



# 2SB1204

## Bipolar Transistor

-50V, -8A, Low  $V_{CE(sat)}$ , PNP 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
- High current and high  $f_T$
- Excellent linearity of  $h_{FE}$
- Fast switching speed
- Small and slim package making it easy to make 2SB1204-applied sets smaller

### Specifications

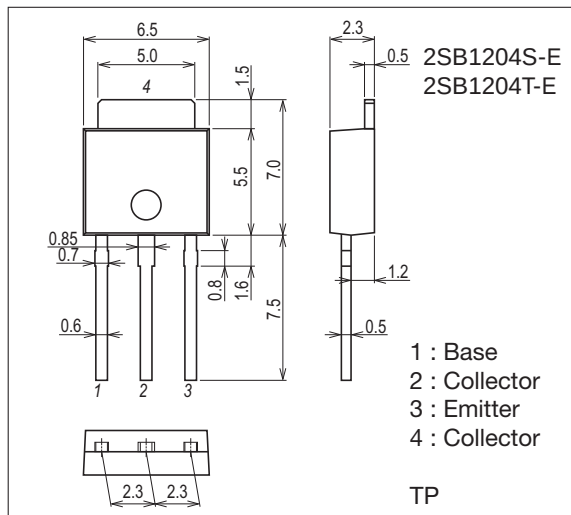
**Absolute Maximum Ratings** at  $T_a=25^\circ\text{C}$

| 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            | $I_C$     |                        | -8          | A                |
| Collector Current (Pulse)    | $I_{CP}$  |                        | -12         | A                |
| Collector Dissipation        | $P_C$     | $T_c=25^\circ\text{C}$ | 1           | W                |
|                              |           |                        | 20          | W                |
| Junction Temperature         | $T_j$     |                        | 150         | $^\circ\text{C}$ |
| Storage Temperature          | $T_{stg}$ |                        | -55 to +150 | $^\circ\text{C}$ |

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.

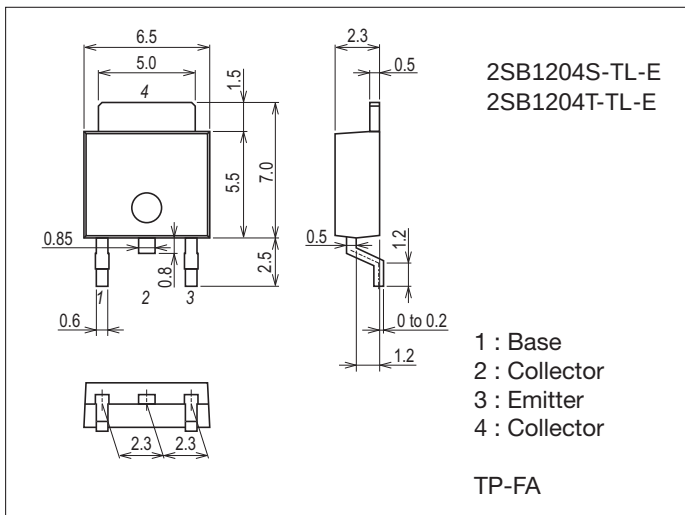
### Package Dimensions unit : mm (typ)

7518-003



### Package Dimensions unit : mm (typ)

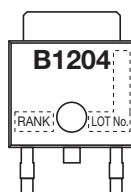
7003-003



### Product & Package Information

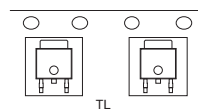
- Package : TP
- JEITA, JEDEC : SC-64, TO-251
- Minimum Packing Quantity : 500 pcs./bag

### Marking (TP, TP-FA)

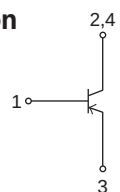


- Package : TP-FA
- JEITA, JEDEC : SC-63, TO-252
- Minimum Packing Quantity : 700 pcs./reel

