



SANYO Semiconductors

# DATA SHEET

An ON Semiconductor Company

## 2SA1593/2SC4135 — High-Voltage Switching Applications

PNP/NPN Epitaxial Planar Silicon Transistors

### 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

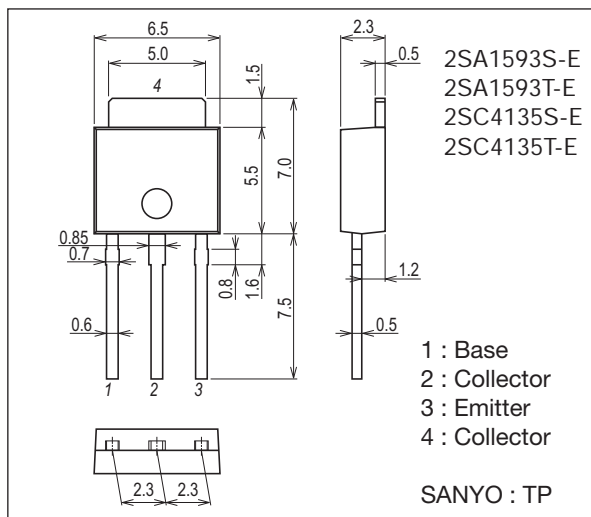
### Specifications ( ) : 2SA1593

Absolute Maximum Ratings at Ta=25°C

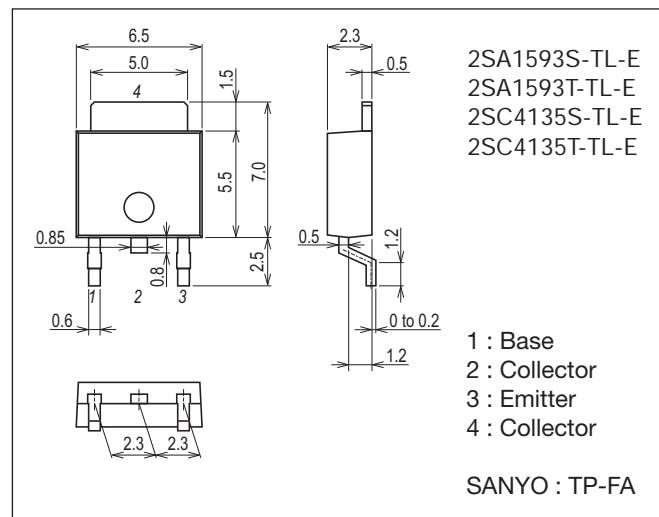
Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V <sub>CB0</sub>		(-)120	V
Collector-to-Emitter Voltage	V <sub>CEO</sub>		(-)100	V
Emitter-to-Base Voltage	V <sub>EBO</sub>		(-)6	V
Collector Current	I <sub>C</sub>		(-)2	A
Collector Current (Pulse)	I <sub>CP</sub>		(-)3	A

Continued on next page.

### Package Dimensions unit : mm (typ) 7518-003



### Package Dimensions unit : mm (typ) 7003-003

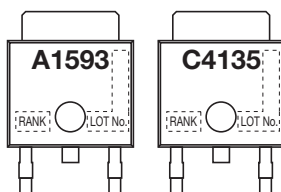


### Product & Package Information

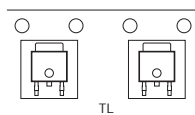
- Package : TP
- JEITA, JEDEC : SC-64, TO-251
- Minimum Packing Quantity : 500 pcs./bag

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

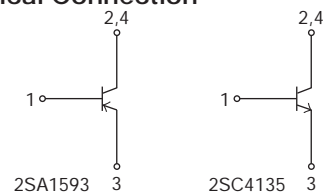
### Marking (TP, TP-FA)



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



### Electrical Connection



SANYO Semiconductor Co., Ltd.

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

## 2SA1593/2SC4135

Continued from preceding page.

