



SANYO Semiconductors

## DATA SHEET

An ON Semiconductor Company

# 2SA1418/2SC3648 — High-Voltage Switching, Preriver Applications

PNP / NPN Epitaxial Planar Silicon Transistor

## Applicaitions

- Color TV audio output, inverter

## Features

- Adoption of FBET, MBIT processes
- Fast switching speed
- Ultrasmall size making it easy to provide high-density, small-sized hybrid IC's
- High breakdown voltage and large current capacity

## Specifications ( ) : 2SA1418

Absolute Maximum Ratings at Ta=25°C

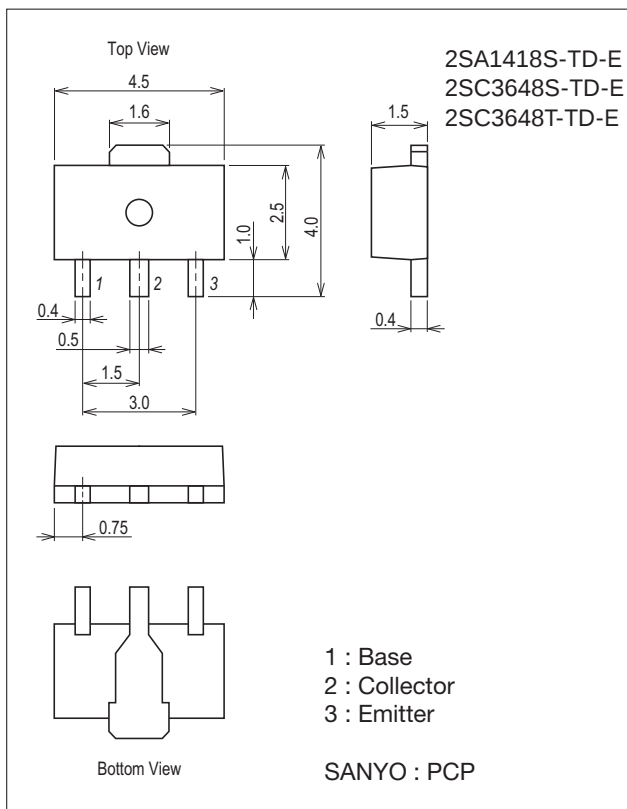
| Parameter                    | Symbol           | Conditions | Ratings | Unit |
|------------------------------|------------------|------------|---------|------|
| Collector-to-Base Voltage    | V <sub>CB0</sub> |            | (-)180  | V    |
| Collector-to-Emitter Voltage | V <sub>CEO</sub> |            | (-)160  | V    |
| Emitter-to-Base Voltage      | V <sub>EB0</sub> |            | (-)6    | V    |
| Collector Current            | I <sub>C</sub>   |            | (-)0.7  | A    |
| Collector Current (Pulse)    | I <sub>CP</sub>  |            | (-)1.5  | A    |

Continued on next page.

## Package Dimensions

unit : mm (typ)

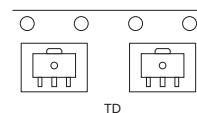
7007B-004



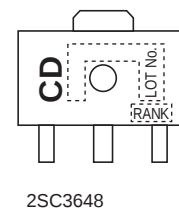
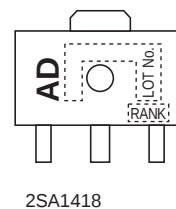
## Product & Package Information

- Package : PCP
- JEITA, JEDEC : SC-62, SOT-89, TO-243
- Minimum Packing Quantity : 1,000 pcs./reel

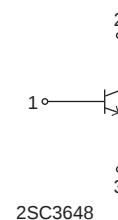
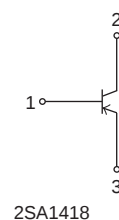
## Packing Type: TD



## Marking



## Electrical Connection



SANYO Semiconductor Co., Ltd.

