



# 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
- High breakdown voltage and large current capacity
- Fast switching speed
- Small and slim package permitting 2SA1593/2SC4135-applied sets to be made more compact

### Specifications ( ) : 2SA1593

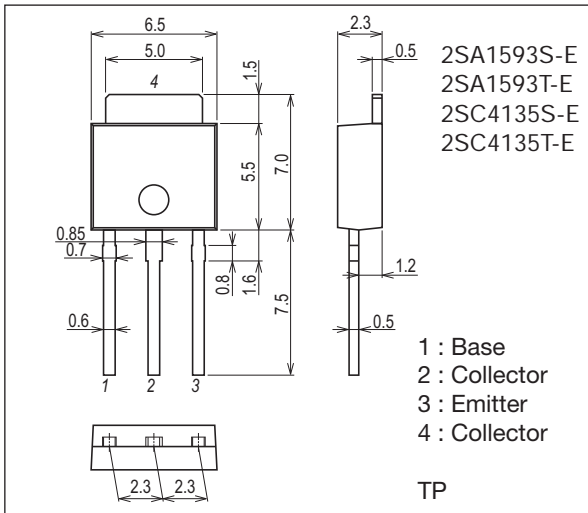
Absolute Maximum Ratings at Ta=25°C

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>EB0</sub>		(-)6	V
Collector Current	I <sub>C</sub>		(-)2	A
Collector Current (Pulse)	I <sub>CP</sub>		(-)3	A

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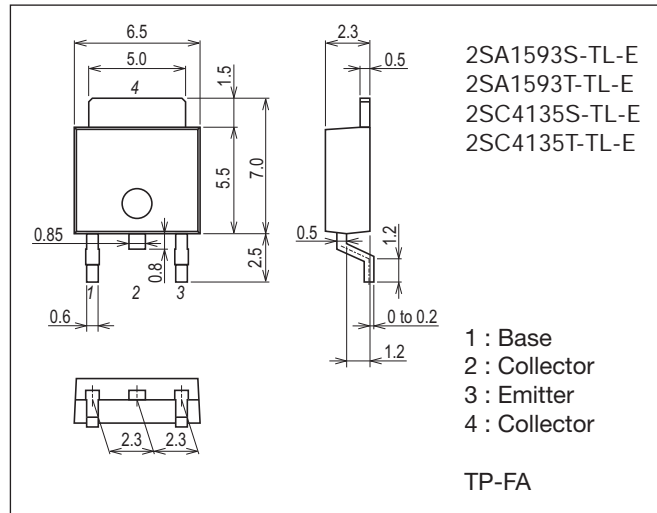
### Package Dimensions unit : mm (typ)

7518-003



### Package Dimensions unit : mm (typ)

7003-003

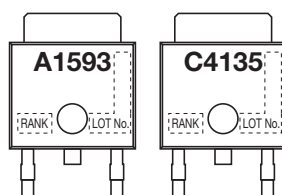


### Product & Package Information

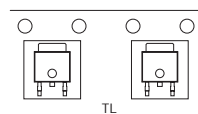
- Package : TP
- JEITA, JEDEC : SC-64, TO-251
- Minimum Packing Quantity : 500 pcs./bag

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

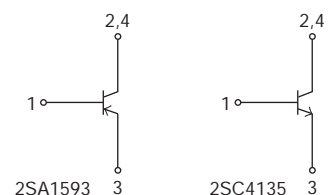
### Marking (TP, TP-FA)



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



### Electrical Connection



## 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

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.

