



# 2SA1593/2SC4135

## Bipolar Transistor

(-)100V, (-)2A, Low VCE(sat), (PNP)NPN Single TP/TP-FA

ON Semiconductor®

<http://onsemi.com>

### Applications

- Power supplies, relay drivers, lamp drivers

### Features

- Adoption of FBET, MBIT processes
- Fast switching speed
- Small and slim package permitting 2SA1593/2SC4135-applied sets to be made more compact
- High breakdown voltage and large current capacity

### Specifications ( ) : 2SA1593

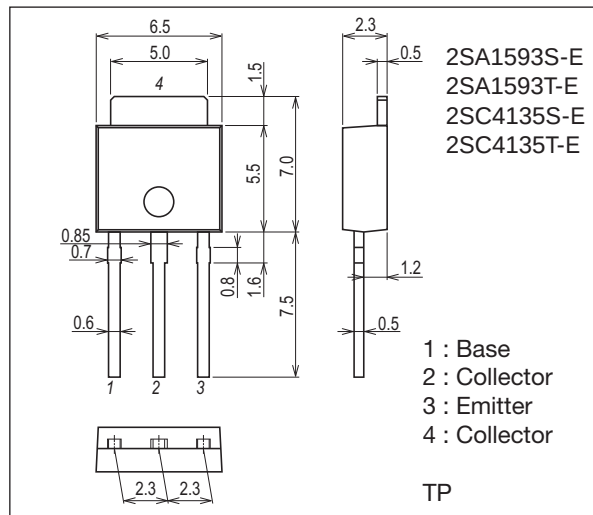
Absolute Maximum Ratings at Ta=25°C

| Parameter                    | Symbol           | Conditions | Ratings | Unit |
|------------------------------|------------------|------------|---------|------|
| Collector-to-Base Voltage    | V <sub>CB0</sub> |            | (-)120  | V    |
| Collector-to-Emitter Voltage | V <sub>CE0</sub> |            | (-)100  | V    |
| Emitter-to-Base Voltage      | V <sub>EB0</sub> |            | (-)6    | V    |
| Collector Current            | I <sub>C</sub>   |            | (-)2    | A    |
| Collector Current (Pulse)    | I <sub>CP</sub>  |            | (-)3    | A    |

Continued on next page.

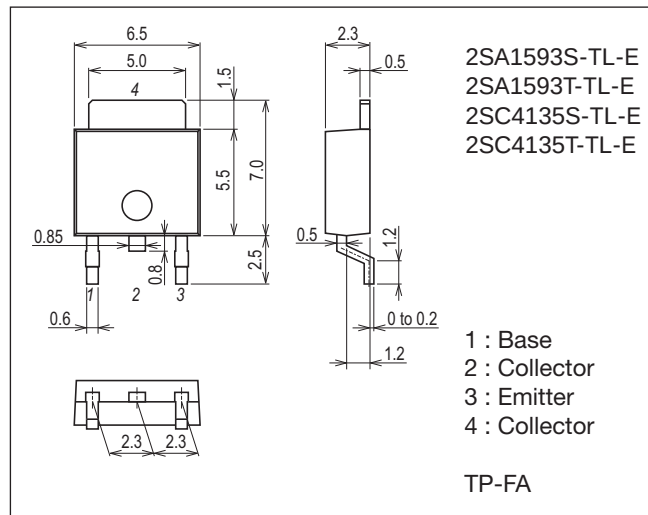
### Package Dimensions unit : mm (typ)

7518-003



### Package Dimensions unit : mm (typ)

7003-003

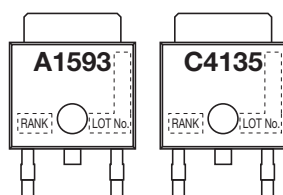


### Product & Package Information

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

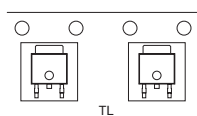
### Marking

(TP, TP-FA)

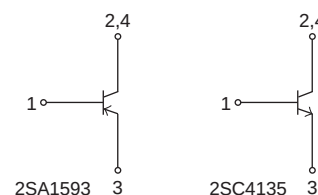


- Package : TP-FA
- JEITA, JEDEC : SC-63, TO-252
- Minimum Packing Quantity : 700 pcs./reel

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



### Electrical Connection



## 2SA1593 / 2SC4135

Continued from preceding page.

| Parameter             | Symbol           | Conditions           | Ratings     | Unit |
|-----------------------|------------------|----------------------|-------------|------|
| Collector Dissipation | P <sub>C</sub>   |                      | 1           | W    |
|                       |                  | T <sub>c</sub> =25°C | 15          | 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.