<http://www.sanyosemi.com/en/network/>

## 2SA1418 / 2SC3648

Continued from preceding page.

| Parameter             | Symbol    | Conditions                                                    | Ratings     | Unit |
|-----------------------|-----------|---------------------------------------------------------------|-------------|------|
| Collector Dissipation | $P_C$     |                                                               | 500         | mW   |
|                       |           | When mounted on ceramic substrate (250mm <sup>2</sup> ×0.8mm) | 1.3         | W    |
| Junction Temperature  | $T_j$     |                                                               | 150         | °C   |
| Storage Temperature   | $T_{stg}$ |                                                               | -55 to +150 | °C   |

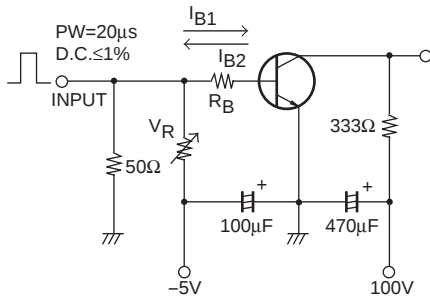
### Electrical Characteristics at $T_a=25^{\circ}\text{C}$

| Parameter                               | Symbol        | Conditions                                    | Ratings |            |           | Unit          |
|-----------------------------------------|---------------|-----------------------------------------------|---------|------------|-----------|---------------|
|                                         |               |                                               | min     | typ        | max       |               |
| Collector Cutoff Current                | $I_{CBO}$     | $V_{CB}=(-)120\text{V}$ , $I_E=0\text{A}$     |         |            | (-)0.1    | $\mu\text{A}$ |
| Emitter Cutoff Current                  | $I_{EBO}$     | $V_{EB}=(-)4\text{V}$ , $I_C=0\text{A}$       |         |            | (-)0.1    | $\mu\text{A}$ |
| DC Current Gain                         | $h_{FE1}$     | $V_{CE}=(-)5\text{V}$ , $I_C=(-)100\text{mA}$ | 100*    |            | 400*      |               |
|                                         | $h_{FE2}$     | $V_{CE}=(-)5\text{V}$ , $I_C=(-)10\text{mA}$  | 90      |            |           |               |
| Gain-Bandwidth Product                  | $f_T$         | $V_{CE}=(-)10\text{V}$ , $I_C=(-)50\text{mA}$ |         | 120        |           | MHz           |
| Output Capacitance                      | $C_{ob}$      | $V_{CB}=(-)10\text{V}$ , $f=1\text{MHz}$      |         | (11)8      |           | pF            |
| Collector-to-Emitter Saturation Voltage | $V_{CE(sat)}$ | $I_C=(-)250\text{mA}$ , $I_B=(-)25\text{mA}$  |         | (-0.2)0.12 | (-0.5)0.4 | V             |
| Base-to-Emitter Saturation Voltage      | $V_{BE(sat)}$ | $I_C=(-)250\text{mA}$ , $I_B=(-)25\text{mA}$  |         | (-)0.85    | (-)1.2    | V             |
| Collector-to-Base Breakdown Voltage     | $V_{(BR)CBO}$ | $I_C=(-)10\mu\text{A}$ , $I_E=0\text{A}$      | (-)180  |            |           | V             |
| Collector-to-Emitter Breakdown Voltage  | $V_{(BR)CEO}$ | $I_C=(-)1\text{mA}$ , $R_{BE}=\infty$         | (-)160  |            |           | 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.                   |         | (60)50     |           | ns            |
| Storage Time                            | $t_{stg}$     |                                               |         | (900)1000  |           | ns            |
| Fall Time                               | $t_f$         |                                               |         | (60)60     |           | ns            |

\* : The 2SA1418 / 2SC3648 are classified by 100mA  $h_{FE}$  as follows :

