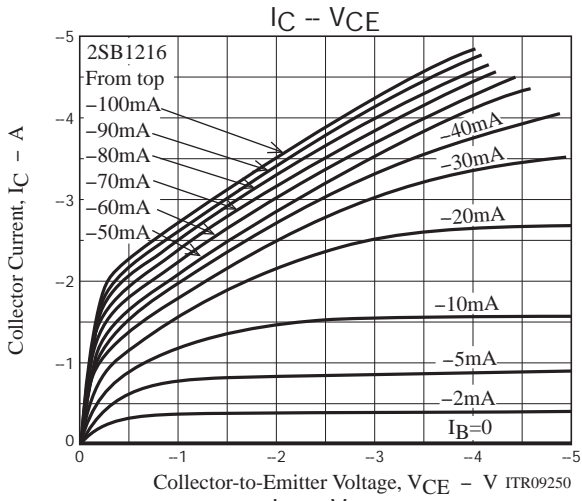


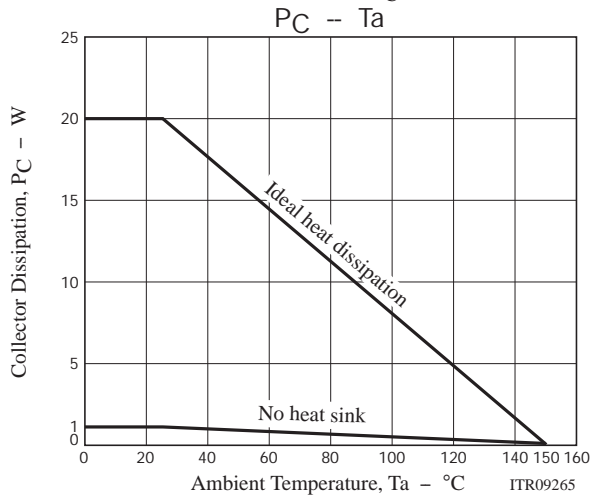
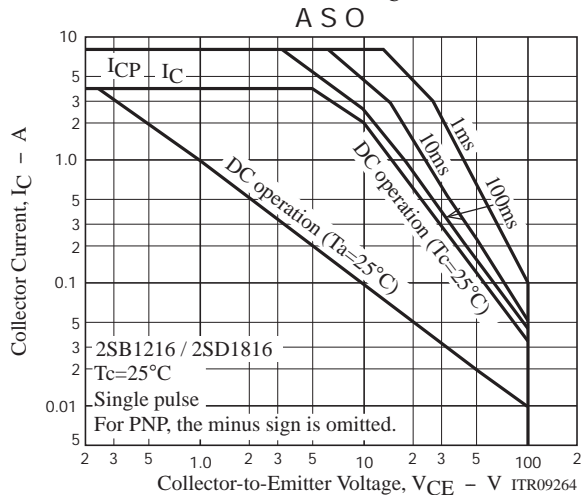
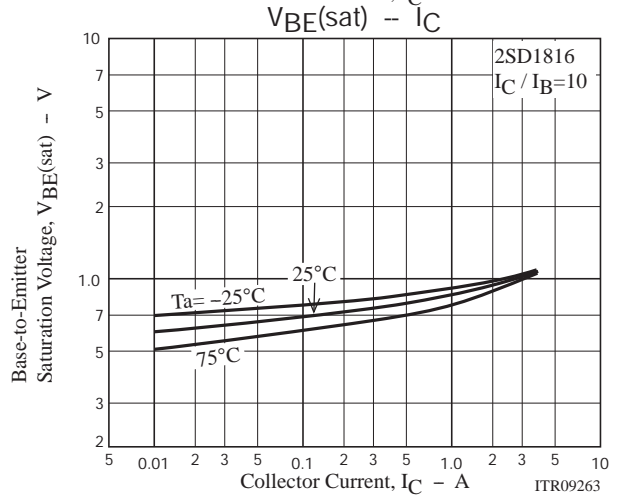
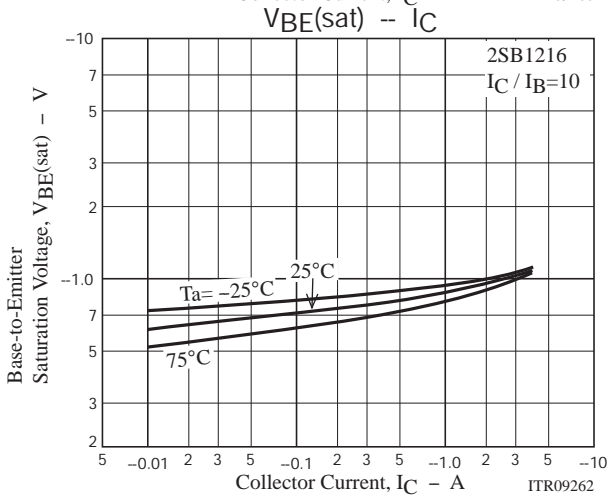