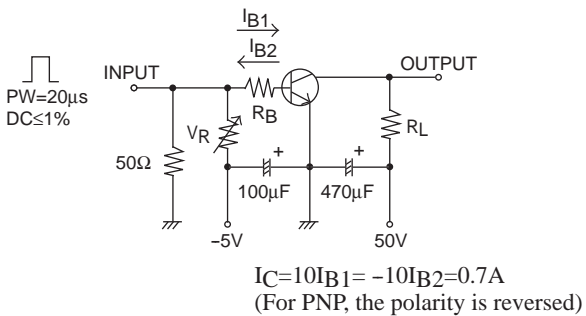
### Electrical Characteristics at T<sub>a</sub>=25°C

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(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 :

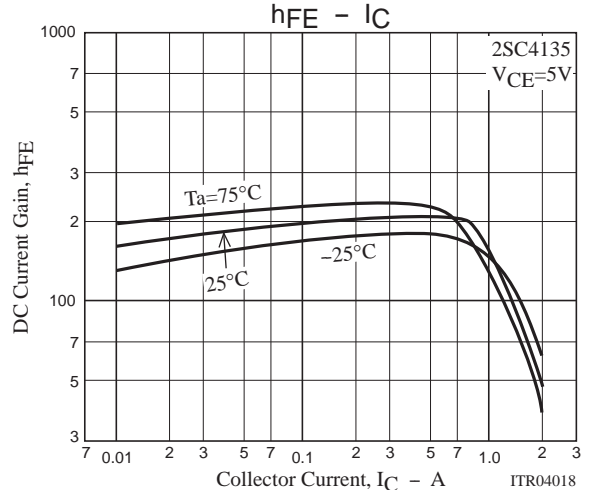
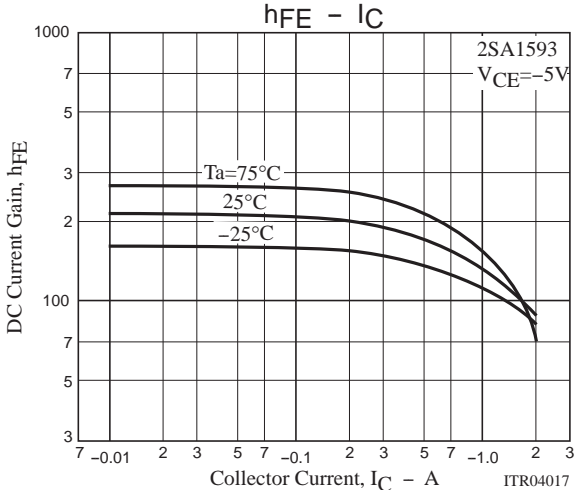
