



SANYO Semiconductors

## DATA SHEET

An ON Semiconductor Company

# 2SA2016/2SC5569 — PNP / NPN Epitaxial Planar Silicon Transistor

## DC / DC Converter Applications

### Applicaitions

- Relay drivers, lamp drivers, motor drivers, flash

### Features

- Adoption of FBET and MBIT processes
- Low collector-to-emitter saturation voltage
- Ultrasmall package facilitates miniaturization in end products
- High allowable power dissipation
- Large current capacity
- High-speed switching

( )2SA2016

### Specifications

Absolute Maximum Ratings at Ta=25°C

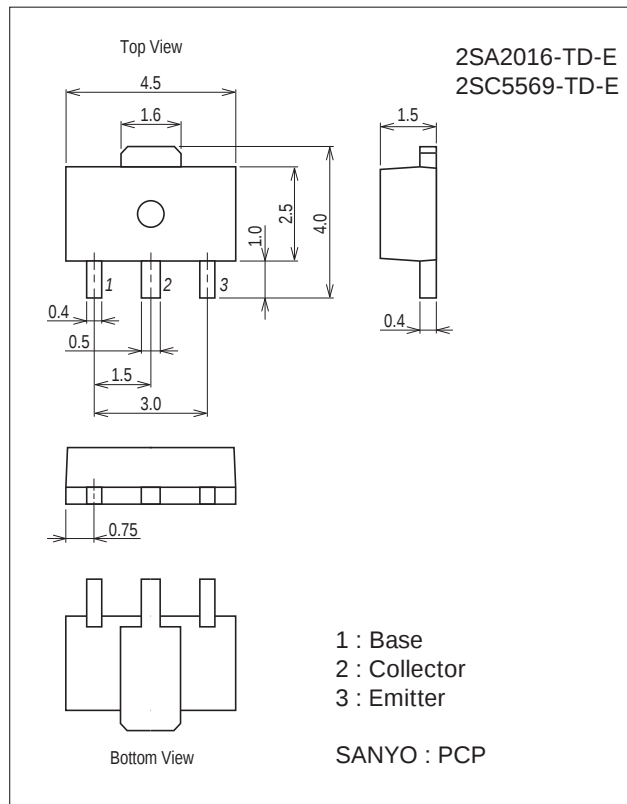
| Parameter                    | Symbol           | Conditions | Ratings  | Unit |
|------------------------------|------------------|------------|----------|------|
| Collector-to-Base Voltage    | V <sub>CBO</sub> |            | (-50)100 | V    |
| Collector-to-Emitter Voltage | V <sub>CES</sub> |            | (-50)100 | V    |
| Collector-to-Emitter Voltage | V <sub>CEO</sub> |            | (-)50    | V    |
| Emitter-to-Base Voltage      | V <sub>EBO</sub> |            | (-)6     | V    |

Continued on next page.

### Package Dimensions

unit : mm (typ)

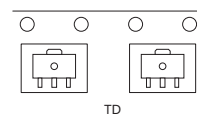
7008B-003



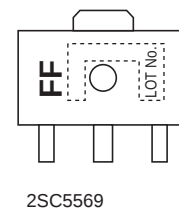
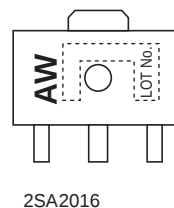
### Product & Package Information

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

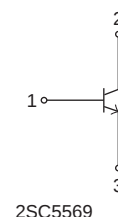
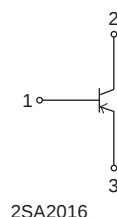
### Packing Type: TD



### Marking



### Electrical Connection



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

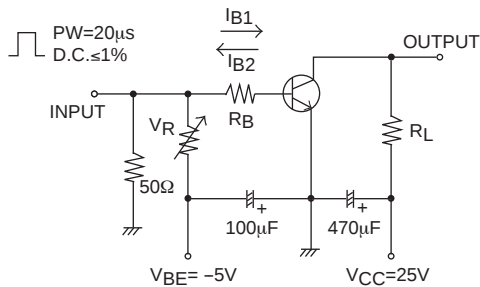
Continued from preceding page.