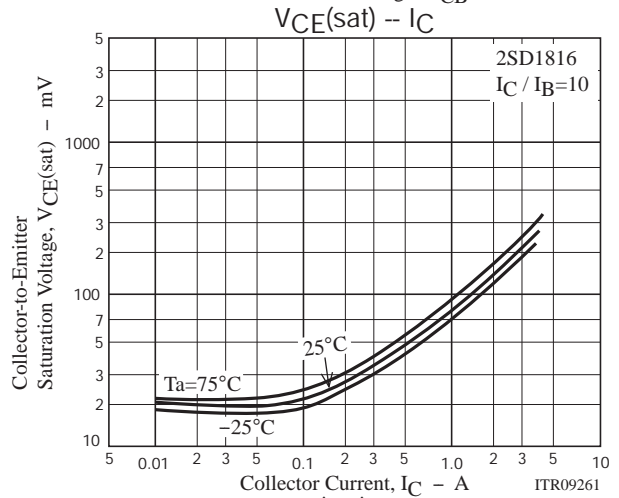
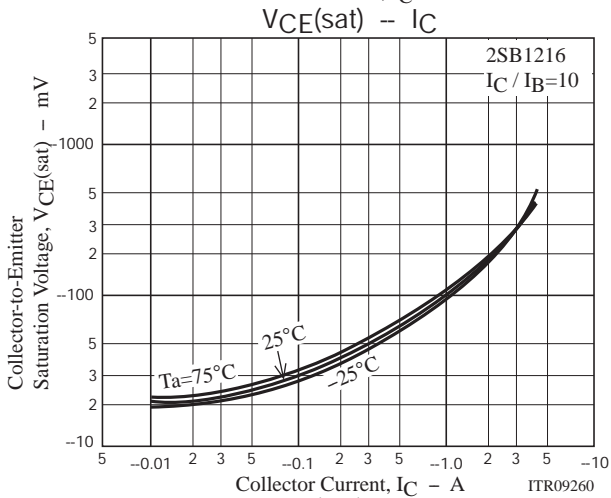
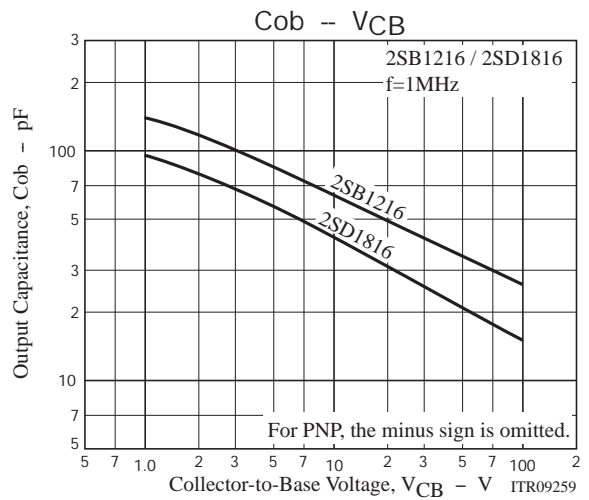
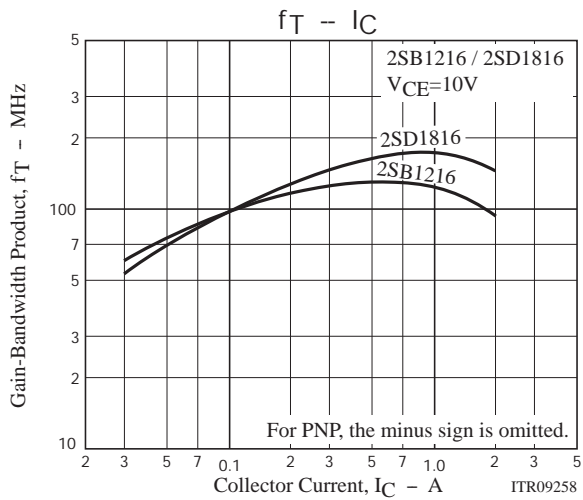
$$I_C = 10I_{B1} = -10I_{B2} = 2A$$

For PNP, the polarity is reversed.