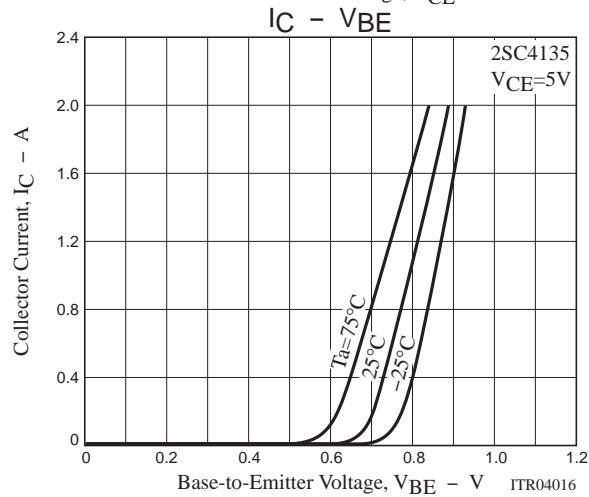
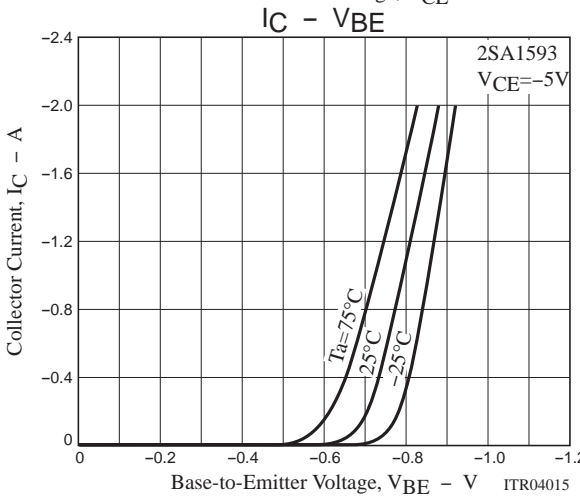
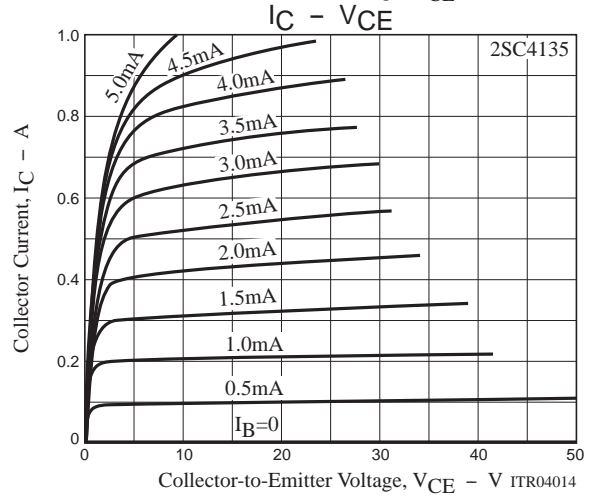
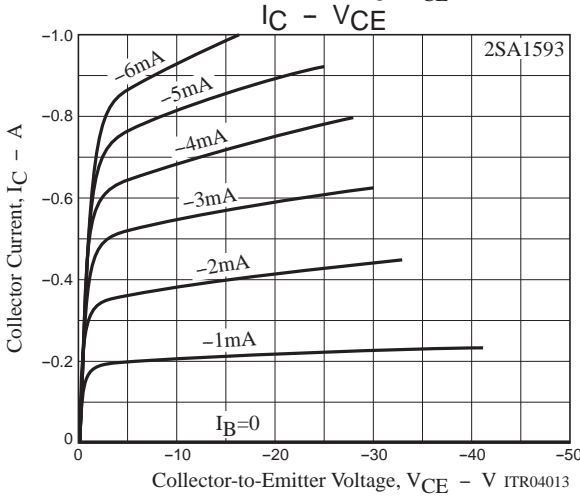
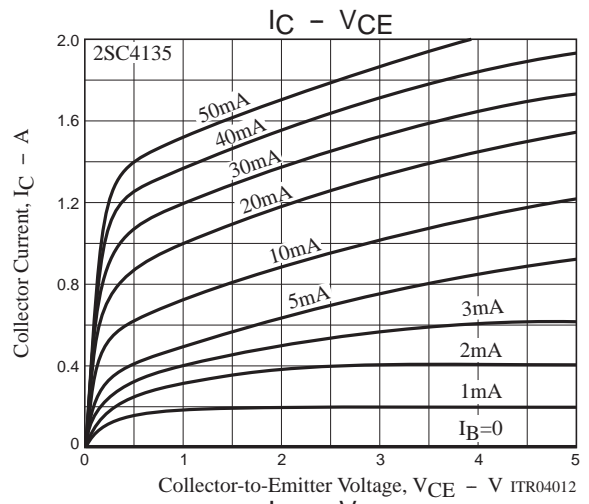
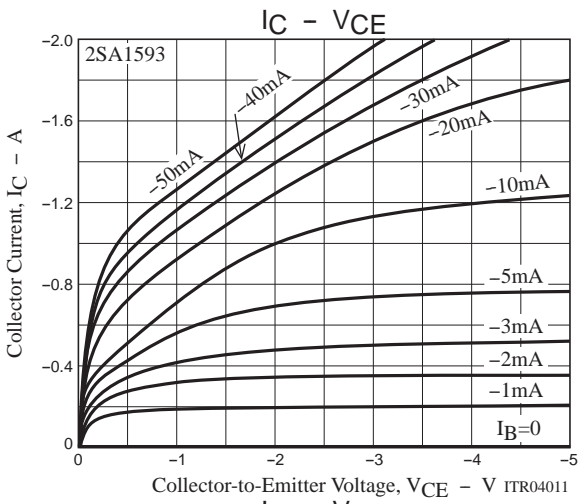
Rank	R	S	T
h <sub>FE</sub>	100 to 200	140 to 280	200 to 400

