



SANYO Semiconductors

# DATA SHEET

An ON Semiconductor Company

## 2SA2013/2SC5566 — PNP / NPN Epitaxial Planar Silicon Transistors DC / DC Converter Applications

### Applications

- 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

( )2SA2013

### Specifications

Absolute Maximum Ratings at Ta=25°C

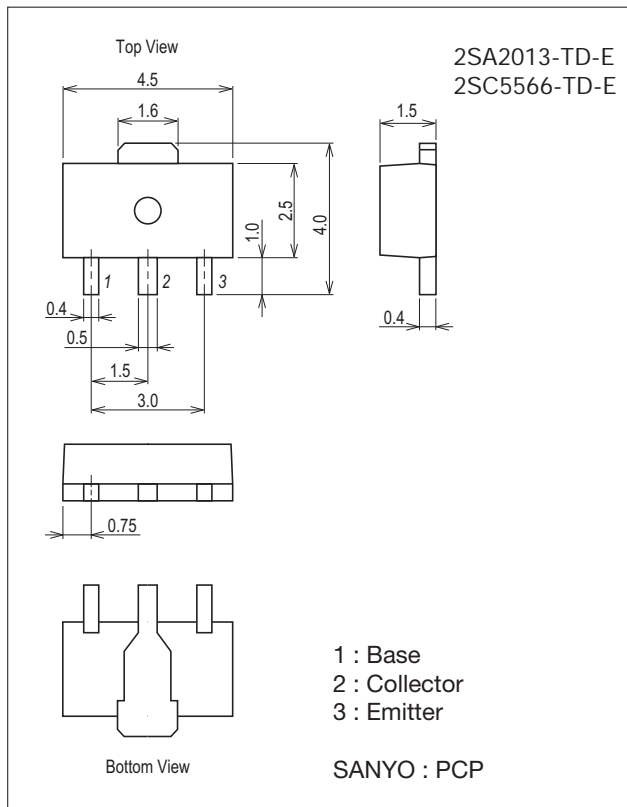
| Parameter                    | Symbol | Conditions | Ratings  | Unit |
|------------------------------|--------|------------|----------|------|
| Collector-to-Base Voltage    | VCBO   |            | (-50)100 | V    |
| Collector-to-Emitter Voltage | VCES   |            | (-50)100 | V    |
| Collector-to-Emitter Voltage | VCEO   |            | (-)50    | V    |
| Emitter-to-Base Voltage      | VEBO   |            | (-)6     | V    |

Continued on next page.

### Package Dimensions

unit : mm (typ)

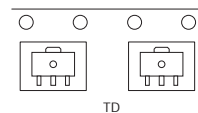
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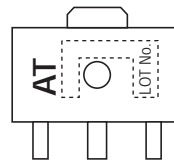
### Product & Package Information

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

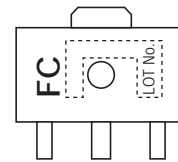
### Packing Type: TD



### Marking

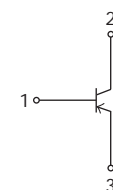


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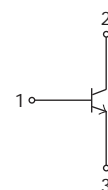