Parameter	Symbol	Conditions	Ratings	Unit
Collector Dissipation	PC		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

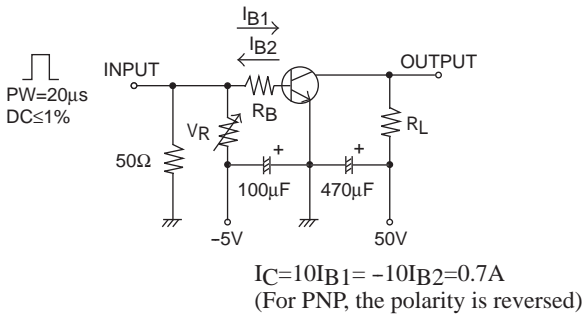
### Electrical Characteristics at T<sub>a</sub>=25°C

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(BR)CBO	I <sub>C</sub> =(-)10μA, I <sub>E</sub> =0A	(-)120			V
Collector-to-Emitter Breakdown Voltage	V(BR)CEO	I <sub>C</sub> =(-)1mA, R <sub>BE</sub> =∞	(-)100			V
Emitter-to-Base Breakdown Voltage	V(BR)EBO	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 :

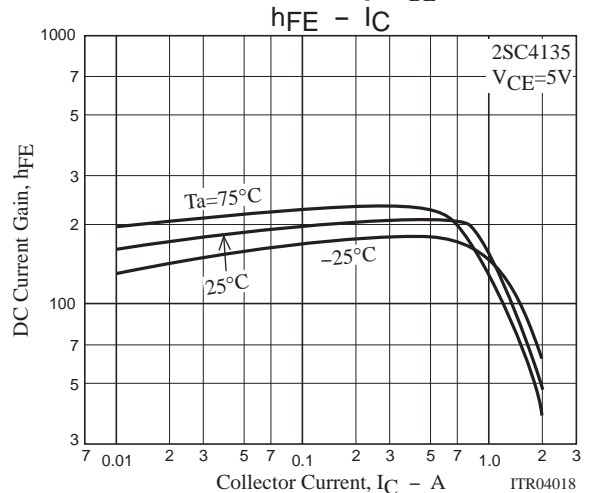
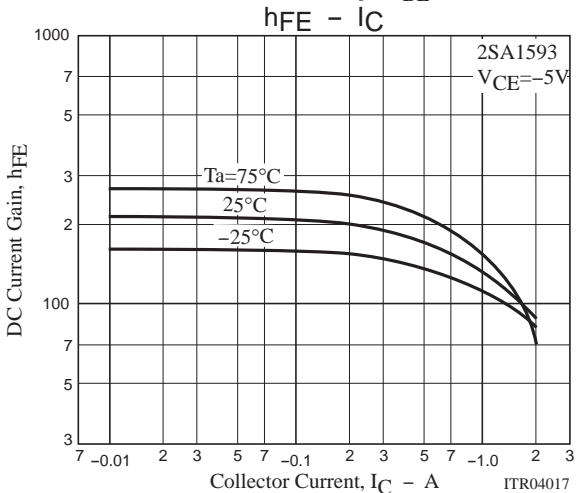
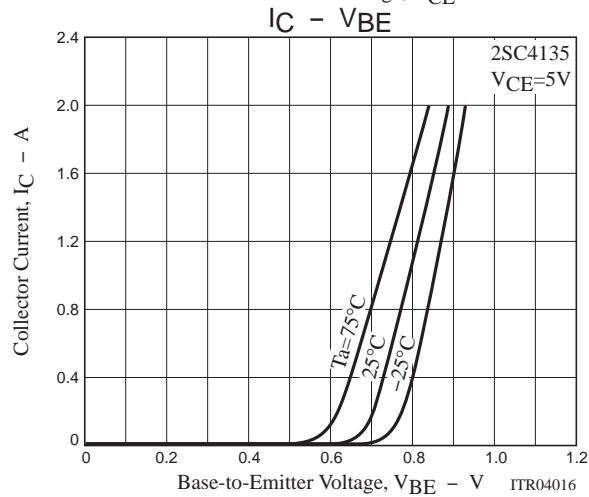
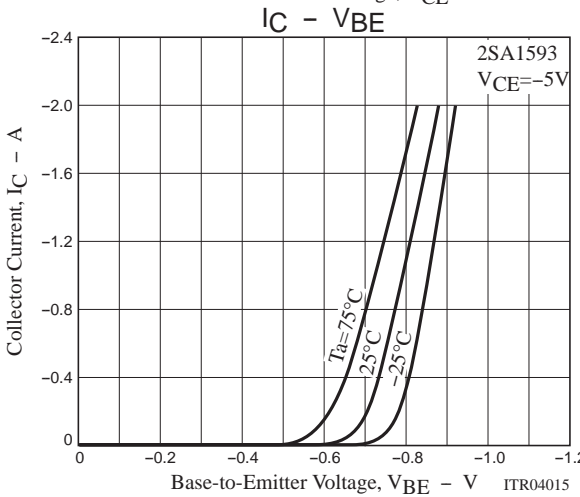
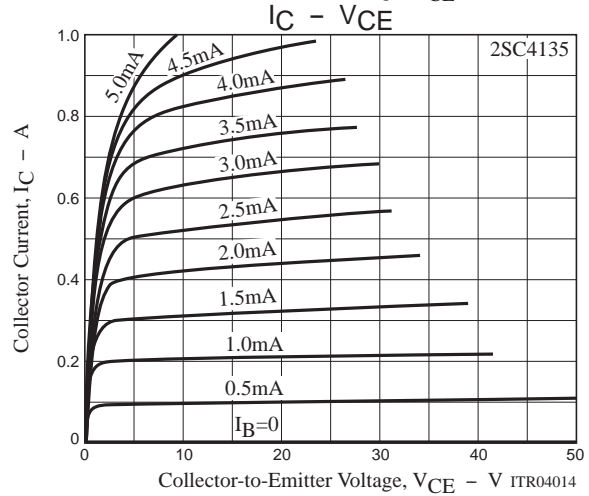
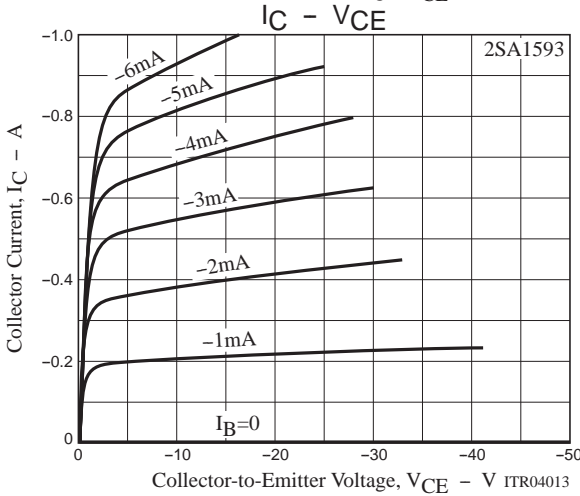
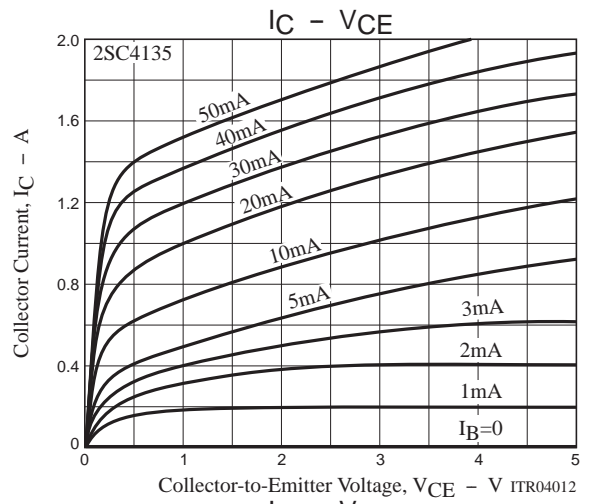
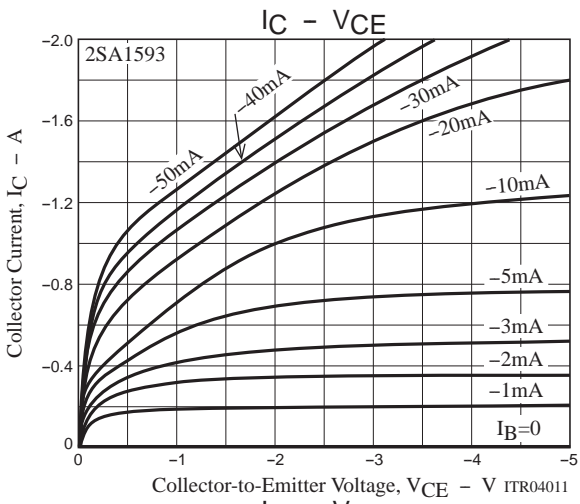
Rank	R	S	T
h <sub>FE</sub>	100 to 200	140 to 280	200 to 400