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



### Electrical Connection



## 2SB1204

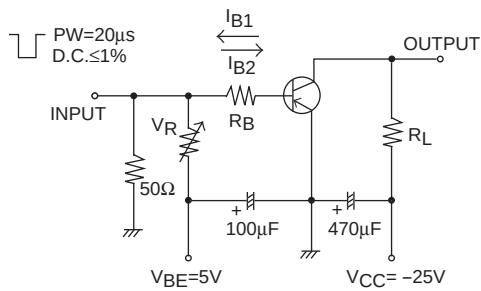
### Electrical Characteristics at Ta=25°C

| Parameter                               | Symbol        | Conditions                    | Ratings |       |      | Unit    |
|-----------------------------------------|---------------|-------------------------------|---------|-------|------|---------|
|                                         |               |                               | min     | typ   | max  |         |
| Collector Cutoff Current                | $I_{CBO}$     | $V_{CB} = -40V, I_E = 0A$     |         |       | -1   | $\mu A$ |
| Emitter Cutoff Current                  | $I_{EBO}$     | $V_{EB} = -4V, I_C = 0A$      |         |       | -1   | $\mu A$ |
| DC Current Gain                         | $h_{FE1}$     | $V_{CE} = -2V, I_C = -0.5A$   | 70*     |       | 400* |         |
|                                         | $h_{FE2}$     | $V_{CE} = -2V, I_C = -6A$     | 35      |       |      |         |
| Gain-Bandwidth Product                  | $f_T$         | $V_{CE} = -5V, I_C = -1A$     |         | 130   |      | MHz     |
| Output Capacitance                      | $C_{ob}$      | $V_{CB} = -10V, f = 1MHz$     |         | 95    |      | pF      |
| Collector-to-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C = -4A, I_B = -0.2A$      |         | -250  | -500 | mV      |
| Base-to-Emitter Saturation Voltage      | $V_{BE(sat)}$ | $I_C = -4A, I_B = -0.2A$      |         | -0.95 | -1.3 | V       |
| Collector-to-Base Breakdown Voltage     | $V_{(BR)CBO}$ | $I_C = -10\mu A, I_E = 0A$    | -60     |       |      | V       |
| Collector-to-Emitter Breakdown Voltage  | $V_{(BR)CEO}$ | $I_C = -1mA, R_{BE} = \infty$ | -50     |       |      | V       |
| Emitter-to-Base Breakdown Voltage       | $V_{(BR)EBO}$ | $I_E = -10\mu A, I_C = 0A$    | -6      |       |      | V       |
| Turn-On Time                            | $t_{on}$      | See specified Test Circuit    |         | 50    |      | ns      |
| Storage Time                            | $t_{stg}$     |                               |         | 450   |      | ns      |
| Fall Time                               | $t_f$         |                               |         | 20    |      | ns      |