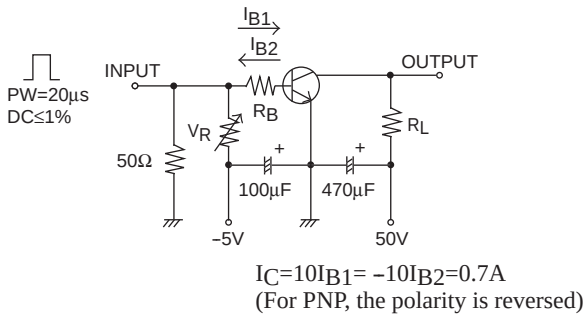
### Electrical Characteristics at T<sub>a</sub>=25°C

| 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      |         |             | (-) $100$ | nA   |
| Emitter Cutoff Current                  | I <sub>EBO</sub>     | V <sub>EB</sub> =(-)4V, I <sub>C</sub> =0A        |         |             | (-) $100$ | nA   |
| DC Current Gain                         | h <sub>FE</sub>      | V <sub>CE</sub> =(-)5V, I <sub>C</sub> =(-)100mA  | 100*    |             | 400*      |      |
| Gain-Bandwidth Product                  | f <sub>T</sub>       | V <sub>CE</sub> =(-)10V, I <sub>C</sub> =(-)100mA |         | 120         |           | MHz  |
| Output Capacitance                      | C <sub>ob</sub>      | V <sub>CB</sub> =(-)10V, f=1MHz                   |         | (25)16      |           | pF   |
| Collector-to-Emitter Saturation Voltage | V <sub>CE(sat)</sub> | I <sub>C</sub> =(-)1A, I <sub>B</sub> =(-)100mA   |         | (-0.22)0.13 | (-0.6)0.4 | V    |
| Base-to-Emitter Saturation Voltage      | V <sub>BE(sat)</sub> | I <sub>C</sub> =(-)1A, I <sub>B</sub> =(-)100mA   |         | (-)0.85     | (-)1.2    | V    |
| Collector-to-Base Breakdown Voltage     | V <sub>(BR)CBO</sub> | I <sub>C</sub> =(-)10μA, I <sub>E</sub> =0A       | (-)120  |             |           | V    |
| Collector-to-Emitter Breakdown Voltage  | V <sub>(BR)CEO</sub> | I <sub>C</sub> =(-)1mA, R <sub>BE</sub> =∞        | (-)100  |             |           | V    |
| Emitter-to-Base Breakdown Voltage       | V <sub>(BR)EBO</sub> | I <sub>E</sub> =(-)10μA, I <sub>C</sub> =0A       | (-)6    |             |           | V    |
| Turn-ON Time                            | t <sub>on</sub>      | See specified Test Circuit.                       |         | (80)80      |           | ns   |
| Storage Time                            | t <sub>stg</sub>     |                                                   |         | (750)1000   |           | ns   |
| Fall Time                               | t <sub>f</sub>       |                                                   |         | (40)50      |           | ns   |

\* : The 2SA1593/2SC4135 are classified by 100mA h<sub>FE</sub> as follows :