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

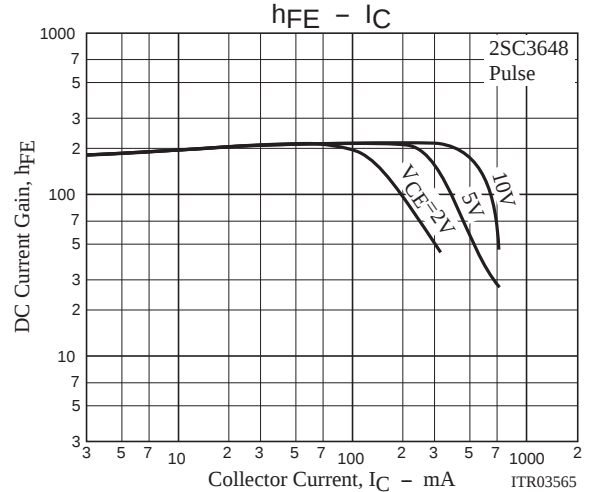
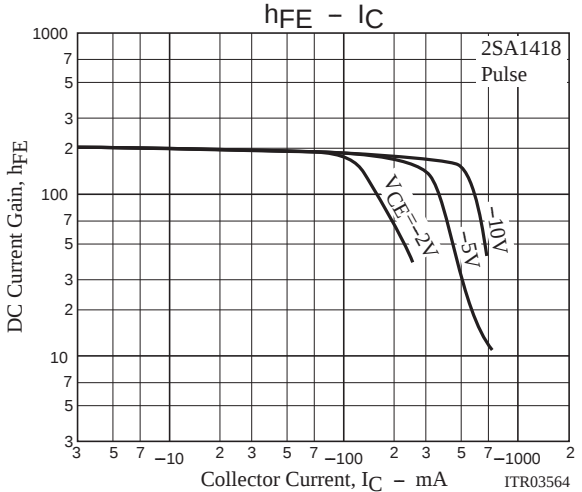
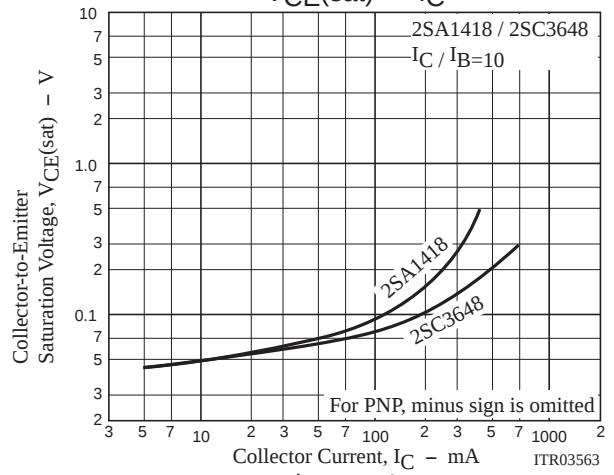
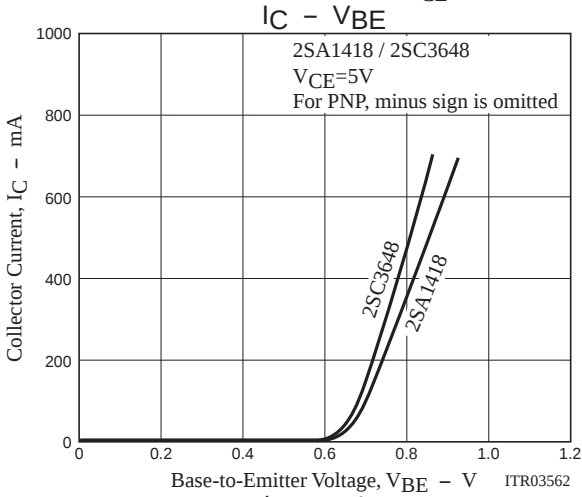