### Switching Time Test Circuit

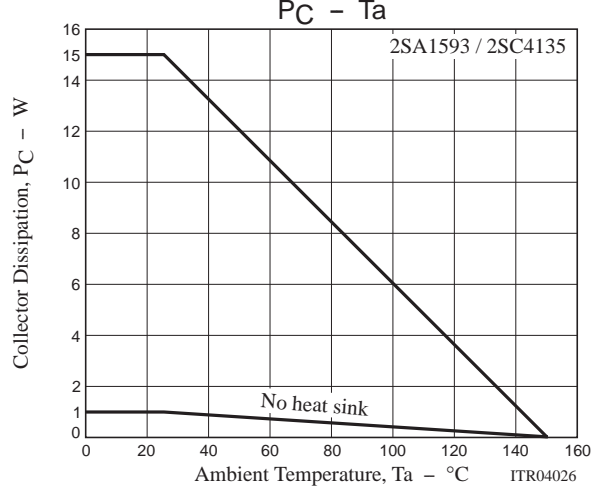
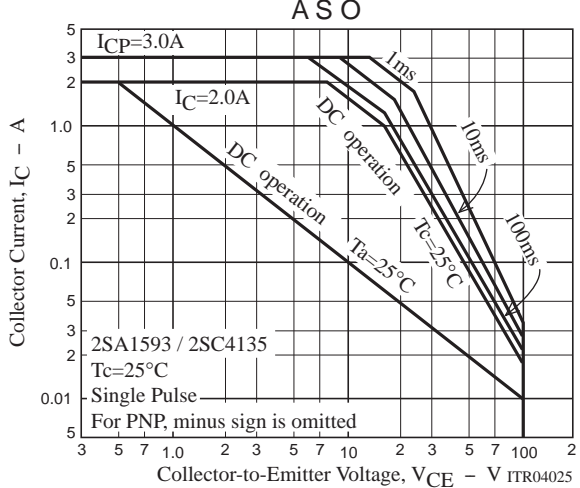
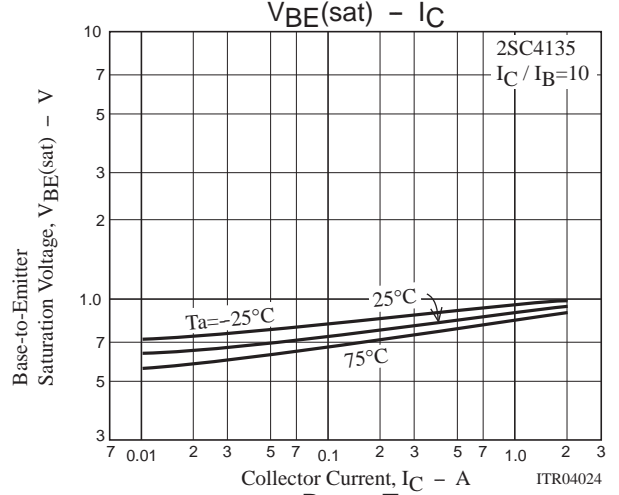
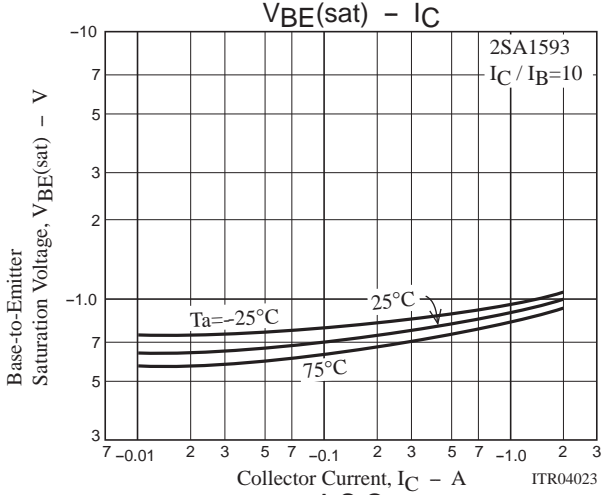