| Parameter                 | Symbol    | Conditions                                                    | Ratings     | Unit               |
|---------------------------|-----------|---------------------------------------------------------------|-------------|--------------------|
| Collector Current         | $I_C$     |                                                               | (-)7        | A                  |
| Collector Current (Pulse) | $I_{CP}$  |                                                               | (-)10       | A                  |
| Base Current              | $I_B$     |                                                               | (-)1.2      | A                  |
| Collector Dissipation     | $P_C$     | When mounted on ceramic substrate (250mm <sup>2</sup> ×0.8mm) | 1.3         | W                  |
|                           |           | $T_c=25^{\circ}\text{C}$                                      | 3.5         | 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                | $I_{CBO}$      | $V_{CB}=(-)40\text{V}$ , $I_E=0\text{A}$       |          |           | (-)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                         | $h_{FE}$       | $V_{CE}=(-)2\text{V}$ , $I_C=(-)500\text{mA}$  | 200      |           | 560       |               |
| Gain-Bandwidth Product                  | $f_T$          | $V_{CE}=(-)10\text{V}$ , $I_C=(-)500\text{mA}$ |          | (290)330  |           | MHz           |
| Output Capacitance                      | $C_{ob}$       | $V_{CB}=(-)10\text{V}$ , $f=1\text{MHz}$       |          | (50)28    |           | pF            |
| Collector-to-Emitter Saturation Voltage | $V_{CE(sat)1}$ | $I_C=(-)3.5\text{A}$ , $I_B=(-)175\text{mA}$   |          | (-230)160 | (-390)240 | mV            |
|                                         | $V_{CE(sat)2}$ | $I_C=(-)2\text{A}$ , $I_B=(-)40\text{mA}$      |          | (-240)110 | (-400)170 | mV            |
| Base-to-Emitter Saturation Voltage      | $V_{BE(sat)}$  | $I_C=(-)2\text{A}$ , $I_B=(-)40\text{mA}$      |          | (-)0.83   | (-)1.2    | V             |
| Collector-to-Base Breakdown Voltage     | $V_{(BR)CBO}$  | $I_C=(-)10\mu\text{A}$ , $I_E=0\text{A}$       | (-50)100 |           |           | V             |
| Collector-to-Emitter Breakdown Voltage  | $V_{(BR)CES}$  | $I_C=(-)100\mu\text{A}$ , $R_{BE}=0\Omega$     | (-50)100 |           |           | 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.                    |          | (40)30    |           | ns            |
| Storage Time                            | $t_{stg}$      |                                                |          | (225)420  |           | ns            |
| Fall Time                               | $t_f$          |                                                |          | 25        |           | ns            |