### Ordering Information

| Device        | Package | Shipping     | memo                     |
|---------------|---------|--------------|--------------------------|
| 2SB1216S-E    | TP      | 500pcs./bag  | Pb Free                  |
| 2SB1216S-H    | TP      | 500pcs./bag  | Pb Free and Halogen Free |
| 2SB1216T-E    | TP      | 500pcs./bag  | Pb Free                  |
| 2SB1216T-H    | TP      | 500pcs./bag  | Pb Free and Halogen Free |
| 2SD1816S-E    | TP      | 500pcs./bag  | Pb Free                  |
| 2SD1816S-H    | TP      | 500pcs./bag  | Pb Free and Halogen Free |
| 2SD1816T-E    | TP      | 500pcs./bag  | Pb Free                  |
| 2SD1816T-H    | TP      | 500pcs./bag  | Pb Free and Halogen Free |
| 2SB1216S-TL-E | TP-FA   | 700pcs./reel | Pb Free                  |
| 2SB1216S-TL-H | TP-FA   | 700pcs./reel | Pb Free and Halogen Free |
| 2SB1216T-TL-E | TP-FA   | 700pcs./reel | Pb Free                  |
| 2SB1216T-TL-H | TP-FA   | 700pcs./reel | Pb Free and Halogen Free |
| 2SD1816S-TL-E | TP-FA   | 700pcs./reel | Pb Free                  |
| 2SD1816S-TL-H | TP-FA   | 700pcs./reel | Pb Free and Halogen Free |
| 2SD1816T-TL-E | TP-FA   | 700pcs./reel | Pb Free                  |
| 2SD1816T-TL-H | TP-FA   | 700pcs./reel | Pb Free and Halogen Free |





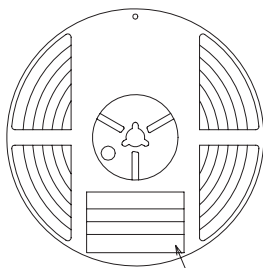
Taping Specification

2SB1216S-TL-E, 2SB1216S-TL-H, 2SB1216T-TL-E, 2SB1216T-TL-H, 2SD1816S-TL-E, 2SD1816S-TL-H, 2SD1816T-TL-E, 2SD1816T-TL-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<br>Dimensions:mm (external)<br>183×72×185 | 6 inner boxes contained<br>Dimensions:mm (external)<br>440×195×210 |

Packing method



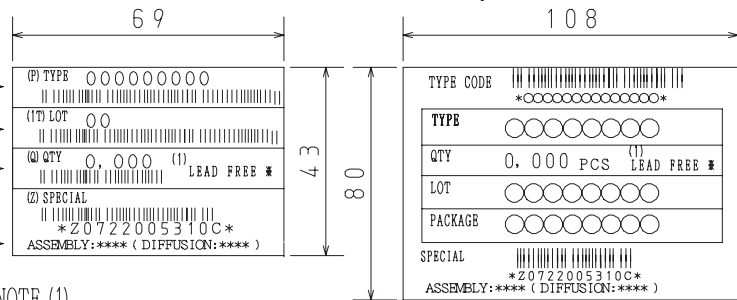
Type No.  
LOT No.  
Quantity  
Origin

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.