### Switching Time Test Circuit

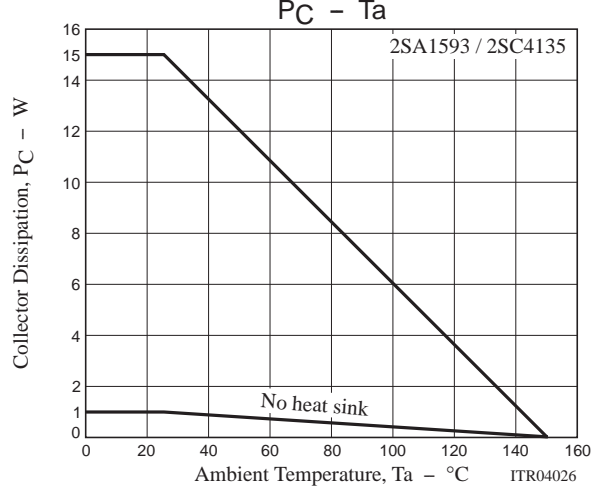
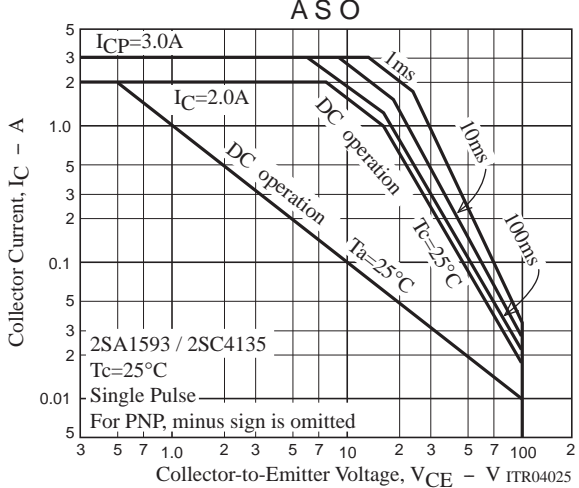
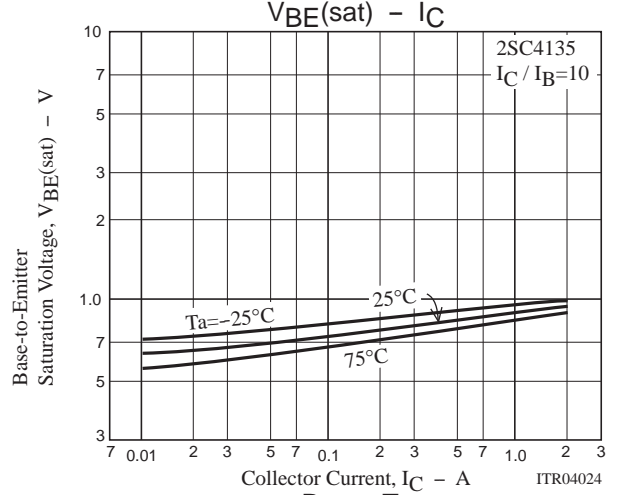
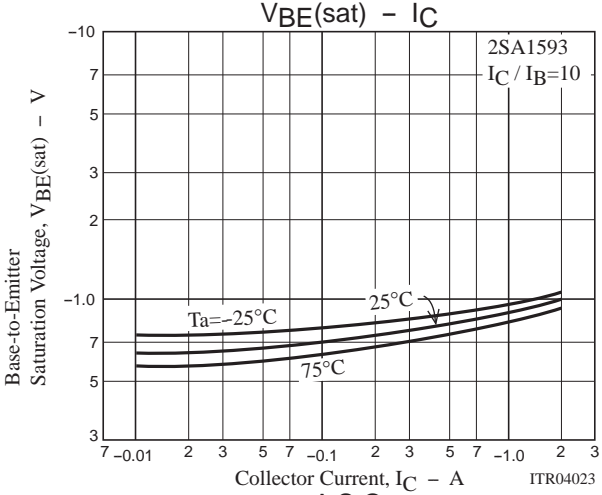