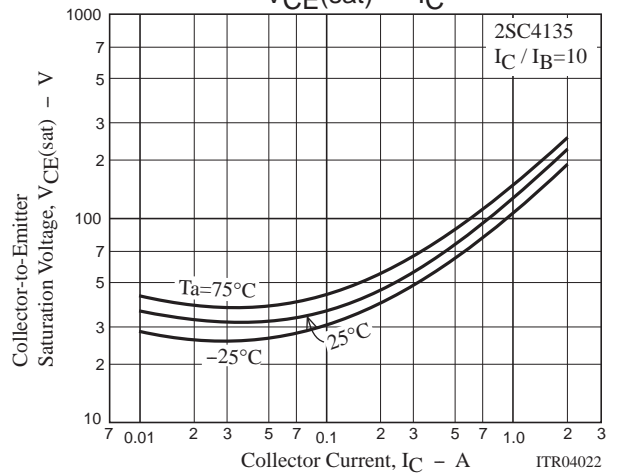
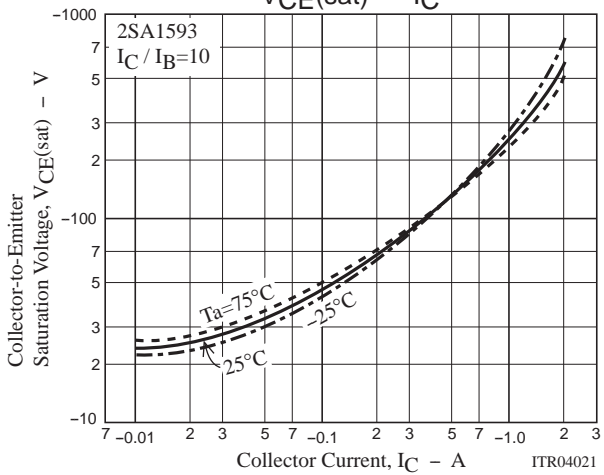
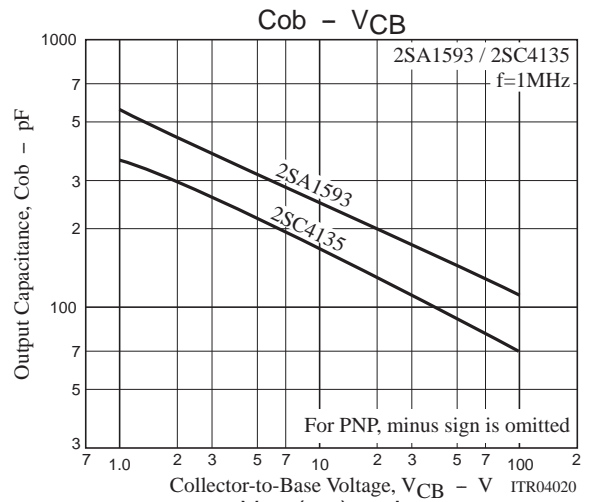
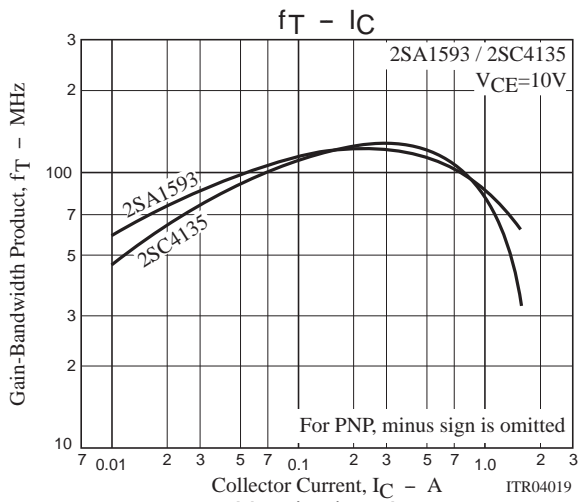