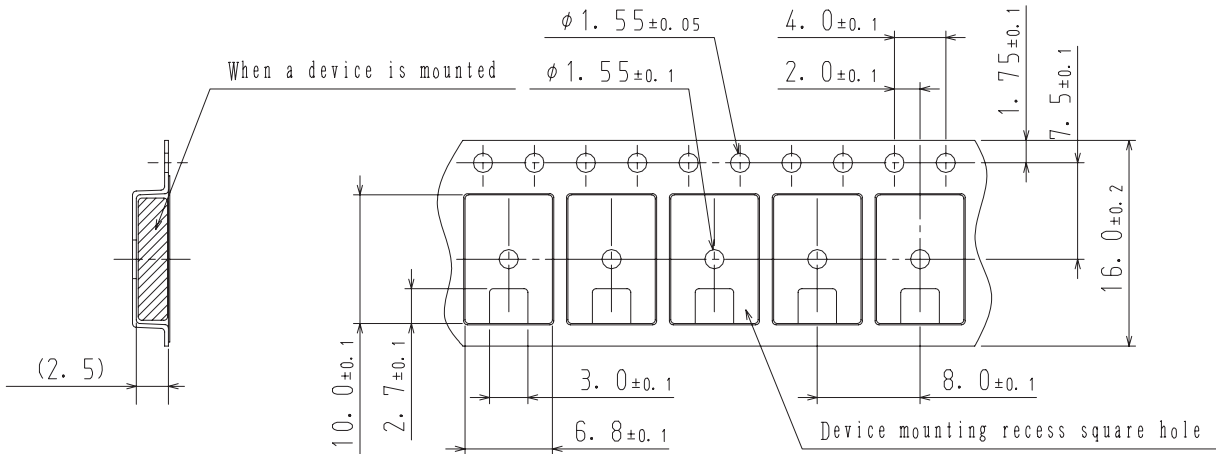
NOTE (1)

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

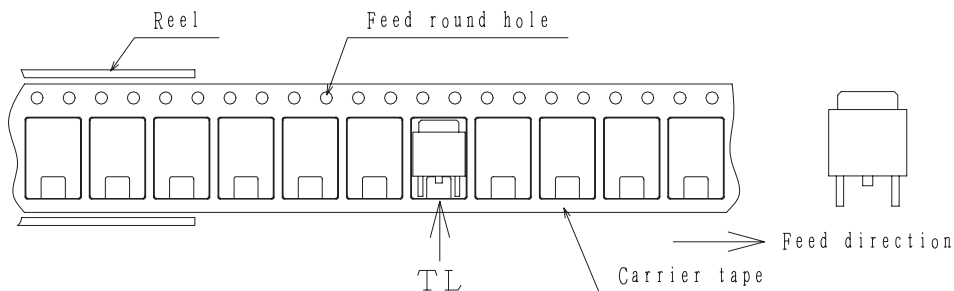
| Label       | JEITA Phase    |
|-------------|----------------|
| LEAD FREE 3 | JEITA Phase 3A |
| LEAD FREE 4 | JEITA Phase 3  |