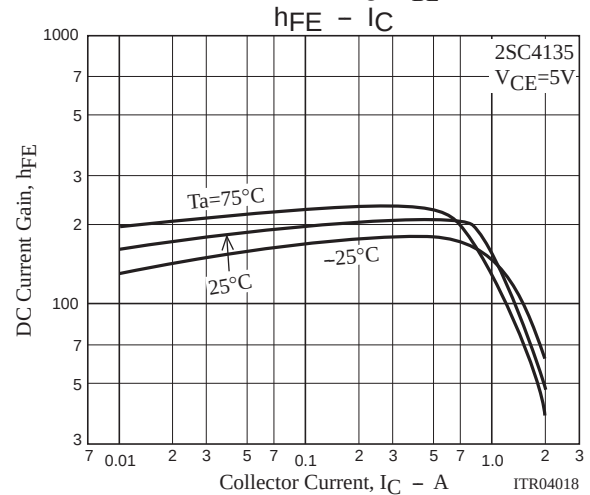
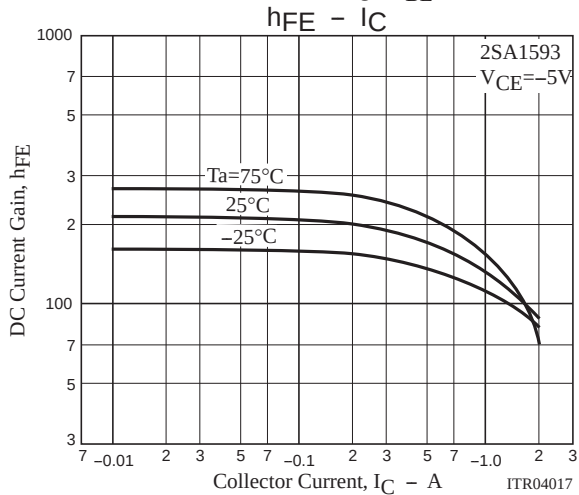
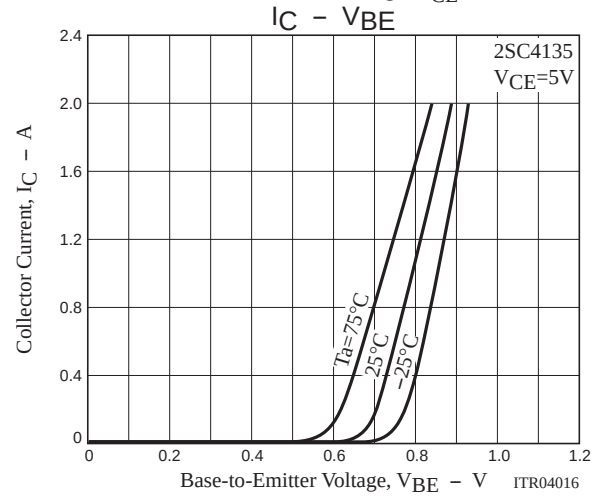
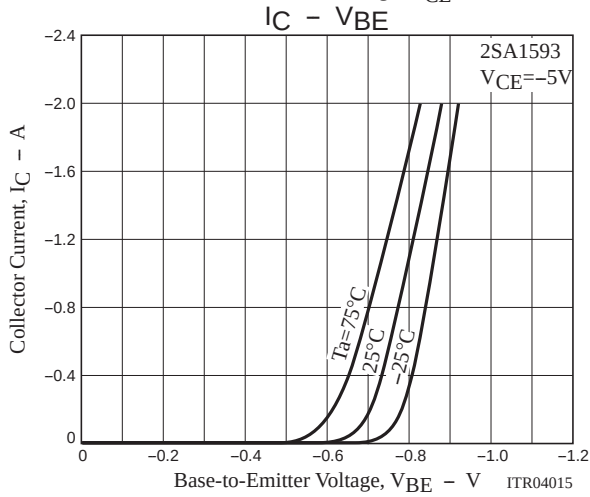
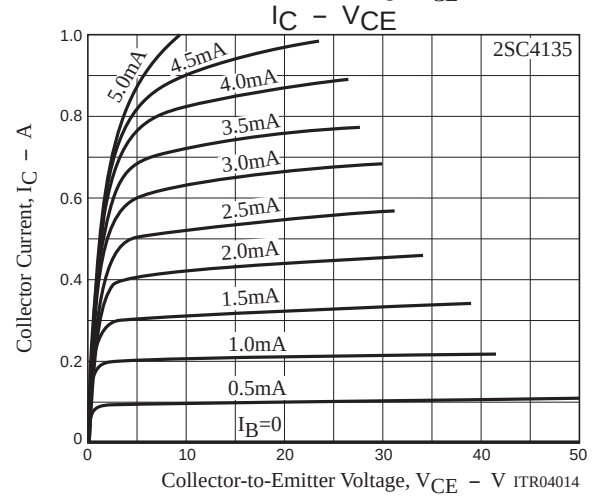
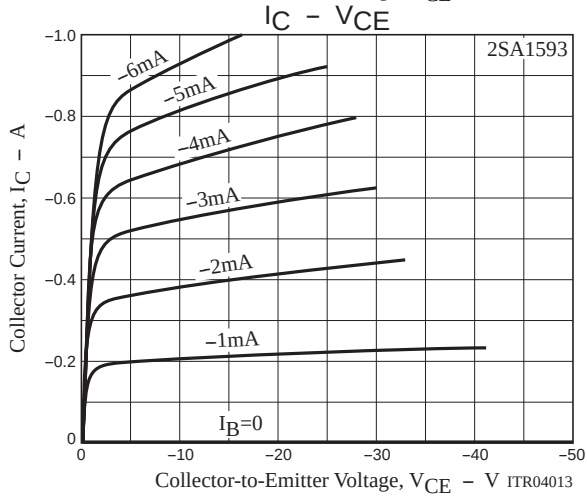