### Ordering Information

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



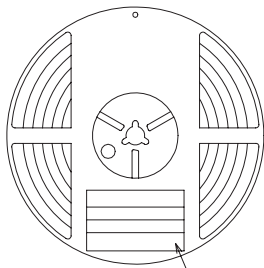
Taping Specification

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

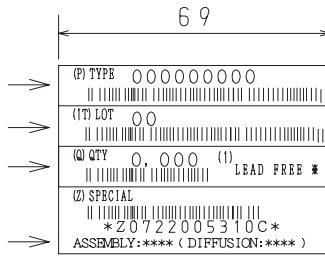
Packing method



Type No.  
LOT No.  
Quantity  
Origin

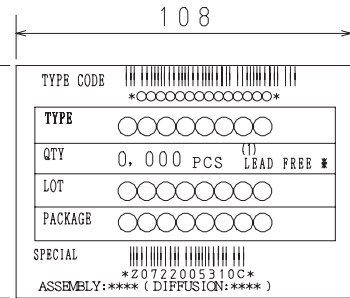
Reel label

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.



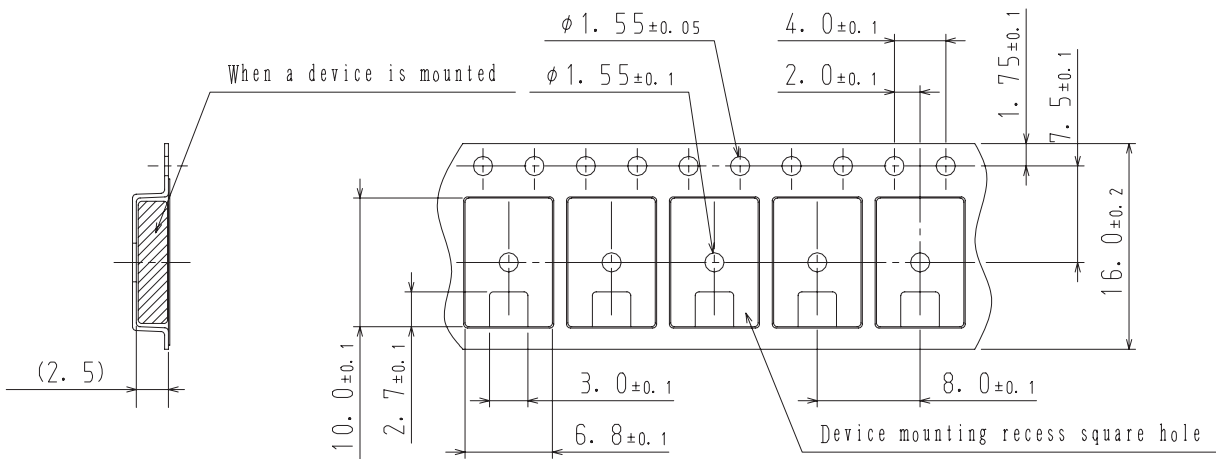
NOTE (1)