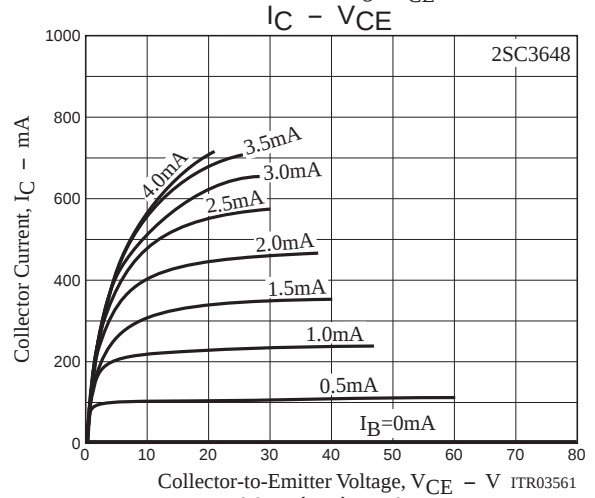
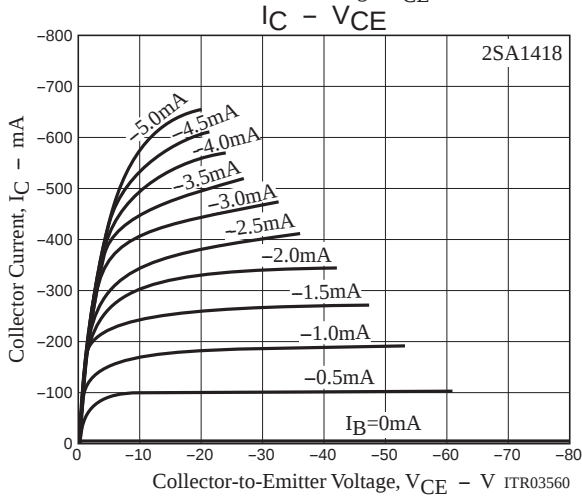
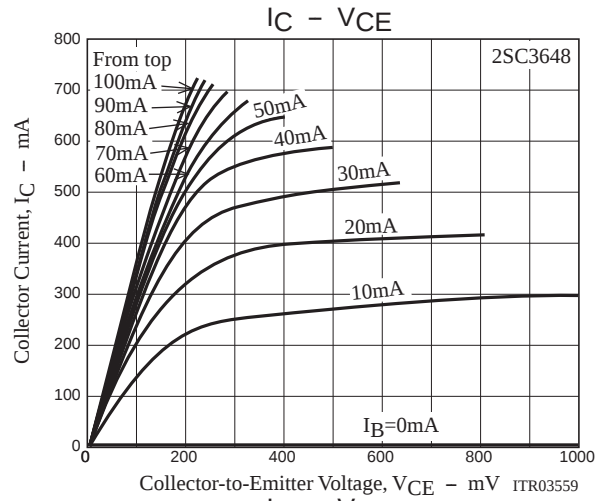
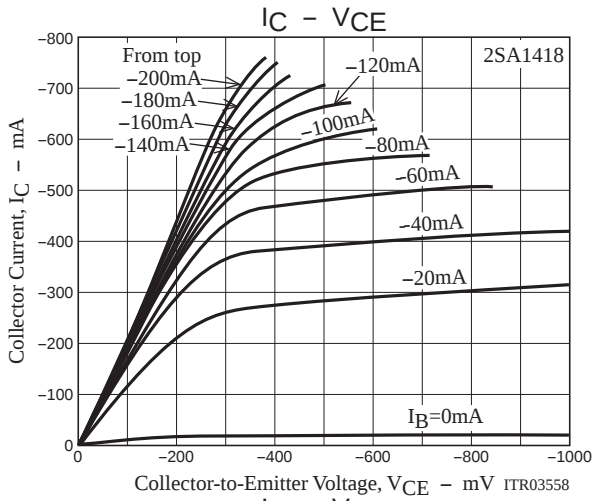
### Switching Time Test Circuit