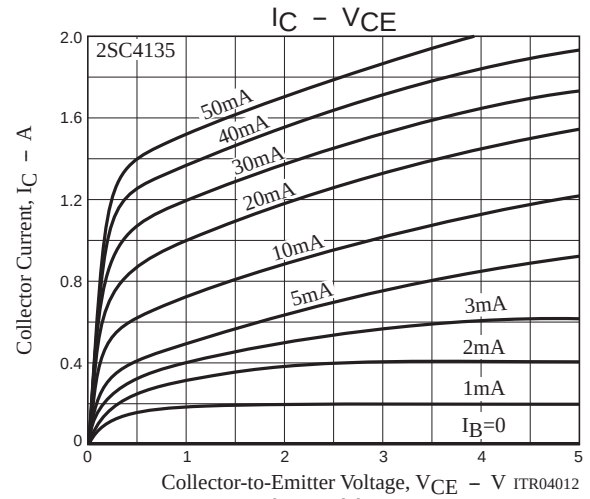
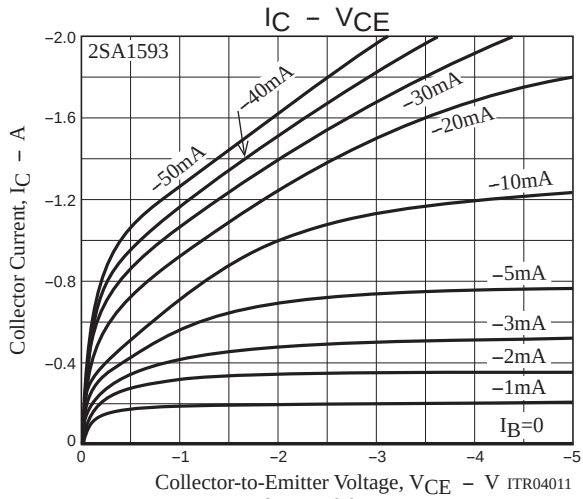
| Rank            | R          | S          | T          |
|-----------------|------------|------------|------------|
| h <sub>FE</sub> | 100 to 200 | 140 to 280 | 200 to 400 |