\* : The 2SB1204 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 |

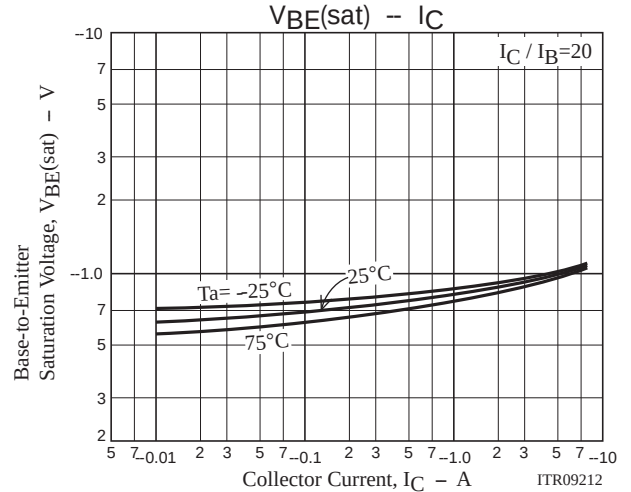
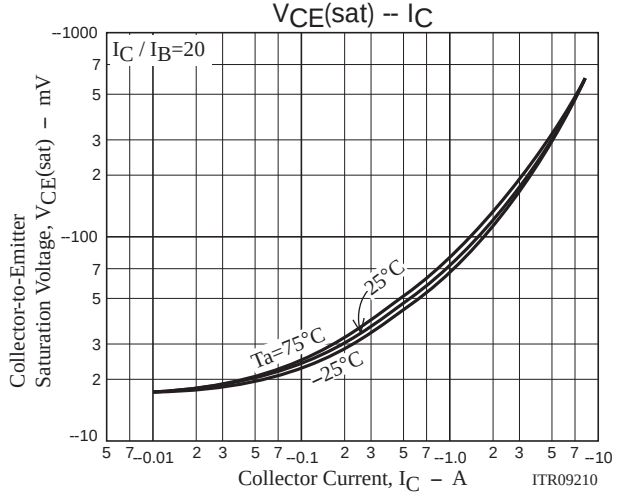
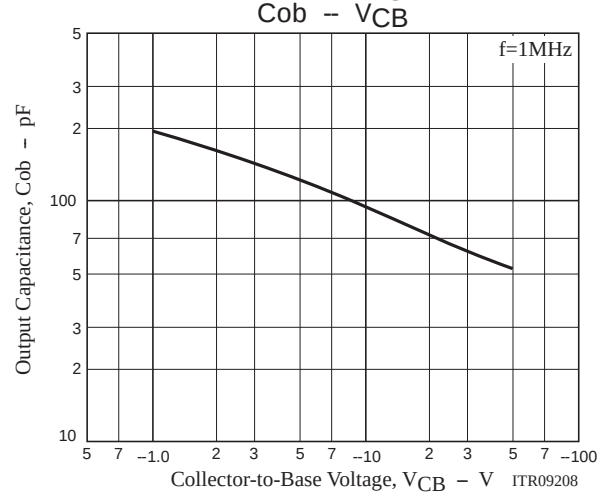
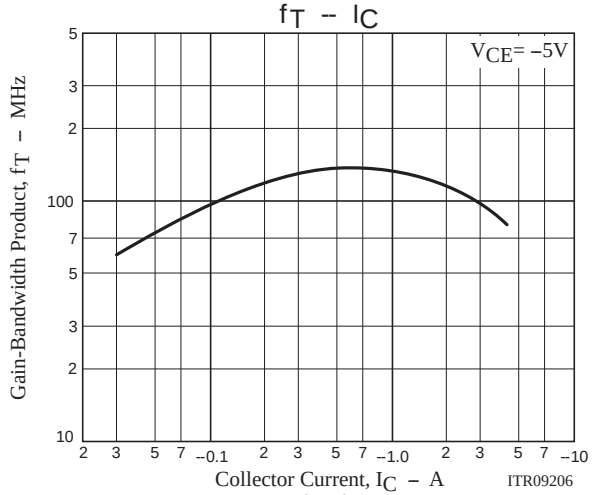
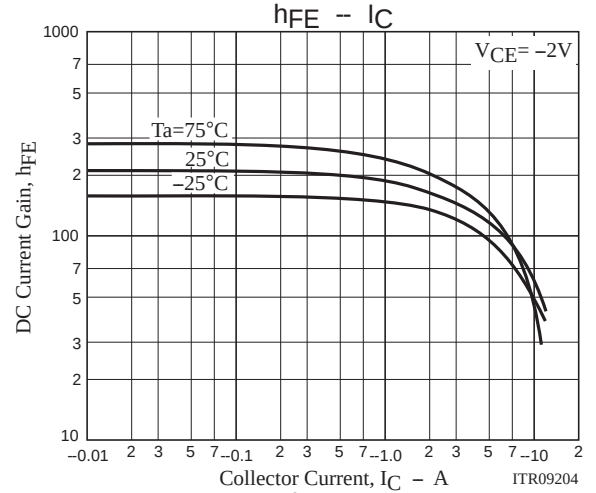
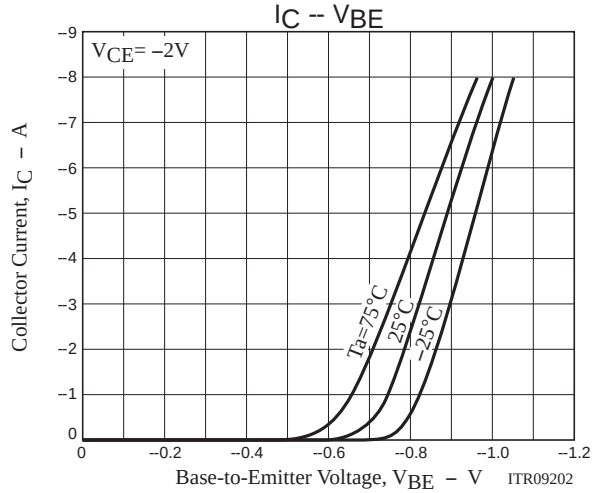
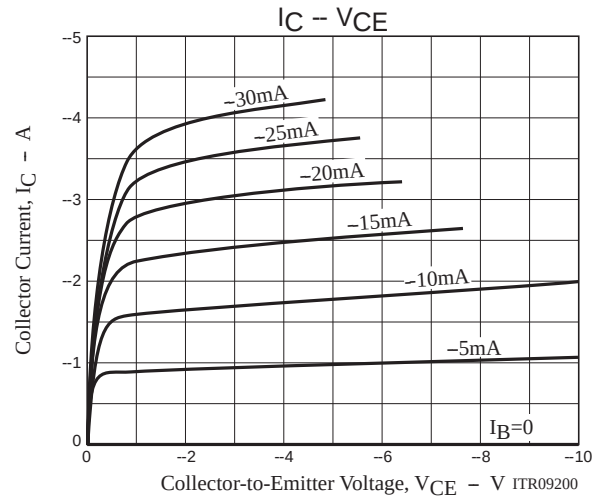
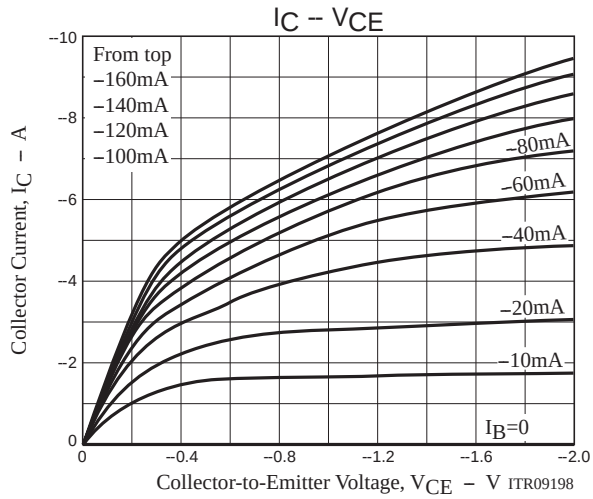
### Switching Time Test Circuit