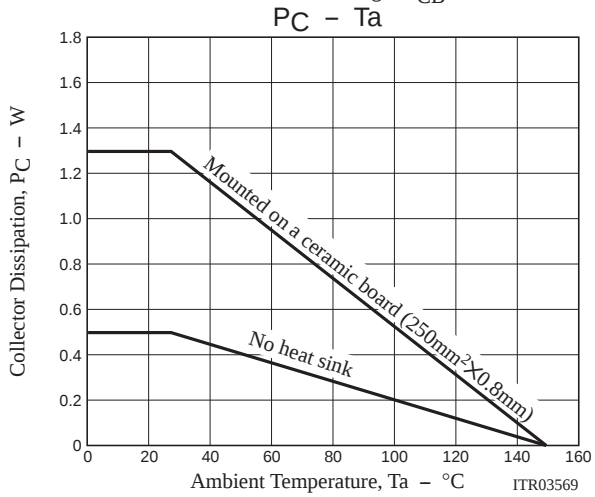
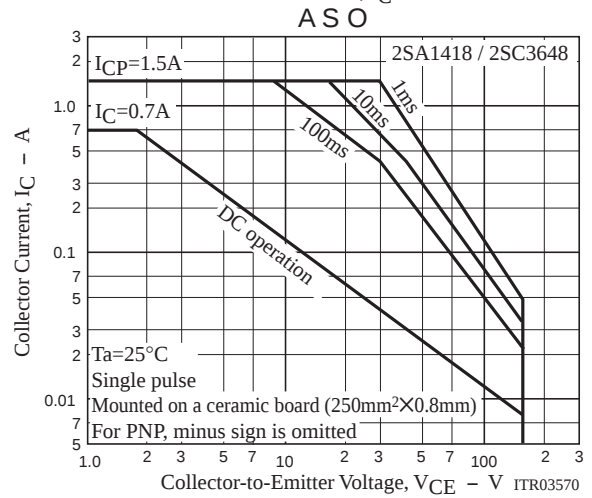
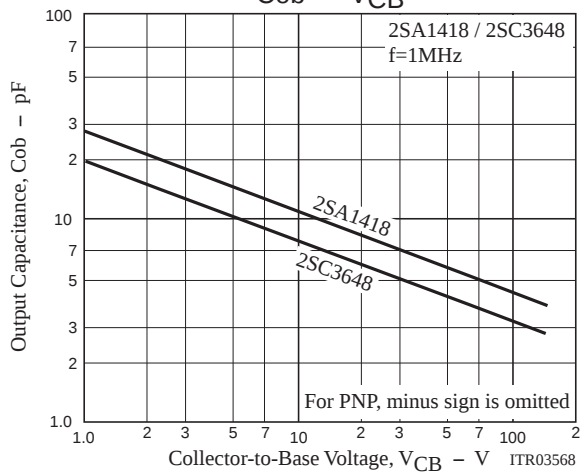
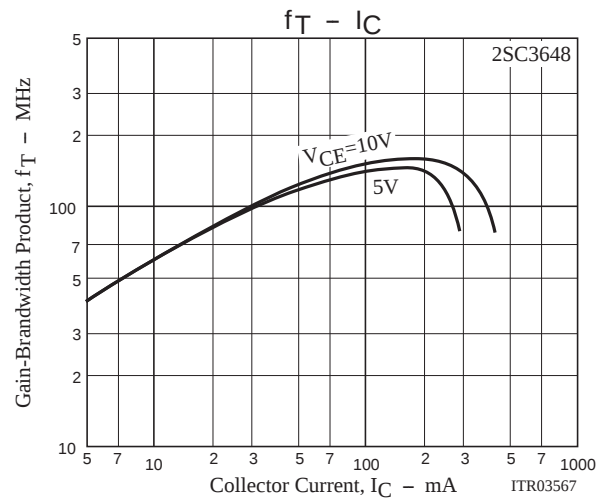
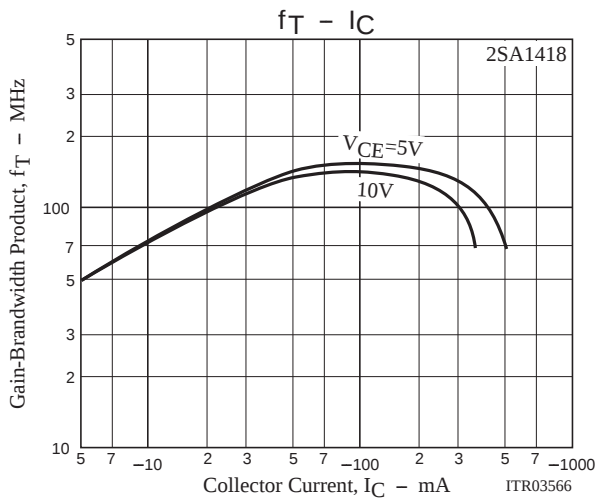