### Switching Time Test Circuit

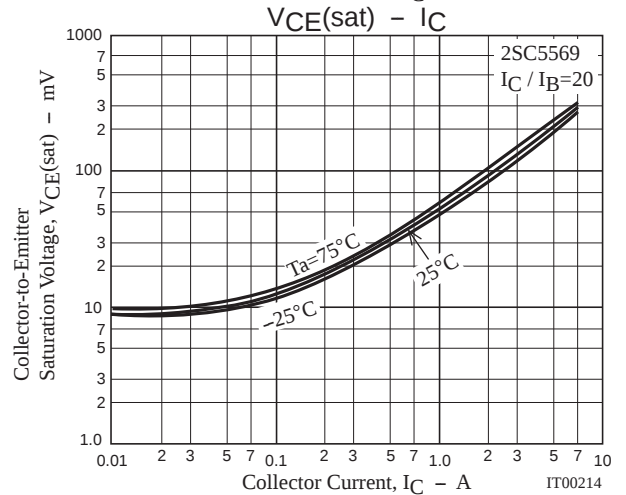
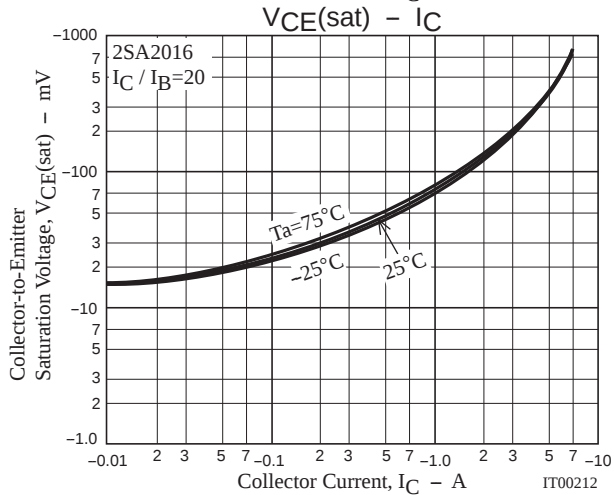
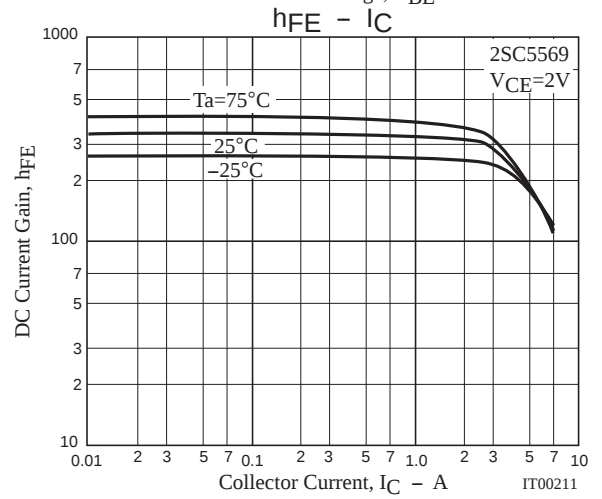
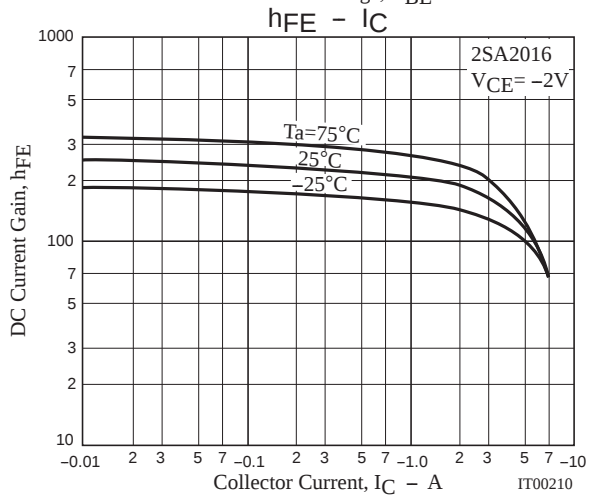
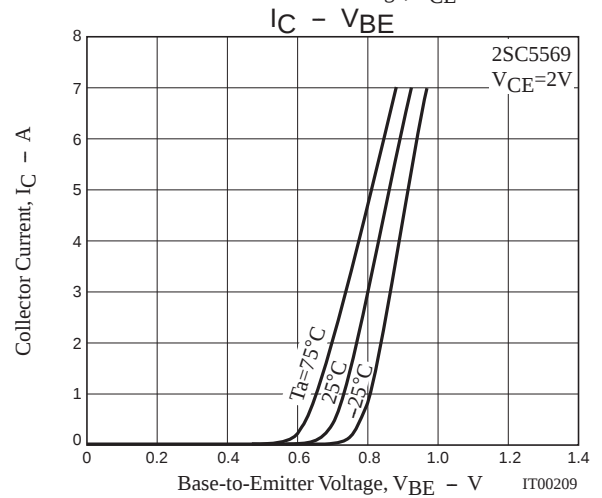
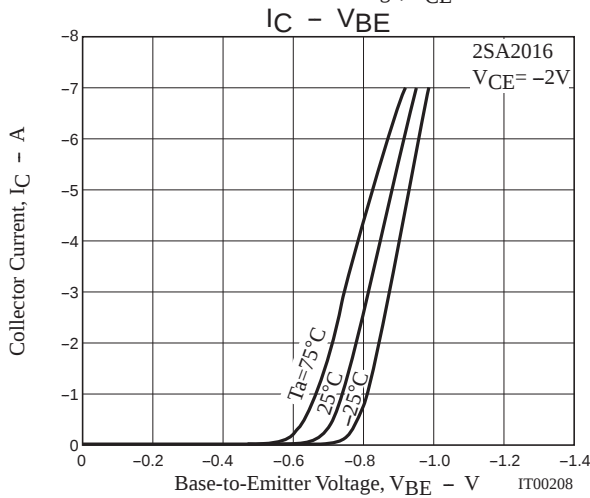
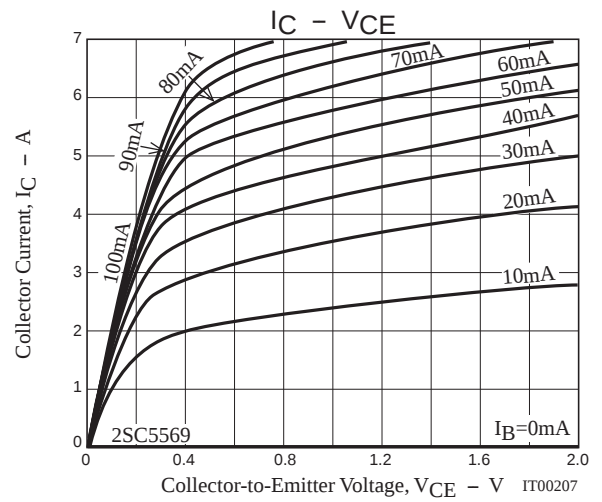
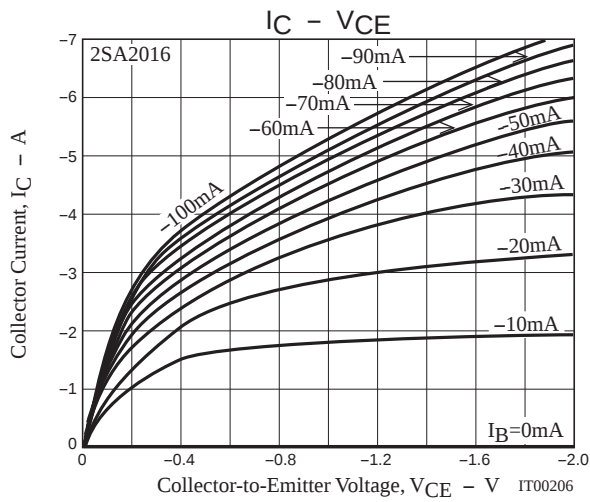