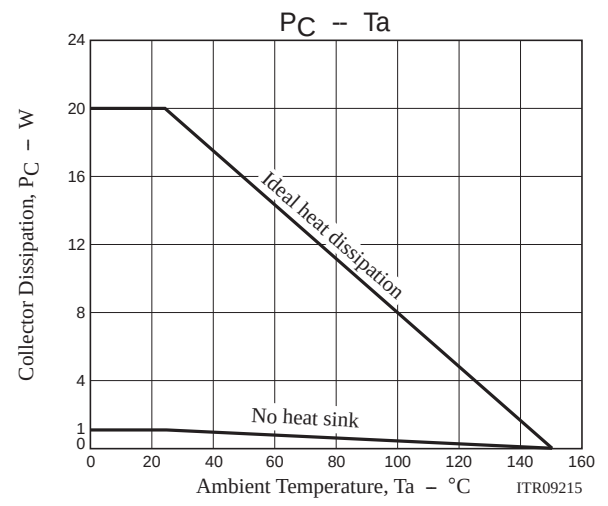
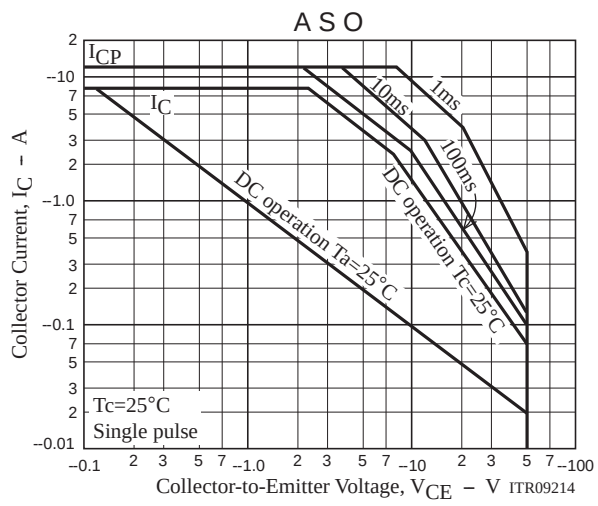