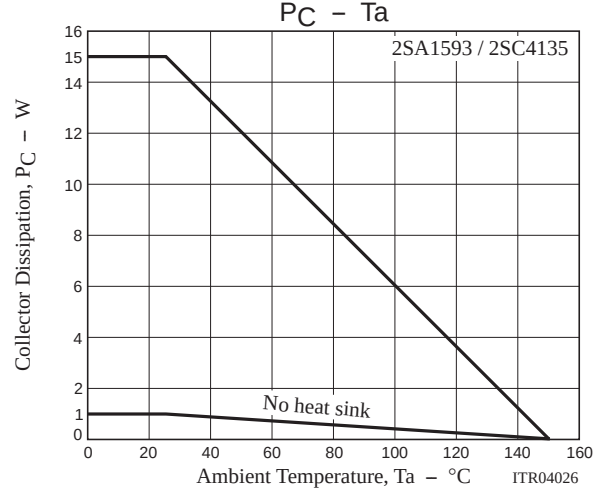
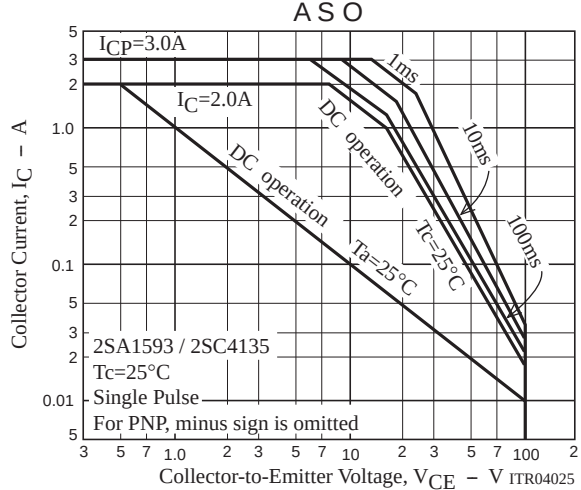
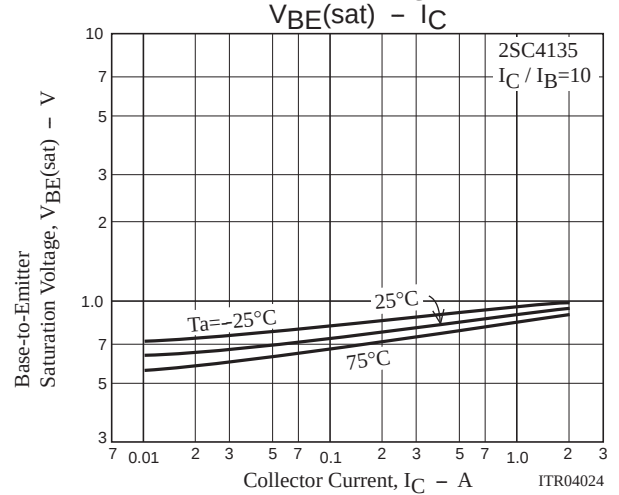
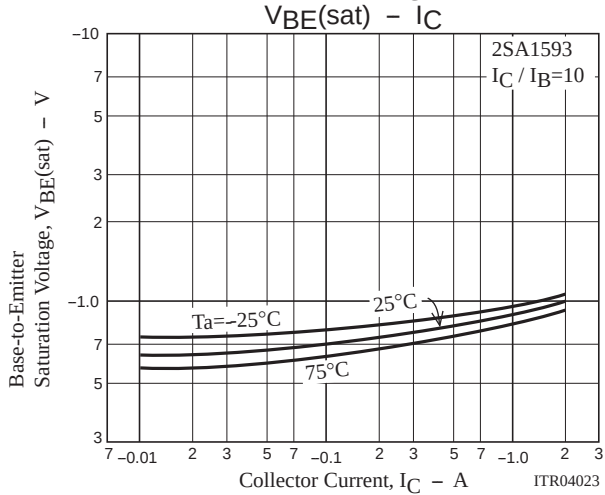
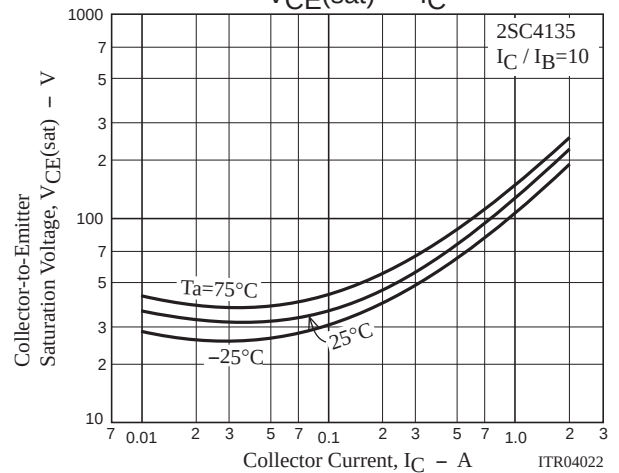
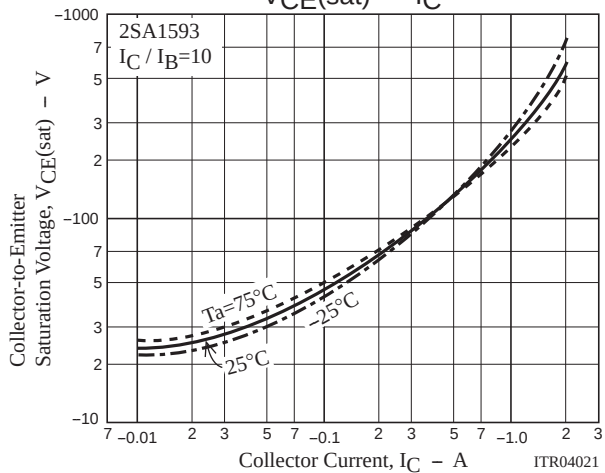
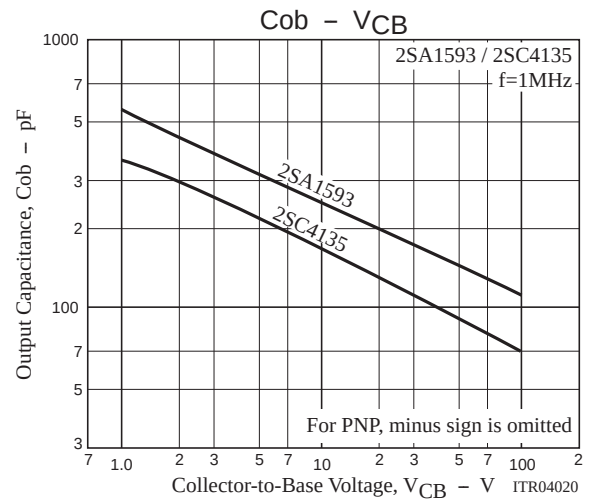
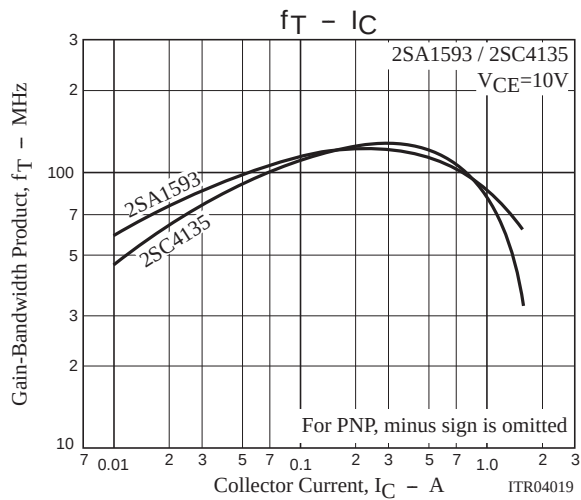
### Switching Time Test Circuit