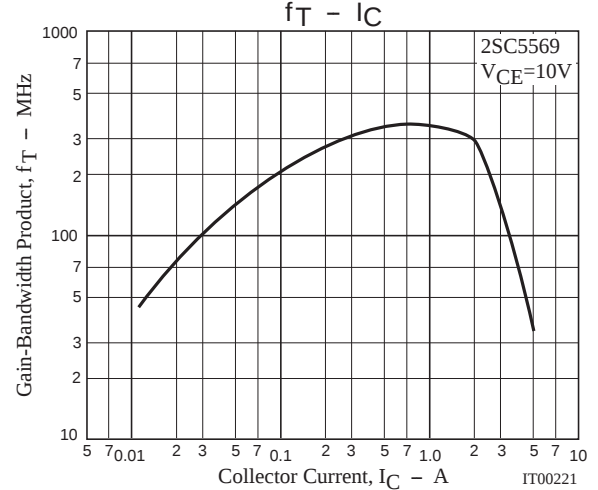
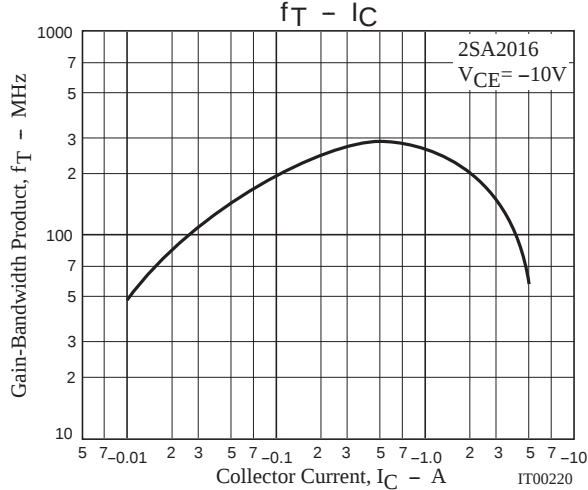
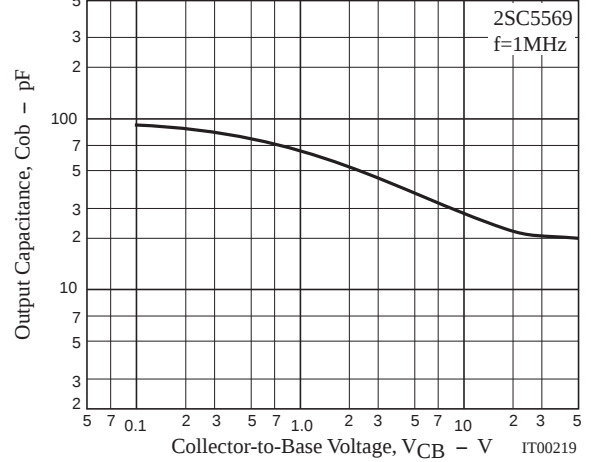
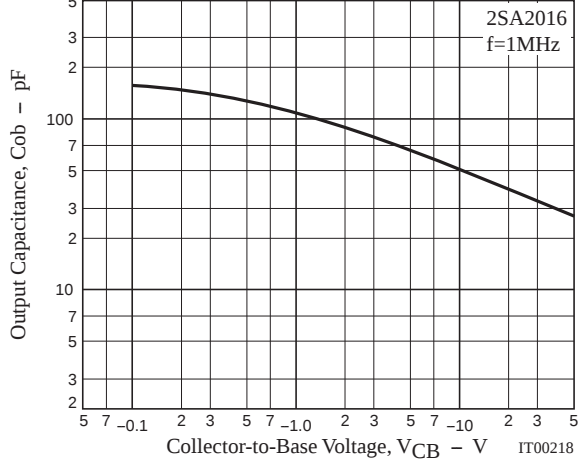