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### Electrical Connection



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2SC5566

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

## 2SA2013 / 2SC5566

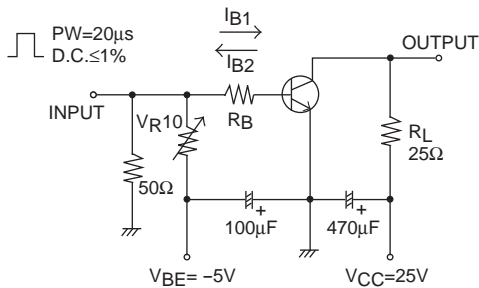
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| Parameter                 | Symbol    | Conditions  | Ratings         | Unit             |
|---------------------------|-----------|---|-----------------|------------------|
| Collector Current         | $I_C$     |   | (-) $4$         | A                |
| Collector Current (Pulse) | $I_{CP}$  |   | (-) $7$         | A                |
| Base Current              | $I_B$     |   | (-) $600$       | mA               |
| 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                | $I_{CBO}$      | $V_{CB}=-40\text{V}, I_E=0\text{A}$     |          |            | (-) $1$   | $\mu\text{A}$ |
| Emitter Cutoff Current                  | $I_{EBO}$      | $V_{EB}=-4\text{V}, I_C=0\text{A}$      |          |            | (-) $1$   | $\mu\text{A}$ |
| DC Current Gain                         | $h_{FE}$       | $V_{CE}=-2\text{V}, I_C=-500\text{mA}$  | $200$    |            | $560$     |               |
| Gain-Bandwidth Product                  | $f_T$          | $V_{CE}=-10\text{V}, I_C=-500\text{mA}$ |          | (360)400   |           | MHz           |
| Output Capacitance                      | $C_{ob}$       | $V_{CB}=-10\text{V}, f=1\text{MHz}$     |          | (24)15     |           | pF            |
| Collector-to-Emitter Saturation Voltage | $V_{CE(sat)1}$ | $I_C=-1\text{A}, I_B=-50\text{mA}$      |          | (-105)85   | (-180)130 | mV            |
|   | $V_{CE(sat)2}$ | $I_C=-2\text{A}, I_B=-100\text{mA}$     |          | (-200)150  | (-340)225 | mV            |
| Base-to-Emitter Saturation Voltage      | $V_{BE(sat)}$  | $I_C=-2\text{A}, I_B=-100\text{mA}$     |          | (-) $0.89$ | (-) $1.2$ | 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                            | $t_{on}$       |   |          | (30)35     |           | ns            |
| Storage Time                            | $t_{stg}$      | See specified Test Circuit.             |          | (230)300   |           | ns            |
| Fall Time                               | $t_f$          |   |          | (15)20     |           | ns            |