$$I_C = -10I_{B1} = 10I_{B2} = -4A$$

### Ordering Information

| Device        | Package | Shipping     | memo    |
|---------------|---------|--------------|---------|
| 2SB1204S-E    | TP      | 500pcs./bag  | Pb Free |
| 2SB1204T-E    | TP      | 500pcs./bag  |         |
| 2SB1204S-TL-E | TP-FA   | 700pcs./reel |         |
| 2SB1204T-TL-E | TP-FA   | 700pcs./reel |         |





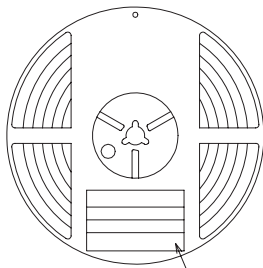
# Taping Specification

2SB1204S-TL-E, 2SB1204T-TL-E

## 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



Reel label

Type No.  
LOT No.  
Quantity  
Origin

Reel label, Inner box label  
(unit:mm)

|                                |                       |
|--------------------------------|-----------------------|
| (P) TYPE                       | 00000000              |
| (1) LOT                        | 00                    |
| (Q) QTY                        | 0,000 (1) LEAD FREE * |
| (Z) SPECIAL                    | *20722005310C*        |
| ASSEMBLY:**** (DIFFUSION:****) |                       |

Outer box label

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

|                                |                           |
|--------------------------------|---------------------------|
| TYPE CODE                      |                           |
| TYPE                           | ○○○○○○○○                  |
| QTY                            | 0,000 PCS (1) LEAD FREE * |
| LOT                            | ○○○○○○○○                  |
| PACKAGE                        | ○○○○○○○○                  |
| SPECIAL                        |                           |
| ASSEMBLY:**** (DIFFUSION:****) |                           |

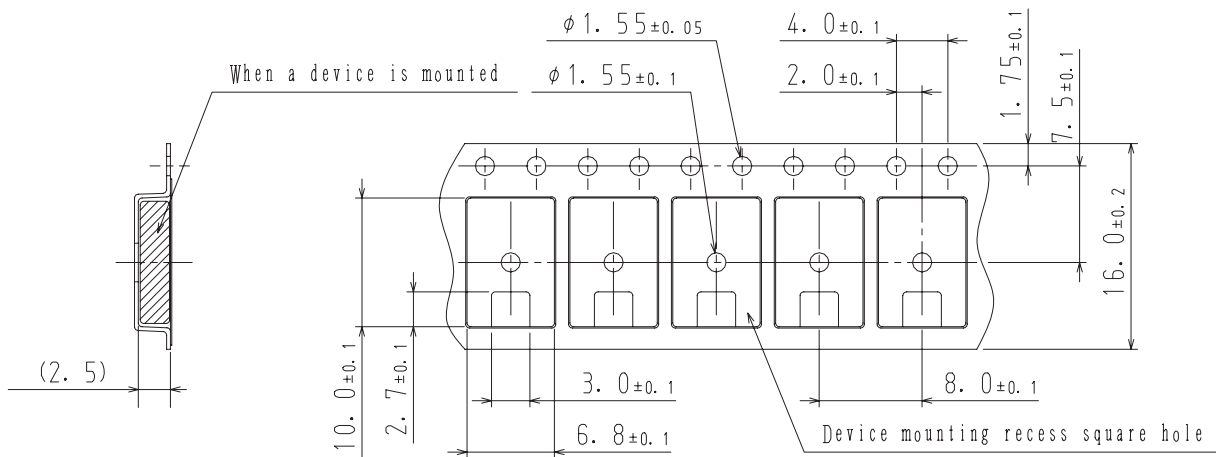
NOTE (1)