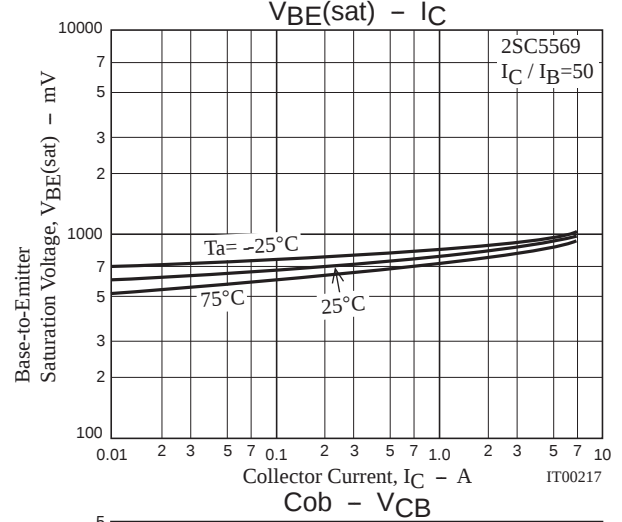
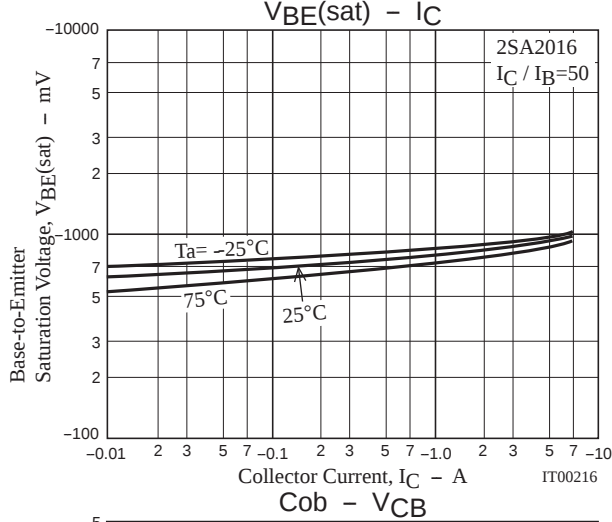
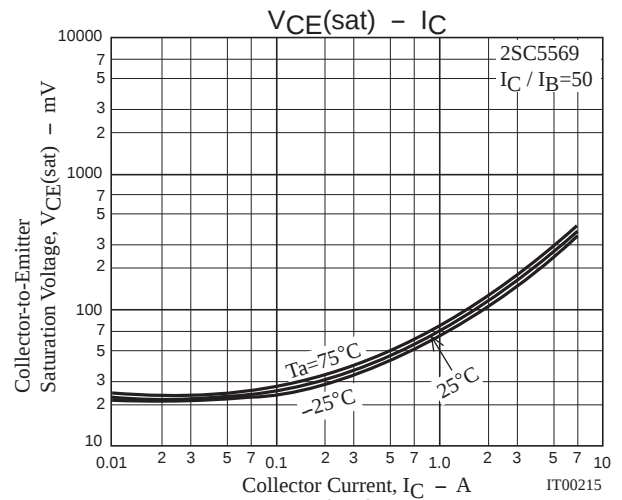
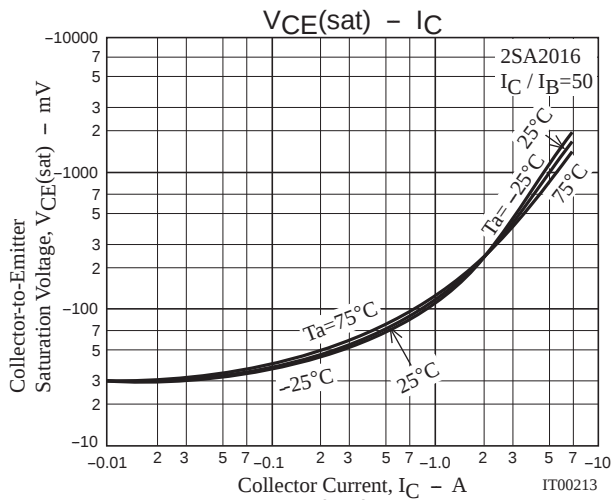
$$I_C=20I_{B1}=-20I_{B2}=2.5\text{A}$$