### Switching Time Test Circuit

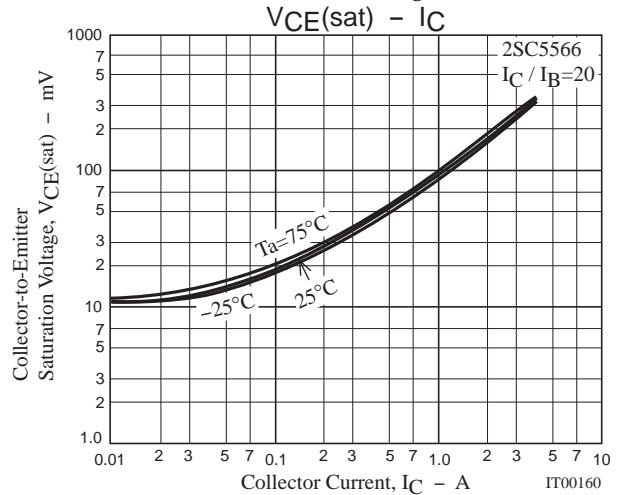
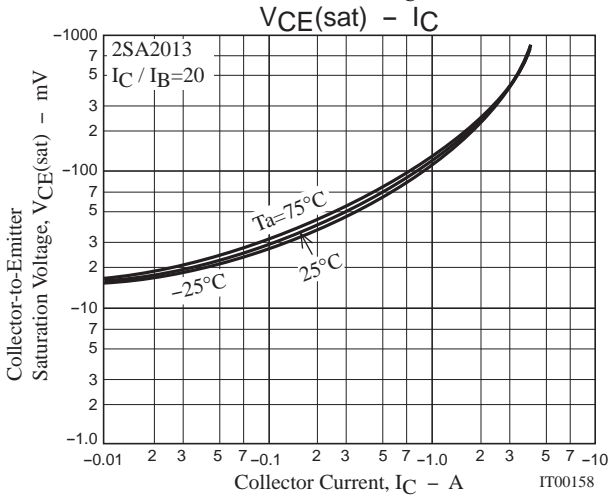
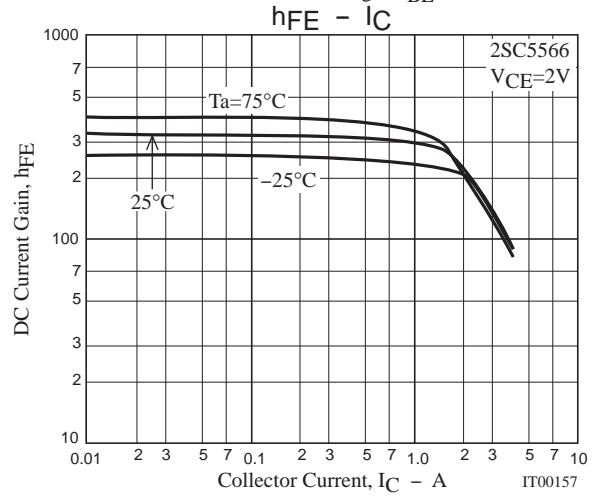
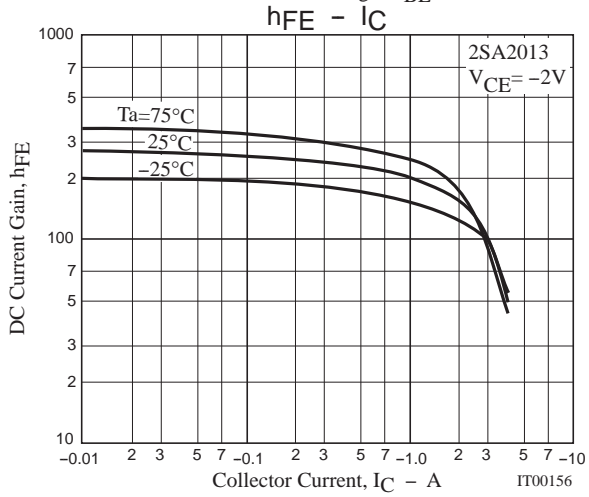
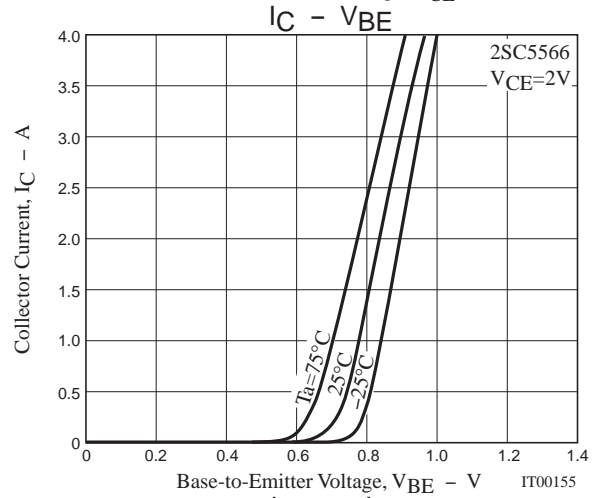
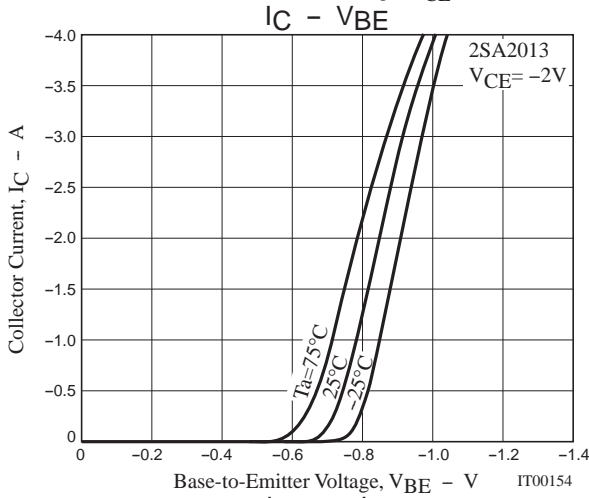
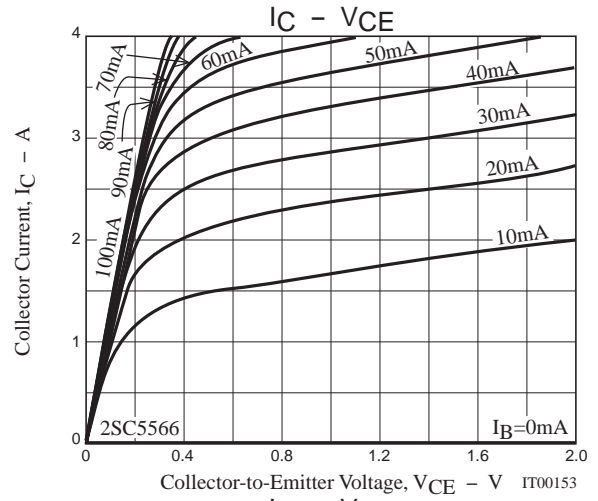
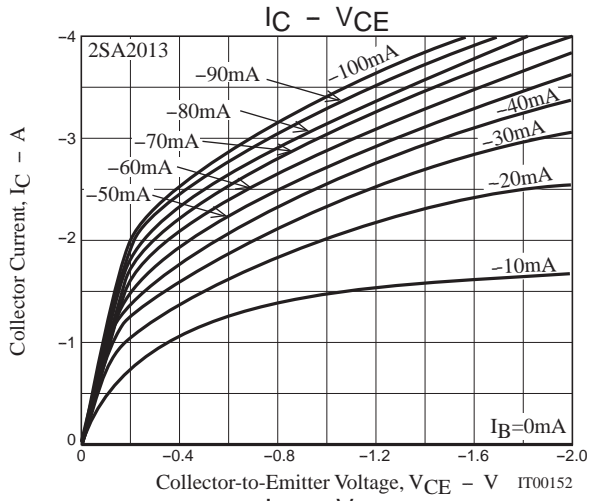