$I_C=20I_{B1}=-20I_{B2}=300\text{mA}$   
(For PNP, the polarity is reversed)

### Ordering Information

| Device        | Package | Shipping       | memo    |
|---------------|---------|----------------|---------|
| 2SA1418S-TD-E | PCP     | 1,000pcs./reel | Pb Free |
| 2SC3648S-TD-E | PCP     | 1,000pcs./reel |         |
| 2SC3648T-TD-E | PCP     | 1,000pcs./reel |         |



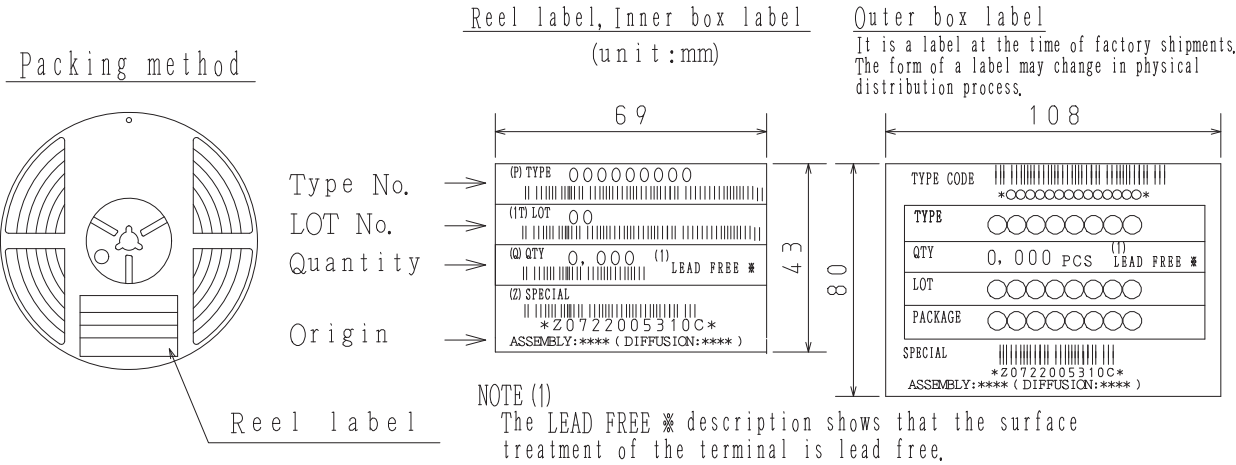


Bag Packing Specification

2SA1418S-TD-E, 2SC3648S-TD-E, 2SC3648T-TD-E

1. Packing Format

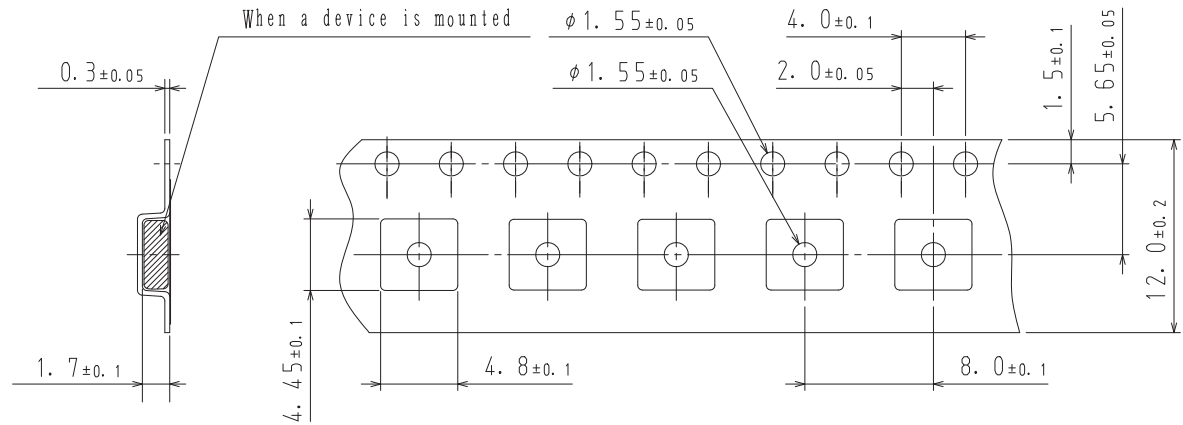
| Package Name | Carrier Tape Type | Maximum Number of devices contained (pcs) |           |           | Packing format                                              |                                                                    |
|--------------|-------------------|-------------------------------------------|-----------|-----------|-------------------------------------------------------------|--------------------------------------------------------------------|
|              |                   | Reel                                      | Inner box | Outer box | Inner BOX (C-1)                                             | Outer BOX (A-7)                                                    |
| PCP          | PCP               | 1,000                                     | 4,000     | 24,000    | 4 reels contained<br>Dimensions:mm (external)<br>183×72×185 | 6 inner boxes contained<br>Dimensions:mm (external)<br>440×195×210 |