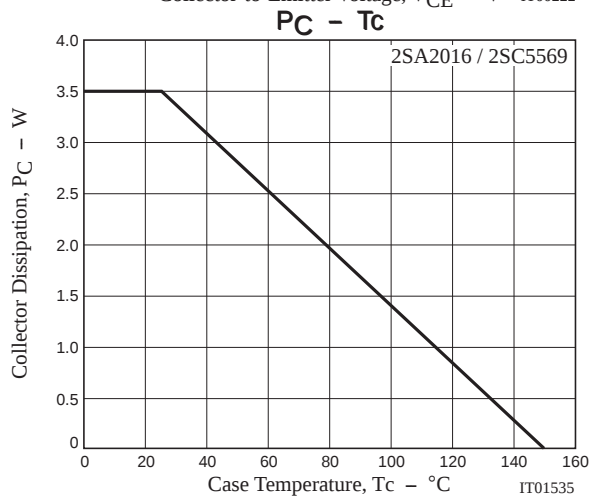
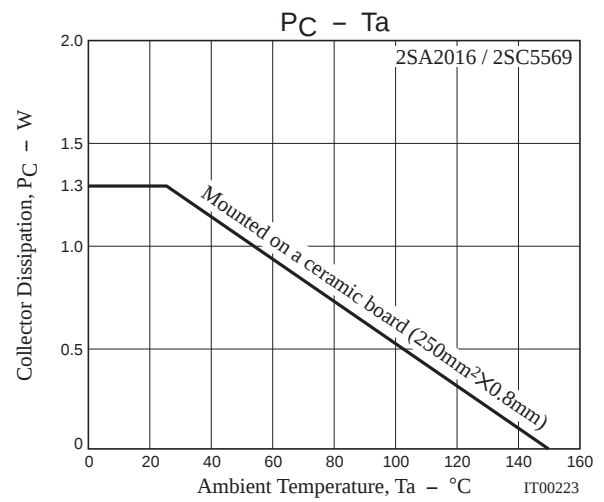
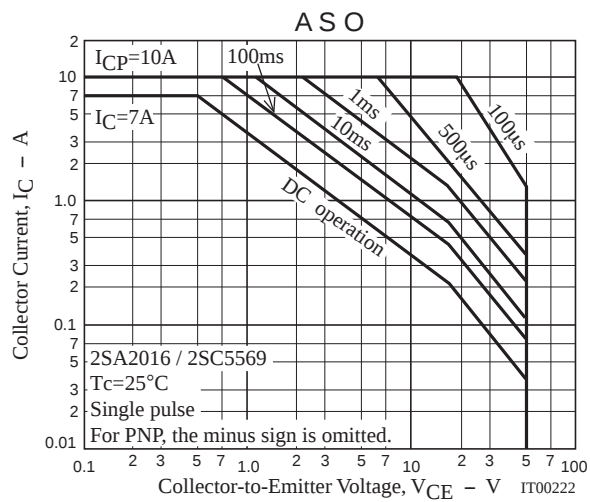
For PNP, the polarity is reversed.