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

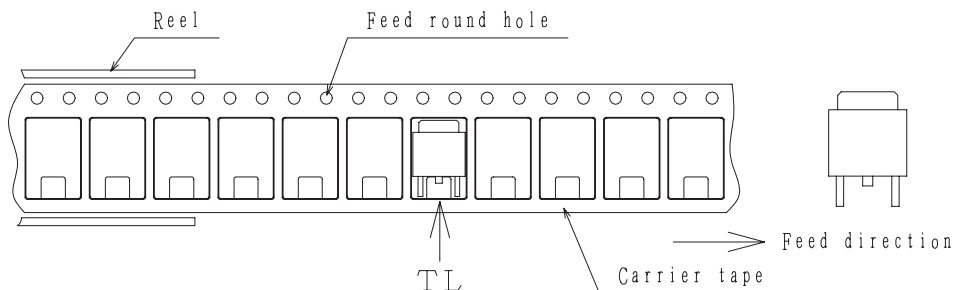
| Label       | JEITA Phase    |
|-------------|----------------|
| LEAD FREE 3 | JEITA Phase 3A |
| LEAD FREE 4 | JEITA Phase 3  |

## Taping configuration

### 1. Carrier tape size (unit:mm)



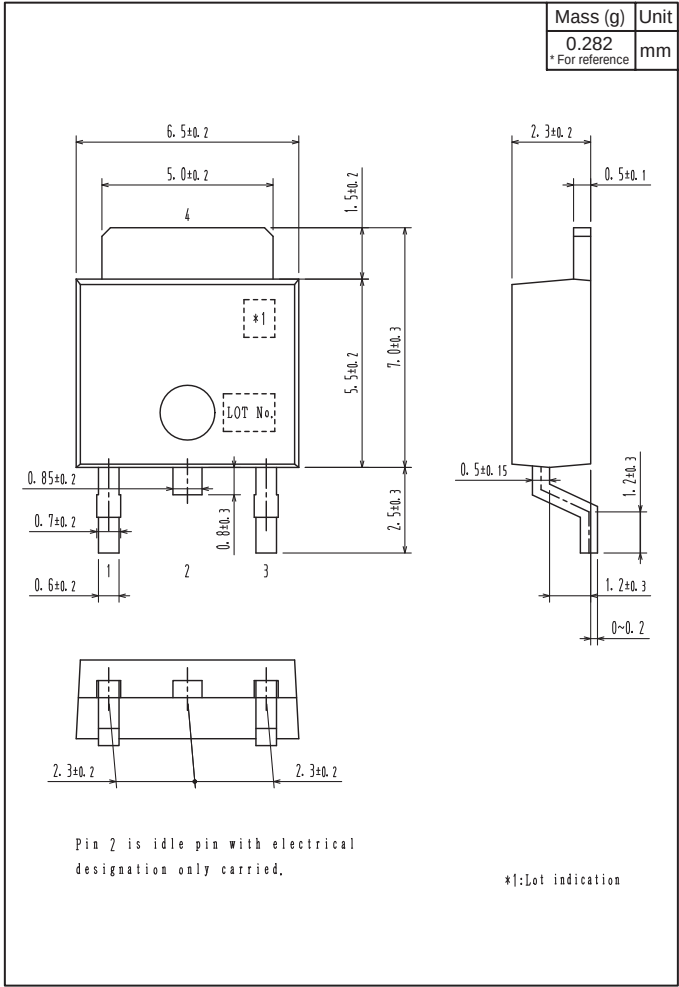
### 2. Device placement direction



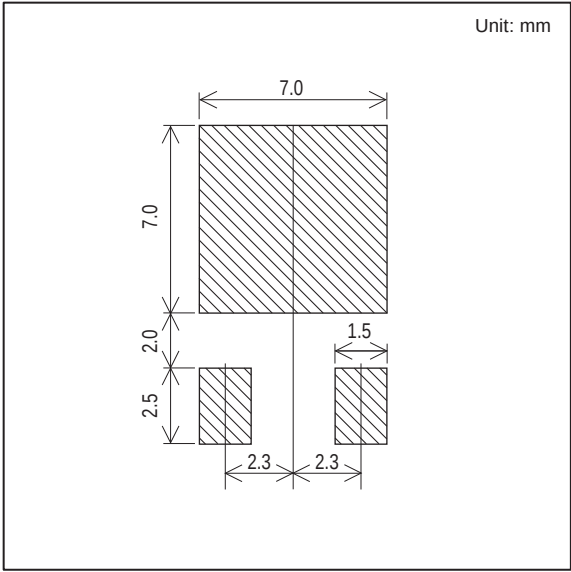
Those with one electrode terminal on the feed hole side.....TL