### Ordering Information

| Device        | Package | Shipping     | memo    |
|---------------|---------|--------------|---------|
| 2SA1593S-E    | TP      | 500pcs./bag  | Pb Free |
| 2SA1593T-E    | TP      | 500pcs./bag  |         |
| 2SC4135S-E    | TP      | 500pcs./bag  |         |
| 2SC4135T-E    | TP      | 500pcs./bag  |         |
| 2SA1593S-TL-E | TP-FA   | 700pcs./reel |         |
| 2SA1593T-TL-E | TP-FA   | 700pcs./reel |         |
| 2SC4135S-TL-E | TP-FA   | 700pcs./reel |         |
| 2SC4135T-TL-E | TP-FA   | 700pcs./reel |         |





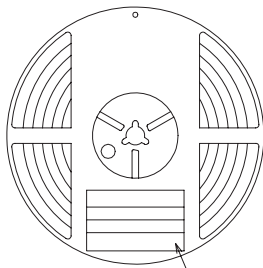
# Taping Specification

2SA1593S-TL-E, 2SA1593T-TL-E, 2SC4135S-TL-E, 2SC4135T-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      | 000000000             |
| (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:****)          |

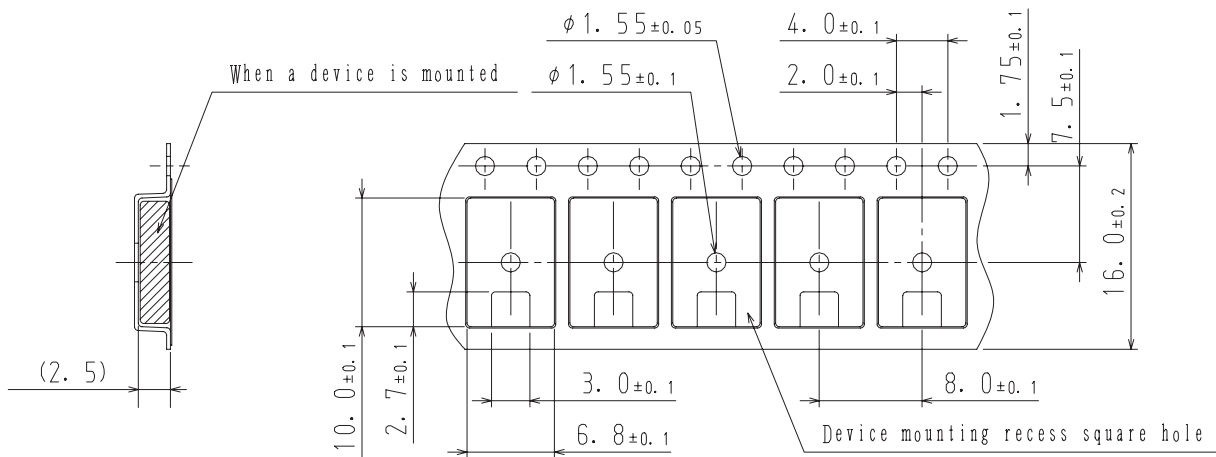
NOTE (1)