### Ordering Information

| Device       | Package | Shipping       | memo    |
|--------------|---------|----------------|---------|
| 2SA2016-TD-E | PCP     | 1,000pcs./reel | Pb Free |
| 2SC5569-TD-E | PCP     | 1,000pcs./reel |         |





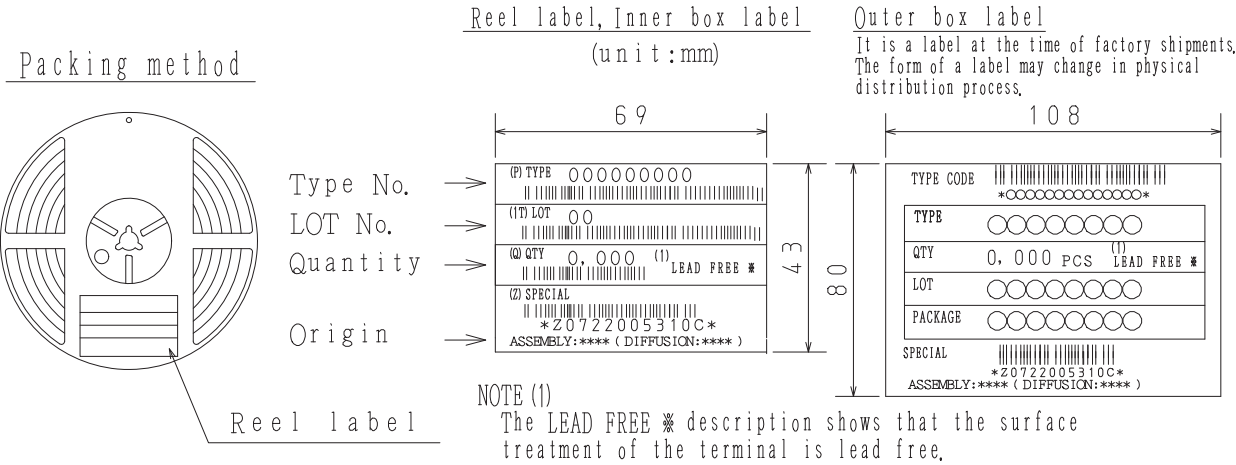


Bag Packing Specification

2SA2016-TD-E, 2SC5569-TD-E

1. Packing Format

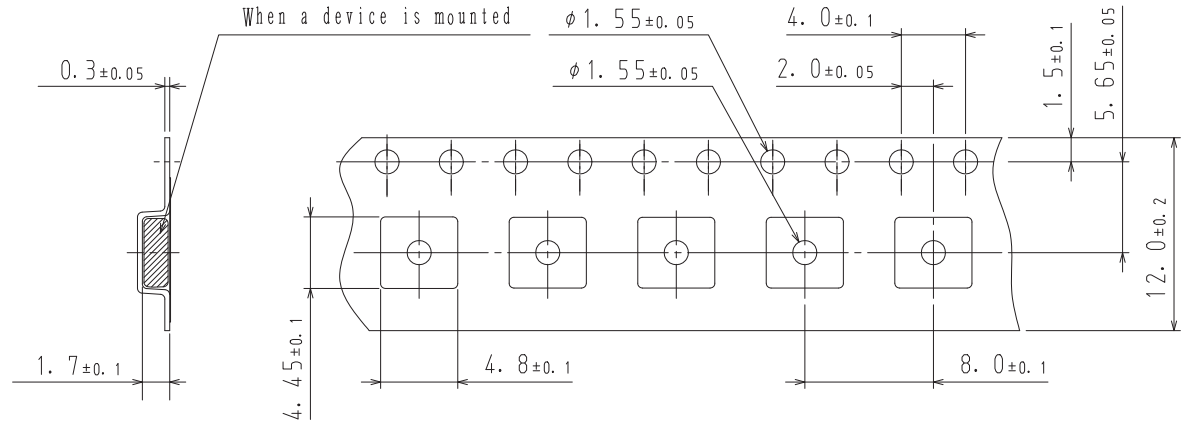
| Package Name | Carrier Tape Type | Maximum Number of devices contained (pcs) |           |           | Packing format                                              |                                                                    |
|--------------|-------------------|-------------------------------------------|-----------|-----------|-------------------------------------------------------------|--------------------------------------------------------------------|
|              |                   | 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 |