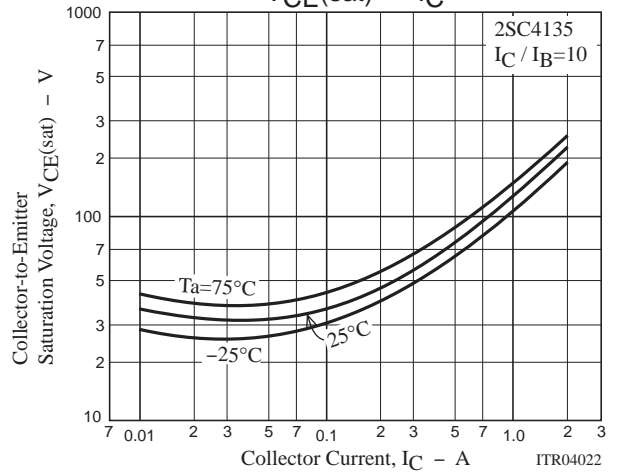
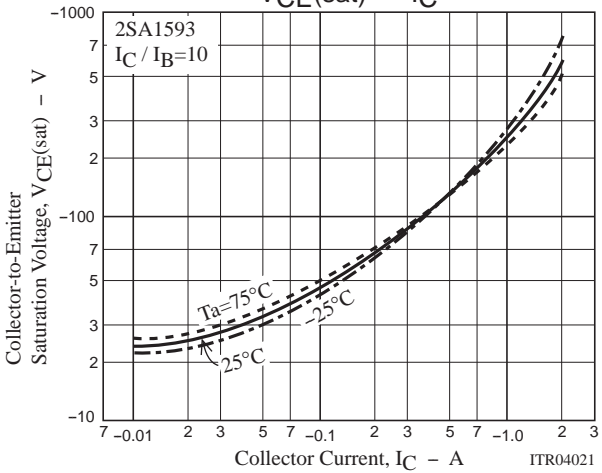
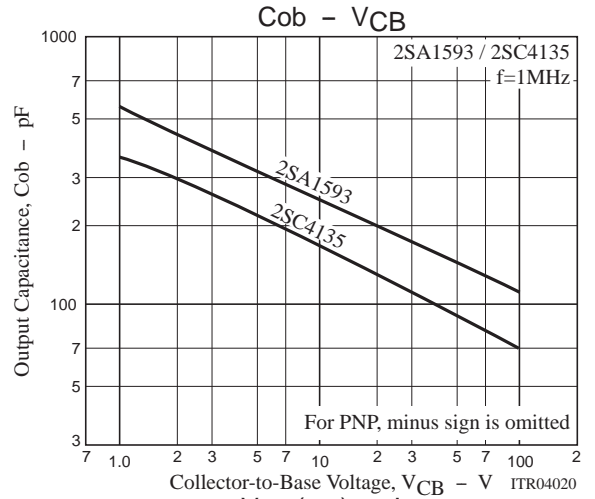
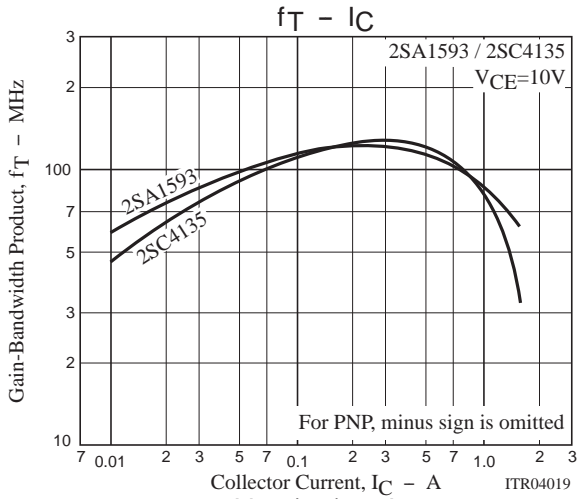