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

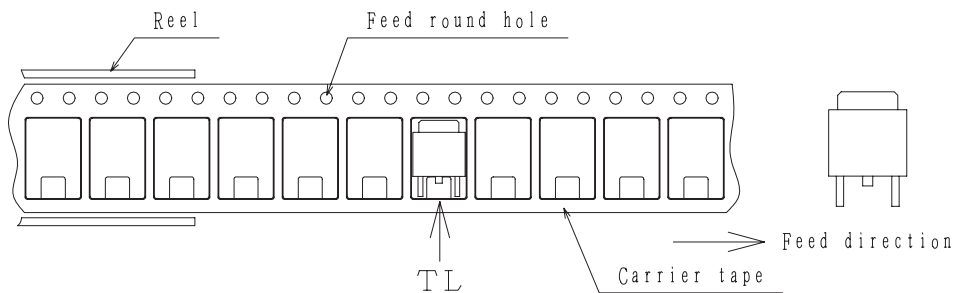
| Label       | JEITA Phase    |
|-------------|----------------|
| LEAD FREE 3 | JEITA Phase 3A |
| LEAD FREE 4 | JEITA Phase 3  |

## Taping configuration

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



### 2. Device placement direction

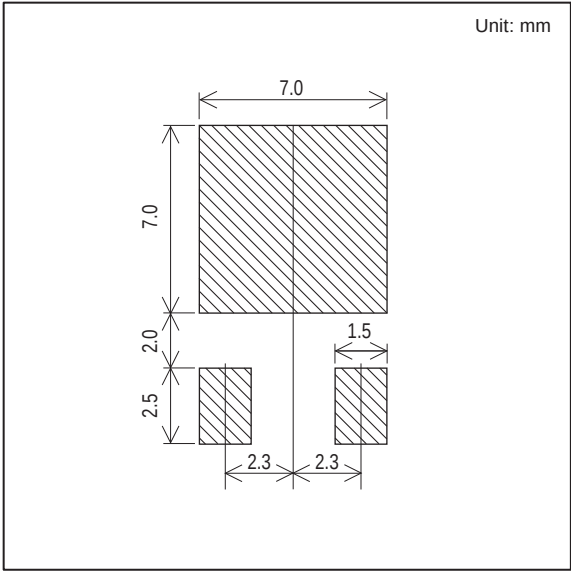
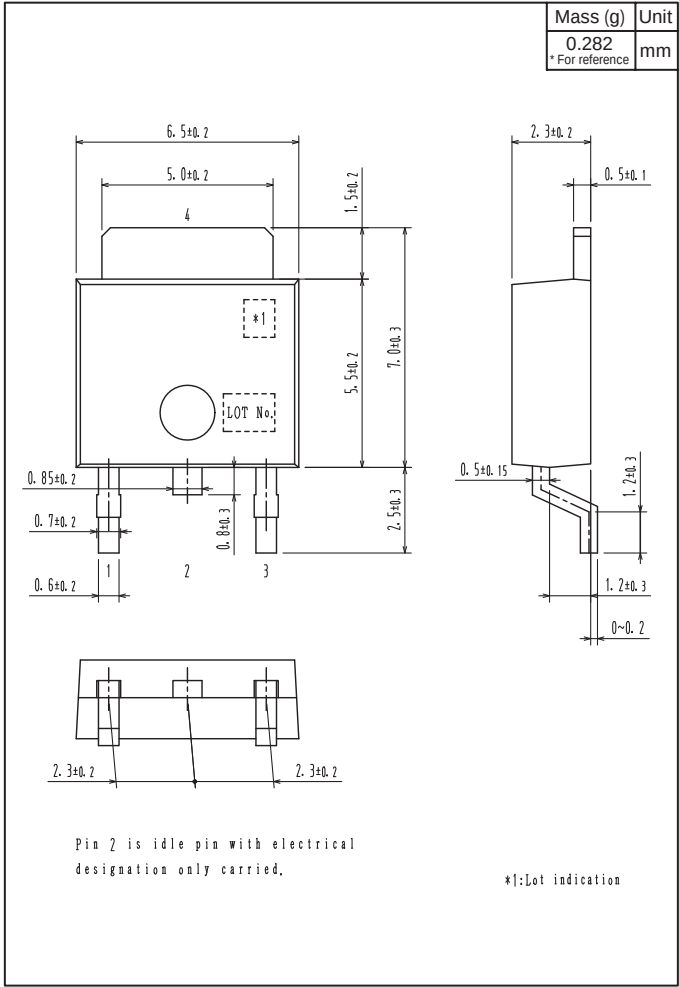