Outline Drawing

2SB1204S-TL-E, 2SB1204T-TL-E



Land Pattern Example

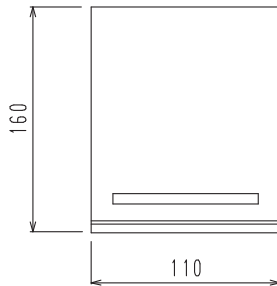


**Bag Packing Specification**

2SB1204S-E, 2SB1204T-E

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)

|            |                                                                 |    |
|------------|-----------------------------------------------------------------|----|
| Type No. → | (P) TYPE 0000000000                                             | 43 |
| LOT No. →  | (1) LOT 00                                                      |    |
| Quantity → | (Q) QTY 0,000 (1) LEAD FREE *                                   |    |
| Origin →   | (2) SPECIAL<br>*20722005310C*<br>ASSEMBLY:**** (DIFFUSION:****) |    |

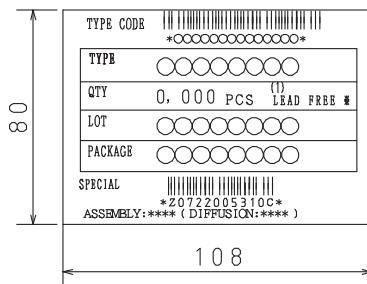
4. Outer box label  
(unit:mm)

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

NOTE (1)

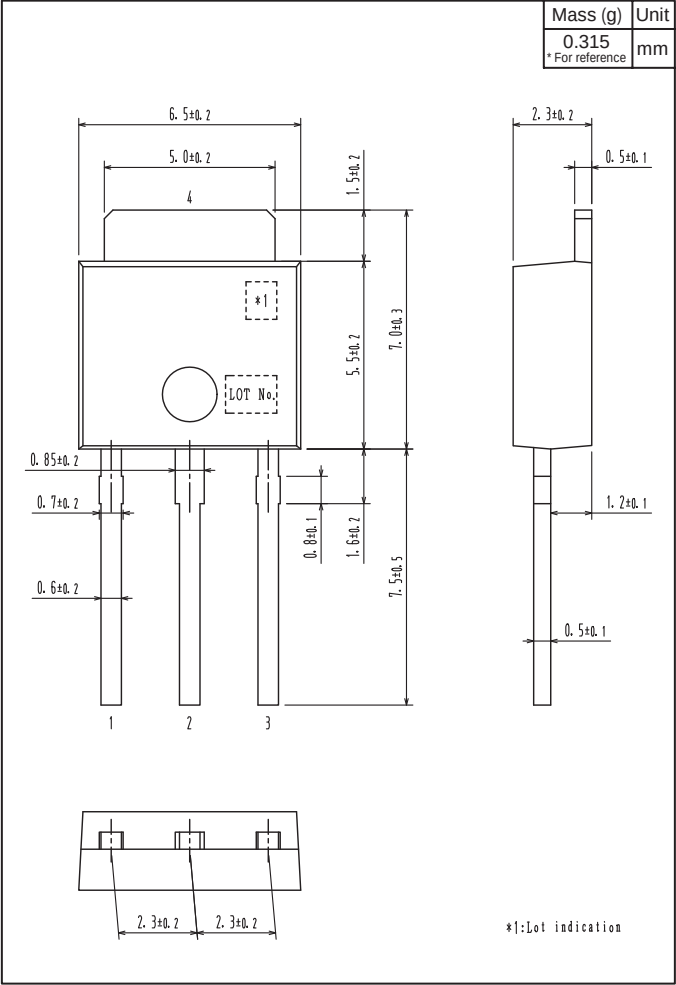
The LEAD FREE \* description shows that the  
surface treatment of the terminal is lead free.

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



Outline Drawing

2SB1204S-E, 2SB1204T-E





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