### Ordering Information

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	



# 2SA1593/2SC4135



# 2SA1593/2SC4135

## Taping Specification

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

### Packing Format

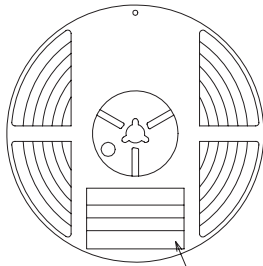
Package Name	Carrier Tape Type	Maximum Number of devices contained (pcs)			Packing format	
		Reel	Inner box	Outer box	Inner BOX (C-1)	Outer BOX (A-7)
TP-FA	TP	700	2,100	12,600	3 reels contained Dimensions:mm (external) 183×72×185	6 inner boxes contained Dimensions:mm (external) 440×195×210

Reel label, Inner box label  
(unit:mm)

Outer box label

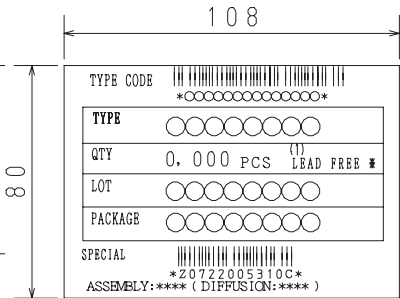
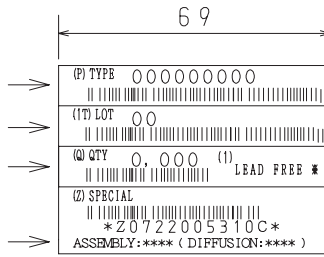
It is a label at the time of factory shipments.  
The form of a label may change in physical distribution process.

### Packing method



Reel label

Type No.  
LOT No.  
Quantity  
Origin



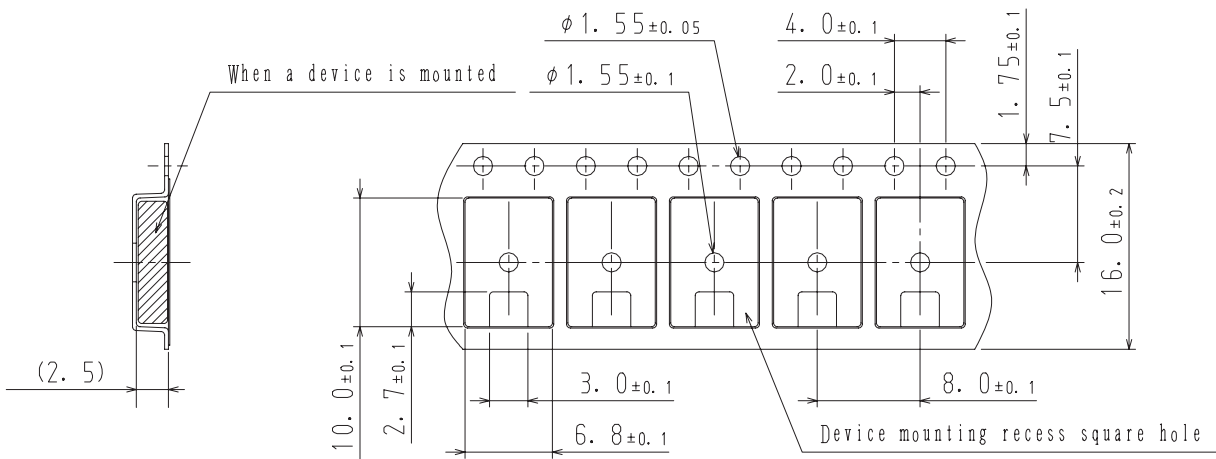
#### NOTE (1)

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

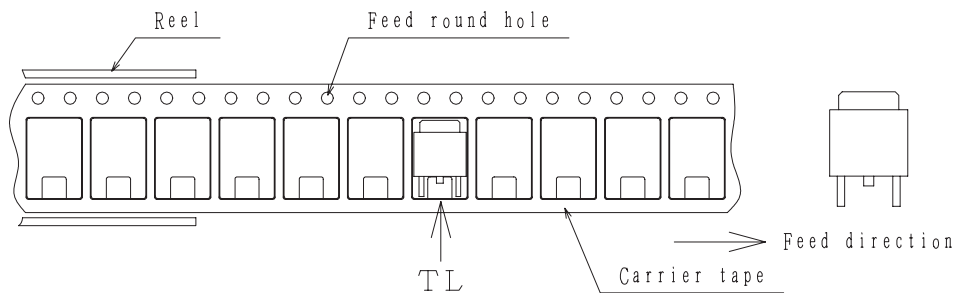
Label	JEITA Phase
LEAD FREE 3	JEITA Phase 3A
LEAD FREE 4	JEITA Phase 3