Those with one electrode terminal on the feed hole side.....TL

Outline Drawing

Land Pattern Example

2SA1593S-TL-E, 2SA1593T-TL-E, 2SC4135S-TL-E, 2SC4135T-TL-E



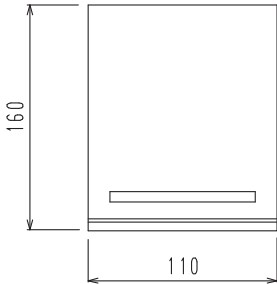
Bag Packing Specification

2SA1593S-E, 2SA1593T-E, 2SC4135S-E, 2SC4135T-E

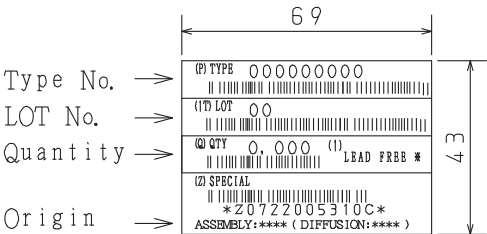
1. Packing Format

| 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)

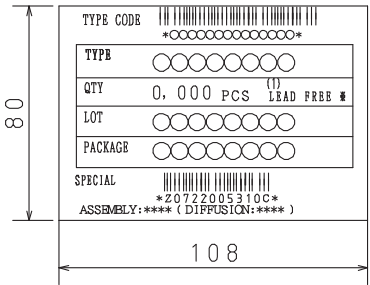


4. Outer box label  
(unit:mm)

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

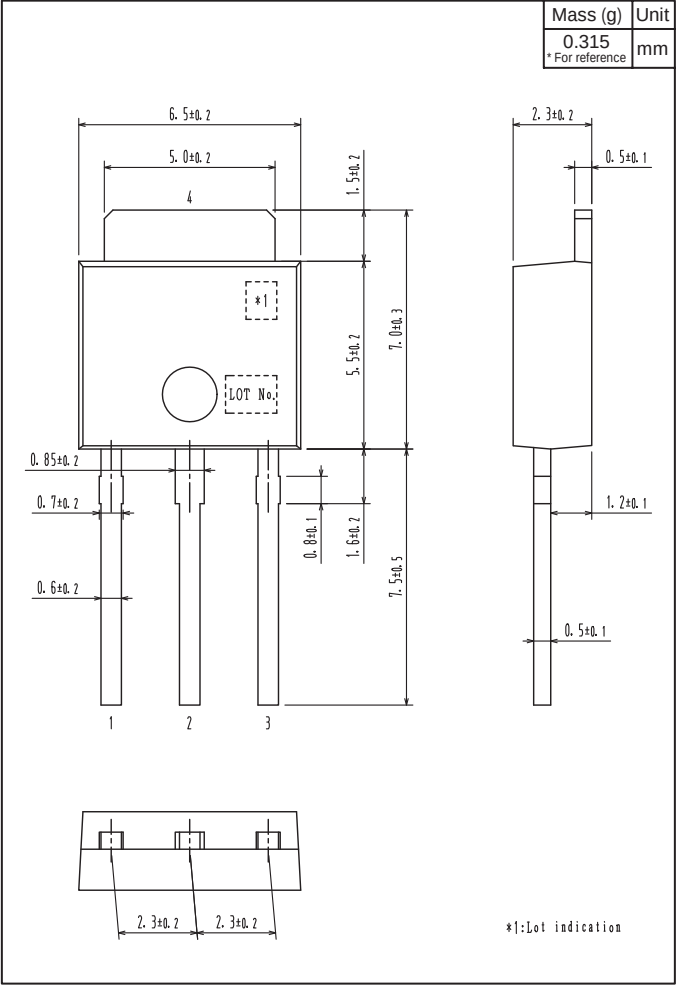
NOTE (1)  
The LEAD FREE \* description shows that the  
surface treatment of the terminal is lead free.

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



Outline Drawing

2SA1593S-E, 2SA1593T-E, 2SC4135S-E, 2SC4135T-E





ON Semiconductor and the ON logo are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of SCILLC's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

# AMEYA360

## Components Supply Platform

### Authorized Distribution Brand :



### Website :

Welcome to visit [www.ameya360.com](http://www.ameya360.com)

### Contact Us :

#### ➤ Address :

401 Building No.5, JiuGe Business Center, Lane 2301, Yishan Rd  
Minhang District, Shanghai , China

#### ➤ Sales :

Direct +86 (21) 6401-6692

Email [amall@ameya360.com](mailto:amall@ameya360.com)

QQ 800077892

Skype ameyasales1 ameyasales2

#### ➤ Customer Service :

Email [service@ameya360.com](mailto:service@ameya360.com)

#### ➤ Partnership :

Tel +86 (21) 64016692-8333

Email [mkt@ameya360.com](mailto:mkt@ameya360.com)