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

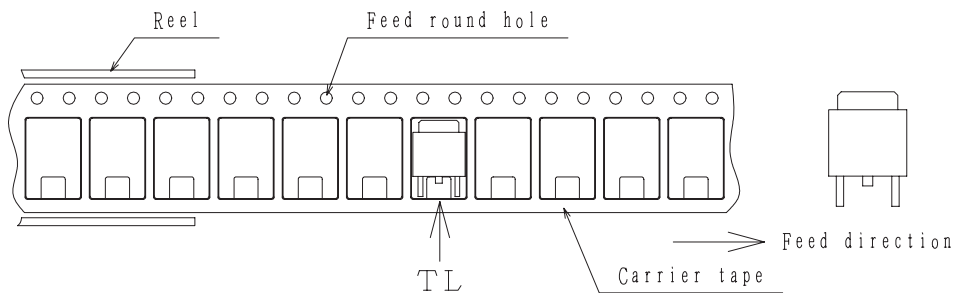
Label	JEITA Phase
LEAD FREE 3	JEITA Phase 3A
LEAD FREE 4	JEITA Phase 3

Taping configuration

1. Carrier tape size (unit:mm)



2. Device placement direction



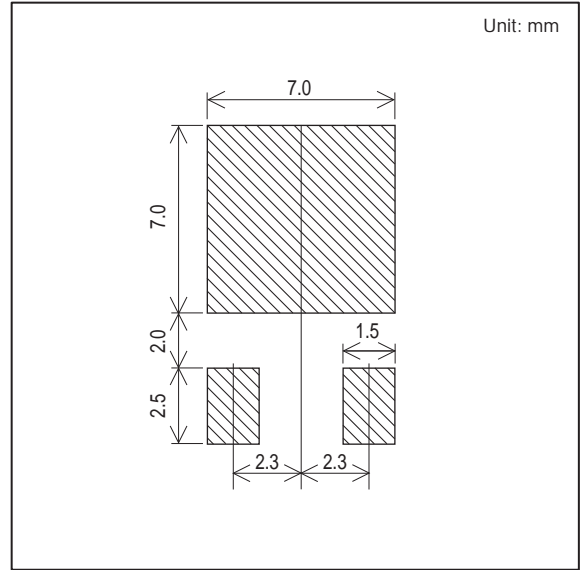
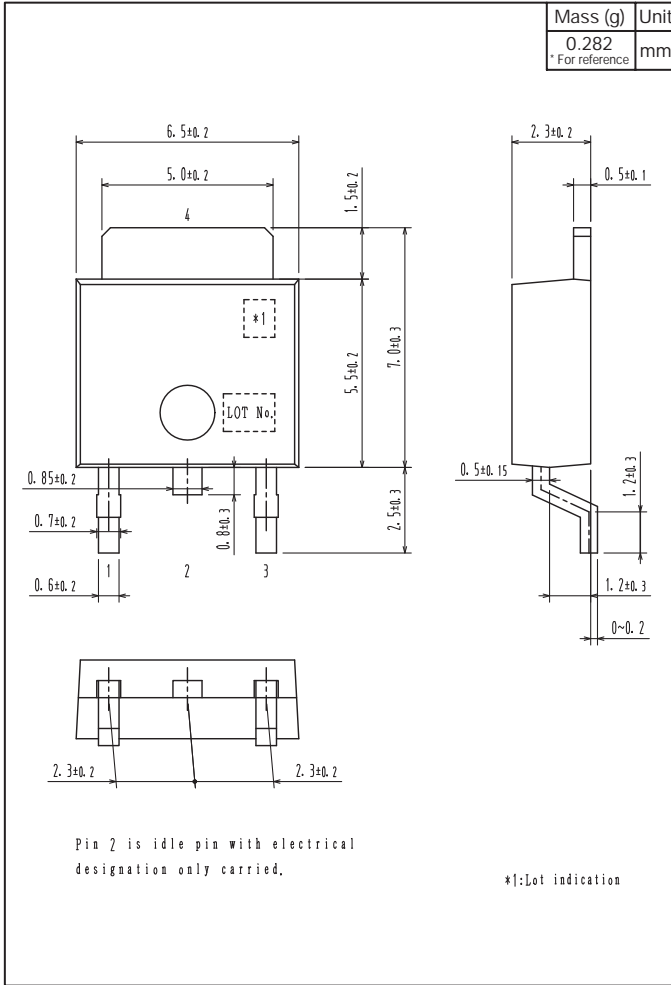
Those with one electrode terminal on the feed hole side.....TL