### Taping configuration

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



#### 2. Device placement direction



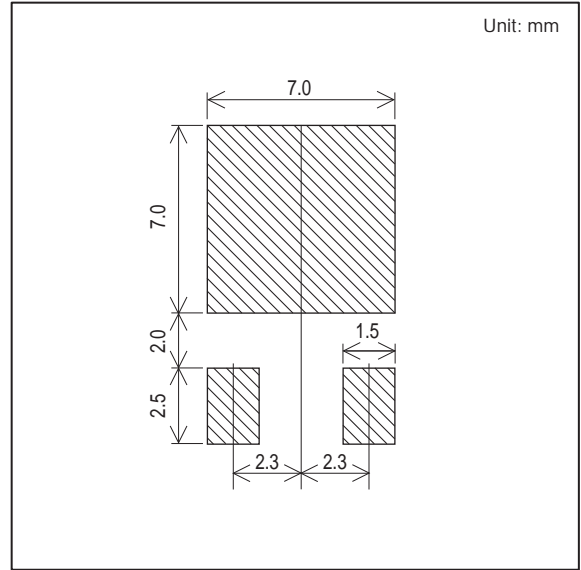
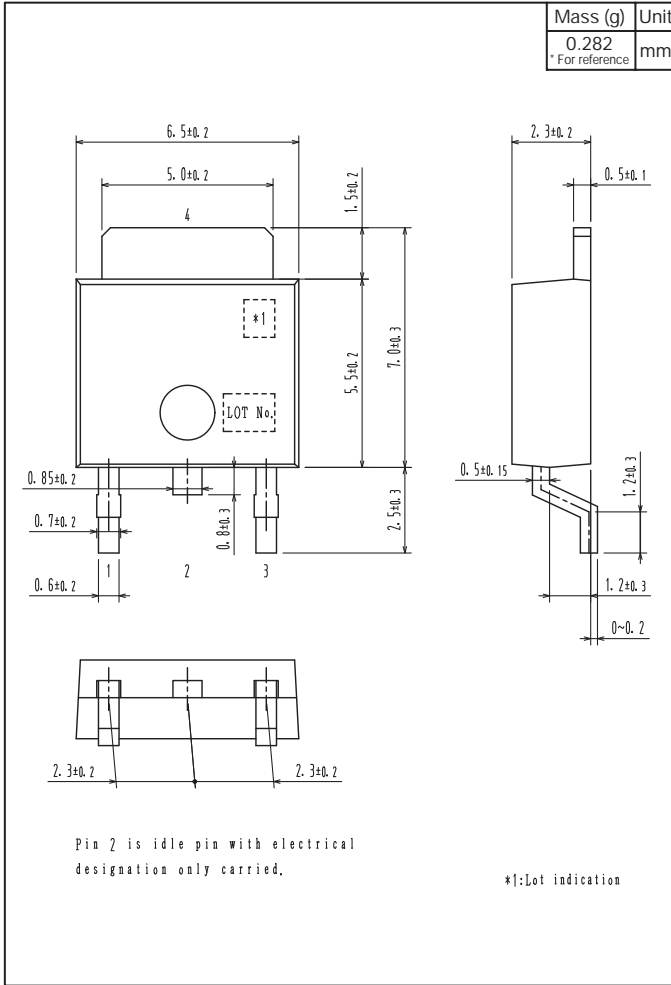
Those with one electrode terminal on the feed hole side.....TL

# 2SA1593/2SC4135

## Outline Drawing

## Land Pattern Example

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



# 2SA1593/2SC4135

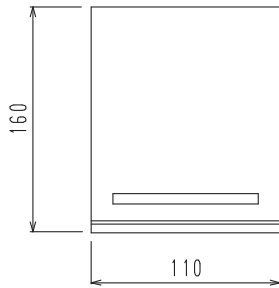
## Bag Packing Specification

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

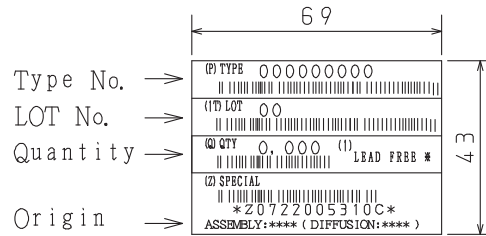
### 1. Packing Format

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)



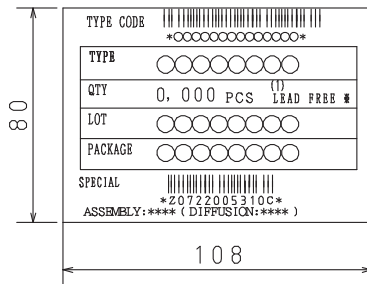
### 4. Outer box label (unit:mm)

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



# 2SA1593/2SC4135

## Outline Drawing

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





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Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А