Taping configuration

1. Carrier tape size (unit:mm)



2. Device placement direction

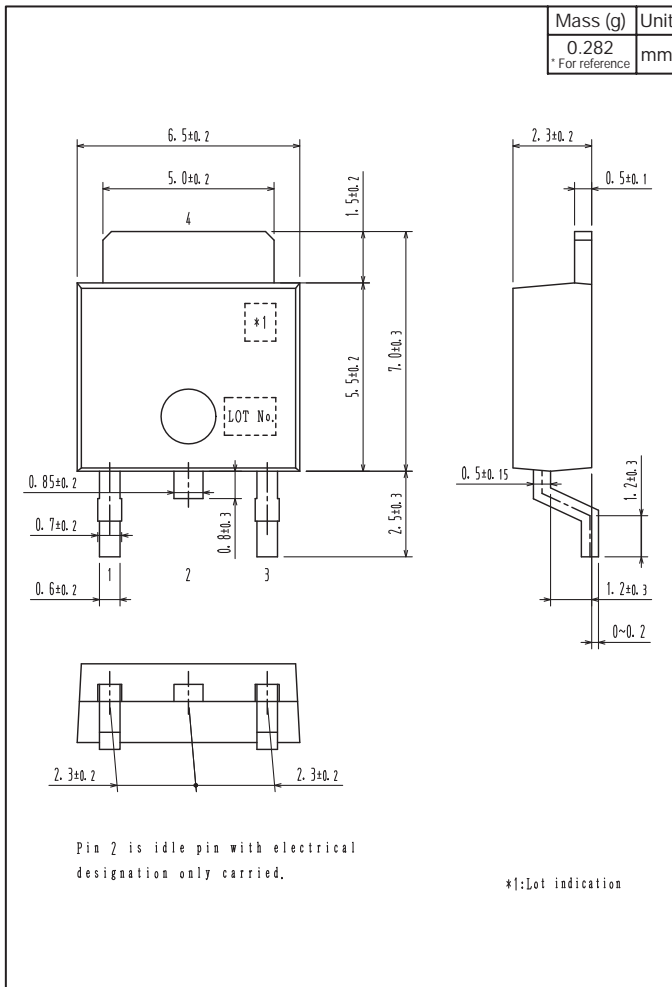


Those with one electrode terminal on the feed hole side.....TL

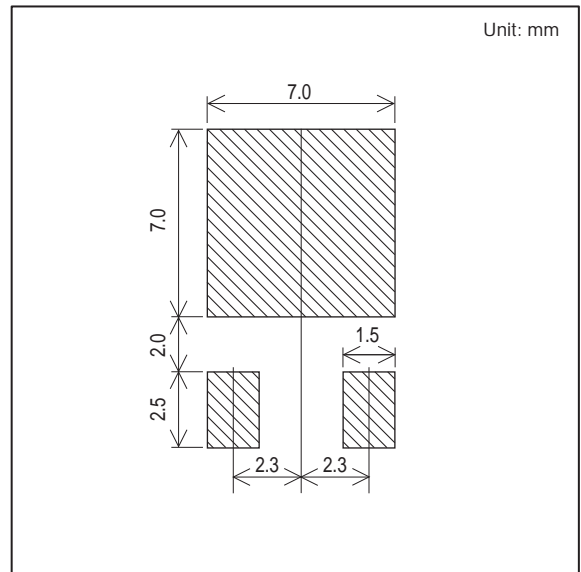
# 2SB1216 / 2SD1816

## Outline Drawing

2SB1216S-TL-E, 2SB1216S-TL-H, 2SB1216T-TL-E, 2SB1216T-TL-H, 2SD1816S-TL-E, 2SD1816S-TL-H, 2SD1816T-TL-E, 2SD1816T-TL-H



## Land Pattern Example

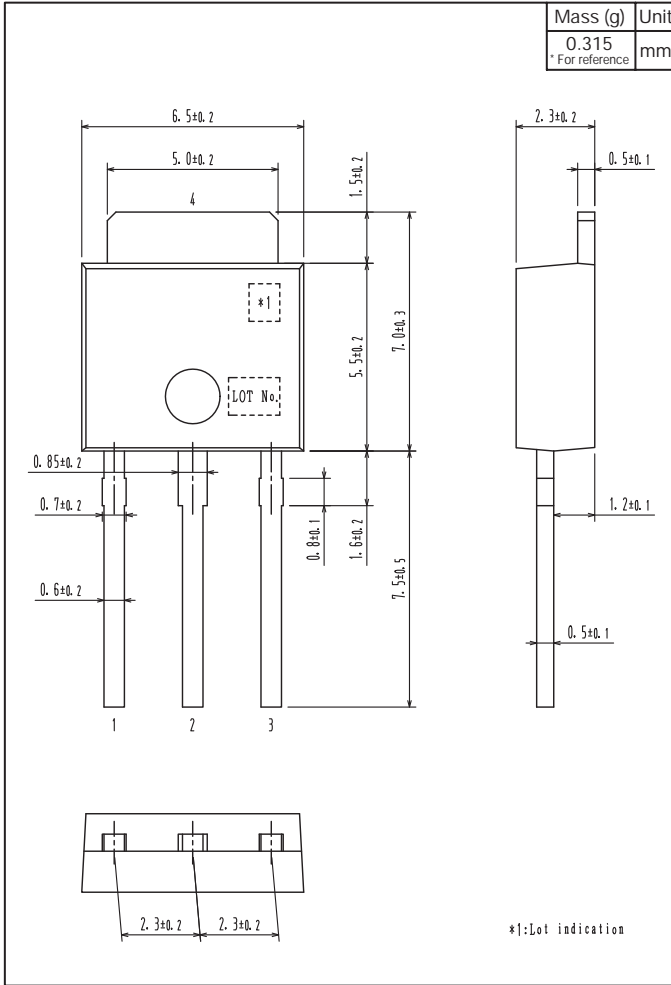




# 2SB1216 / 2SD1816

## Outline Drawing

2SB1216S-E, 2SB1216S-H, 2SB1216T-E, 2SB1216T-H, 2SD1816S-E, 2SD1816S-H, 2SD1816T-E, 2SD1816T-H





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