# 2SA1593 / 2SC4135

## Outline Drawing

## Land Pattern Example

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



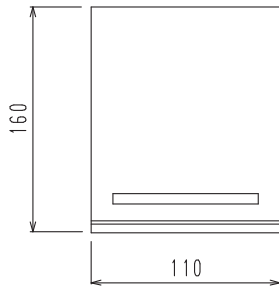
Bag Packing Specification

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

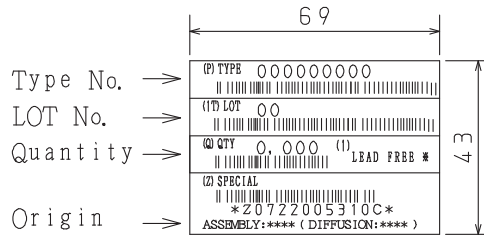
1. Packing Format

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)



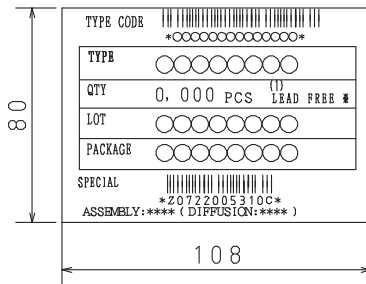
4. Outer box label  
(unit:mm)

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

NOTE (1)

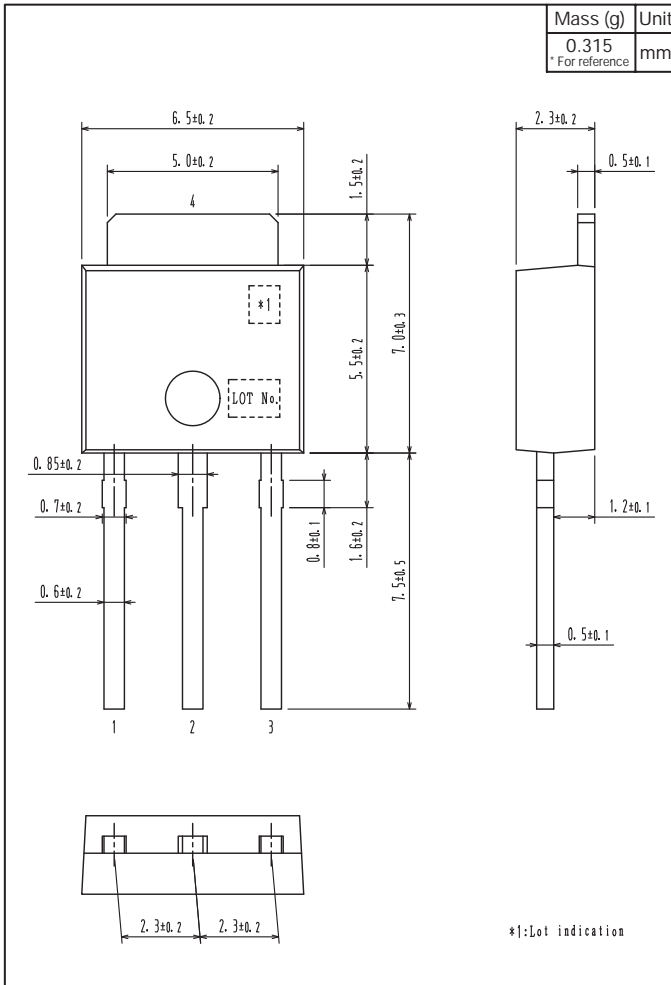
The LEAD FREE \* description shows that the  
surface treatment of the terminal is lead free.

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





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