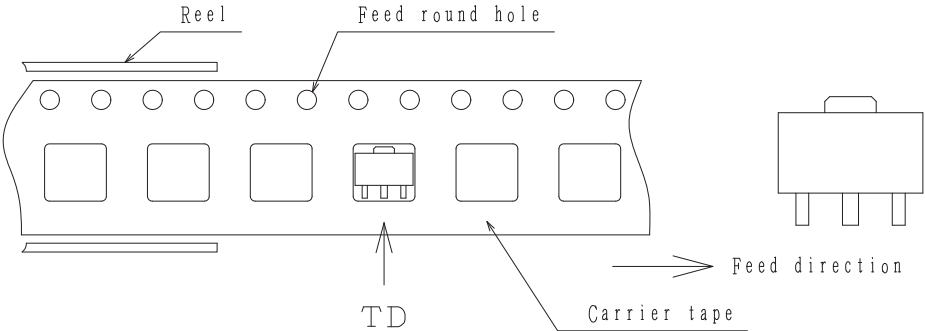
| Label       | JEITA Phase    |
|-------------|----------------|
| LEAD FREE 3 | JEITA Phase 3A |
| LEAD FREE 4 | JEITA Phase 3  |

2. Taping configuration

2-1. Carrier tape size (unit:mm)



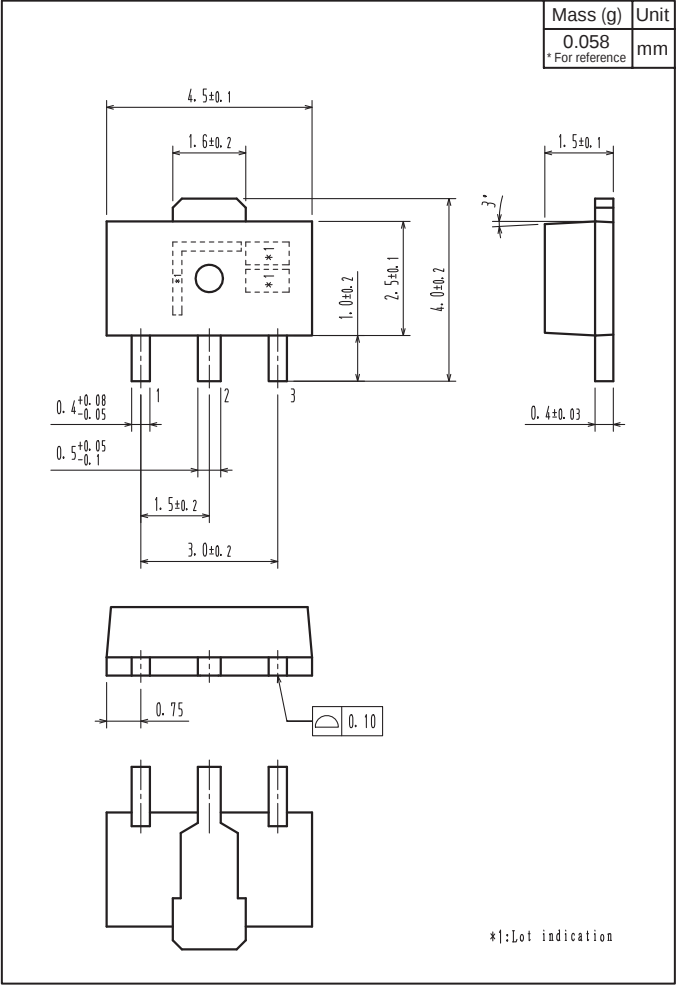
2-2. Device placement direction



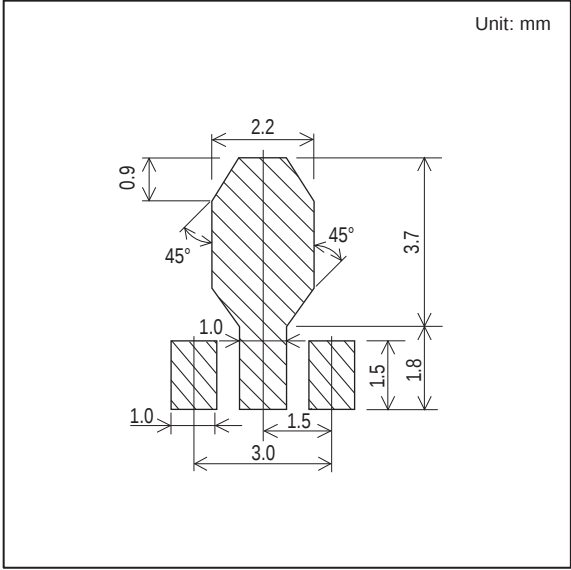
Those with pin 1 index on the feed hole side.....TD

Outline Drawing

2SA1418S-TD-E, 2SC3648S-TD-E, 2SC3648T-TD-E



Land Pattern Example



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