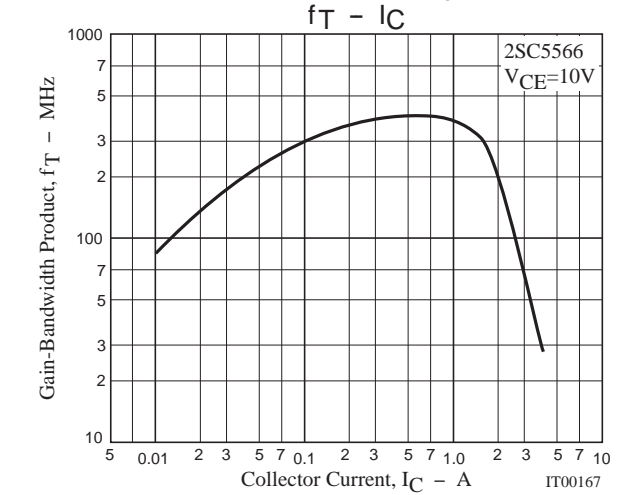
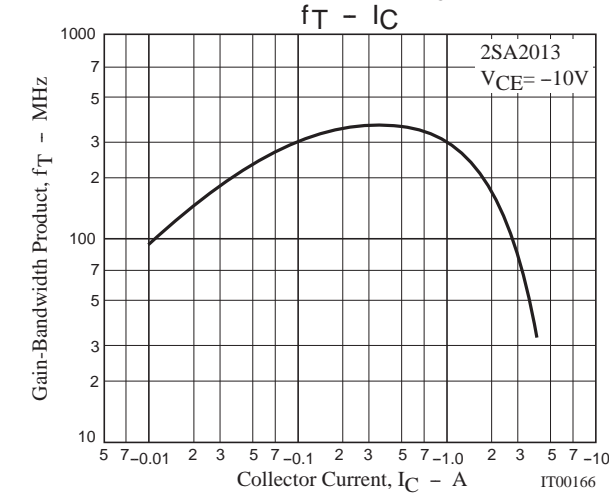
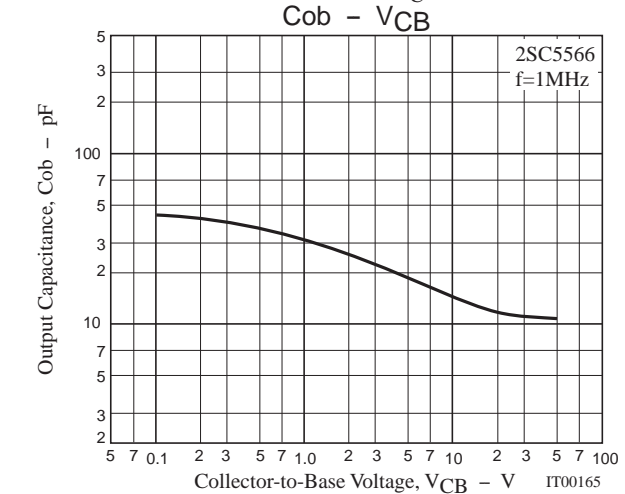
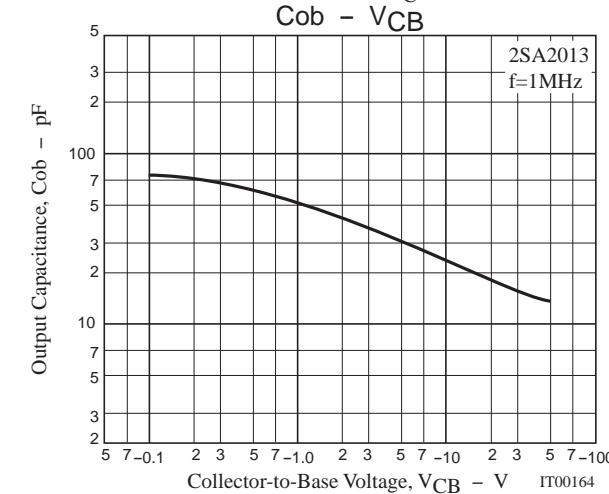
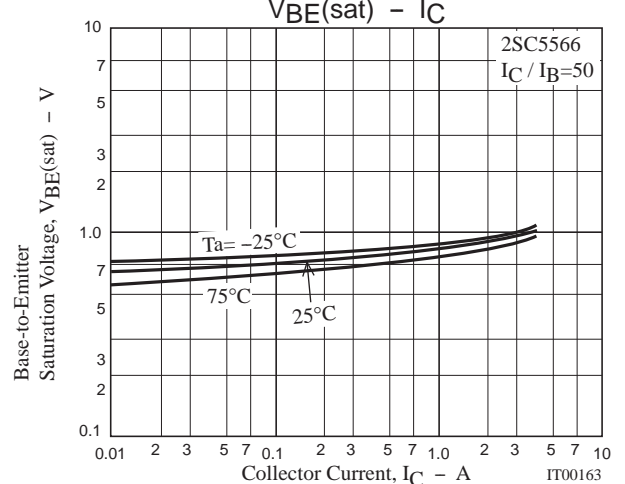