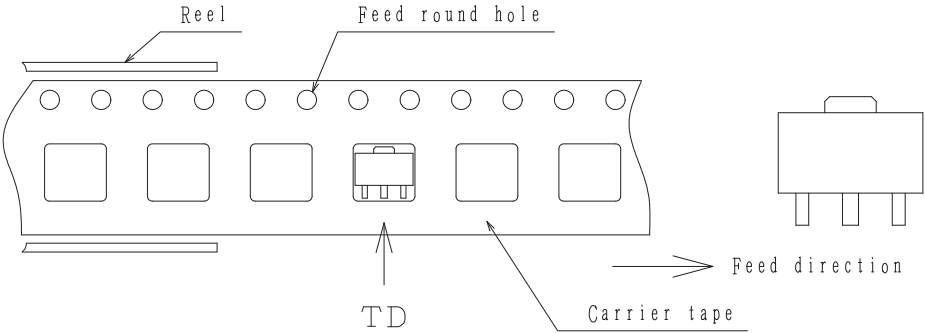
| Label       | JEITA Phase    |
|-------------|----------------|
| LEAD FREE 3 | JEITA Phase 3A |
| LEAD FREE 4 | JEITA Phase 3  |

2. Taping configuration

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



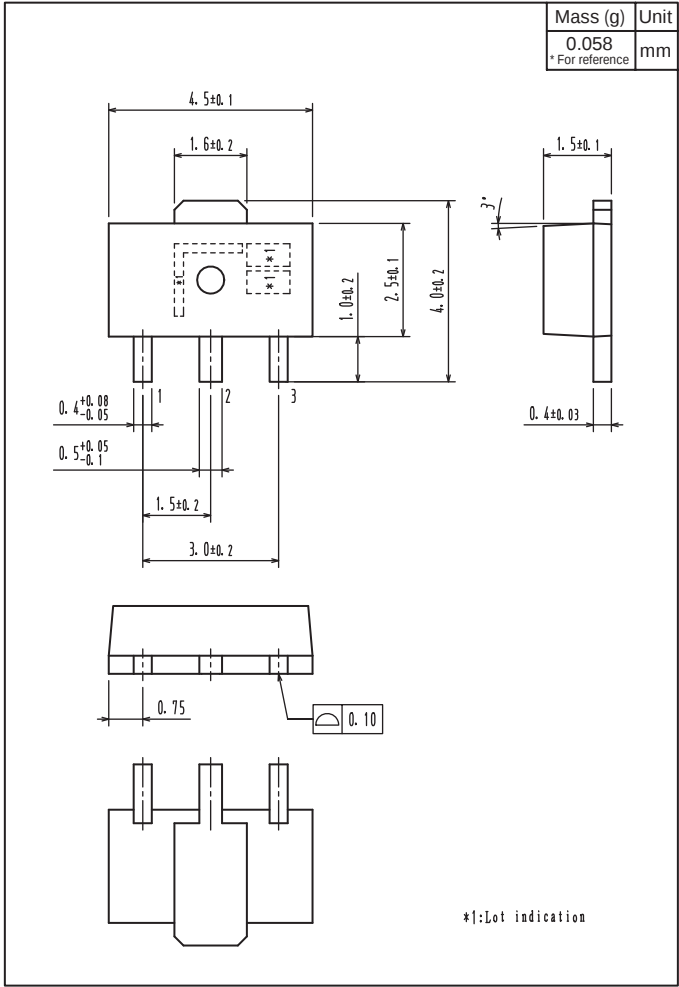
2-2. Device placement direction



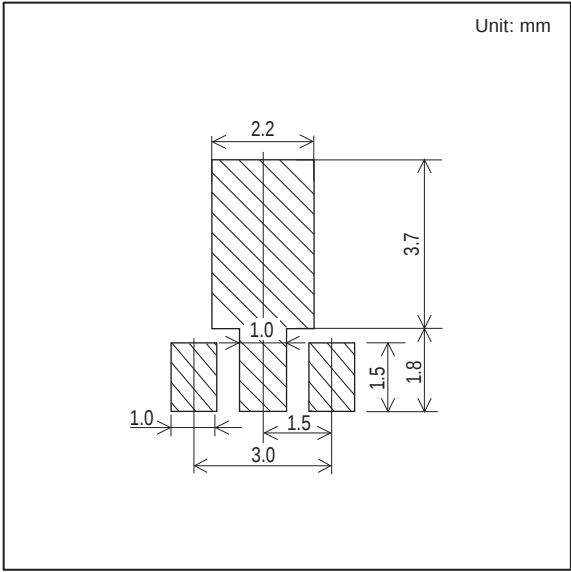
Those with pin 1 index on the feed hole side.....TD

Outline Drawing

2SA2016-TD-E, 2SC5569-TD-E



Land Pattern Example



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