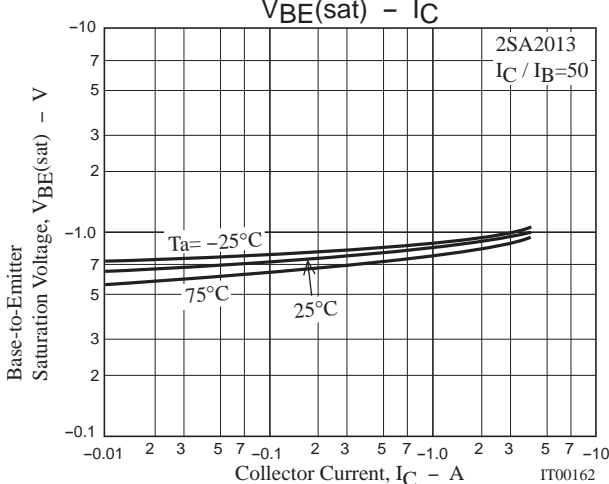
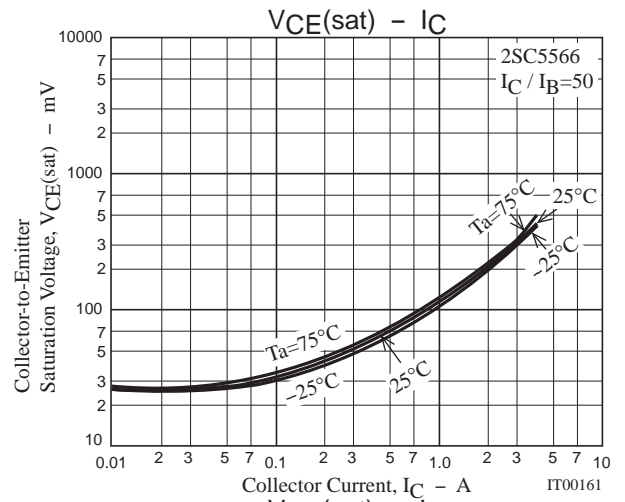
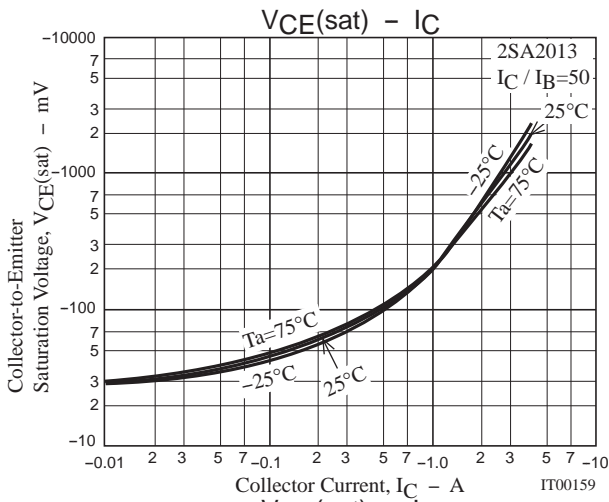
$$I_C = 10I_{B1} = -10I_{B2} = 1\text{A}$$

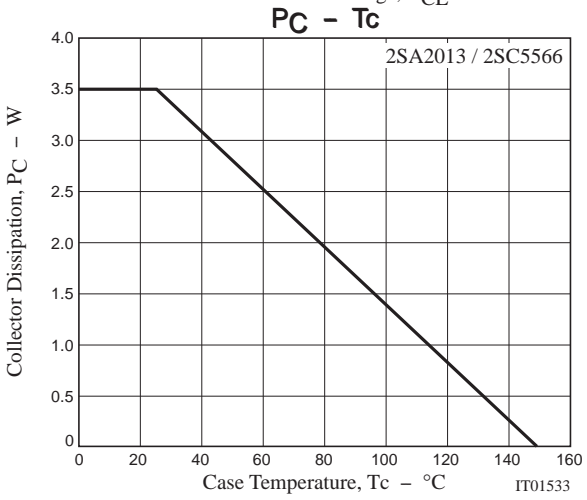
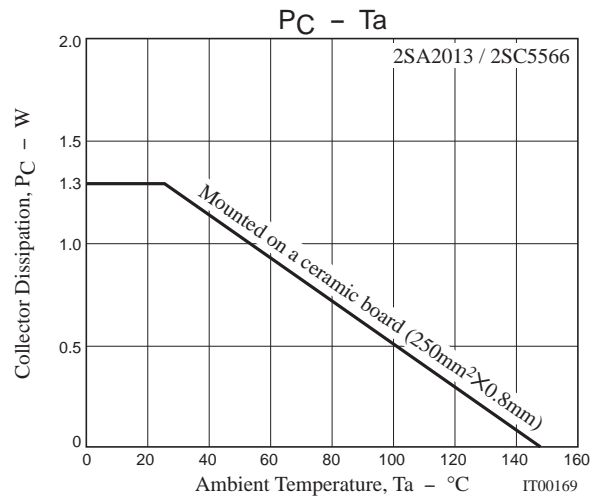
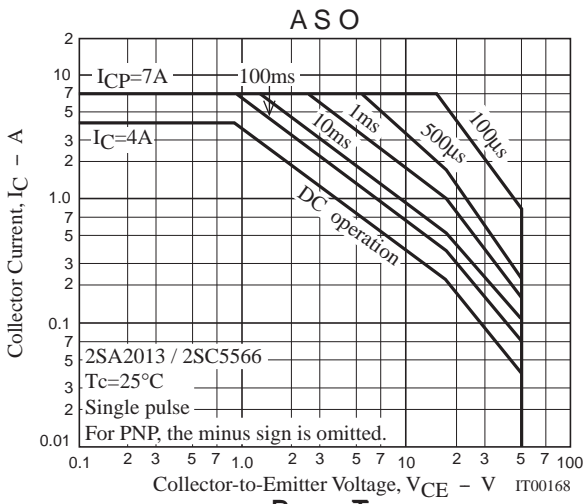
For PNP, the polarity is reversed.

### Ordering Information

| Device       | Package | Shipping       | memo    |
|--------------|---------|----------------|---------|
| 2SA2013-TD-E | PCP     | 1,000pcs./reel | Pb Free |
| 2SC5566-TD-E | PCP     | 1,000pcs./reel |         |







Bag Packing Specification

2SA2013-TD-E, 2SC5566-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 |

Reel label, Inner box label  
(unit : mm)

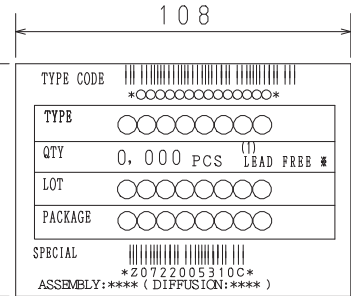
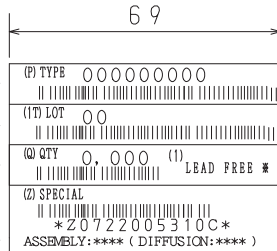
Outer box label  
It is a label at the time of factory shipments.  
The form of a label may change in physical distribution process.

Packing method



Reel label

Type No.  
LOT No.  
Quantity  
Origin



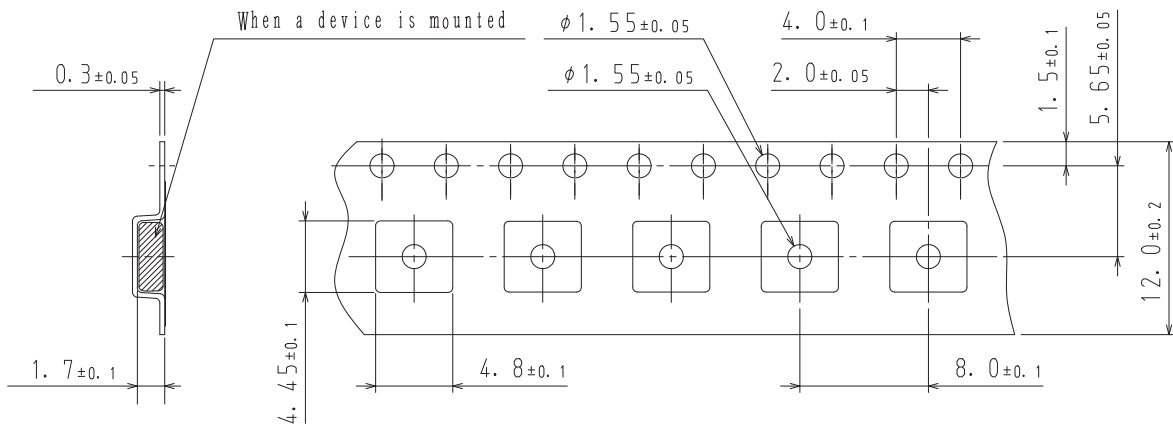
NOTE (1)

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  |

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



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#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.